

Bevul and Adress

VERRIGTINGS
van die
36ste KONVENSIË
8ste tot 11de Mei, 1962
te Oos-Londen

DIE VERENIGING VAN MUNISIPALE ELEKTRISITEITS-
ONDERNEMINGS VAN SUIDELIKE AFRIKA



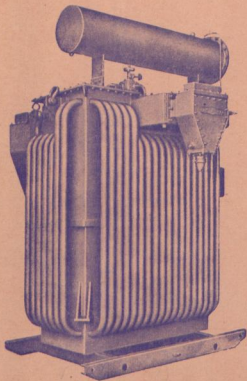
PROCEEDINGS
of the
36th CONVENTION
8th to 11th May, 1962
at East London

THE ASSOCIATION OF MUNICIPAL ELECTRICITY
UNDERTAKINGS OF SOUTHERN AFRICA

E.C.C. TRANSFORMERS

to all relevant B.S.S. standards

plus



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DIE VERENIGING VAN MUNISIPALE ELEKTRISITEITS-
ONDERNEMINGS VAN SUIDELIKE AFRIKA

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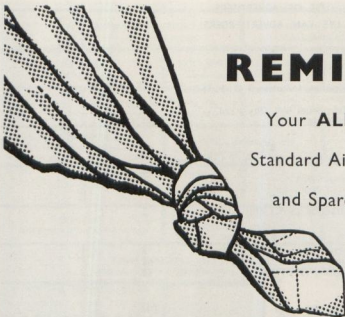
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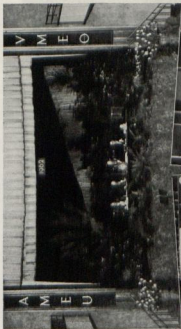
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 1936 Nigel, Tvl., Municipality, P.O. Box 23.
- 1948 Odendaalsrus, O.F.S., Municipality, P.O. Box 21.
 1959 Orkney, Tvl., Health Committee, P.O. Box 34.
 1944 (1915) Oudtshoorn, C.P., Municipality, P.O. Box 255.
- 1935 (1926) Paarl, C.P., Municipality, P.O. Box 12.
 1935 (1920) Pietersburg, Tvl., Municipality, P.O. Box 111.
 1935 (1915) Pietermaritzburg, Natal City Council, P.O. Box 321.
 1936 Piet Retief, Tvl. Municipality, P.O. Box 23.
 1936 (1934) Port Alfred, C.P., Municipality, P.O. Box 13.
 1935 (1915) Port Elizabeth, C.P., City Council, P.O. Box 116.
 1936 Port Shepstone, Natal, Borough, P.O. Box 5.
 1948 (1915) Potchefstroom, Tvl., Municipality, P.O. Box 113.
 1944 Potgietersrust, Tvl., Municipality, P.O. Box 34.
 1935 (1915) Pretoria, Tvl., City Council, P.O. Box 440.
 1951 Parys, O.F.S., Municipality, P.O. Box 39.
 1953 Potmasburg, C.P., Municipality, P.O. Box 5.
 1959 Peri-Urban Areas Health Board, P.O. Box 1341, Pretoria.
- 1935 (1915) Queenstown, C.P., Municipality, P.O. Box 113.
 1948 Que Que, S.R., Municipality, P.O. Box 15.
- 1935 (1929) Randfontein, Tvl., Municipality, P.O. Box 139.
 1935 (1929) Robertson, C.P., Municipality, P.O. Box 52.
 1935 (1926) Roodepoort-Maraisburg, Tvl., Municipality, P.O. Box 217, Roodepoort.
 1944 (1920) Rustenburg, Tvl., Municipality, P.O. Box 16.
 1956 Riversdale, C.P., Municipality, P.O. Box 29.
- 1935 (1926) Salisbury, S.R., City Council, P.O. Box 990.
 1956 Sasolburg, O.F.S., Village Board, P.O. Box 60.
 1935 (1916) Somerset East, C.P., Municipality, P.O. Box 21.
 1935 (1916) Springs, Tvl., Town Council, P.O. Box 45.
- 1935 (1931) Springfontein, O.F.S., Municipality, P.O. Box 10.
 Stanger, Natal, Borough, P.O. Box 72.
- 1938 (1916) Stellenbosch, C.P., Municipality, P.O. Box 17.
 1948 (1927) Somers West, C.P., Municipality, P.O. Box 19.
 1935 (1915) Standerton, Tvl., Municipality, P.O. Box 66.
 1959 Stilfontein, Tvl., Health Committee, P.O. Box 20.
 1959 Stutterheim, C.P. Municipality, P.O. Box 2.
- 1959 (1927) Tarkastad, C.P., Municipality.
 1949 The Strand, C.P., Municipality, P.O. Box 3.
 1957 Tzaneen, Tvl., Village Board, P.O. Box 24.
- 1936 (1920) Uitenhage, C.P., Municipality, P.O. Box 45.
 1936 (1927) Umata, Tembuland, Municipality, P.O. Box 57.
 1935 (1927) Umtali, S.R., Municipality, P.O. Box 121.
- 1960 Vanderbijlpark, Tvl., Municipality, P.O. Box 3.
 1949 Ventersdorp, Tvl., Municipality, P.O. Box 15.
 1935 Vereeniging, Tvl., Municipality, P.O. Box 35.
 1961 Viljoenskroon, O.F.S., Municipality, P.O. Box 37.
 1955 Virginia, O.F.S., Village Board of Management, P.O. Box 156.
- 1947 (1929) Vrede, O.F.S., Municipality, P.O. Box 155.
 1935 Vryburg, C.P., Municipality, P.O. Box 35.
 1948 (1920) Vryheid, Natal, Borough, P.O. Box 57.
- 1960 White River, E. Tvl., Village Council, P.O. Box 2.
 1935 (1934) Walmer, C.P., Municipality, P.O. Box 5010, Walmer.
- 1955 Warmbaths, Tvl., Municipality, P.O. Box 48.
 1956 Wellington, C.P., Municipality, P.O. Box 12.
 1953 Welkom, O.F.S., Village Board, P.O. Box 708.
 1953 Westonaria, Tvl., Municipality, P.O. Box 19.
 1946 Willowmore, C.P., Municipality, P.O. Box 15.
 1944 (1919) Winburg, O.F.S., Municipality, P.O. Box 26.
 1945 (1924) Windhoek, S.W.A., Municipality, P.O. Box 59.
 1955 (1927) Witbank, Tvl., Municipality, P.O. Box 3.
 1936 (1922) Worcester, C.P., Municipality, P.O. Box 37.
 1960 Walvis Bay, Village Council, P.O. Box 2.

Dates in brackets initial membership as or by Engineer.

Membership not necessarily continuous.

ENGINEER MEMBERS/INGENIEUR-LEDE

- 1949 Asselbergs, P. C., Town and Elec. Eng., P.O. Box 21, Empangeni, Natal.
- 1947 Aalbers, G. Municipal Electrical Engineer, P.O. Box 12, Wellington, C.P.
- 1939 Adams, C. H., Municipal Electrical Engineer, P.O. Box 19, Somerset West, C.P.
- 1962 Baillie, T. H., Town Electrical Engineer, P.O. Box 24, Broken Hill, N.R.
- 1960 Bozyezko, W., Municipal Electrical Engineer, P.O. Box 25, Edenvale, Tvl.
- 1959 Beard, G. R., City Electrical Engineer, P.O. Box 176, Grahamstown, C.P.
- 1948 Barratt, V. E. O., Municipal Electrical Engineer, P.O. Box 113, Queenstown, C.P.
- 1948 Barton, R. W., Electrical Engineer, P.O. Box 708, Welkom, O.F.S.
- 1957 Beesley, W., Town Electrical Engineer, P.O. Box 29, Livingstone, N.R.
- 1956 Benson, T., Town Electrical Engineer, P.O. Box 35, Matatielle, E.G.
- 1957 Booyen, L., Town and Electrical Engineer, P.O. Box 155, Vrede, O.F.S.
- 1949 Brown, D. D., Municipal Electrical Engineer, P.O. Box 217, Roodepoort, Tvl.
- 1959 Botes, P. J., Assistant Electrical Engineer, P.O. Box 217, Roodepoort, Tvl.
- 1959 Billington Eales, A., Town Electrical Engineer, P.O. Box 2, Stutterheim, C.P.
- 1960 Boshoff, J. J., Electrical Engineer, P.O. Box 3, Vanderbijlpark.
- 1962 Boshoff, M. H. L., Town Electrical Engineer, P.O. Box 71, Graaff-Reinet, C.P.

- 1955 Clarke, M. P. P., Municipal Electrical Engineer, P.O. Box 21, Somerset East, C.P.
- 1948 Cherry, J. R., Municipal Electrical Engineer, P.O. Box 139, Randfontein, Tvl.
- 1954 Coetzee, F. J., Electrical Engineer, P.O. Box 21, Evaton, Transvaal.
- 1947 Cowley, B. W., Municipal Electrical Engineer, P.O. Box 33, Barberton, Tvl.
- 1946 Craig, J. S., Borough Electrical Engineer, P.O. Box 21, Newcastle, Natal.
- 1950 Dreyer, L., Municipal Electrical Engineer, P.O. Box 19, Westonaria, Tvl.
- 1957 Dunstan, R. S., Deputy City Electrical Engineer, P.O. Box 369, Port Elizabeth, C.P.
- 1956 Dawson, J.D., Municipal Electrical Engineer, P.O. Box 45, Uitenhage.
- 1955 De Villiers, E. E., Municipal Electrical Engineer, P.O. Box 3, Carletonville, Tvl.
- 1954 De Villiers, S. de V., Municipal Electrical Engineer, P.O. Box 44, Ceres, C.P.
- 1945 De Wet, D. P., Municipal Electrical Engineer, P.O. Box 15, Willowmore, C.P.
- 1944 Downey, J. C., Town Electrical Engineer, P.O. Box 45, Springs, Tvl. (Past President).
- 1947 Downie, C. G., City Electrical Engineer, P.O. Box 82, Cape Town, C.P. (Past President).
- 1957 Dreyer, H. C., Assistant Electrical Engineer, P.O. Box 94, Krugersdorp, Tvl.
- 1959 Durr, H. R., Electrical Engineer, Peri-Urban Areas Health Board, P.O. Box 1341, Pretoria, Tvl.
- 1950 Erikson, J. G. F., Borough, Electrical Engineer, P.O. Box 15, Estcourt, Natal.
- 1944 Fisher, K. M., Municipal Electrical Engineer, P.O. Box 551, Bethlehem, O.F.S.
- 1952 Fitcher, L., Municipal Electrical Engineer, P.O. Box 13, Kempton Park, Tvl.
- 1957 Fohren, H., Borough Electrical Engineer, P.O. Box 37, Eshowe, Zululand.
- 1961 Frantz, A. C. T., Assistant City Electrical Engineer, P.O. Box 82, Cape Town.
- 1945 Gericke, J. M., Municipal Electrical Engineer, P.O. Box 99, Klerksdorp.
- 1939 Giles, P. A., City Electrical Engineer, P.O. Box 529, East London, C.P. (President).
- 1936 Grandin, P. C., Municipal Electrical Engineer, P.O. Box 114, Gatooma, S.R.
- 1960 Gresse, U. B., Town Electrical Engineer, P.O. Box 94, Krugersdorp, Tvl.
- 1944 Gripper, H. J., Municipal Electrical Engineer, P.O. Box 21, Knysna, C.P.
- 1954 Hafele, C. F., Deputy City Electrical Engineer, P.O. Box 288, Bloemfontein, O.F.S.
- 1953 Haig-Smith, D., Municipal Electrical Engineer, P.O. Box 55, Middelburg, C.P.
- 1949 Halliday, K. W. J., Municipal Electrical Engineer, P.O. Box 5, Port Shepstone, Natal.
- 1927 Harvey, A. Q., Town Electrical Engineer, Warmbaths, Transvaal.
- 1953 Hatwich, A. H. J., Town and Electrical Engineer, P.O. Box 13, Dewetsdorp, O.F.S.
- 1953 Heunis, G. B., Town and Electrical Engineer, P.O. Box 66, Standerton, Tvl.
- 1956 Hobbs, I. L., Town Electrical Engineer, P.O. Box 156, Virginia, O.F.S.
- 1962 Honiball, G. T., Town Electrical Engineer, P.O. Box 59, Windhoek, S.W.A.
- 1938 Hugo, D. J., City Electrical Engineer, P.O. Box 423, Pretoria, Tvl. (Past President).
- 1944 Inglis, J. I., Town Electrical and Water Engineer, P.O. Box 111, Pietersburg, Tvl.
- 1933 Jones, G. E. H., Municipal Electrical Engineer, P.O. Box 42, Mafeking, Bechuanaland.
- 1959 Jooste, R. K., Municipal Electrical Engineer, P.O. Box 255, Oudtshoorn.
- 1945 Kane, R. W., General Manager, Electricity Department, P.O. Box 699, Johannesburg (Past President).
- 1962 Kinsman, A. D., Deputy City Electrical Engineer, P.O. Box 147, Durban.
- 1949 Kirberger, M. N., Town Engineer, P.O. Box 3, Bethal, Transvaal.
- 1949 Kruger, M. J. C., Municipal Electrical Engineer, P.O. Box 13, Port Alfred, C.P.
- 1959 Koesslag, H. J., Electrical Engineer, P.O. Box 29, Riversdale, C.P.
- 1931 Lategan, J. F., Town Electrical Engineer, P.O. Box 17, Stellenbosch, C.P.
- 1953 Lees, D., Town Electrical Engineer, P.O. Box 45, Benoni, Tvl.
- 1944 Leishman, R., Deputy General Manager, Electricity Department, P.O. Box 699, Johannesburg.
- 1956 Lewis, L., Town Electrical Engineer, P.O. Box 25, Mossel Bay, C.P.
- 1947 Lombard, C., City Electrical Engineer, P.O. Box 145, Germiston, Tvl. (President).
- 1944 Lotter, G. A., Town Electrical Engineer, P.O. Box 96, Louis Trichardt, Tvl.
- 1955 Lynch, E. C., Assistant City Electrical Engineer, P.O. Box 73, Salisbury, S.R.
- 1953 Macques, J. A., Municipal Electrical Engineer, P.O. Box 42, De Aar, C.P.
- 1948 McIntyre, H. A., Asst. Town Elec. Eng., P.O. Box 35, Vereeniging.
- 1948 Mathews, J. A., City Electrical Engineer, P.O. Box 494, Kimberley, C.P.
- 1945 Meintjies, P. A., Municipal Electrical Engineer, P.O. Box 16, Rustenburg, Tvl.
- 1929 Mocke, T. M., Town and Electrical Engineer, P.O. Box 23, Piet Retief, Tvl.
- 1934 Muller, G. J., City and Electrical Engineer, P.O. Box 288, Bloemfontein, O.F.S. (Past President).
- 1954 McNeil, J. L., Borough Electrical Engineer, P.O. Box 72, Stanger, Natal.
- 1952 Millen, T. J., Town and Electrical Engineer, P.O. Box 24, Tzaneen, Tvl.
- 1955 Nobbs, D. M., City Electrical Engineer, P.O. Box 369, Port Elizabeth.

- 1957 Paull, R. A., Municipal Engineer, P.O. Box 57, Umtata, Transvaal.
- 1952 Potgieter, N. A., Municipal Electrical Engineer, P.O. Box 106, Brits, Tvl.
- 1951 Pretorius, D. R., Town Electrical Engineer, P.O. Box 39, Parys, O.F.S.
- 1952 Pretorius, E. de C., Electrical Engineer, P.O. Box 113, Potchefstroom.
- 1960 Pretorius, J. W., Assistant Electrical Engineer, P.O. Box 23, Nipol.
- 1961 Rattey, W. P., Electrical Engineer, P.O. Box 34, Orkney, Transvaal.
- 1957 Rautenbach, G. F., Electrical Engineer, P.O. Box 99, Klerksdorp.
- 1946 Redman, R. H., City Electrical Engineer, P.O. Box 1803, Bulawayo, S.R.
- 1943 Reyneke, G. M., Town Electrical Engineer, P.O. Box 26, Winburg, O.F.S.
- 1952 Rishworth, D. L., Town Electrical and Mechanical Engineer, P.O. Box 21, Oeëndaalsrus, O.F.S.
- 1954 Ross, J. W., Municipal Electrical Engineer, P.O. Box 34, Potgietersrust, Tvl.
- 1934 Rossler, A., Municipal Electrical Engineer, P.O. Box 24, Cradock, C.P.
- 1935 Rossler, W., Town Electrical Engineer, P.O. Box 302, Kroonstad, O.F.S.
- 1944 Rush, W., Borough Electrical Engineer, P.O. Box 57, Vryheid, Natal.
- 1954 Simpson, A. C., Municipal Electrical Engineer, P.O. Box 5010, Walmer, C.P.
- 1953 Simpson, R. M. O., City Electrical Engineer, P.O. Box 147, Durban, Natal (Past President).
- 1946 Sims, C. N., Municipal Electrical Engineer, P.O. Box 3, The Strand, C.P.
- 1937 Smith, E. L., Municipal Electrical Engineer, P.O. Box 215, Boksburg, Tvl.
- 1962 Stanton, R. J. G., Deputy Town Electrical Engineer, P.O. Box 197, Ndola.
- 1962 Steele, E. E., Town Electrical Engineer, P.O. Box 197, Ndola, N.R.
- 1934 Stevens, F., Borough Electrical Engineer, P.O. Box 29, Ladysmith, Natal.
- 1956 Sulter, F. J., Assistant Electrical Engineer, P.O. Box 145, Germiston, Tvl.
- 1962 Surtees, E. H., Electrical Engineer, P.O. Box 76, Dundee, Natal.
- 1947 Thackway, W. G., Town Electrical Engineer, P.O. Box 8, Kokstad, E.G.
- 1945 Theron, W. C., Municipal Electrical Engineer, P.O. Box 37, Worcester, C.P.
- 1946 Theron, G. C., Town Electrical Engineer, P.O. Box 3, Vanderbijlpark, Tvl.
- 1931 Turner, H. T., Town and Electrical Engineer, P.O. 121, Umtali, S.R.
- 1950 Turnbull, A. F., Town and Electrical Engineer, P.O. Box 35, Vereeniging, Tvl.
- 1955 Van der Merwe, F. J., Municipal Electrical Engineer, P.O. Box 20, Stilfontein, Tvl.
- 1959 Van Heerden, B. G., Mun. Elec. Eng., P.O. Box 48, Ermelo, Tvl.
- 1957 Van Heerden, W. J. B., Elect. Eng., Orkney Health Committee, P.O. Box 201, Heidelberg, Tvl.
- 1956 Van Meerdervoort, J. K. L., Pompe, Town Electrical Engineer, P.O. Box 43, Harrismith, O.F.S.
- 1962 Van Niekerk, J. D., Town Electrical Engineer, P.O. Box 4, Alberton.
- 1945 Vergottini, P. L., Municipal Electrical Engineer, P.O. Box 15, Brakpan, Tvl.
- 1951 Verschoor, D. R., Town and Electrical Engineer, P.O. Box 36, Fort Beaufort, C.P.
- 1955 Vorster, P. J., Municipal Electrical Engineer, P.O. Box 3, Witbank, Tvl.
- 1957 Von Ahlfton, J. K., Town Electrical Engineer, P.O. Box 60, Sasolburg, Tvl.
- 1954 Waddy, J. C., City Electrical Engineer, P.O. Box 399, Pietermaritzburg, Natal.
- 1952 Waldron, F. R., Municipal Electrical Engineer, P.O. Box 86, Walvis Bay.
- 1952 Ward, H. V., Borough Engineer, P.O. Box 71, Greytown, Natal.
- 1952 Williams, A. H., Assistant Electrical Engineer, P.O. Box 45, Springs, Tvl.
- 1938 Wilson, J., Assistant City Electrical Engineer, P.O. Box 423, Pretoria, Tvl.
- 1948 Woolridge, W. E. L., Town Electrical Engineer, P.O. Box 24, Harding, Natal.
- 1961 Wiehahn, G. D., Town Engineer, P.O. Box 551, Bethlehem, O.F.S.
- 1956 Yodaiken, J., Municipal Electrical Engineer, P.O. Box 115, Que Que, S.R.
- 1959 Zausmer, H., Municipal Electrical Engineer, P.O. Box 20, Hermanus.

ASSOCIATES/GEASSOSIEERDERS:

- 1959 Bester, J. H., Town Electrician, P.O. Box 15, Venstersdorp, Tvl.
- 1959 Carpenter, B. F., Town Electrical Engineer, P.O. Box 206, Alwal North, C.P.
- 1962 De Witt, F., Electrical Engineer, P.O. Box 38, Adelaide, C.P.
- 1960 Flint, V. G., Acting Electrical Engineer, P.O. Box 14, Middelburg, Tvl.
- 1962 Huysamen, G. A., Electrical Engineer, P.O. Box 5, Postmasburg, C.P.
- 1959 Jordaan, J. H., Municipal Electrical Engineer, P.O. Box 35, Vryburg, C.P.
- 1959 Laas, C. P., Electrical Engineer, P.O. Box 15, Kenhardt.
- 1959 Lochner, J. van S., Town Electrical Engineer, P.O. Box 64, Ladybrand, O.F.S.

- 1956 McNamara, A. B., Electrical Engineer, P.O. Box 21, Komgha.
 1962 Ploos-van Amstel, Electrical Engineer, P.O. Box 37, Viljoenskroon, O.F.S.
 1959 Ross, M. J., Town Electrical Engineer, P.O. Box 13, Brandfort, O.F.S.

- 1959 Schoombee, G. T. van W., Town Electrical Engineer, P.O. Box 61, Lydenburg, Tvl.
 1962 Sweetman, A. A., Town Electrical Engineer, P.O. Box 21, Tarkastad, C.P.

ASSOCIATE MEMBERS/VERBONDE LEDE:

- 1946 Andrew, W. M., c/o. E.S.C., P.O. Box 667, East London, C.P.
 1951 Attridge, W. H., P.O. Box 463, Tsumeb, S.W. Africa.
 1944 Burton, C. R., 54, Memorial Road, Kimberley, C.P.
 1952 Bailey R. V., P.O. Box 255, Oudtshoorn, C.P.
 1955 Barnard, F. J. W., c/o. Electricity Supply Commission, P.O. Box 12, Springs.
 1933 Campbell, A. R., P.O. Box 3, Impendhle, Natal.
 1929 Clinton, J. S., P.O. Box 4648, Johannesburg (Past President).
 1948 Conradie, D. J. R., P.O. Box 1009, Bloemfontein, O.F.S.
 1951 Dalton, G. A., 111, Eckstein Street East, Observatory Extension, Johannesburg, Tvl.
 1934 Dawson, C., Electricity Supply Commission, P.O. Box 2408, Durban.
 1948 De Wit, T., P.O. Box 44, Brits, Tvl.
 1960 Ford, W. P., P.O. Box 40, Lusaka, N.R.
 1960 Gill, G. B., Zululand Electrical Utility Co. (Pty.) Ltd., P.O. Box 29, Gingindhlova, Natal.
 1936 Heasman, G. G., P.O. Box 77, Fort Vicoria, S.R.
 1962 Liebenberg, S. J., Electrical and Mechanical Engineer, Dept. of Bantu Admin. and Development, P.O. Box 384, Pretoria.

- 1949 Lutsch, W. J. F. S., c/o. Faculty of Engineering, University of Stellenbosch, C.P.
 1960 McGibbon, J., P.O. Box 92, Carletonville, Tvl.
 1926 Marchand, B., P.O. Box 223, Witbank, Tvl.
 1945 Mole, E. W., P.O. Box 106, Saxonwold, Johannesburg.
 1926 Muller, H. M. S., P.O. Box 112, Uppington, C.P.
 1961 Magowan, J. M., Southern Rhodesia Electricity Supply Commission, P.O. Box 377, Salisbury.
 1927 Nicholas, I. J., P.O. Box 185, Dordrecht (Past President).
 1959 Petersen, G. R., Federal Power Board, P.O. Box 630, Salisbury.
 1934 Phillips, J. W., P.O. Box 1731, Bulawayo, S.R.
 1953 Rothman, J. L., P.O. Box 606, Kimberley.
 1927 Simpson, H. G., Engineering Department, Searles Ltd., Great Brak River, C. P.
 1931 Wright, G. R. E., P.O. Box 465, Benoni, Tvl.
 1947 Williams, J. T., P.O. Box 1617, Pretoria, Tvl.
 1946 Wylie, R. J. S., c/o. E.S.C., Rand Undertaking, P.O. Box 103, Germiston, Tvl.
 1957 Zeederberg, T. D., 96, Olive Road, Valhalla, Pretoria.

AFFILIATES/GEAFFILEERDES:

- 1959 AEG South Africa (Pty.) Ltd., P.O. Box 10264, Johannesburg.
 1957 Aberdare Cables (Africa) Ltd., P.O. Box 494, Port Elizabeth.
 1957 Adams, Symes & Partners, P.O. Box 1498, Johannesburg.
 1957 African Cables Ltd., P.O. Box 9909, Johannesburg.
 1959 African Explosives & Chemical Industries, Ltd., P.O. Box 1122, Johannesburg.
 1962 African Wire Ropes, Ltd., P.O. Box 72, Cleveland, Tvl.
 1957 Allenwest S.A. (Pty.) Ltd., P.O. Box 6168, Johannesburg.
 1957 Alcan Aluminium Co. of S.A. Ltd., P.O. Box 2430, Johannesburg.
 1957 Arthur Trevor Williams (Pty.) Ltd., P.O. Box 2873, Johannesburg.
 1959 Asea Electric (Pty.) Ltd., P.O. Box 691, Pretoria.
 1957 Aycliffe Cables Ltd., Hargreaves Works, Main Road, Eastleigh, Edenvale.

- 1960 African Lamps (Pty.) Ltd., P.O. Box 75, Industria.
 1960 Associated Electrical Industries C.A. (Pvt.) Ltd., P.O. Box 1979, Salisbury, S.R.
 1960 Associated Electrical Industries (Pty.) Ltd., P.O. Box 7755, Johannesburg.
 1957 Babcock & Wilcox of Africa Ltd., P.O. Box 545, Vereeniging, Tvl.
 1957 Brian Colquhoun & Partners (Rhodesia), Floor Five, Century House, Baker Ave., Salisbury, S.R.
 1957 British General Electric Co. of C.A. (Pvt.) Ltd., P.O. Box 845, Salisbury, S.R.
 1957 British General Electric Co. Ltd., P.O. Box 2406, Johannesburg.
 1959 British Insulated Callender's Cables S.A. Ltd., P.O. Box 2827, Johannesburg.
 1957 Burgun (Pty.) Ltd., A. M., P.O. Box 132, Jeppestown.
 1957 Caltex (Africa) Ltd., P.O. Box 714, Cape Town.

- 1957 Chloride Electrical Storage Co. S.A. (Pty.) Ltd., P.O. Box 7508, Johannesburg.
- 1957 C.M.B. Engineering Co. (Pty.) Ltd., P.O. Box 55, Denver, Johannesburg.
- 1959 Construction Electric Co. (Pty.) Ltd., P.O. Box 10100, Johannesburg.
- 1959 Contactor (Pty.) Ltd., Zuider Paarl, C.P.
- 1957 Crompton Parkinson S.A. (Pty.) Ltd., P.O. Box 4235, Johannesburg.
- 1957 Davidson & Co. (Africa) (Pty.) Ltd., P.O. Box 180, Springs, Tvl.
- 1957 Dowson & Dobson Ltd., P.O. Box 7764, Johannesburg.
- 1959 Ian Drewett, P.O. Box 35, Johannesburg.
- 1959 Electrical Contractors' Association (South Africa), P.O. Box 11359, Johannesburg.
- 1957 Enfield Cables (S.A.) Ltd., P.O. Box 5289, Johannesburg.
- 1959 English Electric Co. (C.A.) (Pvt.) Ltd., P.O. Box 2191, Salisbury.
- 1957 English Electric Co. S.A. Ltd., P.O. Box 2387, Johannesburg.
- 1961 Farad (Pty.) Ltd., P.O. Box 220, Jeppestown.
- 1957 First Electric Corp. of S.A., P.O. Box 3961, Johannesburg.
- 1957 F. W. J. Electrical Industries Ltd., P.O. Box 58, Alberton, Tvl.
- 1958 George Kent S.A. (Pty.) Ltd., P.O. Box 7396, Johannesburg.
- 1957 W. T. Glover & Co. Ltd., c/o. W. G. Harlow, 202 Bordeaux, Sea Point, Cape Town.
- 1957 E. Green & Son S.A. (Pty.) Ltd., 406 Barclays Bank Buildings, Kruis Street, Johannesburg.
- 1959 Henley-Simplex Africa (Pty.) Ltd., P.O. Box 100, Jeppe, Johannesburg.
- 1957 Heinemann Electric (S.A.) Ltd., 1 Long Street, Booyseins, Johannesburg.
- 1957 Hopkinsons S.A. (Pty.) Ltd., P.O. Box 11029, Johannesburg.
- 1957 James Hawden & Co. Africa (Pty.) Ltd., P.O. Box 11139, Johannesburg.
- 1957 Hubert Davies & Co. Ltd., P.O. Box 1386, Johannesburg.
- 1960 Hawker Siddeley Brush (Southern Africa) Ltd., P.O. Box 75, Booyseins, Tvl.
- 1957 International Combustion Africa Ltd., P.O. Box 5981, Johannesburg.
- 1962 A. Jackson, P.O. Box 4814, Cape Town.
- 1957 John Thompson (S.A.) (Pty.) Ltd., P.O. Box 3570, Johannesburg.
- 1957 Johnson & Phillips S.A. (Pty.) Ltd., P.O. Box 552, Germiston.
- 1957 R. T. Jones, Esq., 43, The Avenue, Orchards, Johannesburg.
- 1957 G. H. Langler & Co. Ltd., P.O. Box 3762, Johannesburg.
- 1961 Lodge-Cottrell (Africa) (Pty.) Ltd., P.O. Box 6070, Johannesburg.
- 1957 Harold Marthinusen & Co. (Pty.) Ltd., P.O. Box 469, Johannesburg.
- 1957 L. H. Marthinusen Ltd., P.O. Box 64, Denver, Tvl.
- 1957 Merz & McLelan, P.O. Box 11578, Johannesburg.
- 1957 Mine Elect. (Pty.) Ltd., P.O. Box 2356, Salisbury, S.R.
- 1959 Mitchell Engineering Group S.A. (Pty.) Ltd., 63 Harrison Street, Johannesburg.
- 1959 Mouchel & Partners, L. G., P.O. Box 9732, Johannesburg.
- 1959 N.V. Nederlandsche Kabelfabrieken Ltd., P.O. Box 3513, Cape Town.
- 1957 C.A. Parsons & Co. (Rhodesia) (Pvt.) Ltd., P.O. Box 3296, Salisbury, S.R.
- 1957 C. A. Parsons & Co. (S.A.) (Pty.) Ltd., P.O. Box 3425, Johannesburg.
- 1959 Patrick Murray (Pty.) Ltd., P.O. Box 1541, Durban.
- 1957 Reunert & Lenz Ltd., P.O. Box 92, Johannesburg.
- 1957 A. Reyrolle & Co. Ltd., P.O. Box 9677, Johannesburg.
- 1960 A. Reyrolle & Co. (Rhodesia Ltd.), P.O. Box 1975, Salisbury.
- 1957 Rice & Diethelm Ltd., P.O. Box 930, Johannesburg.
- 1957 Samuel Osborn S.A. (Pty.) Ltd., P.O. Box 19, Denver.
- 1957 Scottish Cables (S.A.) Ltd., P.O. Box 2882, Johannesburg.
- 1957 Shell Co. of S.A. Ltd., P.O. Box 2231, Cape Town.
- 1958 Siemens Edison Swan (Pty.) Ltd., P.O. Box 7404, Johannesburg.
- 1957 Standard Telephones & Cables Ltd., P.O. Box 4687, Johannesburg.
- 1957 Stancor (Pty.) Ltd., P.O. Box 6107, Johannesburg.
- 1957 Stewards & Lloyds of S.A. Ltd., P.O. Box 1195, Johannesburg.
- 1957 S.A. General Electric Co. Ltd., P.O. Box 1905, Johannesburg.
- 1957 S.A. Philips (Pty.) Ltd., P.O. Box 7703, Johannesburg.
- 1957 Superconcrete Pipes (Pty.) Ltd., P.O. Box 92, Roodepoort, Tvl.
- 1957 Switchcraft (Pty.) Ltd., P.O. Box 6444, Johannesburg.
- 1960 South Wales Electric (Pty.) Ltd., P.O. Box 2180, Johannesburg.
- 1957 Southern African Cable Makers Association, P.O. Box 2258, Johannesburg.
- 1960 Siemens S.A. (Pty.) Ltd., P.O. Box 4583, Johannesburg.
- 1957 Union Steel Corporation S.A. Ltd., P.O. Box 48, Vereeniging, Tvl.
- 1957 Wilson & Herd (Pty.) Ltd., P.O. Box 3093, Johannesburg.
- 1957 Wright Anderson (S.A.) Ltd., P.O. Box 5057, Boksburg.
- 1957 Yarrow Africa (Pty.) Ltd., 201, Geldenhuis, 33, Jorissen Street, Braamfontein, Johannesburg.
- 1959 Yorkshire Transformers (S.A.) (Pty.) Ltd., P.O. Box 44, Paarden Eiland, C.P.

LIST OF MEMBERS, COUNCIL MEMBERS AND VISITORS ATTENDING THE 36th ANNUAL
CONVENTION OF THE ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS.
LYS VAN LEDE, RAADSLEDE EN BESOEKERS—36ste JAARLIKSE KONVENSIË VAN DIE
VERENIGING VAN MUNISIPALE ELEKTRISITEITSONDERNEMINGS

COUNCIL AND ENGINEER MEMBERS:

ALIWAL NORTH: Edwards, Cr. R. C. Carpenter, B. F.	GERMISTON: Hattingh, Cr. J. S. Lombard, C.	NEWCASTLE: Wade, Cr. J. W. Craig, J. S.
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BENONI: Lees, D.	GRAAF-REINET: Van Dyk, Cr. J. A. Boshoff, M. H. L.	ODENDAALSRSUS: Knoetze, Cr. G. C. Rishworth, D. L.
BETHAL: Kirberger, M. N.	HEIDELBERG: Greyling, Cr. P. J. Van Heerden, W. J. B.	ORKNEY: Luckhoff, Cr. H. J. Ratthey, W. P.
BLOEMFONTEIN: Muller, G. J.	JOHANNESBURG: Marais, Cr. D. J. Kane, R. W.	OUDTSHOORN: Railey, R. V.
BOKSBERG: Smith, E. L.	KENHARDT: Laas, C. P.	PARYS: Pretorius, D. R.
BRAKPAN: Rossouw, Cr. W. J. C. Vergottini, P. L.	KIMBERLEY: Alufowitz, Cr. S. Mathews, J. A.	PIETERSBURG: Glass, Cr. H. W. Inglis, J. I.
BRITS: Bodenstein, Cr. J. C. Potgieter, N. A.	KLERKSDORP: Swanepoel, Cr. J. W.	PIETERMARITZBURG: Franklin, Col. Cr. H. C. Waddy, J. C.
BULAWAYO: Dold, Cr. A. C. Redman, R. H.	KNYSNA: Gripper, H. J.	PORT ALFRED: Kruger, M. J. C.
CAPE TOWN: Downie, C. G.	KOKSTAD: Thackwray, W. G.	PORT ELIZABETH: Chaplin, Cr. E. L. Dunstan, R. S.
CARLETONVILLE: Geldenhuys, Cr. B. N. D. De Villiers, E. E.	KROONSTAD: Rule, Cr. P. C. Rossler, W.	POTCHEFSTROOM: Oosthuizen, Cr. J. C. Pretorius, E. de C.
DE AAR: Macques, J. A.	LADYSMITH: Gailey, Cr. Mrs. R. Stevens, F.	POTGIETERSRUST: Ross, J. W.
DURBAN: Nagle, Cr. W. Kinsman, A. D.	LIVINGSTONE: Beesley, W.	PRETORIA: Acton, Cr. C. E. Wilson, J. Stoffberg, T. C.
EAST LONDON: Northcote, Cr. J. D. Giles, P. A.	LOUIS TRICHARDT: Lotter, G. A.	PERI-URBAN AREAS HEALTH BOARD: Lever, Cr. W. T. Van der Merwe, Cr. G. J. Durr, H. A.
EDENVALE: Archer, Cr. R. R. Bozyczko, W.	MAFEKING: Katz, Cr. M. Jones, G. E. H.	QUEENSTOWN: Barratt, V. E. O.
ERMELO: Van Heerden, B. G.	MIDDELBERG: Haig Smith, D.	RANDFONTEIN: Massyn, Cr. H. B. Cherry, J. R.
ESTCOURT: Erikson, J. G. F.	MOSSEL BAY: Van der Westhuizen, Cr. S. J. Lewis, L.	ROBERTSON: Kok, J. A.
FORT BEAUFORT: Bloemhof, Cr. J. F. Verschoor, D. R.	NELSPRUIT: Gresse, U. B.	

ROODEPOORT: Barnard, Cr. J. H. Botes, P. J.	STILFONTEIN: Van der Merwe, F. J.	VILJOENSKROON: Ploos van Amstel, W. F.
RIVERSDALE: Koeslag, H. J.	STANDERTON: Smith, Cr. E. J. Heunis, G. B.	WARMBATHS: Lanser, Cr. A. H. Harvey, A. Q.
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SALISBURY: Pocket, Cr. L. A. G. Ponter, Cr. B.	TARKASTAD: Sweetman, A. A.	WELKOM: Maree, Cr. D. Meyer, Cr. W. F. Barton, R. W.
SASOLBURG: Du Toit, Cr. P. J. C. Von Ahlften, J. K.	TZANEEN: Millen, T. J.	WESTONARIA: Dreyer, L.
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SPRINGS: Deysel, Cr. F. F. Thuyisma, Cr. J. C. Downey, J. C.	UMTALI: Gammon, Cr. F. Turner, H. T.	WITBANK: Vorster, P. J.
STELLENBOSCH: Lategan, J. F.	VEREENIGING: Botha, Cr. D. H. Turnbull, A. F.	WALMER: Simpson, A. C.
SOMERSET WEST: Mackay, Cr. R. C. Adams, C. H.	VIRGINIA: Hobbs, I. L.	WALVIS BAY: Waldron, F. R.
	VANDERBILPARK: Jamneck, Cr. L. Theron, G. C.	

OTHER MEMBERS

Andrew, W. M. (Associate Member), East London.	Fraser, J. C. (Honorary Member), Johannesburg.
Bradley, D. A. (Honorary Member), Port Elizabeth.	Kinsman, C. (Honorary Member), Durban North.
Burton, C. R. (Associate Member), Kimberley.	Magowan, J. M. (Associate Member), Salisbury.
Campbell, A. R. (Associate Member), Impendhlo, Natal.	McGibbon, J. (Associate Member), Carletonville.
Clinton, J. S. (Associate Member), Johannesburg.	Milton, W. H. (Honorary Member), Johannesburg.
Conradie, D. J. R. (Associate Member), Bloemfontein.	Mitchell, J. E. (Honorary Member), Kitwe.
Dalton, G. A. (Associate Member), Johannesburg.	Muller, H. M. S. (Associate Member), Upington.
Foden, A. (Honorary Member), East London.	Simpson, H. G. (Association Member), Great Brak River.
Ford, W. P. (Associate Member), Lusaka.	Van der Walt, J. L. (Honorary Member), Vereeniging.

A.M.E.U. OFFICIALS

R. G. Ewing (Representing the Secretaries), East London.
Mrs. H. G. Simms (Convention Proceedings Clerk), Johannesburg.
Mrs. Y. Hartley (Executive Minute Clerk), East London.

AFFILIATES

ORGANISATION	NAME	TOWN
Aberdare Cables (Africa) Ltd.	G. Mc. Yuill.	Port Elizabeth.
African Cables Ltd.	J. C. Sutherland.	
African Wire Ropes Ltd.	V. H. Woods, R. W. Lord.	Vereeniging.
Alcan Aluminium of S.A. Ltd.	T. N. D. Griffin.	Johannesburg.
	E. B. Martin.	Johannesburg.

ORGANISATION	NAME	TOWN
Associated Electrical Industries.	H. G. Val Davies.	Johannesburg.
	C. G. Watkins-Ball.	Johannesburg.
	N. C. Smith.	Port Elizabeth.
African Lamps (Pty.) Ltd.	J. Duffield, E. Crole,	Johannesburg.
	J. Edwards.	
Arthur Trevor Williams (Pty.) Ltd.	R. W. Wood, J. A. Barnett,	Johannesburg.
	R. A. Scanes.	
Asea Electric S.A. (Pty.) Ltd.	V. F. Checketts.	Pretoria.
Aycliffe Cables, Ltd.	C. A. Rist.	Johannesburg.
Babcock & Wilcox of S.A. Ltd.	H. J. Kroon.	Vereeniging.
British General Electric Co. Ltd.	T. G. Lawson, N. Holmes,	Johannesburg.
	C. L. Munsie.	
British Insulated Callender's Cables S.A. (Pty.) Ltd.	A. W. Allen, N. R. Price.	Johannesburg.
Chloride Electrical Storage Co. S.A. (Pty.) Ltd.	A. C. Tilley,	Johannesburg.
	P. G. C. Steyn,	Johannesburg.
	N. D. Jones,	Johannesburg.
	P. M. Duggan,	East London.
	S. Coman.	Salisbury.
Davidson & Co. (Africa) (Pty.) Limited.	F. S. Haigh.	Springs.
Dowson & Dobson, Ltd.	C. R. Dalton.	Johannesburg.
Ian Drewett.	I. H. M. Drewett.	Johannesburg.
Electrical Contractors' Association (South Africa).	K. B. Shone.	East London.
Enfield Cables S.A. (Pty.) Ltd.	A. D. Haslop.	Johannesburg.
English Electric Co. S.A. (Pty.) Limited.	H. Prins.	Johannesburg.
	G. L. Jessup.	Johannesburg.
English Electric Co. (Central Africa) (Pty.) Ltd.	A. E. O'Dowd.	Salisbury.
Farad (Pty.) Ltd.	G. Gerber, E. Baumann,	Johannesburg.
	H. Backer.	
First Electric Corporation of S.A. Limited.	L. G. Axe.	Johannesburg.
F. W. J. Electrical Industries.	M. R. Marot.	Johannesburg.
W. T. Glover & Co. Ltd.	W. G. Harlow.	Cape Town.
E. Green & Sons S.A. (Pty.) Ltd.	A. W. Bulless.	Johannesburg.
Harold Marthinussen & Co. (Pty.) Limited.	G. Roeske.	Johannesburg.
Hawker Siddeley Brush (S.A.) (Pty.) Limited.	P. N. Vickerman.	Johannesburg.
Heinemann Electric S.A. Ltd.	E. Tarchalski,	Johannesburg.
	H. Whitfield.	
Henley Simplex Africa (Pty.) Ltd.	J. A. Morrison,	Johannesburg.
	A. K. Dean.	
Hopkinson S. A. (Pty.) Ltd.	E. C. Enfield.	Johannesburg.
Hubert Davies & Co. Ltd.	W. N. Powell.	Johannesburg.
A. Jackson — Consulting Engineer.	A. Jackson.	Cape Town.
John Thompson S.A. (Pty.) Ltd.	D. W. Eaton.	Johannesburg.
Johnson & Phillips S.A. (Pty.) Limited.	H. L. Dawe,	Germiston.
	E. W. Dixon.	
G. H. Langler & Co. Ltd.	G. H. Boyle.	Johannesburg.
Lodge-Cottrell (Africa) (Pty.) Ltd., Sakers Corner,	J. L. Easterbrook.	Johannesburg.
Johannesburg.		
Merz & McLellan.	C. E. R. Langford.	Johannesburg.
Patrick Murray (Pty.) Ltd.	M. E. Walsh.	Durban.
C. A. Parsons & Co. S.A. (Pty.) Ltd.	T. R. Strawson.	Johannesburg.
Reunert & Lenz, Ltd.	T. K. Adams,	Johannesburg.
	O. Alveskog,	Johannesburg.
	T. C. March,	Johannesburg.
	E. R. Miles.	Cape Town.
A. Reyrolle & Co. S.A. (Pty.) Ltd.	M. L. Breden,	Johannesburg.
	C. R. J. Pilcher.	Cape Town.
A. Reyrolle & Co. (Rhodesia) Ltd.	N. Kirschner.	Salisbury.

ORGANISATION	NAME	TOWN
Scottish Cables S.A. Ltd.	D. G. Sutherland, A. C. Grant, W. E. L. Tonkinson.	Pietermaritzburg. Johannesburg. Durban.
Shell Co. of S.A. Ltd.	G. Phillips, G. D. Matchett.	Cape Town.
Siemens Edison Swan (Pty.) Ltd.	E. B. Sidney, F. B. Shiner.	Johannesburg.
Siemens S.A. (Pty.) Ltd.	A. Biehler.	Johannesburg.
S.A. General Electric Co. (Pty.) Limited.	F. W. de Zeeuw, J. W. Allen.	Johannesburg.
South Wales Electric (Pty.) Ltd.	C. L. de Beer.	Johannesburg.
Standard Telephones & Cables, Ltd.	B. W. Hawkins.	Johannesburg.
Stewarts & Lloyds of S.A. Ltd.	R. N. Nevin.	Johannesburg.
Superconcrete Pipes S.A. Ltd.	A. R. Nel.	Roodepoort.
Switchcraft (Pty.) Ltd.	M. H. Froling.	Johannesburg.
Union Steel Corporation of S.A. Limited.	H. R. R. Holton, N. G. Beveridge.	Vereeniging.
Wilson & Herd (Pty.) Ltd.	H. N. Hancox.	Johannesburg.
Yarrow Africa (Pty.) Ltd.	C. W. Suckling.	Johannesburg.

VISITORS

NAME	ORGANISATION	TOWN
Axe, L. G.	S.A. Institute of Electrical Engineers.	Johannesburg.
Aspinall, H. T.	Department of Education, Arts and Science.	Pretoria.
Baxter, J. D. C.	Northern Cape Regional Electrification Board.	Kimberley.
Berry, J.	Town Electrical Engineer.	Johannesburg.
Buchanan, E. G.	Inspector of Factories (Engineering), Dept. of Labour.	Barberton.
Cairns, S.	City Treasurer.	Salisbury.
Campbell, N.	City and Water Engineer.	East London.
Chalmers, J. G.	Electrical Engineer.	East London.
Clayson, T. F.	Institution of Certificated, Mechanical and Electrical Engineers.	East London.
Cordes, T. K.		Keimoes.
Compton, J. D.		Johannesburg.
Drewett, L.H.M.		
Gailey, H.	E.S.C.	Ladysmith.
Gardner, D. A.	South African Railways.	King Williams Town.
Gosling, A. J.	Town Treasurer.	Johannesburg.
Gous, H. J.	Chief Inspector of Factories, Department of Labour and Electrical Wiremen's Registration Board.	Virginia.
Groenewald, J. J.	Electricity Control Board.	Pretoria.
Heydorn, Prof. A. F. P. J.	Electricity Department.	Pretoria.
Johnstone, K. G.	S.A. Institution of Mechanical Engineers.	East London.
Kane, R. W.	S.A. Electrical Review and Power Magazine.	Johannesburg.
Kraft, Mrs. K.	South African Railways.	Johannesburg.
Le Grice, E. W.	Rand Water Board.	East London.
Lineker, A. W.	Director of Parks and Amenities.	Johannesburg.
Linley, T. A.	Cape Provincial Administration.	East London.
Louw, M.	Town Clerk of East London and Institute of Town Clerks.	East London.
Mc Pherson, I. T.	Electricity Supply Commission.	Johannesburg.
Milton, W. H.	S.A. Bureau of Standards.	Pretoria.
Middlecote, A. A.	The South African Cable Makers Association.	Johannesburg.
Morrison, J. A.	Rhodesian Railways.	Bulawayo.
Molyneux, G. C.		

NAME

ORGANISATION

TOWN

Peterson, G. R.	Federal Power Board.	Salisbury.
Phillips, A. G.	Cape Provincial Administration.	East London.
Prins, F. J.	South African Bureau of Standards.	Pretoria.
Roberts, H. C. K.	His Worship the Mayor of East London.	East London.
Rooke, B. W.	Ministry of Power, Federal Government of Rhodesia and Nyasaland.	Salisbury.
Rudolph, A. F.	Electricity Department.	East London.
Smith, R. F.	Public Works Department.	East London.
Tomlin, A. W.	Electricity Supply Commission (Border Undertaking).	East London.
Van der Spuy, M.	Electricity Department.	East London.
Van Lelyveld, L. J.	Pineapple Research Station.	East London.
Venter, P.	Municipal Native Administration Department.	East London.
Van Wyk, J. D. N.	Council for Scientific and Industrial Research.	Pretoria.
Walsh, R. E.	Electricity Department.	East London.
West, J. H.	Ministry of Power, Federal Government of Rhodesia and Nyasaland.	Salisbury.

LADIES

<i>Name</i>	<i>Town</i>	<i>Name</i>	<i>Town</i>	<i>Name</i>	<i>Town</i>
Aalbers, Mrs. G.,	Wellington.	Dixon, Mrs. E. W.,	Germiston.	Kroon, Mrs. H. J.,	Vereeniging.
Adams, Mrs. C. H.,	Somerset West.	Downey, Mrs. J. C.,	Springs.	Kruger, Mrs. M. J. C.,	Port Alfred.
Allen, Miss O. M.,	Johannesburg.	Drewett, Mrs. I. H. M.,	Johannesburg.	Langford, Mrs. C. E. R.,	Johannesburg.
Andrew, Mrs. W. M.,	East London.	Dunstan, Mrs. R. S.,	Port Elizabeth.	Lees, Mrs. D.,	Benoni.
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Axe, Mrs. L. G.,	Johannesburg.	Edwards, Mrs. J.,	Johannesburg.	Lineker, Mrs. A. W.,	Johannesburg.
Bailey, Miss, Oudtshoorn.		Erikson, Mrs. J. G. F.,	Estcourt.	Linley, Mrs. T. A.,	East London.
Bailey, Mrs. R. V.,	Oudtshoorn.	Ewing, Mrs. R. G.,	East London.	Lombard, Mrs. C.,	Germiston.
Barnard, Mrs. J. H.,	Roodepoort.	Enfield, Mrs. E. C.,	Johannesburg.	Lord, Mrs. R. W.,	Vereeniging.
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Beard, Mrs. G. R.,	Grahamstown.	Foden, Mrs. A.,	East London.	Luckhoff, Mrs. H. J.,	Orkney.
Beveridge, Mrs. N. G.,	Vereeniging.	Franklin, Mrs. H. C.,	Pietermaritzburg.	Marais, Mrs. D. J.,	Johannesburg.
Bodenstein, Mrs. J. C.,	Britz.	Fraser, Mrs. J. C.,	Johannesburg.	Marsh, Mrs. T. C.,	Johannesburg.
Boshoff, Mrs. M. H. L.,	Graaff-Reinet.	Froling, Mrs. M. H.,	Johannesburg.	Martin, Mrs. E. B.,	Johannesburg.
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Buchanan, Mrs. E. G.,	Barberton.	Gresse, Mrs. U. B.,	Nelspruit.	Mitchell, Mrs. J. E.,	Kitwe.
Bullus, Mrs. A. W.,	Johannesburg.	Gripper, Mrs. H. J.,	Knysna.	Molyneux, Mrs. G. C.,	Bulawayo.
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Botha, Mrs. D. H.,	Vereeniging.	Hancox, Mrs. H. N.,	Johannesburg.	Muller, Mrs. G. J.,	Bloemfontein.
Cairns, Mrs. S.,	Salisbury.	Haig Smith, Mrs. D.,	Middelburg.	Nagle, Mrs. W.,	Durban.
Campbell, Mrs. A. R.,	Impendhle.	Harvey, Mrs. A. Q.,	Warmbaths.	Nel, Mrs. A. R.,	Roodepoort.
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Checketts, Mrs. V. F.,	Pretoria.	Heunis, Mrs. G. B.,	Standerton.	Peterson, Mrs. G. R.,	Salisbury.
Clarke, Mrs. M. P. P.,	Somerset East.	Inglis, Mrs. J. J.,	Pietersburg.	Pilcher, Mrs. C. R. J.,	Cape Town.
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Clinton, Mrs. J. S.,	Johannesburg.	Johnstone, Mrs. K. G.,	East London.	Phillips, Mrs. G.,	Cape Town.
Coman, Mrs. S.,	Salisbury.	Kinsman, Mrs. A. D.,	Durban.	Pretorius, Mrs. D. R.,	Parys.
Conradie, Mrs. D. J. R.,	Bloemfontein.	Kinsman, Mrs. C.,	Durban, North.	Prins, Mrs. H.,	Johannesburg.
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Dalton, Mrs. C. R.,	Johannesburg.	Kirberger, Mrs. M. N.,	Bethal.	Ratney, Mrs. W. P.,	Orkney.
Dawe, Mrs. H. L.,	Germiston.	Kok, Mrs. J. A.,	Robertson.	Rist, Mrs. C. A.,	Johannesburg.
De Beer, Mrs. C. L.,	Johannesburg.			Roeske, Mrs. G.,	Johannesburg.
Deysel, Mrs. F. F.,	Springs.				

<i>Name</i>	<i>Town</i>
Roberts, Mrs. H. C. K.,	East London.
Rossler, Mrs. W.,	Kroonstad.
Ross, Mrs. J. W.,	Potgietersrust.
Rudolph, Mrs. A. F.,	East London.
Ru'le, Mrs. P. C.,	Kroonstad.
Smith, Mrs. E. L.,	Boksburg.
Smith, Mrs. N. C.,	Port Elizabeth.
Smith, Mrs. R. F.,	East London.
Stevens, Mrs. F.,	Ladysmith.
Strawson, Mrs. T. R.,	Johannesburg.
Stoffberg, Mrs. T. C.,	Pretoria.
Suckling, Mrs. C. W.,	Johannesburg.
Sutherland, Mrs. J. C.,	Port Elizabeth.
Sutherland, Mrs. D. G.,	Pretoria.
Thackwray, Mrs. W. G.,	Kokstad.
Thuynsma, Mrs. J. C.,	Springs.
Tomlin, Mrs. A. W.,	East London.

<i>Name</i>	<i>Town</i>
Tonkinson, Mrs. W. E. L.,	Durban.
Turnbull, Mrs. A. F.,	Vereeniging.
Val Davies, Mrs. H. G.,	Johannesburg.
Van der Merwe, Mrs. F. J.,	Stilfontein.
Van der Spuy, Mrs. M.,	East London.
Van Dyk, Mrs. J. A.,	Graaff-Reinet.
Venter, Mrs. P.,	East London.
Vickerman, Mrs. P. N.,	Johannesburg.
Von Ahlfen, Mrs. J. K.,	Sasolburg.
Waddy, Mrs. J. C.,	Pietermaritzburg.
Walsh, Mrs. R. E.,	East London.
Watkins-Ball, Mrs. C. G.,	Johannesburg.
West, Mrs. J. H.,	Salisbury.
Whitfield, Mrs. H.,	Johannesburg.
Wilson, Mrs. J.,	Pretoria.
Wood, Mrs. R. W.,	Johannesburg.
Woods, Mrs. V. H.,	Vereeniging.

Notice of 36th Annual Convention

Notice is hereby given that the 36th Annual Convention of the Association will be held in the City Hall, East London, from the 8th MAY, to the 11th MAY, 1962, both days inclusive.

Davidson & Ewing (Pty.) Ltd.
per R. G. EWING,
Secretaries.

Kennisgewing van die 36ste Jaarlikse Konvensie

Hiermee word kennis gegee dat die 36ste Jaarlikse Konvensie van die Vereniging van 8 tot 11 Mei 1962 in die Stadsaal, Oos-Londen, gehou sal word.

Davidson & Ewing (Edms) Bpk.
per R. G. EWING,
Sekretarisse

AGENDA AND PROGRAMME

Monday, 7th May, 1962

- 9.30 a.m.—4.30 p.m. Meeting of Executive Council, Carlton Hotel.
6.30 p.m.—7.30 p.m. Civic Reception and Welcome, City Hall Quadrangle.

Tuesday, 8th May, 1962

- 8.45 a.m. Registration and Issue of Badges.
9.30 a.m. Welcome to East London by His Worship the Mayor of East London.
Official Opening by Professor A. F. P. J. Heydorn, Electricity Control Board.
Election of President.
Venue of next Convention.
10.30 a.m. Refreshment Interval.
11.00 a.m. Apologies and Greetings.
11.15 a.m. Presentations (Past President's and Honorary Members' Medals and Certificates).
11.30 a.m. Election of Executive Council.
11.45 a.m. Presidential Address.
12.45 p.m. Luncheon Adjournment.
2.30 p.m. Paper: "Some Aspects of Electricity Supply Economics" by Hugh H. Smith, M.Comm., Ph.D., Professor of Commerce at Rhodes University.
3.30 p.m. Refreshments.
4.00 p.m. Discussion on Paper.
5.00 p.m. Adjournment.
8.00 p.m. Film Premiere.

AGENDA EN PROGRAM

Maandag, 7 Mei 1962

- 9.30 vm.—4.30 nm. Vergadering van Uitvoerende Raad, Carlton Hotel.
6.30 nm.—7.30 nm. Burgerlike onthaal en Verwelkoming Stadsaal, Binneplein.

Dinsdag, 8 Mei 1962

- 8.45 vm. Registrasie en Uitreiking van Kentekens.
9.30 vm. Verwelkoming in Oos-Londen deur Sy Edelhare die Burgemeester van Oos-Londen.
Amptelike Opening deur Professor A. F. P. J. Heydorn, Elektriesiteitsbeheerraad.
Verkieing van President.
Vergaderplek van volgende Konvensie.
Verkieing van Vise-President.
10.30 vm. Verversings.
11.00 vm. Verskonings en Groete.
11.15 vm. Presentasies (Aftredene President en Erelede se Medaljes en Sertifikate).
11.30 vm. Verkieing van Uitvoerende Raad.
11.45 vm. President se Rede.
12.45 nm. Verdaging vir Middagete.
2.30 nm. Referaat: "Somme Aspekte van Elektriesiteitsvoorsienings ekonomie" deur Hugh H. Smith, M.Com., Ph.D., Professor in Handel te Rhodes-Universiteit.
3.30 nm. Verversings.
4.00 nm. Besprekings van Referaat.
5.00 nm. Verdaging.
8.00 nm. Filmpremiere.

Wednesday, 9th May, 1962

- 8.30 a.m. Executive Council Meeting—Council Chamber.
- 9.30 a.m. Convention Resumes.
Communications from Council.
Paper: "The Effect of Standardisation on the Economy of Electricity Supply", by A. A. Middlecote, B.Sc.(Eng.), M.S.A.I.E.E., South African Bureau of Standards.
- 10.30 a.m. Tea.
- 11.00 a.m. Paper: "Electricity Costs and Tariffs" by John H. West, M.B.E., B.A.(Com.), M.Econ., F.I.S., Under-Secretary, Ministry of Finance, Federation of Rhodesia and Nyasaland.
- 12 noon Discussion on Papers.
- 12.30 p.m. Luncheon Adjournment.
- 2.30 p.m. Paper: "The Development of a Power Station for an Isolated Community" by V. E. O. Barrett.
- 3.30 p.m. Discussion on Paper.
- 4.30 p.m. Adjournment.
- 8.15 p.m. Members' Forum.
- 10.00 p.m. Refreshments.

Thursday, 10th May, 1962

- 9.30 a.m. Convention Resumes.
Communications from Council.
Annual Report of Secretaries.
Appointment of Auditors.
Discussion on Reports of Sub-Committees and Representatives.
Discussion on Papers.
- 10.30 a.m. Tea.
- 11.00 a.m. Paper: "Load Factor and Consumer's Demand" by M. P. P. Clarke.
- 12.30 p.m. Luncheon Adjournment.
- 2.30 p.m. Visits to Car Distributors Assembly Limited and The Chloride Electrical Storage Co. S.A. (Pty.) Ltd., or alternatively Johnson & Johnson (Pty.) Ltd.
- 8.30 p.m. Dinner Dance, City Hall.

Friday, 11th May, 1962

- 9.30 a.m. Convention Resumes.
Communications from Council.
Discussion regarding Papers, Reports, etc.
- 10.30 a.m. Tea.
- 11.00 a.m. Closing Session.
- 12 noon Meeting of Executive Council, Council Chamber.

Woensdag, 9 Mei 1962

- 8.30 vm. Vergadering van Uitvoerende Raad, Raadsaal.
- 9.30 vm. Konvensie word hervat.
Mededelings van Raad.
Referaat: „Die Effeke van Standaardisering op die Ekonomie van Elektriesiteitsvoorsiening" deur A. A. Middlecote, B.Sc.(Eng.), M.S.A.I.E.E., S.A. Buro van Standaarde.
- 10.30 vm. Teepouse.
- 11.00 vm. Referaat: „Elektrisiteitskoste en -Tariewe" deur John H. West, M.B.E., B.A.(Com.), M.Econ., F.I.S., Ondersekretaris, Ministerie van Geldsake, Federasie van Rhodesia en Njassaland.
- 12.00 vm. Bespreking van Referate.
- 12.30 nm. Verdaging vir Middagete.
- 2.30 nm. Referaat: „Die Ontwikkeling van 'n Kragentrale vir 'n Geïsoleerde Gemeenskap" deur V. E. O. Barrett.
- 3.30 nm. Bespreking van Referaat.
- 4.30 nm. Verdaging.
- 8.15 nm. Lede-forum.
- 10.00 nm. Verversings.

Donderdag, 10 Mei 1962

- 9.30 vm. Konvensie word hervat.
Mededelings van Raad.
Jaarlikse verslag van Sekretarisse.
Aanstelling van Ouditoure.
Bespreking van Verslae van Onderkomitees en Verteenwoordigers.
Bespreking van Referate.
- 10.30 vm. Teepouse.
- 11.00 vm. Referaat: „Belastingfaktor en Verbruikersaanvraag" deur M. P. P. Clarke.
- 12.30 nm. Verdaging vir Middagete.
- 2.30 nm. Besoek aan Car Distributors Assembly Ltd, en The Chloride Electrical Storage Co. (S.A.) Ltd., or Johnson & Johnson (Pty.) Limited.
- 8.30 nm. Dinee/Dans, Stadsaal.

Vrydag, 11 Mei 1962

- 9.30 vm. Konvensie word hervat.
Mededelings van Raad.
- 10.30 vm. Teepouse.
Bespreking van Referate, Verslae, e.d.m.
- 11.00 vm. Afsluiting.
- 12.00 vm. Vergadering van Uitvoerende Raad, Raadsaal.

LADIES' PROGRAMME**Monday, 7th May, 1962**

6.30 p.m.—7.30 p.m. Civic Reception, City Hall Quadrangle.

Tuesday, 8th May, 1962

8.45 a.m. Assemble for Registration, Issue of Badges and Official Opening.

10.30 a.m. Tea.

11.00 a.m. Apologies and Greetings.

11.15 a.m. Presentations (Past President's and Honorary Members' Medals and Certificates).

11.45 a.m. Presidential Address.
Free afternoon or alternatively visit to Wilson Rowntree (Pty.) Limited.

8.00 p.m. Film Premiere.

Wednesday, 9th May, 1962

a.m. Drive and morning tea with the Mayoress, East London Golf Club.

p.m. Visit to Berkshire Knitting (S.A.) Ltd. and Pine-apple Research Station.

8.15 p.m. Members' Forum.

Thursday, 10th May, 1962

a.m. Free morning or alternatively visit to Wilson Rowntree (Pty.) Limited.

p.m. Visits to Car Distributors Assembly Limited and The Chloride Electrical Storage Co. S.A. (Pty.) Ltd. or alternatively Johnson & Johnson (Pty.) Ltd.

8.30 p.m. Dinner Dance, City Hall.

Friday, 11th May, 1962

10.30 a.m. Assemble for Tea and Closing Session.

PROGRAM VIR DAMES**Maandag, 7 Mei 1962**

6.30—7.30 nm. Burgerlike Onthaal, Stadsaal, Binneplein.

Dinsdag, 8 Mei 1962

8.45 vm. Vergader vir Registrasie, Uitreiking van Kentekens en Amptelike Opening.

10.30 vm. Teeponse.

11.00 vm. Verskonings en Groete.

11.15 vm. Presentasies (Aftredene President en Erelede se Medaljes en Sertifikate).

11.45 vm. President se rede.
Namiddag vry of besoek aan Wilson Rowntree (Edms.) Bpk.

8.00 nm. Filmpremiere.

Woensdag, 9 Mei 1962

vm. Plesierriit en oggendtee saam met Burgemeesters-vrou, Oos-Londense Gholfklub.

nm. Besoek aan Berkshire Knitting (S.A.) Bpk., en Pynappelnavorsingstasie.

8.15 nm. Lede-forum.

Donderdag, 10 Mei 1962

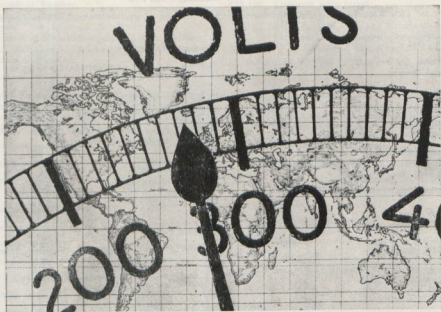
vm. Vry oggend of besoek aan Wilson Rowntree (Edms.) Bpk.

nm. Besoeke aan Car Distributors Assembly Ltd. en The Chloride Electrical Storage Co. S.A. (Pty.) Ltd. of Johnson & Johnson (Pty.) Ltd.

8.30 vm. Dinee/Dans, Stadsaal.

Vrydag, 11 Mei 1962

10.30 vm. Vergader vir Tee en Afsluiting.



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1508

The Thirty-Sixth Convention of the Association was opened in the City Hall, East London, by Professor A. F. P. J. Heydorn, Electricity Control Board, at 9.30 a.m. on Tuesday, 8th May, 1962.

Attendance at the Convention was as follows:—81 Councils represented by 43 Councillors and 82 Engineers and Associates; 6 Honorary Members (not representing Councils or Affiliates); 11 Associate Members; 85 representatives of 55 Affiliates; 44 Visitors (representing Government Departments, Public Utilities and other organisations); 139 Ladies; 3 A.M.E.U. Officials—a total of 413 persons.

FIRST DAY

THE PRESIDENT: Good morning, ladies and gentlemen. More, dames en here. Dit is vir my werklik 'n genoë en ook 'n voorreg om u vannore op hierdie ons ses-en-dertigste konvensie welkom te heet. Ek wil die vertroue uitspreek dat u 'n baie aangename en suksesvolle konvensie sal hê, en dat ons verrigtings hier goeie vrugte sal afwerp.

I also wish to extend a very cordial welcome to His Worship the Mayor of East London, Clr. Roberts, and Prof. Heydorn, of the Electricity Control Board.

Ladies and Gentlemen, I now have much pleasure in calling on His Worship the Mayor to address you and to introduce to you Prof. Heydorn who has kindly consented to officially open our Convention this morning. (Applause).

HIS WORSHIP THE MAYOR: Mr. President, ladies and gentlemen, first of all thank you for the very cordial welcome extended to me this morning, and the hospitality extended to Mrs. Roberts and myself on Sunday evening, and at the second part last evening.

It is my pleasant duty to welcome you all to East London for the 36th Annual Convention of the Association of Municipal Electricity Undertakings of Southern Africa.

Ek sê dis 'n aangename plig want ons in Oos-Londen voeg die daad by die woord en laat ons besoekers welkom voel in ons midde. Hier sal u vind dat ons inwoners vriendelike en gelukkige mense is, dat hulle gretig is om u verblyf aangenaam te maak en ek vertrou dat u ons gasvryheid ten volle sal geniet. Dit is my wens dat u tuis voel en dat u verblyf genotvol en interessant sal wees.

Last year when Clr. J. D. Northcote, on behalf of the City of East London invited you to come to East London, he referred to us as the City of Conferences. This is no more than the truth, and since assuming the office of Mayor eight months ago, we have had a large number of congresses in our city. Most probably the salty air adds ozone and high voltage velocity to the deliberations of these gatherings and affords you more time for pleasure.

I welcome you as one of the larger and important conventions consisting of representatives from over 100 Municipal Electricity Undertakings from within the Republic and beyond its borders. I am well aware of the responsibility which falls upon you all and that the problems associated with the workings of these municipal enterprises are of considerable magnitude, both from the financial and technical points of view. It is therefore particularly gratifying to me to see so many councillors attending this Convention. The elementary knowledge which they gain must be of assistance, when they are faced with making a decision on problems which affect their respective cities and towns.

It may be said that a councillors knowledge of the technicalities of gasfilled cables may be somewhat limited, but I can assure you that his knowledge of the ratepayers is absolutely unlimited.

A convention such as this is of great value in promoting satisfactory service to all consumers. Glancing at your Agenda, I notice that among the items to be discussed are the questions of electricity cost and economics, which I should say are subjects of vital concern to both local authorities and rate-

payers alike. It goes without saying that councillors are always trying to find ways and means of reducing electricity costs, or at least to prevent increases in costs of this universal agent of public service. It is to be hoped that a way will be found to lower the costs of electricity on the sea-board of South Africa to a figure comparable with the inland centres, which are close to the working coal fields of the country. But this, I gather, is outside the scope of your proposed discussions.

East London, however, has a potential coal field not so far away. Originally, I believe, this coal field provided furnace coal for the engines of the old East London-Queenstown Railways in the early days. The coal was mined from exposed seams on the mountain side at Indwe some 60 miles from Queenstown, but when the visible seams were worked out, development ceased. Since that time farmers in the vicinity have found when drilling for water that the drills pass through very substantial seams and this development has now resulted in further exploration.

The opening up of these coal deposits will be of enormous economic significance and will considerably benefit electricity consumers in the border area.

At the moment white diamonds are being found in the sea off South West Africa; one wishes that black diamonds could be found somewhere in the vicinity of East London.

I see that your Agenda embraces a considerable exchange of technical and other knowledge, as well as promotion of thought and ideas for further examination and discussion. I wish you well in these deliberations.

Nogmaals baie hartlik welkom in Oos-Londen. Ek wens u alle sukses toe met u beraadslagings. Oos-Londen behoort aan u—geniet wat ons het, kuier lekker, maak vriende, en by terugkeer by u tuiste, vertel die mense dat daar net een Konferensie oord is—Oos-Londen.

Ladies and gentlemen, I now have much pleasure in introducing to you, (although it is not necessary), Prof. Heydorn, who will address you.

PROFESSOR A. F. P. J. HEYDORN (Pretoria): Mr. President, it is a very pleasant task for me to convey to this convention the greetings of the past Chairman of the Electricity Control Board, Dr. Gaigher, and of the new Chairman Dr. P. S. Rautenbach together with their good wishes for the success of the proceedings.

When you invited me to open this convention I not only felt highly honoured to be called upon to serve this most important gathering in the country's electrical profession, but I also appreciated it in the same measure, to be asked to partake in one of the spheres of electrical engineering in which I am particularly interested ever since I was an apprentice: that is generation and distribution of electricity and its service to mankind through large and small supply undertakings. I am not quite a newcomer in your midst, since I had the privilege of attending conventions of your Association as a guest as long ago as 25 years and I am also familiar with many of your problems through close contact with numerous members of the profession.

In South Africa the municipal electricity undertakings were the pioneers of supply to the general public right from the beginning of the power supply industry. When electric light was introduced almost eighty years ago, it was something of

a mysterious and novel luxury of little consequence, when compared with the other engineering services then already existing within the realm of local authorities. In some ways the electricity departments still seem to be suffering from being second-arrivals, although they have since then and particularly during the 47 years of this Association's existence grown to be one of the most important municipal departments and, viewed from the financial aspect, to an almost unique type of undertaking.

In this gathering it is unnecessary to stress the place taken by the supply of electricity as an amenity and as a means of doing things that could otherwise not be done. A dislocation of supply lasting only thirty minutes is sufficient to bring home to everybody affected what electricity really means to the public.

At this juncture, however, the financial position of municipal electricity undertakings must be examined since this really defines their status within the municipal structure. A reasonable picture can be gained by a glance at some of the figures published in the Official Municipal Year Book. Take, for instance, the following figures for 64 towns in the Republic in 1959/60 having more than 10,000 inhabitants each, some with their own power stations and some taking bulk supply. Permit me also to employ physical and electrical usage and to call 1 million Rand 1 Megarand (1 MR):

Total general revenue	— — — — —	MR 66.52
Total trading revenue	— — — — —	MR 86.52
Total revenue from electricity	— — — — —	MR 55.62
Total surplus from electricity	— — — — —	MR 7.16

These figures show that electricity is not only one of the most important revenue producers but that its surplus actually represents the creation of capital for the benefit of the community served by the electricity undertaking.

This being so, our municipal councils should have every reason to nurse their electricity undertakings with all possible care and, still more, the municipal electrical engineers and their staff whose loyal efforts and unceasing watchfulness produce these results. I shall again refer to the electrical engineer at the conclusion of these notes.

Present day transmission systems can cover very long distances before their technical limits are reached. It therefore appears unlogical to confine a supply system within administrative boundaries, if there are consumers within reach as well as a craving for supply outside such boundaries. All credit is due to our municipalities and their electricity departments for never hesitating to fulfill this neighbourly duty. Thus we find many of our municipalities surrounded by extensive networks serving small-holdings, rural areas and even other municipalities.

As in other spheres, this technical development has brought about various new problems and disputes. In such situations the contending parties very often look to the legislator to solve their problems. In respect of the supply of electricity this appeal is not always in vain. Although the Electricity Act of 1922 and its successor of 1958 does not touch the local authorities' control over their electricity undertakings within their area of jurisdiction, the extension of electricity undertakings beyond these boundaries was already foreseen when the act of 1922 was framed. Thus clause 40 makes extension of supply outside the area of jurisdiction of local authorities

subject to the permission of the Electricity Control Board. Further it stipulates that the prices of supply shall be the same as those prevailing within the local authority's area of jurisdiction, unless the Board otherwise prescribes. This clause is obviously based, inter alia, on recognition of the fact that the system of civic government and control of trading departments, such as electricity, by the vote of consumers who are also rate-payers, becomes ineffective on municipalities' activities extending beyond their boundaries. Thus a regulating and mediating function is conferred on the Electricity Control Board. Practice has shown that the majority of disputes arise out of the tariff of charges and particularly the surcharge allowed to cover the additional expense incurred in reaching and administering the outside consumers.

In carrying out this duty as imposed on it in Chapter II of the act, the Board is also faced with the provisions of Chapter I in which the Electricity Supply Commission is bound to supply electricity without profit or loss. The basic utility idea underlying this proviso is in contradiction with the established custom of municipal trading departments to show a profit where this is possible and where such indirect taxation can be borne by the consumer. When this situation leads to disputes between outside consumers and the municipalities, as is almost inevitable, both viewpoints are frequently invoked and it is incumbent on the Board to find a solution equitable to both parties.

In an effort to minimise future disputes and to obtain a surcharging system which does justice to all parties, the Board has, during the last few years, been working on various sets of "Standard Conditions". As it is not the desire of the Board to act dictatorially in this matter, the drafts were repeatedly submitted to this Association and other representative bodies of local government. After much work and deliberation by all parties concerned, it is hoped that the conditions are now in a form ready for issuing.

In all its deliberations the Board feels that a factual approach based on exact calculations will best lead to a satisfactory solution. In this respect the negotiations with local authorities sometimes ended with insuperable difficulties, so that, in the end, resort had to be taken to the old method of guessing "on the safe side". The reason appears to be that the otherwise excellent municipal accounting systems employed in the treasurer's departments do not, in all respects, do justice to the engineer's requirements. Mr. President, may I, in this connection be permitted to opine that the ever-increasing economic importance of municipal electricity undertakings, as already demonstrated by the quotation of figures, can give this Association a continual and fruitful field of activity in shaping the accounting and costing systems relating to the supply of electricity and in strengthening the municipal electrical engineers' influence on their councils' financial decisions as far as these affect their departments.

Mnr. die Voorsitter, in die voorafgaande het ek na die uiters belangrike rol verwys wat die elektrotegniese ingenieur en sy departement in die finansiële struktuur van ons plaaslike owerhede speel. Dit wil my egter voorkom asof hy nie altyd, in verhouding tot die ander departemente, van die stadsrade ook die administratiewe erkenning ontvang wat op grond van verdienste aan hom toekom nie. Dit is 'n lot wat hy met ingenieurs in ander vertakings van die beroep deel. In die

universiteitsopleiding waarby ek betrokke is, voel ons dat die ingenieur by homself moet begin om hierdie toestand te verbeter deur uitbouing van 'n breër agtergrond en lewensuitkyk. As aansporing daartoe ken ons in ons kursusse al meer ruimte toe aan ekonomiese en administratiewe vakke.

Nou vra ek hierdie vereniging: hoe staan dit met die kwalifikasies van jong manne in die munisipale elektrotegniese loopbaan wat nie die voorreg gehad het om te studeer nie? Moet nie aan hul opleiding verskaf word wat aanvullend is tot die regeringsertifikaat van bekwaamheid wat veral op bevoegdheid in die sin van veiligheid gerig is nie? Met erkende bevoegdhede op die administratiewe vlak sal die munisipale ingenieur sy status kan verbeter en sal hy die verederende behandeling as verhoogde masjienoppasser wat hy soms moet ervaar, by sy raad kan uitwis. Hier is nie die tyd en plek om voorstelle in te dien nie. Ek voel net dat dit dringend noodsaaklik is dat u vereniging aan hierdie saak sy aandag skenk.

Mr. President, in conclusion I wish to add a sincere word of welcome to our friends from Rhodesia. They have not got to contend with a Board such as that of which I am a member, but in many other respects their problems are very much the same as ours. I am looking forward to their contributions to the proceedings and I hope that they will not only benefit from their participation but that they will also feel at home in the City of East London which is the host of this convention.

I now have the honour of declaring the convention open and to convey my Board's good wishes for its success to you.

THE PRESIDENT: Mr. Mayor, Prof. Heydorn, ladies and gentlemen, I think you will all agree that we have been extremely fortunate at this Convention in having Prof. Heydorn deliver such an interesting and thought-provoking address.

Ons weet almal hoe besig u is, Professor, en hoe beperk u tyd is, en ons stel dit dus te meer op prys dat u self die moeite getroos het om ons Konvensie vanmôre hier vir ons te kom open. Ek kan u verseker dat ons dit baie waardeer en dat die gedagtes wat u hier uitgespreek het vir ons, ingenieurs sowel as raadslede, baie stof tot nadenke gegee het.

We also thank you, Prof. Heydorn, for the good wishes which you have conveyed to us from the Chairman and members of your Board, and I thank you once again for opening our Convention. (Applause.)

I also wish to convey to His Worship the Mayor, and his Council, our very sincere thanks for inviting us to hold our Convention in East London. We are also grateful to you, Sir, for honouring us with your presence here this morning, and for your hearty welcome to us.

Your fair city deservedly has a world-wide reputation for friendliness, graciousness, and hospitality and I can assure you that we are all looking forward with great anticipation to the few days that we shall spend here. (Applause.)

Now Mr. Mayor, Prof. Heydorn, ladies and gentlemen, before proceeding further with the business of the day, I would like to make a few remarks in connection with members and visitors attending the Convention.

In the first place I'd like to say how pleased we are to have with us this morning four very distinguished gentlemen who are past presidents and honorary members of our association.

I refer, of course, to Mr. D. A. Bradley of Port Elizabeth, Mr. Horace Eastman of Cape Town, Mr. Arthur Foden of East London, and Mr. J. C. Fraser of Johannesburg. (Applause.)

I'd like to give them a very warm welcome. I'd also like to welcome to the convention Mr. H. G. Simpson, of Great Brak River. Mr. Simpson, who is now an Associate Member, was an Engineer Member of this Association for many years, and 35 years ago he attended the 7th Convention of this Association in East London, which was then of course, known as the Association of Municipal Electrical Engineers.

The following Municipalities are represented here at this Convention for the first time:—

Kenhard Municipality, represented by Mr. C. P. Laas.
Tarkastad Municipality, represented by Mr. A. Sweetman.
Walvis Bay Municipality, represented by Mr. F. R. Waldron.
Viljoenskroon Municipality, represented by Mr. W. F. van Amstel. I would like to welcome all of you here today.

I also wish to welcome the following engineer members who are representing their Municipalities for the first time at an A.M.E.U. Convention.

Mr. R. H. Redman, Bulawayo.
Mr. A. D. Kinsman, Durban.
Mr. J. D. van Niekerk, Alberton.
Mr. R. S. Dunston, Port Elizabeth. (Applause.)

I am sorry, ladies and gentlemen, in mentioning past presidents and honorary members, I find that I have overlooked Mr. Clarence Kinsman, of Durban, and I would like to say to him that we are very, very pleased to see him here today.

Since the last Convention the following firms have become affiliates of this Association, and I can assure them that they are very welcome.

African Wire Ropes, represented by Mr. T. N. D. Griffin;
Alean Aluminium Company of S.A. Ltd., represented by Mr. E. B. Martin; Farad (Pty.) Ltd., represented by Messrs. G. Berber, E. Baumann, and H. Backer; Lodge-Cottrell (Africa) (Pty.) Ltd., represented by Mr. J. L. Easterbrook.

We are also pleased to have with us today Mr. A. Jackson who has decided to join the ranks of consulting engineers, and is now an Affiliate of this Association.

Another friend of many years standing, who we are always pleased to have with us, Mr. A. Lineker, is attending this Convention as Chief Engineer of the Rand Water Board.

I would also like to welcome the Chief Inspector of Factories, Mr. J. J. Groenewald and Mr. B. W. Rooke of the Ministry of Power, Federal Government of Rhodesia and Nyasaland, who on this occasion attending an A.M.E.U. Convention for the first time.

We also have with us today two peculiar types, one Jimmy Mitchell, from some place south of the Congo, and one Johan van der Walt, alias 'Van', from some place North of the Vaal, and we shall have to do something about them, but I think I will leave it to the incoming president to deal with them! (Applause.)

Before I carry out my last function this morning, ladies and gentlemen, I should like to take this opportunity to express my thanks to the members of this Association for electing me

its President during the past year. I have endeavoured to do my best, and I hope that I have not let the Association down.

I am also very grateful for the support which I have received during the year from all the members of the Association. I would also like to thank all the members of the Executive Committee, and our Secretary, Dick Ewing and his staff for their hard work, generous assistance, and co-operation during the year.

Dames en here, ek wil u weereens baie hartlik bedank vir die groot eer wat u aan die stad Germiston en aan my betoon het toe u my 'n jaar gelede as u President verkies het. Nogmaals, baie dankie. (Applause.)

We now come to the next item on the Agenda, which is the election of a President of this Association for the year, and I now call for nominations for that office.

Ek vra vir nominasies vir die amp van President van hierdie vereniging vir die volgende jaar.

Clr. J. D. NORTHCOTE (East London): Mr. President, Mr. Mayor, Prof Heydorn, I have very much pleasure in nominating Mr. Percy Giles as President of your Association for the ensuing year.

This is the third occasion that a City Electrical Engineer of East London has been nominated for this office. Mr. John Mordy Lambe was elected President in 1927, and Mr. Arthur Foden in 1948 and as a City Councillor I feel privileged to suggest that once again this distinction should come to East London.

Mr. President, I hope you won't mind if I digress for a moment about one of these honourable past presidents of yours, Arthur Foden. Some of you present here may remember, and some of you may not, so I will just ask Arthur Foden to stand for a moment.

Some of us have known Arthur for quite a long time, and we know that for the last seven years of his active life, before he retired, he led a double life. Yes, I am very serious, Mr. President — he led a double life. He was City Electrical Engineer, and he was also Manager of the Border Undertaking of the Electricity Supply Commission. Well, there were occasions when Arthur, as City Electrical Engineer was not satisfied with the 'juice' he was getting from Escom, so he used to write himself a letter, using very strong terms, at times, I understand. But rumour has it that when he got his mail he just tore it up. I haven't been able to confirm whether or not he ever rang himself up, but that is the sort of thing that went on for the last 7 years with Arthur Foden.

As far as I know, we have been able to keep Percy Giles on the straight and narrow up to this stage!

I have known Mr. Giles for a long time—in fact he and I were both born in Kimberley. He of course several years before I was! In recent years, as Chairman of the Committee which controls the affairs of the Electricity Department, I have had the privilege of working closely with him, and I am sure that he, like his predecessors, will prove worthy of this honour, the highest in the gift of the Association.

I have noticed that in his Council work he is particularly fond of globular sums and terse reports, and that when difficulties arise he gets by with some engineering explanation. But for all that I feel sure that the City Council will be

pleased to hear, and feel honoured, that another City Electrical Engineer has been proposed for this very responsible office.

I feel also, Mr. President, that he will prove a worthy successor to yourself and the long line of capable men who have previously filled this office.

Mr. President, I formally propose Mr. Percy Giles as President. (Applause.)

THE PRESIDENT: Thank you Clr. Northcote. May I have a seconder for this proposal?

Mr. R. W. KANE (Johannesburg): Mr. President, Mr. Mayor, ladies and gentlemen, it gives me the greatest of pleasure to support the proposal made by Clr. J. D. Northcote, and I feel extremely honoured to help in fulfilling the natural outcome of our joint proposals made in Livingstone last year. On that occasion a brief outline of Percy's career was given, and I think for the benefit of many members I should repeat it very briefly.

Apart from mentioning that Percy was born in Kimberley, Clr. Northcote said nothing more about him — or not too much. He served his apprenticeship and gained his knowledge of the trade in Durban, under John Roberts; he had a short time with Escom, and finally he came to this town I think about 1937, and became the Assistant City Electrical Engineer in 1939, finally becoming City Electrical Engineer in 1954.

According to our records he has appeared at Conventions since about 1948, and was elected to the Executive in Margate during 1957, and he finally became Vice-President in 1961.

Clr. Northcote did tell you a fair amount about East London and some of the Past Presidents of East London. I don't know if I am entirely in order in suggesting to our members that one must not believe everything one reads. I arrived here on Saturday afternoon in the rain, and I spent yesterday afternoon watching the penguins being fed, in the wind, and I like this little publication that has been given to us about East London, and may I quote: "The months of April, May and June, are however regarded by the majority of visitors as the best time to spend a holiday in East London." (Laughter.)

"Whereas other resorts along the South African Sea board, are rather in the throes of winter or sweltering in tropical heat, East London during that period has neither rain nor wind, and the sun gives off just sufficient warmth to make your holiday the best ever."

In support of that, ladies and gentlemen, we had a very excellent cocktail party last night, in the quadrangle. And everyone appears in winter furs, extra sweaters and things like that so once again you can't believe all you read!

Ladies and gentlemen I have very much pleasure in supporting Clr. Northcote in his proposal that our Percy should be our President for the ensuing year, and in turn I wish him all the very best of luck, and am sure he will make a very successful President. (Applause.)

THE PRESIDENT: Thank you Mr. Kane. Are there any further nominations? If not, I have much pleasure in declaring Mr. Percy Giles, City Electrical Engineer of East London as being duly elected President for the ensuing year, and he has my very sincere congratulations.

May I ask His Worship the Mayor to invest Mr. Giles with the Chain of Office. (Applause.)

HIS WORSHIP THE MAYOR: Ladies and gentlemen, let me say at the outset, I feel highly honoured in being asked to invest our mutual friend Percy Giles this morning.

He is a man amongst men, someone who endears himself to everybody with whom he comes in contact. The honour which has been conferred on him is an honour, which I understand, is well deserved; he has brought honour to the city and we are extremely proud of him, and we only hope that he will serve the rest of his days in the East London Municipality's service, and that no other Municipality is going to take him from us.

On behalf of the City of East London I am going to congratulate you, Percy. I am going to wish you in advance a very happy and successful term of office, and I now have much pleasure in investing you with the insignia of that office.

THE PRESIDENT (Mr. Percy Giles, East London): Thank you Mr. Mayor.

Mr. Mayor, Mr. Lombard, Prof. Heydorn, ladies and gentlemen: It is with some trepidation that I undertake this task; I can see that a very high standard has been mentioned. I only hope my capabilities will enable me to fulfil it. The ideals of the association I uphold with the greatest amount of force that I can command, and I will do my very best to make this Convention a success — and I'll do it with your help.

Thank you very much. (Applause.)

Now ladies and gentlemen, my first task is to call for nominations for the office of Vice-President.

Mr. G. J. MULLER (Bloemfontein): Mr. President, most of the engineer members of the Executive have been in the Chair, and some of us, in the normal course of events, have had a second term. There are, however, members who, because they are situated near the centre of activity, and because they were willing horses, have borne, and are still bearing, more than their fair share of the work which devolved on the Executive Council, and one of whom this is particularly true is Mr. Jack Downey of Springs.

As you know, much of the work which must be done has to be done by members on the Rand, as it involves frequent meetings and discussions in Johannesburg and Pretoria.

Of this work, the major share was offloaded on Mr. Downey and, as can be judged by the number of reports for which he is responsible, you can assess the amount of work which he is doing for this Association.

He has always shouldered these duties with enthusiasm and I feel that a substantial gesture of recognition is due to him. As none of us is getting any younger there is no time like the present to take steps in this direction. A second term of office before he retires would, I consider, be a fitting recognition for the outstanding service he is rendering, and with this in view I have great pleasure in proposing Mr. Jack Downey as Vice-President for the ensuing year. (Applause.)

THE PRESIDENT: Thank you Mr. Muller.

May I have a seconder to Mr. Muller's proposal, please.

Clr. F. F. DEYSEL (Springs): Mnr. die President, dit is vir my baie aangenaam om een van die eerstes te wees om u geluk te wens met u verkiesing tot die hoë amp van President.

Laat my toe, mnr. die President, om ook Oos-Londen geluk te wens met die besondere eer wat hulle te beurt geval het.

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Ek verstaan dat Rd. Northcote nie baie van sigare hou nie, maar ek glo dat Oos-Londen, noudat hulle hul eie President het, nie sal toelaat dat sulke klein dingetjies tussen hulle en die President sal wapper nie.

Graag wil ek nou mnr. Muller van Bloemfontein se voorstel sekerder. Dit is vir Springs inderdaad 'n oer en 'n voorreg dat hulle Elektrotegniese-ingenieur genoomer is as Vice-President. As mnr. Jack Downey aan hierdie vereniging dieselfde goeie dienste lewer as wat hy aan Springs lewer, en ek is seker hy sal, dan glo ek dat u met hom en sy diens net so trevede sal wees as Springs.

Ek verstaan mnr. die President dat Margate hul bereidwilligheid te kenne gegee het om ons volgende jaar te ontvang. En nou wil ek somar twee voëls met een klip tref. Ek sien hier op die Agenda dat ons ook vanoggend moet besluit oor die vergaderplek vir volgende jaar, en nou wil ek namens Springs u uitnooi om u volgende Konvensie in Margate te hou.

Baie graag sou ek u na Springs wou nooi, aangesien ons in Springs baie lief is om met ons dorp te spog, maar ongelukkig verkeer ons in dieselfde dilemma as Germiston — ons beskik nie oor voldoende hotel-akkommodasie nie.

Mr. President, it now affords me really great pleasure to formally second Mr. Jack Downey as Vice-President of this Association for the ensuing year, and in the second place to propose that the 37th Convention be held at Margate.

THE PRESIDENT: Thank you Mr. Deysel.

Mr. Deysel has seconded the proposal that we elect Mr. Jack Downey as Vice-President, and he has coupled with it that the venue of the next Convention be Margate.

I think we all remember a very happy and successful Convention having been held in Margate in 1957, so in order to deal with this matter I propose to put the propositions to you together, and I suggest that you accept Jack Downey as Vice-President, and that the venue of the next Convention be Margate.

If you do, would you kindly give me your support by acclamation. (Applause.)

Thank you ladies and gentlemen. Your wishes are granted. May I call upon Jack Downey to approach the platform. (MR. DOWNEY WENT UP TO THE PRESIDENTIAL TABLE.)

We have now welcomed Jack Downey to the 'beauty chorus'! (Convention Announcements followed before the tea interval.)

TEA ADJOURNMENT.

On Resuming After Tea:

THE PRESIDENT: Ladies and gentlemen, the first thing is a telegram from Horace Eastman with best wishes for a successful Convention, and he is sorry he will be unable to be present. We fully expected Horace Eastman to be here, and most of us looked forward to it, and we were almost certain he was in the hall. Anyway, he sends his greetings and he is with us in spirit.

Also George Honiball of Windhoek — this is your first Convention, and on behalf of the members of the Association I wish to welcome you into the body of the hall. The secretary

has received a number of apologies and I will ask him to read them out.

THE SECRETARY: Thank you Mr. President. Ladies and Gentlemen, first of all I have just received a telegram from Robert Sibson, wishing you, Mr. President, every success and all of us a very successful Convention.

Then we have a telegram from Mr. Morris, who was going to represent the President of the Federated Chamber of Industries. He has been precluded from attending at the last minute and sends his very good wishes.

We have a telegram of apology from Albert Rossler, and he also congratulates you, Mr. President, on your election.

A telegram has also been received from Mr. Rush of Vryheid, who regrets his inability to attend.

The President referred earlier to the attendance of Mr. Simpson from Great Brak Rivier; actually he isn't in the hall yet but he hopes to be with us on Tuesday afternoon.

We have an apology from Winburg — they are unable to attend at the last minute.

Those are the telegrams we have received this morning.

We have apologies from the Municipality of Bethlehem; the Town Council of Krugersdorp; Municipality of Gatooma; Harrismith Municipality; the Councillor representation in respect of Boksburg; the Municipality of Umtata; the Town Council of Alberton; Lydenburg Municipality; Ceres Municipality; Middelburg Municipality; the Borough of Port Shepstone; Vryburg Municipality; the Town Council of Kempton Park; the Borough of Eshowe; the Town Electrical Engineer of Bloemhof; the Provincial Administration of the Province of the Cape of Good Hope; the Public Works Department, Maseru; the Provincial Secretary, O.F.S. the Provincial Secretary, Transvaal Provincial Administration; the Transvaal Coal Owners' Association; Mr. H. P. Alexander of E.S.C.O.M. Natal Undertaking; the Bantu Affairs Commissioner East London; the Chief Electrical Engineer, The Department of Public Works and the Secretary for Labour, Pretoria; the Chairman of the Fuel Research Institute of South Africa; the Chairman of the I.D.C.; the President of the Transvaal and the O.F.S. Chamber of Mines; the President of the Steel and Engineering Industries' Federation of South Africa; the Director of Local Government, Transvaal Provincial Administration; The Director of Public Works, Mbabane, Swaziland; the Provincial Secretary, Natal; the Federal Minister of Works, Salisbury; Mr. B. P. Couchman; Mr. Dave Lazarus, Deputy Mayor of East London; Mr. Dirk Hugo, City Electrical Engineer of Pretoria; and from Mr. R. M. O. Simpson, City Electrical Engineer of Durban. (He is proceeding overseas within the next few days so he couldn't be with us.)

Mr. Bob Leishman, Deputy General Manager, Electricity Dept., Johannesburg and Mr. R. J. S. Wiley, Germiston.

Then we have some Affiliates who have apologised for their non-attendance. Contactor (Pty.) Ltd.; A.E.I. of Central Africa, Samuel Osborne. That concludes the list Mr. President.

THE PRESIDENT: Thank you Mr. Ewing.

Ladies and gentlemen, since our last meeting three staunch friends of the Association, all Past Presidents, have been promoted to higher office. I refer to Mr. J. L. van der Walt and Mr. J. E. Mitchell, who are with us here today, and Mr. A. R.

Sibson of Bulawayo, who unfortunately could not attend this year, but hopes to attend next year.

Mr. van der Walt as you all know has been appointed Town Clerk of Vereeniging, and he leaves the scene of Municipal Electricity Engineering for the field of administration in public affairs.

Mr. Mitchel has been appointed to the Rhodesia Congo Border Power Company. He leaves the very marked confines of municipal electrical engineering for the broader climes of commercial engineering.

And Mr. Sibson joins the Federal Power Board, as a part-time member, and leaves the municipal scene to join the national scene in Rhodesia.

The Association in the past has been very fortunate in having the services of these gentlemen on the Executive. They are extremely capable men and I think it would be a pity for the Association to lose their services entirely, and to ensure that at least we have some control of them, I think we should do something about it. The retiring President mentioned it this morning.

As both Mr. Mitchell and Mr. van der Walt are present here today, I think we could consider (and I put this proposal to you) electing these two gentlemen Honorary Members of the Association.

I was going to ask you to accept the proposal by acclamation, but you have anticipated me. I think I had better just formally announce that Mr. Mitchell and Mr. van der Walt are now elected Honorary Members of the Association — the highest office that we can give them, apart from the Presidency, I hope!

I see Mr. Ewing has all the envelopes ready, and this is a very interesting ceremony we are going to perform now. Our retiring President has served the Association very well during the last year of office, and I am going to call upon him together with the honorary members, in sequence, to come forward to the platform, to receive their tokens and certificates, as a measure of respect in which we hold them, and as a tribute to the work which they have done for the Association.

Mr. Lombard will you kindly come forward?

(Mr. Lombard, Germiston, received his award.)

THE PRESIDENT: Mr. Lombard I congratulate you on your year of office, and on behalf of the Association I have very great pleasure in attaching to your lapel, a badge of office which is a token of the esteem in which we hold you, and to present to you a certificate commemorating your office.

Mr. C. LOMBARD (Germiston): Thank you, Mr. President. I can assure you that I shall treasure these tokens all my life.

THE PRESIDENT: Mr. Mitchell, would you kindly step up to the platform?

(Mr. Mitchell received his award.)

Congratulations Mr. Mitchell on your promotion. This is one of the most important things (you've already got a badge of this sort), but this is a much better one than you had before, I have great pleasure in pinning it on you, and asking you to accept it as a token of our esteem.

Mr. J. E. MITCHELL (Salisbury): Thank you very much, Percy. First of all as it is my first appearance on the platform

at this Convention, I would like to congratulate you, Mr. President, and wish you a very happy and successful year of office. I have known you for a long, long while and I'm sure you'll make a wonderful job of it.

I'd also like to congratulate you on these wonderful decorations on the stage. I don't think we have had a stage which has been anything like this one during the period of my Conventions with the A.M.E.U.

And turning to my audience, I have been looking up some of the past Conventions, and I am very sorry for the hours during which you've had to listen to me! I find it runs into many.

And talking of audiences, reminds me of a little thing I saw in the paper today where there was a school concert and the press was reporting it, and they reported this way — That when the curtain went up he noticed that the audience was full of expectant mothers anxiously awaiting the arrival of their offspring!

You may be expecting that, but I would just like to say this, that, in accepting this honorary membership, I would like to think that it is not just for my work on the Association, not for my work on the Executive, not even for my work on the Members' Forum, but for what I hope I have endeavoured to do and that is to bring the Rhodesias and the Republic nearer together. (Applause.)

Mr. GILES (President): I said that Jimmy had gone into the broader climes of engineering, and I can see his mind has already broadened.

Having dealt with the engineers, I think it is now my job to deal with the Town Clerks.

I have very great pleasure in asking Mr. van der Walt to come forward.

Congratulations, Van, on your promotion to higher office. You were an infant prodigy in the Association, and you are now an infant prodigy as a Town Clerk. I have great pleasure in conferring this emblem of office upon you, I wish you great success in the future, and thank you for the work you have done in the Association.

Mr. J. L. VAN DER WALT (Vereeniging): Thank you very much.

Mr. President, if I may follow Jimmy I wish to congratulate you on being elected President of this Association. It is a very high honour.

You know, when I saw my name on the list as a visitor, I turned pale blue, and I wondered whether it was a reflection of the faces that made yours red. I think it should have been green.

Mnr. die President, dit is vir my 'n baie groot eer om die erkenning van u te ontvang. Ek is jammer, maar dit is nie my skuld dat u nie ook 'n verhoogde status tot stadsklerk verkry het nie. Dit laat my baie dink aan 'n grappie van 'n Gammat wat vir die afgelope tien jaar voor dieselfde magistraat elke Maandag verskyn het vir dronkenskap. Toe die magistraat vir hom gesê het, „Gammat, ek is sat en moeg daarvan om vir die afgelope tien jaar jou elke dag hier te sien vir dronkenskap. Wat het jy te sê?" „Well, djou Honour," sê hy, „dit is nie my skuld omdat djou honour nie promotion gekry het nie."

Dit is met 'n tikkie van weemoed dat ek hierdie lidmaatskap ontvang want dit meen miskien dat ek nie meer so aktief in hierdie Vereniging se werksaamhede kan deelneem nie, waarvoor ek so lief geword het. Ek het dit baie waardeer; ek het dit baie geniet; maar ek vertrou tog dat dit nie my laaste dae sal wees wat ek met u sal saamverkeer nie.

Thinking of the last days also reminds me of the story of the English-speaking South African and the Afrikaans-speaking South African that had a little private competition. They would describe scenes from famous books, and then the other one had to guess which book.

The English-speaking South African would start first. He said: "You know the other day I walked in a beautiful valley, and this valley was really beautiful and green. What is the title of the book?" So the Afrikaans-speaking South African thought for a while and said: "I'm sorry, I don't know." "Well, it's 'How Green was my Valley'." So the other South African said: "The other night I had a dream that I was going to a Convention in East London, and I had a flat tyre. I got out the pump from the car and I was pumping because my progress was going to depend on whether I would pump up the wheel. All of a sudden the pump burst. What book does that remind you of?"

So the English-speaking South African thought. He said: "No, I'm sorry I can't guess the name of that book." "The last days of Pompeii, hey?" (Laughter.)

Mr. President, I hope that this will not be the last days of this 'pompeii hey.'

I wish to thank you and your Executive for the pleasant association that I have had with you. It was your co-operation that made it so pleasant for me.

I also wish to thank Past Presidents of the older school, and past members of the Executive. I see quite a number of them here. You welcomed them this morning. I wish to thank them as well for their wise counsel, which made a very much wiser man of me in the earlier days.

I also wish to thank the secretary for his co-operation and the very pleasant 'working together' that we had. Thank you very much, Dick.

I wish to thank the Bureau of Standards with whom I have had many pleasant dealings through the activities of this Association; and I also think of the Recommendations Committee. They were a tough lot of technical barbarians, but I still treasure the spirit in which our deliberations took place.

I also wish to thank the members of this Convention for their confidence in me and for having elected me to the Executive for such a long period.

Mnr. die Voorsitter, nogmaals baie dankie vir die groot eer wat u my aandoen vir hierdie hoogste toekenning, ek sal dit waardeer, en alle sukses en voorspoed vir die Vereniging vir die toekoms.

THE PRESIDENT: Ladies and gentlemen, it is now time to call upon the delegates to vote for the appointment of six members to the vacancies on the Executive Council. You must gather your papers together, — ballot papers have been provided, and if you will just look at them, and turn them over, you'll find there are some notes on voting procedure.

I have been asked a number of questions, and trading on your good nature I'd just like to go over one or two of them.

The members entitled to vote are: Honorary Members, who are of course in a class by themselves, but each local Supply Authority or each Member Undertaking, may have two votes — one from the councillor and one from the Engineer Representative.

Having nominated or mentioned those who are entitled to vote, are there any delegates who are, in their opinion, entitled to a vote and who haven't got ballot papers? Will you kindly stand up and we'll provide them!

I have to remind you of the provisions in the Constitution (I'm certain you haven't looked it up recently—and I hope I am not boring you), which requires that each Province shall have at least one Member Undertaking represented on the Executive. The Federation is regarded as a Province.

Also in terms of the Constitution, you have already a number of members on the Executive — the first are the President and Vice-President, on the rostrum here. Then the two Past Presidents, Mr. Lombard, and Mr. Simpson, of Durban, and the Branch Chairman of the Cape Eastern Branch, Mr. Beard, of Grahamstown.

These members who are already on the Executive represent the Provinces of Natal, the Transvaal, and the Cape, so in your voting you will decide the representatives of the Rhodesias and the Orange Free State.

The members of the Executive who are retiring, and who are eligible for nomination, are Mr. G. J. Muller of Bloemfontein; Mr. R. W. Barton of Welkom; and Mr. R. W. Kane of Johannesburg.

I now call for nominations and will please write the names on your scrap paper.

The following members were nominated for election to the Executive Council.

- Mr. J. C. Waddy, Pietermaritzburg.
- Mr. R. W. Kane, Johannesburg.
- Mr. G. J. Muller, Bloemfontein.
- Mr. H. T. Turner, Umtali, S. Rhodesia.
- Mr. E. L. Smith, Boksburg.
- Mr. H. J. Klopper, Knysna.
- Mr. W. Beesley, Livingstone.
- Mr. W. Rossler, Kroonstad.
- Mr. D. Murray-Nobbs, Port Elizabeth.
- Mr. J. I. Inglis, Pietersburg.
- Mr. R. W. Barton, Welkom.
- Mr. A. F. Turnbull, Vereeniging.
- Mr. J. K. Von Ahlfen, Sasolburg.
- Mr. M. P. P. Clarke, Somerset East.
- Mr. D. J. Hugo, Pretoria.
- Mr. F. Stevens, Ladysmith.
- Mr. J. A. Mathews, Kimberley.
- Mr. G. C. Theron, Vanderbijlpark.
- Mr. J. Downey took the chair.



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Presidential Address

by P. A. GILES

Departmental Administration.

In the past it has been the privilege of those elected to the office of President of this Association to choose freely of any topic as the subject for this address and in exercising this concession I venture to speak to you on the objectives associated with the administration of a Municipal Electricity Department.

This is a subject which comes under the purview of both Councillor and Engineer members of the Association and is one that in my opinion merits attention at all times, being of significance and importance in the promotion of productive activity. The implications are broad in scope and much of which is proposed to be said can be characterised as commonsense or non-controversial in nature. However, experience has shown that in many cases the ideas and thinking forming the basis or the background of the remarks which follow are not self-evident and it is suggested that a restatement of the purposes of the details of administration can be both valuable and constructive.

With a view to clarification at the outset it is suggested that certain terms which shall be used should be defined. In a dictionary sense the purpose of administration is to direct. In some quarters it is suggested that this resolves itself into two main functions. To determine and to manage. These are regarded as separate functions and both arise in the first instance out of a directive given.

The determinative aspect is normally in the hands of the Council and calls for the formulation of a policy in respect of labour, finance and organisation.

The management aspect is taken to be the responsibility of the heads of departments who carry out the policy laid before them.

A policy is generally regarded as a course of action determined by the Council for the guidance of the Departments who thus become aware of the precise aims and objectives of the Councillors. In this way policy provides the Departments with a defined objective which is valuable as a guide to planning. Under present conditions one imagines that a definite objective would be economy in all branches and that the plan for achieving this would be selective in its application. Whatever plan is decided upon would necessitate an examination of the functions of management in the light of the permanent and important requirements of Municipal Administration to enable a selective and objective approach to be made to the problems of economy and efficiency. Any time devoted to such a study would be well spent.

In a large organisation the lines of relationship and demarcation between the determinative aspects of administration in the hands of the Council and the management aspects in the hands of the departmental heads tend to become more clearly defined and separate than is the case in a small concern.

Presidensiële Rede

deur P. A. GILES

Departementele Administrasie.

In die verlede was dit die voorreg van diegene wat tot die Voorsittersamp van hierdie Vereniging verkies is om vryelik enige onderwerp te kies vir hierdie rede en by die uitoefening van hierdie toeweging waag ek dit om u toe te spreek oor die doelstellings wat met die administrasie van 'n Munisipale Elektrisiteitsdepartement gepaard gaan.

Hierdie is 'n onderwerp wat beide Raadslid- en Ingenieurslede van die Vereniging raak en wat, na my mening, ten alle tye aandag verdien aangesien dit van betekenis en belang is in die bevordering van produktiewe aktiwiteit. Die implikasie is breed in omvang en baie van wat ek voornemens is om te sê kan as onbetwisbare gesonde verstand bestempel word. Die ondervinding het egter getoon dat in baie gevalle die denke en idees wat die grondslag of agtergrond vorm van die hieropvolgende aanmerking nie vanself blyk nie en ek gee aan die hand dat 'n herhaling van die administratiewe detail beide waardevol en opbouend kan wees.

Duidelikhedshalwe word voorgestel dat sekere terme wat gebruik gaan word uit die stanspoor omskryf moet word. In 'n woordeboeksin is die doel van administrasie om te bestuur. In sommige kringe word aan die hand gedoen dat dit homself in twee hofunksies ontlee. Om te beslis en te bestuur. Hierdie word beskou as twee aparte funksies en beide het in die eerste instansie hulle oorsprong in 'n opdrag wat gegee word.

Die beslissende aspek is normaalweg in die hande van die Raad en dit vereis die formulering van 'n beleid ten opsigte van arbeid, finansies en organisasie.

Die bestuursaspek word beskou as die verantwoordelikheid van departementshoofde wie die beleid wat hulle voorgelê word moet uitvoer.

'n Beleid word in die algemeen beskou as 'n wyse van optrede wat deur die Raad voorgeskryf word as leidraad vir Departementshoofde wie dan op die wyse bewus word van die juiste mikpunte en doelstellings van die Raadslid. Op hierdie wyse verstrekkende beleid die Departement met 'n duidelike mikpunt wat 'n waardevolle gids by beplanning is. In die huidige omstandighede stel mens jou voor dat besparing in alle verakkinge 'n definitiewe doelwit sal wees en die plan wat beraam word om dit te bereik selektief toegepas sal word. Watter plan ook aanvaar word sal 'n ondersoek na die bestuursfunksies in die lig van belangrike en permanente vereistes van Munisipale Administrasie noodsaaklik wees teneinde 'n selektiewe en objektiewe benadering tot die vraagstukke van besparing en doeltreffendheid moontlik te maak. Enige tyd wat aan so 'n ondersoek gewy word sal goed bestee wees.

In 'n groot organisasie, anders as in klein ondernemings, neig die verwantskaps- en skeidingslyne tussen die beslissende aspek van administrasie in die hande van die Raad en die bestuursaspekte in die hande van Departementshoofde om meer en meer duidelik omskryf en van mekaar afgesonderd te word.

This division becomes especially striking when an examination of the results achieved discloses that more efficient utilisation of the work of the staff is necessary and essential.

The needs that then become seen lead towards improvements in the shape and structure of the organisation and the management, control and application of the staff energies and activities.

To achieve these improvements it is usually incumbent upon an administrative authority to promote the efficient routing of work items, to evolve orderly procedures, to institute departmentalisation, to define specialisation and to systemise the productive and routine work of the departments.

The aims lead to the formulation of courses of action and in regard to departmentalisation, given hereunder is a list, not necessarily complete of the suggested functions of a department dealing with the management of an Electricity Supply Undertaking.

Experience has shown that in municipal work, as elsewhere, the urgent is often the enemy of the important. Very frequently the need for decision and action on immediate emergencies seems to preclude a study of an existing organisation which is essential as a basis for achieving efficiency. Very often the neglected problems of the past suddenly arise in their new importance and become the new emergencies to which quick response is necessary, generally with improvisations that may prove uneconomical in the long run. It follows therefore that it is preferable to operate on an organised rather than an emergency basis when dealing with long term management tasks and problems.

In regard to these matters, there is a considerable body of principle that can be taught but each undertaking is required to develop its own method of approach to the work and ascertain where the emphasis has to be placed.

In municipal work, according to some authorities, any study of an existing organisation would emphasise that the Councillors should confine themselves to essentials and have proper data presented to them to enable the right decisions to be made; that arrangements are made for the proper delegation of authority to committees and heads of departments; that steps are taken to ensure that there is close co-operation between departments; that sufficient time is given to the management to plan for the future and that for day-to-day working the system should be largely decentralised with responsibility carried well down the line.

Functions of Administration.

It is generally accepted that any rules for the administration of an organisation should establish and limit the rights and duties of every office and position in the concern in such a way, as, so far as possible, to bring about for both the present and the future, an assured order and harmonious co-operation to thereby ensure the success of the whole as well as the welfare of the individual.

The Council, it has been suggested, should concern itself with and limit itself to the working out of the general policies and plans, and exercise co-ordination, supervision and control

Hierdie verdeling word veral treffend wanneer 'n ondersoek van reeds behaalde resultate openbaar dat 'n meer doeltreffende gebruik van die personeel noodsaaklik is.

Gebreke wat dan openbaar word lei tot verbetering in die struktuur van beheer en organisasie en die beheer oor 'n aanwending van die personeel se energie en werksaamhede.

Teneinde hierdie verbetering te bewerkstellig is dit gewoonlik die plig van die administratiewe owerheid om die doeltreffende verdeling van werksisteme te bevorder, orderlike werksprosedures te ontwikkel, departementalisasie in te stel, spesialisasie te omskryf en die produktiewe en roetine werk van die departement op stelselmatige voet te plaas.

Hierdie doelstelling lei tot aksiebeplanning en sover departementalisasie betref word hieronder 'n lys aangegee wat nie noodwendig volledig is nie, van die voorgestelde funksies van 'n departement wat handel met die bestuur van 'n elektrisiteitsvoorsiensonderneming.

Die ondervinding het geleer dat in munisipale werk, net soos op ander gebede, dringende sake gewoonlik die vyand is van ander wat belangrik is. Baie dikwels sluit die noodsaaklikheid vir beslissings en optrede in verband met 'n onmiddellike noodtoestand die bestudering van 'n bestaande organisasie wat vir die bereiking van doeltreffende noodsaaklik is skynbaar uit. Dikwels neem die verwaarloosde probleme van die verlede skielik nuwe gedaantes aan en word hulle die noodstoelende van die hede wat snelle handeling, dikwels deur improvisasie wat op lange duur gewoonlik onekonomies is, noodsaaklik maak. Dit spreek dus vanself dat dit verkieslik is om te werk te gaan op 'n georganiseerde eerder as op 'n noodsbasis wanneer met langtermyn bestuurstake en -probleme gehandel word.

In hierdie verband is daar 'n aansienlike aantal beginsels wat aangeleer kan word, dog van elke onderneming word verlang dat hy sy eie benaderingsmetode tot die werk moet ontwikkel en self moet vasstel waarop die klem geplaas moet word.

In Munisipale werk sou enige studie van die bestaande organisasie, volgens sommige gesaghebbendes, benadruk dat Raadslede hulle sal bepaal by noodsaaklike dinge en dat behoorlike gegewens aan hulle voorgelê sou word teneinde hulle in staat te stel om tot die korrekte beslissings te geraak; dat reëlings getref sou word vir die behoorlike delegering van gesag aan komitees en departementshoofde, stappe gedoen word om 'n noue samewerking tussen departemente te verseker, dat aan die bestuur voldoende tyd gegee sou word om die toekoms te beplan en dat die stelsel, vir die doeleindes van daaglikse werksaamhede, grotendeels gedentraliseerd sal wees met verantwoordelikheid wat so verdeel is dat die laere range ook daarin sal deel.

Administratiewe Funksies.

Algemeen word aanvaar dat enige reëls vir die bestuur van 'n organisasie die regte en pligte verbonde aan elke pos moet vasstel en beperk op so 'n wyse dat vir die hede en die toekoms 'n versekerde en harmonieuse samewerking daargestel kan word en die sukses van die geheel sowel as die welsyn van die individue sodoende verseker word.

Daar is aan die hand gegee dat die Raad homself moet bemoei met en beperk tot die formulering van algemene

but should not concern itself with the day-to-day activities of management.

1. It is clear that it is essential for the Department to offer to the Council an administration which serves the Council's wishes as defined in policy decisions or statements.

2. The Department should co-ordinate with other Departments but at the same time be objective and impartial in its outlook and the relations and workings between the Department Heads should permit of the maximum initiative and latitude within the framework of the Council's policies.

3. The Department should provide an agenda covering all pending business supported by complete reports on every decision required of the Council, so constructed and modulated as to impress the public with the way the Council conducts its affairs.

4. A procedure should be evolved to establish public relations between the Department and the business people, civic groups and consumers which makes each party feel that it has the friendly co-operation of the Department and Council.

5. Arrangements should be made, that whenever contact between the Department employee and the public occurs, the actions and behaviour of the employees reflect the policies of the Council.

6. The Department should arrange for regulations to be worked to and which govern each situation as completely and wisely as possible, which are defensible in court, which provide equal treatment, which are clear of repetitions and references, which are properly modified and are readily understandable by the public.

7. Provision should be made for an uncomplicated costing and accounting system which renders reports of revenue and expenditure at any time, which provides financial detail promptly so as to control expenditure and transactions, which pays accounts promptly and passes the scrutiny of annual and provincial audits smoothly.

8. A personnel programme which is sensitive to Council wishes yet provides effective staff workers and relieves the Council of involvement in supervisory problems should be instituted.

9. The Department should provide a complaints service geared to local conditions and to the human side of life providing maximum protection and services to consumers with complaints handled promptly, efficiently and courteously.

10. The Department should establish an electrical inspections service which observes all the codes, standards and regulations, yet which is realistic in recognising consumer and contractor problems.

11. The Department should arrange for a legal service which meets the letter of the law laid down by the Electricity Act and other Government, Provincial and local laws and regulations to protect the interests of the Council and to provide a means to avoid stultifying the Council's action where this is possible.

planne, 'n algemene beleid en die uitoefening van ko-ordinasie, toesig en beheer, maar hom nie behoort in te meng met alle-daagse bestuursaktiwiteite nie.

1. Dis duidelik noodsaaklik dat die Departement aan die Raad 'n administrasie verskaf wat die Raad se planne soos in beleidsverklarings en -beginsels uiteengesit sal uitvoer.

2. Die Departement moet met ander Departement ko-ordineer maar moet terselfdertyd objektief en onpartydig wees in sy uitkyk en die verhouding en werkverrigting tussen hoofde van Departemente behoort die maksimum van inisiatief en speling binne die raamwerk van die Raad se beleid toe te laat.

3. Die Departement moet 'n agenda opstel, gestaaft deur volledige verslae oor alle hangende sake wat Raadsbesluite verg, op so 'n wyse dat die publiek beïndruk word deur die wyse waarop die Raad sy werksaamhede verrig.

4. 'n Prosedure behoort uitgewerk te word waardeur verhoudings tussen die Departemente, die sakegemeenskap, burgerlike groepe en verbruikers geskep word wat elke groep sal laat voel dat dit die vriendelike medewerking van die Departement en die Raad geniet.

5. Daar behoort gereël te word dat die optrede en gedrag van werknemers die beleid van die Raad weerspieël wanneer die werknemer ook met lede van die publiek in aanraking kom.

6. Die Departement moet reëlings tref vir werksregulasies wat elke situasie so volledig en verstandelik moontlik dek, wat in 'n Hof gereverdig kan word, vir gelyke behandelingsvoorsiening maak, vry is van herhalings en verwysings, behoorlik gekodifiseer is en wat deur die publiek gereedlik verstaan kan word.

7. Voorsiening moet gemaak word vir 'n ongekompseerde stelsel van kosteberekening en boekhouding waaruit te eniger tyd verslae van inkomste en uitgawes opgestel kan word, wat finansiële besonderhede gereedlik versterk sodat uitgawes en transaksies beheer kan word, rekenings onmiddellik verifieer kan word en wat tog die toets van die jaarlikse Provinsiale audit kan deurmaak.

8. 'n Personeelprogram moet ingestel word wat voeling hou met die wense van die Raad en tog voorsiening maak vir 'n doeltreffende werkspersoneel en dus die Raad vrystel van toesighoudende probleme.

9. Die Departement moet voorsiening maak vir 'n klagediens wat ingeskakel is met plaaslike omstandighede en die menslike sy van die lewe, wat aan verbruikers op doeltreffende en beleefde wyse die maksimum beskerming en diens bied in verband met die spoedige afhandeling van klagtes.

10. Die Departement moet 'n elektriese inspeksiediens instel wat alle kodes, standaarde en regulasies nacom en tog realisties is in die erkenning van verbruikers en kontrakteurs se probleme.

11. Die Departement moet reël vir 'n regsdiens wat voldoen aan die letter van die wet soos neergele deur die Elektriesiteitswet en ander Regerings- en Provinsiale wette, plaaslike verordeninge en regulasies, die belang van die Raad beskerm en as 'n middel dien om sover moontlik te verhoed dat die Raad se handeling verrydel word.

12. The establishment of beneficial relations with adjoining Municipalities, Government and Provincial Departments which gain for the Council the maximum advantage and harmony in governmental relations should be fostered.

13. A planning programme should be drawn up which recognises the limits of basic requirements from time to time and balances the rate of development to the City's needs.

14. A tariff structure should be worked out which provides sufficient funds to operate the service and meet outgoings properly chargeable to revenue yet which is reasonable in its demands on the groups charged and recognises their limitations in sharing costs.

15. Provision should be made for co-ordination, procedure and facilities within the Department and in relation to other departments, aimed at maximum efficiency fully accepted by those involved.

16. Arrangements should be made to provide a records system which is systematic permanent and accurate, yet simple enough to produce documents and plans without undue delay or confusion.

17. Provision should be made for a budget which makes for easy consideration in open Council, which can be heard publicly by the Council without doubt as to its correctness; which can be considered in full participation by the Council, ratepayers associations and ratepayers meetings, which is related precisely to the accounting system, which contains a minimum margin of estimates error, which comprehends all sensible departmental needs as regards maintenance of assets and capital improvements programmes, which provides sufficient funds for budgetted services and withal is not inflated.

It is suggested therefore that these are the heads under which the function or management in the administrative sense, excluding the technical aspects, could be listed in respect of a Municipal Electricity Undertaking. The major function of the Department is probably the preparation of the budget as this epitomises the work of the undertaking in the denominator common to all Departments, that of money, and makes provision for the necessary finance to work and develop. For these reasons it is proposed to enlarge in this topic in the next few paragraphs.

The Budget.

The preparation of the budget is the most important administrative event of the year bringing all Departments together in detailed consideration of the operation and future of the undertaking in the general development of the City Council's activities. The manner and emphasis of these considerations and deliberations vary but in general the trend is to review probable operations over a period of a year or years and prepare an estimate of cash resources to meet the needs of the programme envisaged. In spite of its brevity the word budget is one of the most complex in the language because of the number of procedures to which the word is applied. It is generally accepted that four classifications can be distinguished.

12. Die daarstelling van voordelige verhoudinge met omliggende Munisipaliteite, Staats- en Provinsiale Departemente wat vir die Raad die grootste voordeel en harmonie in sy onderhandelinge met die owerhede sal verseker moet bevorder word.

13. 'n Beplanningsprogram moet opgestel word wat die perke van die basiese vereistes van tyd tot tyd erken en die tempo van ontwikkeling balanseer met die stad se behoeftes.

14. 'n Tariefstruktuur moet uitgewerk word wat voldoende fondse sal verskaf om die diens te laat vlot en uitgawes wat behoortlik teen inkomste gedebiteer behoort te word te kan dek maar wat tog redelik is in sy eise teen die groepe op wie hy druk en hulle beperkings om in die koste te deel erken.

15. Voorsiening moet gemaak word vir ko-ördinasie, werksmetodes en fasiliteite binne die Departement en in verhouding tot ander departemente wat maksimum doeltreffendheid ten doel het en ten volle deur die daartoe betrokke persone aanvaar word.

16. Reëlings moet getref word vir 'n permanente, stelselmatige en akkurate rekordstelsel wat tog eenvoudig genoeg is om rekords en planne sonder onnodige vertraging of verwarring te voorskyn te bring.

17. Daar moet gesorg word vir 'n begroting wat gerieflik in 'n ope Raadsvergadering behandel kan word, in die openbaar deur die Raad bespreek kan word sonder dat aan die juistheid daarvan getwyfel word, wat met volle deelname deur die Raad, belastingbetalersverenigings en -vergaderings ooreweg kan word, presies aan die boekhoustelsel verwant is, 'n minimum van speelruimte met skattings bevat, alle merkbare departementele behoeftes in verband met die instandhouding van bates en kapitale verbeteringsprogramme insluit en wat voldoende fondse vir begrotingsdienste sonder inflasie voorsien.

Daar word aan die hand gedoen dat hierdie die hoofde is waaronder die funksie of bestuur in die administratiewe sin, met uitsluiting van die tegniese aspek in die geval van 'n Munisipale Elektrisiteitsonderneming ingedeel kan word. Die vernaamste funksie van die Departement is waarskynlik die opstel van 'n begroting, aangesien dit die werk van die hele onderneming saamvat in die aanduur wat alle Departemente in gemeen het, nl. die van geld, en ook terselfdertyd voorsiening maak vir die nodige middelle om te kan werk en uitbrei. Om hierdie redes word in die volgende paar paragrawe oor hierdie onderwerp verder uitgebeel.

Die Begroting.

Die opstel van die begroting is die mees belangrike administratiewe gebeurtenis van die jaar want dit bring alle Departemente bymekaar in 'n uitgebreide oorweging van die werking en toekoms van die onderneming in die algemene ontwikkeling van die Stadsraad se werksaamhede. Die metode en nadruk van hierdie beraadslagings en oorwegings verskil, dog in die algemeen bestaan die neiging om die waarskynlike werksaamhede oor 'n tydperk van 'n jaar of jare in oënskou te neem en om beramings van kontantbronne waaruit aan die behoeftes van die beoogde program voldoen kan word voor te berei. Sy bondigheid ten spyte is die woord „begroting“ een van die mees gekompliseerde in ons taal want die aantal prosedures wat daarvoor begryp word. Algemeen word aangeneem dat vier klassifikasies onderskei kan word.

1. The budget may be a plan which groups together the various projects which through the year or proceeding years the Council has decided will merit consideration to meet the needs of the public services.

2. The budget may be a forecast of the results expected when consideration is given to the income and expenditure relating to the projects and services under the plan previously drawn up.

3. The budget may be an authorisation to the officials to operate on the estimates of revenue and expenditure authorised by the Council.

4. The budget may be yardstick of what expenditure and revenue ought to be if the organisation is working efficiently.

The underlying feature of a budget, whatever the classification, is a programme of work to be done, or services to be produced to fulfil the objects of the organisation and the manpower and materials needed to accomplish these objectives.

The plan for the budget of a Municipal Electricity Department is mainly technical and is based on the output required to follow the demand which is largely outside of the control of the undertaking. The budget must therefore be founded on estimates of sales or demand. Sound forecasting of probable load is a pre-requisite of the budget. These forecasts must be drawn up in the light of present trends, the anticipated effects of planned developments in methods of generations and distribution and any likely changes in external circumstances which may effect demand. The annual forecast of demand is usually a more detailed refinement of the larger range estimates for planning capital development. Estimates of demand three to seven years ahead are necessary to allow sufficient time to cover Municipal formalities and installation of equipment to produce the output required.

The forecast of the results of a budget is the most agonising period for Municipal Councillors and is an annual process wherein their personal judgments are given expression and reality. This forecast budget is generally in the form of preliminary estimates of probable costs of items deemed desirable by Councillors as ratepayers representatives and the revenue that may be accrued by reason of establishment of these projects. The annual estimate budget may be regarded as a master plan for allocating limited resources between all the different activities that have to be financed from a central pool. This has to be done by weighing the competing claims of different services, deciding what marginal items have to be sacrificed, and examining every possible combination of alternatives to find what will further the public interest more than can be done in any other way with the funds available. There seems to be no simple measurable financial test for determining the best combination and in a democratic system what finally decides the issue is what the Councillors think will be most acceptable to the community as a whole. However, the Municipal Electricity Department is usually regarded as a commercial enterprise with a specific duty to operate on commercial principles and to see that the income from tariff recovery is not less than sufficient to cover expenditure on

1. Die begroting mag 'n plan beteken wat die verskillende skemas saam groepeer wat deur die jaar of volgende aantal jare na mening van die Raad oorweging sal verdien teneinde aan die openbare behoeftes te voorsien.

2. Die begroting mag 'n voorspelling wees van verwagte resultate wanneer oorweging geskenk word aan inkomste en uitgawes in verband met skemas en dienste onder 'n voorheen opgestelde plan.

3. Die begroting mag beteken 'n magting aan amptenare om op te tree onder die beraming van inkomste en uitgawes deur die Raad goedgekeur.

4. Die begroting mag 'n maatstaf wees van wat inkomste en uitgawes behoort te wees as die organisasie doeltreffend werk.

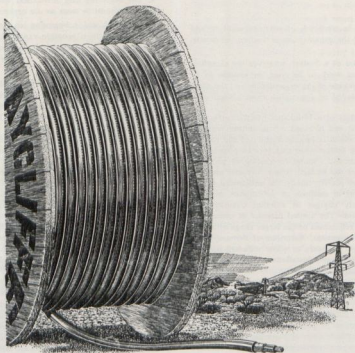
Die kenmerk wat 'n begroting ten grondslag lê, afgesien van sy klassifikasie, is 'n program van werk wat gedoen of dienste wat gelewer moet word teneinde die doelwit van die organisasie te bereik en die mannekrag en materiaal wat benodig word om hierdie doelstelling te bereik.

Die begrotingsplan van 'n Munisipale Elektriesiteitsdepartement is grotendeels tegnies en is gebaseer op die produksie wat nodig is om te voldoen aan die aanvrag wat grotendeels buite die beheer van die onderneming is. Die begroting moet derhalwe gebaseer wees op beramings van verkope of aanvrag. 'n Gesonde voorspelling van die waarsynlike lading is 'n voorvereiste van die begroting. Hierdie voorspellings moet opgestel word in die lig van huidige neigings, die verwagte resultate van beplande ontwikkeling in metodes van kragopwekking en -distribusie en enige waarsynlike veranderings in eksterne omstandighede wat die aanvrag kan affekteer.

Die jaarlikse voorspelling van aanvrag is gewoonlik 'n breedvoerige verfyning van die langtermyn beramings vir die beplanning van kapitale ontwikkeling. Beramings van aanvrag vir tydperke van drie tot sewe jaar vooruit is noodsaaklik teneinde voldoende tyd toe te laat vir Munisipale formaliteite en die installering van toerusting om die benodigde produksie te kan lewer.

Die voorspelling van die uitwerking van 'n begroting is vir Munisipale Raadslede 'n mees angvolle tydperk en dia 'n jaarlikse proses waarin aan hulle persoonlike oordeel uitdrukking en werklikheid gegee word. Hierdie beraamde begroting is gewoonlik in die vorm van voorlopige beramings van die moontlike koste van items wat deur die Raadslede as verteenwoordigers van die belastingbetalers wenslik geag word en die inkomste wat verkry mag word weens die instelling van hierdie skemas. Die jaarlikse beraamde begroting kan beskou word as 'n meestersplan vir die toewysing van beperkte hulpbronne tussen al die verskillende aktiwiteite wat uit 'n sentrale bron gefinansier moet word. Dit moet gedoen word deur die mededingende aansprake van verskeie dienste teen mekaar op te weeg, te besluit watter marginale items opgeoffer moet word en elke moontlike kombinasie van keuses te ondersoek om vas te stel wat die openbare belang tot 'n groter mate sal bevorder as wat anders met die beskikbare fondse gedoen kan word. Daar is skynbaar geen eenvoudige meetbare finansiële toets om die beste kombinasie te bepaal nie en in 'n demokratiese stelsel is dit die wat die Raadslede as die mees aanneemlik vir die gemeenskap as 'n geheel beskou wat uiteindelik die deurslag gee. Die Munisipale Elektriesiteitsdepartement word gewoonlik as 'n sakeonderneming beskou met 'n spesifieke plig om op besighedsbeginsels te werk en toe te sien dat die inkomste

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revenue account over a period of years and for this reason does not appear to be such a problem for Councillors.

The authorisation budget is the final set of figures approved by the Council as the estimates for the year and represents a plan of activity bounded by the authority to spend certain sums or employ certain quantities of manpower and material for specified purposes. It is a set of financial documents drawn up by accountants to distinguish between the two main types of financial transactions in Municipal work, capital expenditure and revenue. A capital expenditure budget is devoted to the proposed acquisition and disposals of fixed assets. A revenue budget contains the expenditures incurred in maintaining the assets and the estimated income to be derived from the electricity tariffs.

Finally, the budget or approved estimates can be used as a yardstick to test the success of the works undertaken for the purpose of attaining the given objectives. With a proper accounting system the Council can use the budget as a means of exercising control over the various departments and in this respect is a valuable aid to management both for formulating policy and keeping a check on its execution. The particular application of budgeting is a major factor leading to efficiency in administration and has some significance in view of the considerable expenditure by Municipal Electricity Undertakings in this country.

In the larger undertakings top management handle the urgent and important business of the day and they require formalised procedures to assist them in decision making and supervision of their subordinates. The budget is of considerable assistance in this respect and helps in promoting order and systematic planning of the departments work.

Efficiency.

It may now be advantageous to pass on to certain questions that arise regarding the attainment of efficiency in management and how this can be achieved. Would it not for example be advantageous to use the budget system to promote efficiency? What in fact are the practical limits to endeavour in achieving efficiency? What is efficiency in terms of the functions of the department? It might be timely to consider these questions in the light of prevailing practice.

A system of management in a Municipal Electricity Undertaking is expected to fulfil two major requirements in the economic sense.

- (a) Devise and operate a public electricity service of adequate capacity to meet the demands of the consumers.
- (b) Improve the operating ratio of expenditure to revenue by day to day control of expenditure.

The first is covered by the capital expenditure budget and the second by the revenue budget.

The answer to the first question raised is that it is advantageous to use the budget to promote efficiency especially by improving the operating ratio of expenditure to revenue. The

verky uit die verkoop van krag nie minder is as wat oor 'n tydperk van jare uitgawes uit inkomsterekening kan dek nie; om hierdie rede is dit skynbaar nie so 'n vreeslike probleem vir Raadslede nie.

Die magtigingsbegroting is die finale stel styfers wat deur die Raad goedgekeur word as die beramings vir die jaar en dit verteenwoordig 'n plan vir werksaamhede wat beperk word deur die magtiging om sekere bedrae uit te gee en sekere hoeveelhede mannekrag en materiaal te gebruik vir gespesifiseerde doeleindes. Dis 'n stel finansiële dokumente deur rekenmeesters opgestel om te onderskei tussen die twee hoof tipes van finansiële transaksies in Municipale werksaamhede—kapitaaluitgawes en uitgawes op inkomsterekening. 'n Begroting van Kapitale uitgawes word gewy aan die voorgestelde verkryging van en geskikking oor vaste bates. 'n Begroting op Inkomsterekening bevat die uitgawes aangegaan vir die instandhouding van die bates en die beraamde inkomste wat uit die elektrisiteitsverkeer moet word.

Ten slotte kan die begroting of goedgekeurde beramings gebruik word as 'n maatstaf om die mate van sukses van die skemas wat onderneem word om die gegewe doelstellings te bereik mee te meet. Met 'n behoorlike rekeningstelsel kan die Raad die begroting gebruik om beheer uit te oefen oor die verskillende Departemente en in hierdie opsig is dit 'n waardevolle hulpmiddel in die hande van die bestuur beide om 'n beleid te kan formuleer en die uitvoering daarvan te kan kontroleer. Hierdie besondere toepassing van die begroting is een van die belangrikste faktore wat bydra tot doeltreffendheid in die bestuur en is nogal van betekenis as in aanmerking geneem word die aansienlike bedrae wat deur Municipale Elektriese ondernemings in ons land uitgegee word.

In die groter ondernemings hanteer die hoogste bestuursrange die belangrike en dringende sake van die dag en hulle het geformaliseerde prosedures nodig om hulle te help om tot 'n beslissing te geraak en toesig te hou oor hulle onderhoriges. Die begroting is in hierdie opsig van aansienlike hulp en dit help om orde en 'n stelselmatige beplanning van die Departement se werk te bevorder.

Doeltreffendheid.

Dit mag voordelig wees om oor te stap na sekere vraagstukke betreffende die bereiking van bestuursdoeltreffendheid en hoe dit verky kan word. Sal dit byvoorbeeld nie voordelig wees om die begrotingstelsel te gebruik om doeltreffendheid te bevorder nie? Wat is in werklikheid die praktiese perke in 'n strewing om doeltreffendheid te bereik? Wat is doeltreffendheid in terme van die funksies van die departement? Dis miskien tyd dat hierdie vraagstukke oorweeg word in die lig van die heersende praktyk.

'n Stelsel van bestuur in 'n Municipale elektrisiteitsonderneming moet aan twee belangrike vereistes in die ekonomiese sin voldoen.

- (a) 'n Openbare elektrisiteitsdiens ontwerp en voortsit wat van voldoende kapasiteit is om in die aanvraag van verbruikers te voorsien.
- (b) Die bedryfsverhouding van uitgawes tot inkomste verbeter deur van dag tot dag beheer uit te oefen oor uitgawes.

Die eerste word gedek deur die begroting van kapitaal uitgawes en die tweede deur die inkomstebegroting.

main emphasis would lie in expenditure, a portion of which is flexible in relation to revenue which to a great extent is out of the control of the Department. The success of the system would depend on how far the budget makes those who work within it constantly aware of the results that their actions and decisions have on the financial operations of the department.

In regard to the second question relating to the practical limits to endeavour in achieving efficiency, these limits are determined by an examination of the organisation and management of the organisation. Organisation being considered as the structure or form of the business side of the undertaking, the form being designed to achieve the necessary co-ordination of the separate functions. Management being regarded as the controlling influence on the organisation; directing the operation of the several parts of the undertaking, ensuring its smooth and efficient working. The budget would provide for the proper superintendence of the practical limits in attaining efficiency as disclosed by work study procedure in relation to staff activities. Care must be taken in determining these practical limits to provide understanding of the procedures to the staff. Experience has shown that many attempts to achieve efficiency have failed to achieve the results expected because of the neglect of the effects of efficiency changes on the staff.

In regard to efficiency this means different things in different industries and organisations and according to some authorities three different ideas in relation to this matter require to be distinguished. The first is effectiveness, or the degree of success with which the objective is achieved. The second is economy or the cost of the effectiveness in money, manpower or materials. The third is efficiency itself which is the ratio of effectiveness to economy. It is of no benefit to the Department for the work to be done regardless of cost nor that insufficient money is provided to do the work effectively. The aim of efficiency is to get the best of two worlds and this is difficult of attainment.

The idea of efficiency resolves itself into three parts.

Technical efficiency covering the use of machines.

Managerial efficiency covering the achievement of efficiency with the minimum use of resources.

Personal efficiency, a combination of knowledge, ability and the will to work. If these remarks are accepted it should be clear that the budget is of the greatest value in promoting managerial efficiency but the detailed financial steps that could be taken lie outside the scope of these comments.

Finance and Electricity Supply.

The provision of electricity has become a hall-mark of civilisation. The amount of electricity used is often the index by which the industrialisation of a country is measured and to a large extent the use by domestic consumers indicates the standard of living of the people. In view of its importance there is a strong economic necessity to keep the price as low as possible. The general financing of the electricity undertakings is quite properly a matter of public policy. The pricing

Die antwoord op die eerste vraag wat geopper is dat dit voordelig is om die begroting te gebruik om doeltreffendheid te bevorder deur veral die bedryfsverhouding tussen inkomste en uitgawes te verbeter. Die klem word hoofsaaklik gelê op uitgawes, 'n deel waarvan buigbaar is in verhouding tot inkomste wat grotendeels buite die beheer van die Departement staan. Die sukses van die stelsel sou afhang van die mate waartoe die begroting diegene wat daarinne werks gedurig gewus maak van die uitwerking wat hulle handelinge en besluite het op die finansiële werking van die Departement.

Aangaande die tweede vraag betreffende die praktiese perke waarbinne pogings aangewend kan word om doeltreffendheid te bewerkstellig, word die perke bepaal deur 'n ondersoek in die organisasie en bestuur van die onderneming. Organisasie word beskou as die struktuur of vorm van die besigheidssys van die onderneming, die vorm word so ontwerp dat die nodige koördinasie van die afsonderlike funksies verkry word. Bestuur word beskou as die behorende invloed oor die organisasie wat die werking van die afsonderlike dele van die onderneming reguleer en die doeltreffende werking daarvan verseker.

Die begroting sal voorsiening maak vir die behoorlike toesig oor die praktiese perke in die bereiking van doeltreffendheid soos openbaar deur werkstudie metodes in verband met personeelaktiwiteite. Sorg moet gedra word by die vaststelling van hierdie praktiese perke om te verseker dat die personeel die werksmetodes begryp. Dêre ondervinding het geleer dat baie pogings om die beoogde doeltreffendheid te bereik misluk het vanweë die verontagsaming van die uitwerking wat veranderinge wat doeltreffendheid beoog op die personeel het.

Doeltreffendheid beteken verskillende dinge in verskillende nywerhede. Volgens sommige gesaghebbendes moet drie verskillende idees in verband met hierdie aangeleentheid onderskei word. Die eerste doeltreffendheid is die mate van sukses waarmee die doelwit bereik word. Die tweede is besparing of die koste van doeltreffendheid in geld, mannekrag en materiaal. Dêre doeltreffendheid self wat die verhouding tussen doelmatigheid en besparing is. Dis van geen voordeel vir die Departement dat die werk gedoen word sonder op die koste daarvan ag te slaan of dat onvoldoende geld beskikbaar gestel word om die werk op doeltreffende wyse te verrig nie. Die mikpunt van doeltreffendheid is om die beste van twee wêreldes te verkry en dis moeilik om te bereik.

Die idee van doeltreffendheid ontleed homself in drie dele. Tegniese doeltreffendheid wat die gebruik van masjinerie dek. Bestuursdoeltreffendheid wat die bereiking van doeltreffendheid met 'n minimum van hulpbronne dek.

Persoonlike doeltreffendheid — 'n kombinasie van kennis, bekwaamheid en die wil om te werk.

As hierdie opmerkings aanvaar word sal dit duidelik wees dat die begroting van die uiterste waarde is in die bevordering van bestuursdoeltreffendheid dog die nadere besonderhede van finansiële stappe wat gedoen kan word val buite die bestek van hierdie kommentaar.

Finansies en Elektriesiteitsvoorsiening.

Die verskaffing van elektrisiteit het die stempel van beskawing geword. Die hoeveelheid elektrisiteit wat gebruik word is dikwels die maatstaf waarmee die industriële ontwikkeling van 'n land gemeet word en tot 'n groot mate dui die huisslike gebruik daarvan die lewensstandaard van 'n gemeenskap aan.

arrangements affect practically every citizen. The capital investment in electricity supply is a significant part of the total investment in the industry of the country.

However, the savings effected by the growth of efficiency in the technical and management sections of the undertakings can be offset by increased cost of materials, higher interest charges and increased cost of fuel. The three latter items are outside the control of management. Such financing as is required was to be recovered from the consumers by way of the electricity tariffs which on balance would tend to rise if an upward trend in costs of materials, interest charges and fuel is in operation.

It is a commonplace observation, observable through history, for the level of prices to rise. There have been, of course periods when prices fell, but observers have remarked, there is a strong trend, some even call it an historical law, for prices to rise, sometimes slowly, other times rapidly, but generally to rise with the passage of time.

There has been a suggestion from some quarters that undertakings should carry sufficient reserves to provide a cushion against short term changes in demand and costs and to avoid the need for substantial or frequent alteration of tariffs. This is a principle to which support can be given. An extension of this idea of building up funds is that undertakings should find their capital requirements by internal finance which in effect is that present consumers should provide the capital requirements for future consumers. For an Electricity Supply Undertaking, doubling its size every ten years, to generate the whole of its capital requirements through prices would mean that revenue from consumers would have to be increased by a substantial amount, approximately 22 per cent per annum, to provide sufficient funds. It would be a bold man that would state that here is a clear principle that should be fully supported and override all other considerations. Conflicting points of view have to be met but there is considerable merit in the proposal and further investigations should be made.

Electricity supply has been termed a capital-intensive system and any proposal which tends to cut back capital is of considerable benefit to the industry by reason of the lower capital charges which would then have to be directly recovered from revenue.

The capital cost in electricity supply is high, the ratio of capital to revenue being two to one in distribution schemes compared with ratios of one to two or even four in some cost of development without compromising efficiency or endangering the security of supply.

When the pressure on the total financial resources is too high, there is, rightly or wrongly, a criticism of the level of industries. Being highly capitalised the most intensive use is required to be made of the capital invested by limiting the Council's expenditure. This criticism rarely distinguishes investment expenditure from the rest. Evidence is available which indicates that price levels of commodities have risen over the 27 year period 1932—1959 by a percentage change of plus 322 per cent. The reference is found in an index of prices compiled by the London School of Economics. One is

Met die oog op sy belangrikheid is daar 'n sterk ekonomiese noodsaaklikheid om die prys daarvan so laag moontlik te hou. Die algemene finansiering van die elektrisiteitsonderneming is tereg 'n saak van openbare belang. Die prysvasstelling affekteer feitlik elke burger. Die kapitale belegging in elektrisiteitsvoorsieningsondernemings vorm 'n betekenisvolle gedeelte van die totale beleggings in die nywerheid van 'n land.

Besparings wat tweegeëbring is deur verhoogde doeltreffendheid in die tegniese en bestuursafdelings van die onderneming kan eger verydeld word deur die verhoogde koste van materiaal, hoër rentekoerse en die verhoogde koste van brandstof. Laasgenoemde drie items val buite die beheer van die bestuur. Finansies wat benodig word moet van verbruikers verhaal word by wyse van elektrisiteitsariewe wat 'n stygende neiging sal toon as die koste van materiaal, rentekoerse en brandstof aan styg is.

Dis 'n algemene geskiedkundige verskynsel dat pryse styg. Daar was natuurlik tye dat pryse gedaal het, dog waarnemers het opgemerk dat daar 'n sterk neiging, sommige noem dit self 'n geskiedkundige wet, bestaan vir pryse om somtyds stadig, somtyds vinniger, dog in die algemeen met verloop van tyd te styg.

Van sommige kante af het daar 'n voorstel gekom dat ondernemings voldoende reserves behoort te dra om te dien as 'n buffer teen korttermyn skommelings in aanvraag en koste en die noodsaaklikheid van herhaalde of aansienlike tariefveranderinge te vermy. Dis 'n opvatting wat nogal steun verdien. 'n Uitbreiding van hierdie idee van fondse op te bou is dat ondernemings in hulle kapitaal behoeftes moet voorsien deur interne finansiering wat in werklikheid beteken dat huidige verbruikers in die kapitale behoeftes van toekomstige verbruikers moet voorsien. Teneinde 'n elektrisiteitsvoorsieningsonderneming wat elke tien jaar verdubbel in grootte instaat te stel om sy hele kapitaalbehoefte deur prysvasstelling te bekom, beteken dit dat inkomste van verbruikers afkomstig sal moet styg—sowat 22 persent per jaar—teneinde voldoende fondse te verskaf. Dit sou 'n waaghals wees wat sal verklaar dat hierdie 'n duidelike beginsel is wat ten volle ondersteun behoort te word sonder enige ander oorwegings in aanmerking te neem. Teenstrydige menings sal teregkom word dog die voorstel hou aansienlike voordele in en behoort verder ondersoek te word.

Elektrisiteitsvoorsiening is as 'n kapitaal-intensiewe stelsel bestempel en enige voorstel wat die benoeding van kapitaaluitgawe beoog is vir die nywerheid van aansienlike voordeel, gesien die laer kapitaaloonkoste wat dan regstreeks van inkomste verhaal moet word.

Die kapitaalkoste verbonde aan elektrisiteitsvoorsiening is hoog—die verhouding van kapitaal tot inkomste is twee teen een in verspreidingskemas in vergelyking met verhoudings van een tot twee of selfs vier in sommige nywerhede. Aangesien dit so hoog gekapitaliseer is moet die mees intensiewe gebruik gemaak word van belegde kapitaal deur die koste verbonde aan uitbreiding te beperk sonder om doeltreffendheid of die bestendigheid van die voorraad in gevaar te stel.

Wanneer druk op die totale geldmiddels te hoog is is daar, tereg of verkeerdlik, kritiek op die die Raad se uitgawepolitiek. Hierdie kritiek onderskei selde of ooit tussen beleggingsuitgawes en ander uitgawes. Getuienis is beskikbaar wat aandui dat die pryspeil van goedere gedurende die 27 jarige tydperk

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not bound to accept these figures as conclusive without further discussion or the presentation of further evidence but they are submitted to define a trend which is observable and definite which should be regarded fundamentally as a basis for dealing with criticism of increased costs in capital expenditure. The effects of increases in prices is difficult to forecast and for this and other reasons there appears to be a reluctance to adopt long term budgeting for capital expenditure as a general practice. Apart from prices there is also the universal difficulty of making reliable forecasts in real terms for several years ahead. Also allowance has to be made for monetary changes induced by variations in the economic structure of the country. It should be accepted however that broad approximations are necessary and possible on the assumption that these calculations have value as a guide in planning which is not destroyed by the inevitable lack of precision in the more distant years; Regular revisions can be made to the original plans to counter the variations in the value of money from time to time. It is recognised that it is virtually impossible to produce a long term plan of capital expenditure that would bring development to finality.

This is a subject which in my opinion merits attention and analysis and is one which could be discussed, with advantage, in greater detail at a future convention.

There is a risk that the remarks that have been made may have sounded either complacent or defensive. It is intended to be neither but rather to indicate that members of the Association are aware of the problems that beset them and realise how much remains to be done in managing an Electricity Department in these changing times.

Abraham Lincoln has said, in regard to taking action in dealing with these problems of change:—

"The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty, and we must rise with the occasion. As our case is new, so we must think and act anew. We must disenthrall ourselves."

I conclude this address with a very deep sense of appreciation of the honour you have conferred upon me, the City Council of East London and my colleagues in electing me President of the Association and wish to assure you that I will endeavour to further the aims and objects of our organisation with all the resources at my command.

Mr. J. DOWNEY (In the Chair): I now call on Mr. C. Downie to propose a vote of thanks to the President for his address.

Mr. C. G. DOWNIE (Cape Town): Mr. President, I would like first of all to add my congratulations to those of all the others upon your having been elected to the Presidency of this Association. May you have a most pleasant and successful term of office.

The principal business of a local authority is the provision and administration of public services, such as Roads and Drainage, Town Planning, Public Health, Traffic Control, Fire Services, Amenities, Parks and Gardens, etc.

1932-1959 gestyg het met 322 persent. Dit word gevind in 'n prysindeks wat opgestel is deur die London School of Economics. Mens hoef nie hierdie syfers sonder verdere bespreking of bewys as afdoende te aanvaar nie, dog hulle word slegs aangee om 'n neiging te illustreer wat waarneembaar en definitief is en wat fundamenteel beskou moet word as 'n grondslag waarop kritiek op verhoogde koste in kapitaalbelegging behandel moet word. Die uitwerking van prysverhogings is moeilik om te voorspel en om hierdie en ander redes word daar skynbaar gehuiwer om langtermynbegrotings ten opsigte van kapitaaluitgawes as 'n algemene probleem van betroubare voorspellings in reële terme vir etlike jare vooruit te doen. Daar moet rekening gehou word met skommelings in geldwaardes veroorsaak deur skommelings in die ekonomiese struktuur van die land. Ons moet egter aanvaar dat benaderings in breë trekke noodsaaklik en moontlik is as veronderstel word dat hierdie berekenings waarde het by bepanning wat nie veredyd word deur die onvermydelike gebrek aan juistheid in voorspellings ten opsigte van die verdere toekoms nie. Die oorspronklike plan kan gereeld gewysig word om periodieke skommelings in geldwaardes teë te werk. Erken word dat dit feitlik onmoontlik is om 'n langtermyn plan vir kapitale uitgawes wat ontwikkeling sal finaliseer uit te werk.

Hierdie is 'n onderwerp wat myns insiens aandaag en ontleding verdien en wat met voordeel in nadere besonderhede by toekomstige byeenkoms bespreek kan word.

Daar bestaan 'n gevaar dat die voorafgaande opmerkings of selfvoldaan of defensief mag klink. Dit word nie so bedoel nie maar eerder om aan te dui dat lede van die Vereniging bewys is van die probleme waarmee hulle te kampe het en besef hoe baie nog gedoen moet word om in hierdie wisselende tye 'n Elektriesiteitsdepartement te bestuur.

In verband met landelede op te tree teenoor hierdie veranderingsprobleme het Abraham Lincoln gesty: "The dogmas of the quiet past are inadequate to the stormy present. The occasion is piled high with difficulty and we must rise with the occasion. As our case is now, so we must think and act now. We must disenthrall ourselves."

Ek sluit hierdie rede af met 'n baie diepe waardering vir die oer wat u bewys het aan my, die Stadsraad van Oos Londen en my kollegas deur my as Voorsitter van die Vereniging te verkies en ek wil u graag verseker dat ek sal trag om die doelstellings en mikpunte van ons organisasie met al die kragte tot my beskikking te bevorder.

Many municipalities, however, have found it desirable to undertake in their areas the supply of electricity, water, and in some cases, transport. They have therefore become the owners of revenue earning public utility undertakings, usually termed "trading undertakings." There is, however, a very important distinction between the trading undertakings and the non-trading ones of a municipality. A trading undertaking has to be operated in accordance with the practices and standards of a commercial enterprise, whereas non-trading departments prepare annual estimates of expenditure for the ensuing year, and a rate is levied on the ratepayers to meet the estimated expenditure.

Such being the case therefore, it is necessary for committees vested with the responsibility for the successful functioning of trading undertakings, and their managements, to have reasonable freedom comparable with that of the managements of private, commercial and industrial business concerns.

Above all, trading undertakings should not be subject to pre-conceived procedures or ideas that may be applicable only to non-trading departments.

Throughout the history of Municipal Electricity Supply both in this country and in the United Kingdom before the industry became nationalised, suggestions have been put forward which have had as their basis the divorcing of Municipal Electricity Undertakings from the usual municipal procedures.

It has also to be borne in mind that besides the need for municipal trading undertakings to be managed and operated in accordance with commercial business practices, there are special statutes which apply to the production, supply and sale of electricity. For example, the Electricity Act, the Factories Act, the Wiremen and Contractors Act, and even the Hire Purchase Act where Electricity Undertakings engage in the sale of electrical appliances.

Besides these statutes there are the conventional industrial statutes and certain Provincial Ordinances. These Acts and Ordinances set the policy and standards for the administration of electricity undertakings, and they have financial and operational implications which cannot be disregarded.

An unrealistic outlook towards an electricity undertaking and its functions, for instance, treating it as if it were no more than just another branch of the municipal service and over-exploitation by councils and ratepayers to the disadvantage of consumers could only strengthen the case for "nationalisation", or, at least, for further control by a superior legislative body.

On the matter of exploitation I refer to the creation of surpluses for relief or municipal rates without regard to the need for making adequate and prudent provision for the electricity undertaking's reserves and financial stability.

Municipal councils that own and operate electricity undertakings must ensure always that they are fully capable of managing and operating their electricity undertakings to the complete satisfaction of all their consumers, and that no other body is likely to do any better.

There are yardsticks, or performance standards, by which electricity undertakings can be judged on whether or not they are being managed and operated efficiently.

As a matter of interest I will refer to just one or two of these standards.

In the generation of electricity, for instance, there is the important "yardstick" of power station overall thermal efficiency. This is something that indicates whether or not, within the limits of the thermo-dynamic cycle of a power station, the maximum amount of electricity is being produced from the fuel consumed, and that as little as possible of electricity is being used in the process of production in the power station. Conservation of use of power station auxiliaries, for instance. Why run four circulating water pumps in a power station when three are sufficient? Why have two auxiliary transformers in commission when one will do the job? In

fact, why leave electric lights burning, in broad daylight, in a power station?

Even the colour of the smoke that comes out of a power station chimney, and the temperature of that smoke which we call flue 'gases' are indications of whether or not a power station is being run efficiently.

There are also other indicators well known to power station operators.

These things are unknown to city councillors, to most of them at any rate, who are very much concerned in electricity undertakings.

The significance of keeping a check on power station operators.

These things are unknown to city councillors, to most of them at any rate, who are very much concerned in electricity undertakings.

The significance of keeping a check on power station performance becomes obvious when a variation in thermal efficiency to the extent of as little as half of one percent in a power station at the coast, burning 600,000 tons of coal a year, means an increase in the coal bill of R24,000. In other words, R24,000 less for the relief of rates!

It emphasises the need for people who manage power stations to exercise all the economy they can in the running of a power station. If a power station's thermal efficiency drops from 25½% to 25%, I don't think many Councillors on any electricity Committee would be any the wiser in regard to the significance to this.

In the distribution of electricity there are also "yardsticks". I refer to the relationship between the amount of electricity sold and the amount originally made available for distribution from power stations, or from the supplier from whom electricity is being purchased in bulk.

The aim of distribution engineers is to so design, maintain and operate their distribution systems as to keep to a minimum the amount of electricity lost in distribution. One could, for example, quote the figure of 10% for such a loss, and also wonder why the loss, by judicious operation of standby transformers, cannot be reduced from 10 to 9%.

Even in the matter of *staff establishments*, an indicator for keeping overstaffing in check can be applied. I refer to the future for the number of employees per million units sold, or the number of consumers per employee.

Just as a matter of interest also, in the matter of *accidents* and the success of one's safety campaign in an organisation, — the success or not of accident prevention campaigns can be judged by the accident frequency rate, i.e. the number of lost time accidents per million man hours worked. The significance of keeping down accidents, of course, is in the reduction of the premium that you pay for accident insurance.

There are only a few of the yardsticks by which we electrical engineers try to maintain control over our electricity undertakings.

I must mention, however, that these indicators cannot be used to compare one electricity undertaking with another, but they can be used to keep a check on operations and procedures within an undertaking.

In other municipal services, criteria on keeping a check on operational efficiency is lacking. The ultimate criterion of a well-managed electricity undertaking is in the complete satisfaction of consumers with the service they are getting, and in what they are paying for it.

This means everything necessary having to be provided to ensure maintenance of continuity of supply at declared voltage, and seeing to it that service is given with enthusiasm by all employees of the undertaking.

This in turn emphasises the importance of good organisation, sound management, and administration, staff competence, morale, and discipline. If electricity undertakings are to be run in accordance with the standards of progressive municipal enterprises, they should follow the example of such enterprises by being placed under the control of a Board of Directors. In this sense I use the term "Board of Directors" to mean "electricity committee". Having over all responsibility for the successful functioning of the business. Where conditions are such as to cause division of responsibility, such as would obtain where more than one board of directors has jurisdiction over the same undertaking, or where a Board of Directors has to try to control several concerns that differ in the types of business conducted by them, one can imagine how unsatisfactory the position becomes for the general manager or the managing director of such a concern.

This also raises the very important question of responsibility, and unless there has been a considerable degree of delegation, a manager in the circumstances referred to will find himself in the position of not knowing, in the one case, what Board of Directors he is answerable to for the successful functioning of the undertaking, and in the other case how his business stands in relation to the other businesses that fall under the control of the same Board of Directors.

This emphasises the point I mentioned previously that trading undertakings should not be subject to pre-conceived procedures for ideas that apply only to non-trading departments. It also emphasises the plea which is inherent in the President's Address, viz. that municipal electricity undertakings should be given a great deal more autonomy than they enjoy today.

After 33 years of experience, covering all the functions and operations of an electricity undertaking, from the generation of electricity to the supply and sale of electricity, including over 11 years of experience as a manager, and having had a lot to do with City Councillors, with all due respect to them, one thing that stands out prominently in my mind, is how little most Councillors know about the business of electricity supply.

There are not only the administrative and financial operations but also the technical and engineering aspects of the business. The supply of electricity is an activity requiring initial capital outlay relatively very heavy in proportion to revenue, covering a large amount and big variety of plant and equipment installed over a widespread area, below, upon, and over the ground, having to be maintained and operated 24 hours per day, seven days a week, 365 days a year. There is also the element of danger in the product we are dealing with. This all emphasises the considerable degree of responsibility, both technical and financial, devolving on engineers who manage and administer electricity undertakings.

The aspect of trying to ensure that consumers get first-class service, that supply is maintained continuously, that power cuts, when they do occur, are reduced to a minimum, weighs heavily on those who are responsible to municipal councils for the successful functioning of their electricity undertakings.

It seems, however, that as far as most municipal councillors are concerned, that what matters most is the amount of profit that becomes available for the relief of rates. The foresight, planning and devotion which results in the success of the electrical engineer's efforts to give consumers good service often passes almost unnoticed by comparison with the interest that is shown in the balance of the electricity undertaking's revenue and expenditure account at the end of the financial year.

Whereas the motive in commercial concern is *profit*, this is not the case with us. Our main object is to produce and deliver our goods at the lowest possible *cost*. The adoption of the practices of well managed business concerns, helps towards that end.

The *price* of the goods we deliver however, is another matter altogether, — it is a matter of policy depending on the extent to which municipal councils wish to use their electricity undertakings to meet the expenses of the *non-trading* branches of the municipal service, or of the *Trading* ones that do not pay their way.

Mr. President, I have great pleasure in performing the function of proposing the vote of thanks for your address which is one that has given to us many points that are worthy of serious consideration, in our efforts to manage our municipal electricity undertakings efficiently, and, if you have not already done so, I suggest that you see to it that as many Councillors as possible obtains a copy of your address. Mr. President, again I have great pleasure in proposing the Vote of Thanks for it. (Applause.)

THE PRESIDENT: Thank you Mr. Downie.

I now call on Mr. J. S. Clinton to second the vote of thanks.

Mr. J. S. CLINTON (Johannesburg): Mr. Chairman, ladies and gentlemen, it gives me great pleasure to rise and support the tributes paid to our President by Mr. Downie of Cap Town. As you know most of our friends hide their lights under a bushel, and our President is of course somewhat different from that. Until this morning most of you could not have seen him — he has hidden himself behind an aromatic cloud, but I suppose the rain to which Bob Kane referred has washed the clouds away, and we now see the man we so much admire.

I think you all will agree with me that he befits that *chairn* of office, that his smile is pleasant, he looks as though he could control us with his 'thrower-out' manly frame, so that the Convention from now on should go very quietly and peacefully.

I think in this inspiring address he has referred to many things most objectively. I have often referred in my talks with friends to what I have read in Prof. Burt's "Metaphysical Foundations of Science". He tried to show how difficult it is for anyone to review current thought of his time, objectively, and I think his opening remarks were something like this, "It is as difficult for a philosopher to get outside of current thought of his time, and to view it objectively, as it is for the

modern maiden who bobs her hair and makes her nether bifurcation more obvious by the clothes she wears, to see herself in the eyes of a puritan matron".

The President in his opening address has set a very high standard for those who want to follow him. I think we are in for a very fine set of intellectual exercises, and I trust all the members who attended the opening session will continue to enjoy all that is before them. It is, of course, an extremely difficult thing for any municipal engineer to stand aside and view what he is doing himself, regulating as he does, objectively, without bias. It affects all of us, and it is particularly difficult for us in the municipal sphere where we are not controlled by the same classical forces that control our friends in the private sector of our economy.

The presidential address as we all know is not something that we put to open debate, but it is a great pity in my opinion, that a paper or an address of such high standing should not be open to debate, and I do hope that the President will find time, when he puts aside the cares of office, to give us a few papers on several of the branches of his address to us today. It contains so much matter which is of great importance to all of us, an certainly to the welfare of our country and to the welfare of municipal undertakings as a whole.

Dames en here, in sy rede vanmore het ons President baie gesê om oor te dink. Die belangrike verskil tussen die staats en privaat sektors van ons ekonomie is vir almal van aan belang. Onse President se skaar is aan die kant van die staats sektor maar dit meen nie dat hy effens skeel kyk nie.

Ek het die ander dag in een van die tegniese koerante gelees dat "... in Groot Brittanje is die regering ook bekommerd oor die verbruik en die ophoping van kapitaal deur die staats sektor."

Ons behoort daarom na ons eie belange te kyk en kennis van ons President se rede te neem. Dit is vir my 'n plesier om mnr. Downie se mosie van dankbetuiging te sekondeer. Ek hoop dat u dit eenparig sal aanneem.

Mr. J. DOWNEY (Springs): Ladies and gentlemen, you have had the pleasure of listening to the Presidential Address, and a vote of thanks proposed by Mr. Downie and seconded by Mr. Clinton.

I'll ask you to show your appreciation in the usual manner. (Applause.)

Mr. President, I will now ask you to take control of the meeting.

THE PRESIDENT: Thank you very much, Mr. Downey, for taking over, and to Mr. Downie of Cape Town, and Mr. Clinton for your very searching remarks. (I hope I don't have to write another paper!)

Gentlemen there are five minutes before we adjourn for lunch, is it your wish that we accept greetings from other representatives? I think we have some greetings from other organisations.

Mr. J. DOWNEY (Springs): Mr. President, I bring you greetings from the S.A. National Committee on Illuminations for a very happy term of office.

Mr. R. W. KANE (Johannesburg): Mr. President, the Institution of S.A. Mechanical Engineers thank you for the

invitation to be present, and congratulate you on your elevation to the Presidency, and wish you a successful Convention.

Rd. F. MEYER (Welkom): Mnr. die President, namens die Afvaardiging van Welkom wil ons van die geleentheid gebruik maak om u hartlik gekom te wens met u verkiesing as President van die Vereniging vir die jaar 1962/63.

On behalf of the delegation from Welkom, we'd like to extend to you our heartiest congratulations on your election as President of this Association.

And while I am at the microphone, I would also like to raise a point which has caused a bit of embarrassment and consternation amongst delegates. We trust that you will be in a position to rectify matters during this Convention. When we received our Convention papers, it contained a brochure on East London, on the cover page of which was a girl in a bikini. Since we arrived here we have looked in vain to find such a specimen, and there I must agree with Mr. Kane that you cannot believe in all you see.

Seeing that we are in the Fighting Port now, we trust that the President may be in a position to improve conditions without our having to put up a fight for it.

May this be a peaceful Convention!

THE PRESIDENT: Dankie Raadslid Meyer.

Mr. L. G. AXE (Johannesburg): Mr. President, I bring to the Convention the greetings of the S.A. Institute of Electrical Engineers, and the apologies of my President who, unfortunately, is unable to attend. He has been detained in Johannesburg.

I would like to wish you, on behalf of all our members, a very successful and happy year of office.

THE PRESIDENT: Thank you Mr. Axe.

Mr. H. T. ASPINALL (Pretoria): Mr. President, I take this opportunity of conveying to you the greetings of the Secretary for Education, Arts and Science, and wish you, sir, a very successful year of office.

Mr. W. H. MILTON (Escom): I bring you greetings from the Electricity Supply Commission and have to express the regret of our Chairman who is retiring at the end of this month, that he was unable to attend.

I have also been asked by Mr. Marchant to convey his regrets that he was unable to attend this particular Convention. They join in wishing you a very successful year of office, and also in congratulating Mr. Lombard on his very able Presidency.

Mr. A. W. LINEKER (Johannesburg): Mr. President, on behalf of the Institution of Electrical Engineers, London, we convey to you congratulations and best wishes for a successful year of office, and in particular for a very happy and successful Convention.

Mr. G. C. MOLYNEAUX (Rhodesia Railways): My general manager wishes me to convey to you, Mr. President, his greetings and best wishes for a most successful Convention.

LUNCHEON ADJOURNMENT.

On Resuming at 2.30 p.m.:

THE PRESIDENT: Gentlemen, I have some important announcements to make and first is the result of the Executive Council election.

It is my great pleasure to announce that Messrs. Kane, Turner, Barton, Hugo and Theron have been elected to the Executive Committee. (Applause.)

My hearty congratulations to those elected, and a welcome to all — old and new members. I can see we have a very fine team, but I would also like to thank those who offered their services to the Executive, and I hope they will stand again and take the opportunity of getting elected.

It is not an easy job, as the newcomers will know, for they must meet tomorrow morning at 8.30 at the committee room at the City Hall, together with their Councillors.

Gentlemen, you may have noticed that Mr. and Mrs. Inglis of Pietersburg have left the Convention Hall. They have had rather sad news, that Mrs. Inglis' father has passed away. We extend our sympathy to them.

(Other Convention Announcements followed.)

We have an apology here from Cfr. A. S. Bodill of Kokstad, and Mr. Ewing has handed me two telegrams. Our old friend Mr. L. P. Davis, Springs, "Congratulations, Mr. President. Best Wishes for a happy Convention" and Mr. Sibson, Past President, "Best wishes for a successful and enjoyable Conference. Greatly regret unable to attend".

Gentlemen, it is now my very great pleasure to call upon Prof. Smith of Grahamstown University to read his paper, "Some Aspects of Electricity Supply Economics". (Applause.)

Prof. HUGH H. SMITH (Grahamstown): Mr. Chairman, Mr. President, gentlemen: it is a very great pleasure for me to be here today and to read this paper to you.

If I were to say I felt like Daniel, perhaps it would be impolite, so perhaps I should say "I feel like a lion in a den of Daniels".

THE PRESIDENT: Thank you Professor Smith.

CONVENTION ADJOURNED FOR TEA.

Some Aspects of Electricity Supply Economics

by

HUGH H. SMITH, M.Comm., Ph.D., Professor of Commerce at Rhodes University

In this paper it has seemed wiser to deal in detail with certain aspects of electricity supply economics, rather than to attempt to cover the whole complex field of economics in relation to the generation and distribution of electricity. Broadly speaking, the paper can be divided into three sections. In the first section an attempt has been made to present some statistics relating to the supply and generation of electricity in the Republic, Southern Rhodesia and in Northern Rhodesia. In this section some indication will be given of the importance of the electricity supply and generating industry in comparison with certain other fields of economic activity and the structure of the industry will be examined. The relative importance of the municipally owned and operated electricity undertakings, on the one hand, and of the Electricity Supply Commission, on the other hand, will also be indicated. Section three will deal with certain financial aspects of electricity generating and distributing undertakings.

SECTION 1: THE GENERATION AND DISTRIBUTION OF ELECTRICITY AND ITS PLACE IN THE NATIONAL ECONOMY.

Before comparing the electricity generating and distributing industry with certain other fields of economic activity, it might be advantageous to examine the structure of the industry from certain points of view, and in Table I an attempt has been made to do this.

The non-municipal undertakings, of course, include the Electricity Supply Commission, but as this undertaking publishes its figures for each calendar year it is not possible to say what proportion of the non-municipal undertakings' figures in Table I are relative to the Electricity Supply Commission. On the basis of the figures given in the Commission's report for the year ended 31st December, 1959, however,

it can safely be assumed that the overwhelming portion of the statistics for non-municipal undertakings given in Table I relate to the Electricity Supply Commission.

With the exception of the term "gross value of output", the terms used in Table I are quite straight-forward. Gross value of output is defined by the Department of Census and Statistics as being:—

"The aggregate value of the goods manufactured and work done during the year by establishments classified under that industry."

It will be seen then that the municipal undertakings generate only approximately one-fifth of all the electricity generated in the Republic, but that they account for between 50 and 60% of the other heads in Table I. This is obviously largely due to their distribution of the electricity purchased from the Electricity Supply Commission.

Tables 2, 3 and 4 shows various statistics for the generation and distribution of electricity compared with corresponding figures for other sectors of the economy. The difficulty here has been to obtain figures for other sectors of the economy. These tables are largely self-evident and there is no need to spend time in commenting upon them.

Table 5 shows the contribution of various sectors to the national income of the Republic in the 1958/9 census year. The national income of a country may be defined as the payments made to the economic factors of production, *viz.*, labour and capital. Labour's share of the national income consists of cash salaries and wages including payments in kind and employers' contributions to pension or provident funds and medical funds. The problem here is to isolate figures relating specifically to the generation and supply of electricity as these are not given separately. It can be noted, however, that the figures given under heading of "Miscellaneous business: muni-

TABLE 1.

Comparison of certain statistics relating to Municipal and Non-Municipal Electricity and Distributing undertakings in the Republic of South Africa in the year ended 31st March, 1959.

	Municipal	%	Non-Municipal	%	Total	%
Units Generated	4,172	21.3	15,489	78.7	19,661	100.00
Number of Persons employed	14,008	50.2	13,899	49.8	27,907	100.00
Cost of Materials used	R000's 37,986	63.1	22,198	36.9	60,184	100.00
Salaries and Wages paid	R000's 10,758	49.2	11,084	50.8	21,842	100.00
Gross Value of Output	R000's 76,288	53.6	65,760	46.4	142,048	100.00

SOURCE: Special Report No. 237 of the Department of Census and Statistics.

TABLE 2.

Statistics relating to the generation and distribution of electric light and power and also of certain other industries in the Republic of South Africa in the year ended 31st March, 1959.

		Electric Light and Power	Manufacturing	Construction
Value of gross output	R000's	142,048	2,421,262	269,004
Cost of materials used	R000's	60,184	1,451,890	154,604
Salaries and wages paid	R000's	21,842	475,978	74,882
Number of persons employed		27,907	632,168	118,845

SOURCE: Special Report No. 237 of the Department of Census and Statistics.

TABLE 3.

Statistics relating to the generation and distribution of electric light and power and also of certain other industries in Southern Rhodesia in the 1958/59 census year.

		Electric Light and Power	Mining and Quar.	Manufacturing	Construction
Gross output	R000's	18,264	52,798	241,134	124,156
Cost of materials and fuel used	R000's	6,702	17,752	141,720	49,428
Salaries and wages paid	R000's	4,426	15,994	49,492	36,562
Number of persons employed		5,608	50,533	85,315	70,279

SOURCE: The Census of Production of the Federation of Rhodesia and Nyasaland 1958-59.

TABLE 4.

Statistics relating to the generation and distribution of electric light and power and also of certain other industries in Northern Rhodesia in the 1958/59 census year.

		Electric Light and Power	Mining and Quar.	Manufacturing	Construction
Gross output	R000's	18,572	220,008	38,678	50,988
Cost of materials and fuel used	R000's	9,680	43,782	21,050	23,476
Salaries and wages paid	R000's	1,040	47,944	8,850	18,962
Number of persons employed		1,012	45,515	16,565	12,217

SOURCE: The Census of Production of the Federation of Rhodesia and Nyasaland 1958-59.

cialities: salaries and wages" includes at least R10.8 million representing the salaries and wages paid by the municipally owned and operated electricity generating and distributing undertakings. Similarly the salaries and wages given under the heading "Miscellaneous Business: other public" includes the salaries and wages paid by the Electricity Supply Commission. It is not possible to give a definite figure here, but again it probably matches the salaries and wages paid by the Municipalities.

The division of the generation and distribution of electricity between the Electricity Supply Commission, on the one hand, and the Municipalities, on the other hand, together with some generation and distribution being in private hands, naturally prompts the question as to whether it would not be advantageous from the point of view of the community as a whole for the generation and distribution of electricity in the Republic to be centralised in the hands of one authority. It is obvious that there would be advantages and disadvantages in taking such a step, and because these advantages are not necessarily mutually exclusive, the concentration of the generation and distribution of electricity in the hands of a single authority would be a step fraught with much controversy. Perhaps the best way of clearing the ground somewhat would be to examine some of the advantages and disadvantages which might be expected to result from such a concentration.

Taking the advantages first, it could be anticipated that some or all of the following advantages might occur as the result of the concentration of the generation and distribution of electricity in the hands of one authority.

- (a) In the first place, it would be possible to derive the benefits which flow from the increase in the size of undertakings. (As these benefits are complicated, instead of indicating

them in detail here, it has been decided to defer them until later in this paper). The electricity generating and distribution industry is one in which the optimum size of the undertaking is large and where this is the case it would seem to be better to have a lesser number of large undertakings, than a larger number of small undertakings each of which operating in limited area cannot obtain sufficient demand for electricity to justify its expansion to optimum size.

- (b) There must be a number of electricity generating and distributing undertakings, particularly the smaller ones, which are operating with out-of-date equipment and which cannot provide a service giving maximum efficiency to the consumers. A single generating and distributing authority for the whole of the Republic would be able to close down those undertakings which are not up to the required standard of efficiency, and to supply the areas concerned from strategically situated large generating undertakings.
- (c) Another aspect of this same advantage is that with a number of generating and distributing undertakings of unequal size and efficiency, there is likely to be over-supply in certain areas, at the same time as there is under-supply of electricity in other areas. One central authority could operate a system by which power stations could be operated at a more uniformly high level of activity and electricity transferred from one area to another to meet different levels of demand.
- (d) Without greater investigation, it is not possible to say if in fact there is duplication of effort, equipment and labour under the present system of electricity generation

TABLE 5.

Summary of the national income of the Republic of South Africa in the 1958/59 census year.

Head	Total	Salaries and Wages	Other
	R Million	R Million	R Million
Agriculture, Forestry and Fishing	472.8	139.0	333.8
Mining	540.4	242.2	298.2
Private Manufacturing	997.8	646.4	351.4
Trade	477.6	305.2	172.4
Transportation	328.6	268.4	60.2
Miscellaneous Business:			
Union Government	67.4	50.0	17.4
Municipalities	59.4	30.6	28.8
Other Public	48.6	23.0	25.6
Private	74.6	29.8	44.8
Public Authorities	425.0	379.0	46.0
Private Households	117.8	117.8	—
Other	444.0	177.8	266.2
Total Geographical National Income	—	—	—
Less amount accruing to non-S.A. Factors	—	—	—
	4,054.0	2,409.2	1,644.8
	457.4	47.8	409.6
Net National Income	3,596.6	2,361.4	1,235.2

SOURCE: "Union Statistics for Fifty Years", Pages 54 and 55.

and distribution in the Republic, but with one centralised electricity generating and distributing authority the possibility of such duplication could be avoided.

- (e) One centralised authority should be able to plan its activities and its expansion more effectively than a number of independent undertakings, and so be of greater benefit to the economy of the Republic as a whole. Such a body would also be in a better position to undertake the research necessary for the solution of the problems confronting the industry and to devote research to the developments of new methods and techniques. Such a body might well also be in a position to train its employees more effectively for the specialised duties which have to be performed in the electricity generating and distributing industry.
- (f) It might be possible for such a centralised authority to provide electricity at a uniform tariff throughout the Republic, though the writer has insufficient knowledge of the industry to say whether he considers this might be possible or not. If it were possible, it might assist to some extent in the decentralisation of industry since it would seem logical that at present these undertakings located in areas of greater population (e.g. the Southern Transvaal, the Western Cape) can supply electricity at a lower rate than those in the less densely populated areas. The cost of electricity may be a factor of some importance to an industrialist in deciding upon a location for his industry, though proximity to the market or to the raw materials may be of greater importance.

On the other hand, there will almost certainly be disadvantages associated with the centralisation of the generation and distribution of electricity in the hands of a single authority. Some possible disadvantages are listed below.

- (a) It is all too common experience to find that when an undertaking is in a monopolistic position (i.e. the sole supplier of a service to a whole country), it lacks the will to maintain maximum efficiency and not only do inefficiencies manifest themselves, but "red tape" or bureaucracy detract from the benefits which should be achieved by such an undertaking.
- (b) Although it is in the nature of things for electricity generating and distributing undertakings to be granted a considerable degree of monopoly in their field, one centralised authority would be even more strongly entrenched in such a position. Such an undertaking, in the absence of suitable safeguards, would be in a position arbitrarily to impose its tariffs on the community. It should be noted in this connection that much of the

opposition to the South African Railways, which occupies a position similar to that which would be occupied by a centralised electricity authority, originates not in the principles upon which it bases its rating policy, but in the fact that it is in a position arbitrarily to determine tariffs and that no appeal machinery exists against the decisions of the Administration.

- (c) It is possible that one centralised electricity authority might override the legitimate interests or desires of a particular region or area.
- (d) Such a centralised authority could become the tool of political interests to a much greater extent than a number of smaller undertakings, and efficiency might be sacrificed to political expediency.

This whole problem is extremely complex and it is almost impossible to give a definite conclusion as to whether the present structure of the electricity generating and distributing industry should be maintained, or whether it should be completely centralised. Much will depend upon the powers which would be given to such a centralised authority. It might, for example, be given complete control of all the activities connected with the generation and distribution of electricity, or it could be given only advisory and consultative powers with the aim of improving co-ordination and planning. Another matter to be considered is whether there should be a complete organic union of all generating and distributing undertakings, or only some loose association. In any event it seems from a point of view of planning and co-ordination that some measure of integration of the generation and distribution of electricity would be beneficial, but the writer would not venture to presume to express an opinion either as to how far this integration should be carried or how it should be accomplished.

A cognate matter here is the part which electricity has played in the expansion of the Republic's activity, say, since the end of the second world war. There is no doubt that there has been a most significant expansion in the economic activity of the Republic in the last twenty years, but it is difficult to obtain figures which indicate accurately the magnitude of this expansion. Such figures as are available tend to be distorted by the rising wage level, rising prices or the fall in the purchasing power of money and so do not give a true picture of the physical expansion of the Republic's economic activity. The following figures show the number of KWH sold by all power stations in the Republic for mining and for industrial purposes in the 1945/6 and 1958/9 census years:

It is obvious that electricity must play an increasingly important part in an expanding industrial economy and therefore any economic planning must take into account the need for the provision of adequate supplies of this essential com-

Year	Electricity in KWH sold for		Total KWH sold
	Industrial Purposes	Mining Purposes	
1945/46 census year	1,419.0	3,796.5	7,338.3
1958/59 census year	4,958.3	8,991.1	19,105.2
Percentage increase	249.0	136.5	160.5



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modity. This involves making decisions about the establishment and location of new power stations, the expansion of existing power stations and the provision of reticulation facilities so that new areas can be provided with the opportunity to use electricity as a source of power, fuel and lighting. This seems to involve two aspects: what might perhaps be termed an extensive phase in which facilities are provided for new consumers, and an intensive phase in which existing consumers are induced to make more use of existing facilities.

The whole question of economic planning is an extremely complex one, and much of the difficulty arises from the formidable number of variables involved. It is not sufficient simply to say that it is expected that the level of economic activity will increase: the planners must attempt to give a quantitative forecast of future levels of economic activity. It is also necessary to give some indication of the areas in which the expected economic activity is likely to take place, for there is no point in providing increased facilities for, say, the supply of electricity in one area only to find that expansion has taken place in another area.

All this means that the planners must have some idea of the trend of growth of all the sectors of a country's economy and also whether there will be available the capital funds necessary to finance the increased economic activity. This in turn will mean that the question of spending and saving by persons will have to be considered and also the effect of changes in demand by consumers, using this word in its broadest sense and not restricting it to the ultimate consumers of consumer goods.

Finally, because the economy of a country is dynamic and not static, changes can occur which will upset the plans of forecasters so that what actually happens may be greater or less than the planners anticipated. To a considerable extent, too, these changes are unpredictable in advance. Nevertheless, some attempt at economic planning is essential on a national, regional and local scale. It is probably true to say that any economic planning is better than no planning at all, even if the plans have to be revised in the light of future events.

SECTION II: SOME ECONOMIC CONCEPTS.

In their analysis of economic problems, economists make use of various concepts and it has been suggested that, as these are not always familiar to the non-economist, some simple explanation of certain of these might be valuable. Perhaps the most fundamental of these concepts is that of supply and demand and the effect of changes in supply and demand on the price of the commodity or service in question. Supply is depicted graphically as a curve sloping upwards to the right thus indicating that under given conditions the suppliers of the particular commodity or service will be prepared to put increasing quantities on the market as the price increases. Demand is depicted graphically as a curve sloping downwards to the right, thus indicating that the consumers of the commodity or service will be prepared to purchase more as the price falls.

From this supply and demand curve mechanism it is possible to see what is likely to happen in the event of there being such changes in the fundamental conditions underlying these curves as to move them either to the right or to the left.

It is possible, for example, for a change in such factors as for example consumer preferences or vagaries of the weather, to change the position of the demand curve or of the supply curve for a commodity. If there is an increase in supply while demand remains unchanged, there will be a fall in the equilibrium price, i.e., the price at which the quantity supplied will be taken off the market with those given demand conditions. Conversely, if there is a decrease in supply while demand remains unchanged, then the new equilibrium price will be higher than the previous equilibrium price. A change in the position of the demand curve, while supply remains unchanged, will have a similar effect, but in the opposite directions. It should be noted that in course of time the higher price resulting from a decreased supply or an increased demand will tend to encourage new entrepreneurs to enter the industry and so increase the supply with a resultant fall in price. In the same way an increased supply or a decreased demand will tend to discourage entrepreneurs from entering that particular industry and will encourage some of the existing entrepreneurs to leave it and so supply will decrease and the price will tend to rise. The time it takes for such an adjustment to become effective varies — in some cases it may be possible to curtail supply almost immediately, whereas in agriculture for example increasing or decreasing the supply may take a considerable length of time. A curious feature about agriculture is that a fall in price may actually lead to an increase in supply, as each producer attempts to ensure that he will receive the same income as before even though prices have fallen. The net result of such a procedure is, of course, to drive prices down still further. Finally, we might note that the demand curve and the supply curve might both change their positions at the same time.

Much of the economist's analysis is concerned with prices in an attempt to find out both how prices come to be what they are and to what extent actual prices represent an ideal situation from the point of view of the economy as a whole. Among various functions, prices serve the purpose of distributing a limited supply of commodities or services among consumers. There are those consumers who want the commodities or services so intensely that, provided they have the financial resources available, they are willing to pay higher prices than other consumers. Those consumers for whom the prices are too high in relation to their estimate of the value of the commodity or service to them, and in relation to their financial resources, have either to go without the commodity or purchase a substitute at a lower price. Among commodities and services we find the factors of production — land, labour and capital — and the pricing system distributes these productive resources among competing demands. The various sectors of the economy (e.g., the State, local government, industry, distribution, etc.) compete for these resources, and different entrepreneurs in the same economic sector compete for the resources available to the sector as a whole. Those entrepreneurs who can offer the highest prices for these factors of production are able to supply their requirements from the resources available, while industries who cannot pay the prices because they are too high to enable the entrepreneur to make a satisfactory profit are forced to limit their activities. The prices of these factors of production are represented in the case of land by its rent or price, in the case of labour by wages and in the case of capital by interest or dividends. It

must be noted that, in practice, pricing may not be as accurate as the theory represents it to be and it is possible for a maldistribution of commodities, services and resources to occur.

It is also necessary to consider briefly the concept of elasticity, as it applies to both supply and demand. Elasticity measures the rate of response of supply and demand to small changes in price. The elasticity of demand for a commodity or service is the rate at which the quantity bought changes as the price changes, other things remaining the same. (It will be recognised that this, therefore, determines the steepness of the supply of the demand curve.) The elasticity of supply of a commodity is the rate at which the quantity offered for sale changes as price changes, other things remaining the same. These definitions are easier to understand in terms of the following simple formulae:—

$$\text{Elasticity of demand} = \frac{\text{Percentage change in quantity bought}}{\text{Percentage change in price}}$$

$$\text{Elasticity of supply} = \frac{\text{Percentage change in quantity offered}}{\text{Percentage change in price}}$$

As Cairncross says:—

"The elasticity of demand measures the ease with which people can put up with a small reduction in their consumption, or alternatively, the ease with which they can be induced, by a reduction in price, to consume a little more of it. If people buy the same amount of a commodity irrespective of the price, *i.e.*, if they cannot do without any of the amount which they are buying then demand is absolutely inelastic (elasticity is equal to zero). If people cease to buy the commodity altogether when it rises slightly in price, then demand is perfectly elastic (elasticity is equal to infinity). These are the outer limits. Within these limits we can distinguish between demands that change more rapidly, and demands that change less rapidly than price. Just on the dividing line, a given change in price will lead to an exactly proportionate change in the quantity bought; elasticity of demand is then equal to unity. On one side of the line, elasticity will be greater, and, on the other side, less than unity. When elasticity is greater than unity—that is, when a given change in price leads to a more than proportionate change in demand—we say demand is *elastic*.

When elasticity is less than unity—that is, when a given change in price leads to a more than proportionate change in demand—we say that demand is *inelastic*. When elasticity is less than unity—that is when a given change in price leads to a less than proportionate change in demand—we say that demand is *inelastic* it will be observed that elasticity is a matter of degree, and that even when demand is inelastic, there are still some elements of elasticity"(1).

The concept of elasticity of demand is of greater importance, especially for such suppliers of public utility services as electricity undertakings. Suppose such an undertaking is thinking of increasing its rates, one of the first questions which will have to be considered will be how much revenue will be

lost. With an increase in the price of electricity, some consumers will reduce the quantity of electricity which they consume, while in certain circumstances, some consumers may give up purchasing electricity completely. An increase in the price of electricity to the consumer may therefore not bring in as much increased revenue as anticipated. To a certain extent this can be overcome by increasing the tariffs of those consumers whose demand for electricity is inelastic—in other words an increase in price will lead to a less than proportionate fall in the quantity demanded. Conversely, if tariff reductions are being contemplated they will be given to those consumers whose demand is elastic because here a fall in price will be followed to a more than proportionate increase in the quantity purchased.

The elasticity of demand for a commodity depends to a considerable extent on the range of substitutes available. The wider the range of substitutes available, the more elastic will be the demand for any commodity or service. If electricity in East London, for example, becomes dearer the demand for electricity may not decrease very much because it is unlikely that many people will consider either a paraffin stove or a coal stove a very satisfactory substitute for an electric stove. If, however, gas is freely available this may be considered a very satisfactory substitute method of cooking and heating and an electricity undertaking would have to be much more circumspect in the latter than in the former case. It is also true that a commodity which has several alternative uses, generally has an elastic demand; and a necessity has a less elastic demand than a novelty or non-essential commodity. It should also be noted that the response of consumers and producers to a change in price is generally spread over a period of time, though in some cases the reaction may be immediate. It is quite possible to find a situation in which, in the short run, consumers may have no alternative but to pay higher prices; but in the long run the range of alternatives may increase and substitution become easier. If railway goods rates go up there may be no immediate reduction in traffic carried, but a great many businesses will begin, other things being equal, to seek alternative forms of transport.

It would be misleading if the foregoing created the impression that it is easy to calculate precisely the elasticity of a commodity or to draw up demand and supply schedules and so draw demand and supply curves. In neither case is this true and the demand-supply curve as a tool of economic analysis is open to many criticisms and weaknesses, but it is nevertheless a necessary foundation upon which to erect the higher structures of economic analysis.

Two other concepts which are frequently used by economists are marginal cost and average cost. It will be recognised that cost is an important determinant of the quantity which will be supplied and cost determines supply in two ways. In the first place it controls the volume of output which each firm finds it profitable to produce, and in the second place it controls the number of firms that can carry on operations at a profit. (In both cases, of course, cost will be considered in relation to either the prices ruling in the market or in relation to the price which the entrepreneur anticipates he will be able to obtain.) If the costs of producing a commodity rise, other things remaining the same, the supply will contract for a double reason: firstly, each firm will discontinue manufacturing units of output that no longer pay their way;

(1) Cairncross: Introduction to Economics; pp. 227-8.

and secondly, some firms will find it necessary or advantageous to abandon production of the commodity altogether. The rise in costs is said, therefore, to affect supply at the margin, i.e., on units of output which it is just worth while for each firm to produce, and on firms which previously had just found it profitable to produce. From this argument, the economist says, and says correctly, that it is the marginal, rather than the average, cost which controls the quantity which will be supplied. *Marginal cost* is defined as the net cost of a marginal addition to output, and from the point of view of an individual undertaking it means the cost of increasing its output by a single unit, as shown in Table 6.

The average cost to a firm is simply the total cost of producing a certain output divided by that output.

The marginal costs and the average costs of a firm can be depicted diagrammatically and when this is done it is seen that the marginal cost curve behaves in a peculiar manner in relation to the average cost curve. The marginal cost curve is at first below average cost. Eventually, the marginal cost curve begins to rise, but as long as it remains below the average cost curve (i.e., so long as each additional unit costs less to produce than the average cost of producing that quantity), the average cost curve continues to fall. When marginal cost is exactly equal to average cost, the average cost curve is at its lowest point and is neither rising nor falling. Thus the marginal cost curve intersects the average cost curve at the latter's minimum point. When marginal cost exceeds average cost (i.e., when each additional unit costs more to produce than the average cost of producing that quantity), average cost is rising but less steeply than marginal cost.

Analogous to marginal cost and average cost are marginal revenue and average revenue. Marginal revenue is the revenue derived from the sale of one additional unit, while average revenue is the total revenue derived from the sale of a certain quantity divided by that quantity.

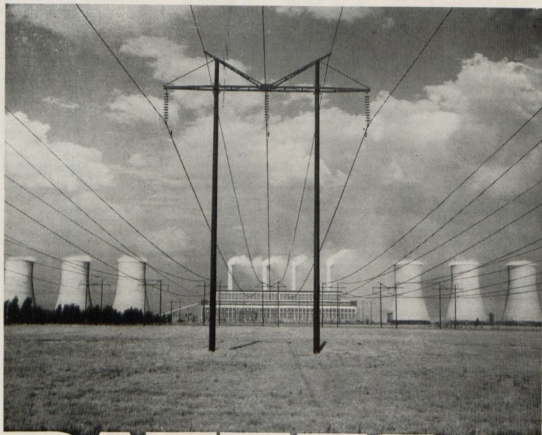
The importance of these concepts in economic analysis is that they are used by economists to show how the most profitable output of a firm can be determined. The most profitable output for a firm is that given by the point of intersection of the marginal cost curve and the marginal revenue curve. Economists distinguish various conditions of markets, the first of these being termed the condition of perfect competition. This, briefly, is a market condition in which no firm can, by its own actions, affect the price at which its product is sold and it can sell as much or as little as it produces but only at the ruling market price. Under such conditions average revenue and marginal revenue are equal and take the form of a horizontal straight line. Using the above principles, a diagram will be drawn on a blackboard illustrating the determination of a firm's most profitable output under these market conditions. In the example on the board it will be seen that at the point of intersection of marginal cost and marginal revenue, average cost is also equal to average revenue. This means that the average cost of producing that output and the average revenue derived from its sale are equal. If the ruling market price were higher, the intersection of marginal cost and marginal revenue would be higher and the firm would be making an abnormal profit. On the other hand, if the price were to be lower, it would not be profitable for the firm to continue in production.

The second market condition is that of monopoly — i.e., there is one producer who, it is postulated, is the sole supplier of the commodity. Such a producer is able to set his price at any level which he chooses, and he can decide whether to sell a smaller quantity at a higher price or a larger quantity at a lower price. As before, however, the most profitable output is given by the intersection of the marginal cost curve and the marginal revenue curve. The only difference in the analysis is that in monopoly conditions marginal revenue is not equal to average revenue, but the former is always below the latter. In the example to be worked on the blackboard, it will be

TABLE 6.

Cost Schedule of a Small Factory.

Output in Units	Total Fixed Costs R	Total Variable Costs R	Total Cost R	Average Total Cost Per Unit Produced R	Marginal Cost R
1	32.00	7.20	39.20	39.20	—
2	32.00	12.90	44.90	22.45	5.70
3	32.00	17.40	49.40	16.47	4.50
4	32.00	21.00	53.00	13.25	3.60
5	32.00	24.00	56.00	11.20	3.00
6	32.00	26.70	58.70	9.78	2.70
7	32.00	29.40	61.40	8.77	2.70
8	32.00	32.40	64.40	8.05	3.00
9	32.00	36.00	68.00	7.55	3.60
10	32.00	40.50	72.50	7.25	4.50
11	32.00	46.20	78.20	7.10	5.70
12	32.00	53.40	85.40	7.12	7.20
13	32.00	62.40	94.40	7.26	9.00
14	32.00	73.50	105.50	7.53	11.10
15	32.00	87.00	119.00	7.93	13.50



PATTERN

FOR THE FUTURE

Two futures, really. For electricity will come to thousands who have never known its benefits before, and more and more uses will be found for this obedient genie which hides behind a simple switch Electricity already bakes scones, separates minerals, freezes ice-cream, powers industry and lights the world. Without it, we would be plunged back into the smoky, clattering age of ponderous steam. With it, we have music, comfort and leisure Escom's job is to provide electricity for this wide land of ours. To stretch the network of clean, modern power to South Africa's far horizons. So that more people will know the comfort and leisure that electricity can bring, more lights will beat the darkness back from dorp and farm - and every planner can count on power in plenty THE FUTURE BELONGS TO ELECTRICITY. ESCOM PROVIDES IT.



ESCOM

serves the present—plans for the future

seen that the application of the principles outlined above gives the most profitable output and at that quantity there occur what are termed abnormal profits. This is a profit additional to that which, being included in the cost curve, is just sufficient to induce the firm to remain in business. Under monopoly conditions it is possible for these abnormal profits to be maintained as long as the monopoly of supply can be maintained. On the whole, while perfect competition, though rare, does exist, perfect monopoly does not exist. It could exist in the case of an electricity supply undertaking, for example, which had the sole right to supply electric light and power to a particular area, in which no substitutes for electricity existed, and where the supply undertaking had the absolute right to fix prices. It will be recognised that such a conjunction of factors is virtually impossible to achieve in practice. A much more likely situation in the market is that of monopolistic competition, i.e., a situation in which each firm is faced by a certain amount of competition but in which each firm also has something tangible or intangible which differentiates its product from that of its competitors. The determination of the most profitable output of a firm in such a market condition is the same as that under perfect monopoly, but since firms can freely enter the industry, in the long run any abnormal profits the existing firms were making will be reduced by competition until an equilibrium situation is reached where each firm is only making the normal profits included in the costs which determine the position and shape of the average cost and the marginal cost curves.

In our earlier discussion of the position of a monopolist it was suggested that he could sell either at a higher or a lower price, but that his profit would be maximised when he sold at the price indicated by the intersection of the marginal revenue and the marginal cost curves. Some monopolists, however, are able to divide their sales among a number of different "markets" and to charge a different price in each market. This is known as discrimination and it is possible for electricity distribution undertakings to practise such a policy. The electricity undertaking can charge different groups of consumers different prices for the electricity which they consume, and/or they can charge different prices for electricity when it is used for different purposes. In this respect electricity undertakings are generally in a different position from other commercial and industrial undertakings.

All the units sold at one price are said to be sold in one "market" so that a discriminating monopolist has as many markets as he charges different prices. Discriminating monopoly is possible only if the goods or services sold in the cheaper market (i.e., at the lower price) cannot readily be transferred to the dearer market. It is this which prevents most commercial and industrial firms from practising such a scheme—it would, for instance, be impossible to charge higher prices to well-dressed customers for people could easily dress shabbily or get others to make their purchases for them. In the case of the electricity undertaking, however, a householder cannot represent himself to be a factory-owner, and separate meters prevent current charged at a lower rate for power purposes being used for lighting.

The importance of all this is that where a monopolist can divide his sales among a number of markets, between which conditions of demand are different, he will make greater total

profits by charging a different price in each market. In the economist's terms: "he will maximise his profits by charging such prices that his marginal costs (for his total output) are equal to the marginal revenue in each separate market." When this is done, the monopolist will gain neither by increasing nor decreasing his output, nor yet by transferring some sales from one market to another. Lastly, it should be noted that discrimination is profitable only if the elasticity of demand is different in each market, the most profitable price being lower in the market where the elasticity of demand is greater.

It will be common knowledge to you, Gentlemen, that the costs of an undertaking can be divided into those which are fixed, in that they do not vary with changes in the level of output or activity, and into those which do vary with these changes. In electricity undertakings, in common with other public utility undertakings, fixed costs are large because these undertakings require a large amount of specialised equipment and plant. Electricity generating and distributing undertakings, it has been shown, are usually monopolists and frequently they can discriminate in the prices which they charge. Another point about a public utility undertaking is that it may well find that at times it has to operate at less than full capacity. One reason for this is that it is frequently cheaper for such an undertaking to build a power station, or provide distribution facilities, in excess of those needed at a certain time as this is cheaper in the long run than making successive alterations. Likewise, if an extension is to be made to cope with say 10% increase in demand for the service, it frequently pays the undertaking to increase facilities to cope with a greater demand than that existing at the time the expansion is made. Again, it may be cheaper to produce electricity from a larger plant working at less than full capacity than from a smaller one operating at full capacity.

Another reason for excess capacity in public utilities is that demand fluctuates over time, and unless the product can be stored one has to have a plant large enough to cater for the "peak" demand. This obviously means that excess capacity will be present when demand is below the peak level. By means of advertising and other propaganda methods it may be possible to raise the demand during off-peak periods, and to reduce it during the peak periods if that strains the capacity of the plant and raises marginal costs sharply. A more effective method of doing this may be to charge a much higher rate per unit of electricity for current consumed during the peak demand period.

Now another factor to be considered in this case is that variable costs are unlikely to be rising if the plant and equipment are being worked below full capacity. Hence to charge a price per unit which is equal to the marginal cost would cover only a part of total costs for it would fail to cover fixed costs. There are two methods open to an undertaking in such a case. Firstly, it could charge a price per unit which is equal to average total cost. This, however, would usually be much higher than marginal cost, and it is in the social interest to meet the potential demand of consumers who are prepared to pay prices for extra units which cover the extra cost of supplying those units.

The second possible method open to an electricity undertaking in such a case is the use of what is called a *two-part tariff*. Under such a system of charging, the consumer has to

pay two charges. The first is a fixed charge which does not vary with consumption. This charge must be paid whether much or little is consumed, or none at all of the service used. All the fixed charges, taken together, would approximately cover the fixed costs of the undertaking. The second part of the charge is a charge per unit of electricity consumed, and sometimes this is at a decreasing rate per unit as various increased quantities are consumed. This second part of the charge covers the marginal costs of the undertaking.

After this somewhat extensive analysis of these concepts, the question arises as to the extent to which an ordinary business firm uses or can use the marginal cost-marginal revenue mechanism. On this subject, Cairncross says:—

"Many business men, comparing the logic of the foregoing argument with their everyday experience, would be inclined to dismiss the argument as academic. Few of them have heard either of marginal cost or of marginal revenue. Only a proportion of them have the costing machinery necessary for the estimation of average, still fewer for the estimation of marginal cost. Even if costing were in universal use, it would in many industries be extremely difficult to apply it to the estimation of marginal cost, while marginal revenue must almost always be a matter of guesswork. In many industries the usual procedure is to fix a price on the basis of average direct costs in labour and materials plus an allowance for overheads. This allowance is worked out so as to cover averaged fixed costs, not at the capacity level of output at which the plant was designed to operate, but at a rather lower level . . . which takes into account fluctuations in activity and is treated as normal or standard for the purpose of costing. Sometimes the procedure is less elaborate: retail prices, for example, are often arrived at by adding a customary percentage margin to the wholesale price, irrespective of the actual selling costs; and in manufacturing industry, firms may use a similar method, adding a uniform percentage mark-up above direct costs for a wide variety of products without any accurate assessment of the fixed costs attributable to each.

Both of these procedures are usually referred to as 'full-cost pricing' and they are frequently cited as evidence of the disdain with which economists treat the elementary facts of business life. The economist on the other hand is sceptical about the 'facts' because they carry the logical implication that the business man, almost as matter of principle, charges less than he might. The way to make as big a profit as possible is to charge, not on the basis of cost, but what the market will bear; this means varying the price with demand on the one hand and marginal cost on the other, not deliberately ignoring both. How are we to reconcile the logic and the apparent facts? Various considerations suggest that the business man may not be so illogical and the economist not so inobservant after all. The behaviour of prices and costs differ from one market to another, and what is true in one market is not true in another. It would be a mistake, therefore, to think that the few propositions outlined above provide an adequate clue to the complexities of cost and market structure throughout industry; but they take us a little way along the road."⁽²⁾

Finally, in this section attention might be directed to one further concept, viz., the law of diminishing returns, which deals with the substitution of one factor of production for another. It must be noted firstly that there are two general principles governing the substitution of one factor of production for another. The first of these principles is that no one factor of production is a perfect substitute for another for if they were we would not have the separate factors of land, labour and capital, but only one general factor of production. The second principle is that substitution becomes progressively more difficult the more it is attempted to substitute one factor for another. It is easy to do without a little of one factor and use a little more of another, it is difficult to do without a great deal of one factor and replace it with another.

From these two principles it is possible to derive the law of diminishing returns which is simply a statement that, sooner

(2) Cairncross: *op. cit.* pp. 265-7.

Variations in Factor Proportions.

Units of A (1)	Units of B (2)	Units of Product (3)	Average Product per Unit of A (4)	Average Cost of Production in Rand (5)
1	10	50	50	2.40
2	10	200	100	.70
3	10	600	200	.27
4	10	960	240	.19
5	10	1,270	254	.16
6	10	1,530	255	.144
7	10	1,750	250	.137
8	10	1,920	240	.136
9	10	2,070	230	.135
10	10	2,200	220	.136

NOTE: Column 5 is based on an assumption that one unit of A costs R20.00 and one unit of B costs R10.00.

or later, other things remaining the same, the combination of an increasing number of units of one factor with a given number of units of other factors must lead to a less than proportionate increase in output. The total output increases, but it does not increase as rapidly as the variable factor is increased. The reason for this is simply that some factors are not increased at the same time as the variable factor, and the increased supplies of the variable factor cannot entirely make up for the deficiency unless the variable factor and the fixed factor are perfect substitutes one for another. This is illustrated in the following table.

The first three columns are purely hypothetical, and are inserted to make it possible to derive columns 4 and 5. If column 4 is increasing as output increases, the increase in output is more than in proportion to the increase in A; and if column 4 is decreasing, the increase in output is less than in proportion to the increase in A. A third situation is also possible, intermediate between the other two, at which output increases exactly in proportion to the increase in A, so that for a time column 4 remains constant. In such a situation we have constant returns.

In the hypothetical table it is after 6 units of A have been combined with 10 units of B that diminishing returns begin to operate. A question which arises is why it is always necessary to combine the variable units of A with 10 units of B; why, for example one should not combine 3 units of A with 5 units of B and so produce half the output given by 6 units of A and 10 units of B. The possibility of doing this will depend upon whether B is divisible into smaller units or not. If B is indivisible, in the sense that it cannot be duplicated on a smaller scale, it will not be possible to take a smaller number of units of it. It will then be necessary to combine the 10 units with a smaller number of units of the factor which is divisible, even though this produces a lesser number of units of output than would seem to be ideal. It is also of little use producing 1,530 units of output, just because it appears to be the most favourable point of production, if there is no market for this number of units. A small power station, for example, may have half the capital of a large one and yet, employing more than half the labour force of a larger station, it may produce less than half as many units of electricity. It is not much use to recommend the smaller station to adopt the methods of the larger ones, and turn itself into a kind of half-size replica, for it is only undertakings which are of a certain minimum size which can avail themselves of certain methods of large-scale production. Nor is it sensible to recommend the small power station to double its output and become a full-size replica of the large station if the increased output cannot be sold.

In reality it will probably seldom be found that all factors are perfectly substitutable or that all factors are equally scarce. It will probably be found that the supply of certain factors are more limited than that of others. This means that it will be more costly to use units of the scarcer factor, or second-rate units of it will have to be used, while the other factor can be obtained in comparative abundance, and so the tendency will be to substitute the more abundant factor for the scarcer. If such substitution were impossible and the factors had to be combined in a fixed proportion, costs would rise steeply. In practice some degree of substitution will be

practised, but because of the law of diminishing returns substitution will be imperfect and costs will rise eventually, though at a considerably higher output than the output at which returns begin to diminish. (See Table 7.) Thus it is because industries are forced to make do with the factors of which they can make increased use, meeting the deficiency of other factors in the best way possible, that diminishing returns come into play. Using a larger proportion of the factor which can be most easily increased is simply a method of economising the other factors and avoiding the consequences of their scarcity.

I would now like to deal briefly with the question of economies of scale. This term is used to indicate that as an undertaking increases in size there are various economies which accrue simply because the firm is large in size. These economies are usually grouped into five sections as the following analysis will show. In the first instance it is possible to distinguish what are called the *technical economies of scale*. These technical economies are of four kinds.

- (a) *The economies of superior technique*: many types of machinery cannot be reproduced at all on a smaller scale, so that a small undertaking either has to instal machinery which it cannot keep continuously in operation or it has to do the best it can with less efficient machinery of a different type.
- (b) *The economies of increased dimensions*: even when a machine can be duplicated on a smaller scale, there is often an advantage in using the larger machine as, for example, when the increase in size results in a less than proportionate loss by friction, evaporation or cooling. Furthermore, in spite of its greater output, a large machine can often be operated by a team of workmen no larger than that required to operate a smaller one of the same type. Not only is a larger machine cheaper to operate in many instances, but it is often proportionately cheaper to construct so that, for example, an electric motor developing 20 horsepower is not twice as expensive as one developing 10 horsepower. It should be noted, however, that large mechanical units are not necessarily more efficient than smaller ones: it depends upon what dimensions are being increased.
- (c) *Economies of increased specialisation*: in large undertakings it is possible to carry division of labour further than in small plants. Each person can be restricted to a single task, which can be rapidly learned and efficiently performed with a minimum amount of time-wasting movement which inevitably occurs when one person performs several different jobs. With specialised division of labour, then, production costs can be reduced. Large scale production, with specialised division of labour, often makes it possible to split operations into small units, each one of which can be taken over by a machine specially designed for the purpose. In a small factory such a process would not be profitable. It should be noted, though, that there are limits to the extent to which division of labour can be carried, even in the largest undertaking.
- (d) *Economies of linked processes*: in a large undertaking it is often possible to link several consecutive pro-

cesses together under one roof, thus resulting in the following economies being achieved.

- (i) a saving in time and in transport costs; for re-heating; and
- (ii) a saving in fuel and power whenever the physical conjunction of two processes avoids the necessity
- (iii) there is the possibility of turning waste materials into by-products.

The second economy of scale deals with *managerial* factors and has two aspects. In the first instance, a large undertaking can buy in the open market the most able managerial skill available. Although it may be expensive, first rate managerial ability is always an advantage to a firm, especially when the cost of this ability can be spread over a large output. In the second instance, the power of a large firm resides in its ability to divide management into a number of specialised sections, each under the care of an executive who is a specialist in his particular field. The manager in a small undertaking, on the other hand, will often be responsible for the detailed planning and supervision of, say, buying, sales promotion, design of the product and technical supervision of production. It is, to say the least, doubtful if any one person can possess or acquire sufficient knowledge to manage all these fields effectively. In a small firm, however, there is insufficient work in each specialised field of management to make profitable to employ a specialist to head a specialised department. Furthermore, in a large undertaking, the senior executives can delegate routine work to subordinates, leaving the senior men free to plan, co-ordinate and control more effectively.

Economies of management, then, can only be achieved when production is on a large scale. *But*, and this is of the utmost importance, once an undertaking grows beyond a certain size the economies of management are replaced by diseconomies. This is because the larger the firm, the more difficult it is to control and the more complicated becomes the process of management, especially co-ordination, and the less flexible the undertaking becomes. It may also be difficult to find a chief executive who is capable of heading the management of a very large firm.

Thirdly, there are economies of scale due to *market* factors. These apply to the purchase of raw materials and the sale of the finished products. The importance of skilled buying of raw materials in efficient and economical production can hardly be over-emphasised. The large undertaking can afford to employ skilled buyers, who have an intimate technical knowledge of the raw materials used by the firm in question, and who are also familiar with all the sources of supply. These buyers are unlikely to be deceived in regard to the quality of the raw materials which are buying, nor are they likely to miss opportunities to obtain bargains. Being employed by large undertakings, they can purchase in large quantities with many economies resulting from this large-scale purchasing, and the cost of raw materials is a considerable item in the cost of the finished product, it is not uncommon to find that the profitability of an undertaking depends more on skill in buying than on a high degree of efficiency in the factory.

On the selling side also considerable economies of scale are possible. An efficient selling organisation may be expensive, but when related to a large turnover it may be operating

most economically. Travellers and agents, too, can take large orders as conveniently as small orders, and a large number of orders can be handled with little more expense than a small number.

In regard, fourthly to *financial* factors, the balance lies heavily with the large undertaking. In raising long-term capital, a large public issue of securities is relatively cheaper to make than a small issue. In fact, the cost of inviting the public to subscribe for securities, and the making of the issue, is often prohibitive to the small undertaking and so it must obtain its capital from other sources. It may also be easier for the large firm to raise temporary financial assistance than the small firm, and it is generally the case that a large firm inspires confidence in the mind of the public just because it is large, even though other small firms may be equally stable.

Finally, a large firm will find that its output is sufficiently large to enable it to spread its *risks* by—

- (a) diversification of output;
- (b) diversification of markets;
- (c) diversification of sources of materials; and
- (d) diversification of methods of manufacturing.

The economies, leading to a reduction of risk, are available only to a large firm, but the extent to which they can be carried depends upon the extent to which the diversification complicates management, and hinders the attainment of the technical economies of scale.

SECTION III: THE FINANCING OF ELECTRICITY GENERATING AND DISTRIBUTING UNDERTAKINGS.

The electricity generating and distributing industry in Southern Africa is peculiar in the sense that, if we exclude the Electricity Supply Commission, only a very small part of it is in the hands of private ownership, i.e., owned either by individuals or by companies. This being the case then, the greater part of the industry is financed from sources, and by methods, other than those found in manufacturing or commercial undertakings which will be financed by the owner or owners investing it in their personal savings, probably augmented by such funds as they can borrow from such sources as commercial banks, other financial institutions and investors who prefer to lend money to business undertakings rather than to invest it in their own undertakings.

The Electricity Supply Commission is a public utility undertaking which has no shareholders or owners in the sense that a company has and its capital is obtained principally from the sale of stock by which money is borrowed from investors. The capital structure of the Commission as at 31st December, 1961, was as follows:

Locally Registered Stock — — — — —	R446,027,428
Loan from the International Bank for Reconstruction and Development — — —	R22,891,072
Loan from Export-Import Bank of Washington — — — — —	R10,233,666
Loan from the Commonwealth Development Finance Co. Ltd. — — — — —	R2,180,000
Swiss Loan — — — — —	R8,274,720
TOTAL	R489,606,886

The capital expenditure of the municipally-owned undertakings is also largely financed by borrowing, since again there are no owners whose savings can be invested in the undertakings. In virtually all cases of borrowing, the loans are repayable after a stated period of time, or on a specified date, with interest at a specified rate being payable in the interval. The rate of interest which will have to be paid varies from time to time, and depends upon such factors as:—

- (a) the state of the capital and the money market—e.g. is it easy or difficult to borrow money;
- (b) the competition for the available funds in the capital and the money markets;
- (c) the borrowers' estimate of the assessment by the investor of the risk involved, it being axiomatic that the greater the investor's assessment of the risk involved the higher the rate of interest which will be necessary to induce him to lend his money; and
- (d) the security which can be offered by the borrower.

The loan may be repaid by setting aside out of revenue an annual sum so that over the tenure of the loan these sums together with interest if they are invested outside the undertaking, will provide a sufficient sum to repay the loan. This method is commonly called the creation of a sinking fund. On the other hand, a loan may be repaid on due date by the flotation of another loan, the proceeds of which are used to pay back the loan which has matured.

Another source of funds for capital expenditure is what in a public utility undertaking could be called a surplus of revenue over expenditure. Now, in the normal course of events public utility undertakings are not expected, taken on the average, to make a profit in the sense that a privately owned undertaking expects to make a profit each year. Ideally, a public utility undertaking, after meeting its current operating costs, and providing for depreciation, the creation of reserve funds and the servicing of loans and sinking funds, should have no surplus remaining. In practice, however, it may be difficult to achieve such a fine balance and surpluses may arise in some years and these can be used to finance capital expenditure. This self-financing is a fairly complex procedure, and mention of certain aspects of it has already been made by the President in his Residential Address. It should be noted, too, that in a municipally-owned undertaking any surpluses which arise in a year are usually taken for the relief of rates.

A question which now arises is the extent to which it is desirable and possible to obtain funds for capital expenditure by a deliberate policy of planning for a surplus after the above mentioned annual expenditure commitments and provisions have been made. From an undertaking's point of view there are several advantages in self-financing, the chief advantage being that the undertaking is freed from the necessity of paying interest to the lenders at stipulated intervals. The possibility of self-financing, however, depends upon the ability of the undertaking to charge a tariff which is sufficiently high to cover the expenditure commitments of the undertaking and still produce sufficient revenue to create a surplus each year. This means, *inter alia*, that the undertaking must have an accurate idea of its operating costs at various levels of activity, and also of the level of activity at which it is likely to operate, or else the anticipated surplus may not materialise.

It might be appropriate to note here that steps are being taken in the Cape Province to compel Municipalities to increase the charges they levy for their services in order that what is termed a *revolving fund* may be built up by each Municipality. The purpose, it seems, of this fund is to help finance the needs of the municipality's trading undertakings for short-term capital.

A further matter to which it is appropriate to draw attention here is the depreciation of fixed assets. It is a cardinal principle of sound financial management that a certain proportion of the book value of fixed assets must be written off against revenue in each year. While there are various methods of depreciating fixed assets, the principle remains the same. It is not, however, to this aspect of depreciation to which I wish to draw your attention, but to whether the annual provision for depreciation is adequate or not. The problem here arises because of the continued increase in the general level of prices, or, in other words, the general fall in the purchasing power of money. If an asset is depreciated by a fixed amount being written off its book value each year, and a sum equal to this amount invested outside the undertaking, there will at the end of the life of the asset be a sum available for its replacement. Now if prices have risen during the life of the asset, it may well be that the accumulated funds will be insufficient to finance the replacement of the asset.

It has been suggested, however, that this situation is alleviated to a certain extent by the following factors:—

- (a) although the asset's book value is written down to zero, it generally has a scrap value which, if realised, will augment the sum available for its replacement; and
- (b) an asset is often given a shorter life for depreciation purposes that it has in fact in reality, so that the accumulated sum can earn interest for a number of years before the asset has to be replaced.

On the other hand, it should be noted that a situation can arise in which an asset, because of technological progress, ceases to serve any useful purpose long before its useful life has expired. This, however, is more likely to affect adversely a commercial or industrial undertaking faced by competitors, than an electricity generating or distributing undertaking.

It seems, Gentlemen, that this is a fitting point at which to terminate these thoughts on certain aspects of electricity supply economics and I trust that which has been said has been of interest, and perhaps of some value, to you.

On Resuming:

THE PRESIDENT: I trust you are all now in a fit condition to take part in further deliberations on this paper by Prof. Smith.

Could I ask for Mr. van der Walt to propose the vote of thanks to Prof. Smith, please.

Mr. J. L. VAN DER WALT (Vereeniging): Mr. President, Prof. Smith, ladies and gentlemen: I trust that this paper is going to cause quite a number of you people and especially councillors, to rise to their feet and get on the attack.

You know the war story. There were the Kings' Guards and the colonel who was in charge was from the Kings'

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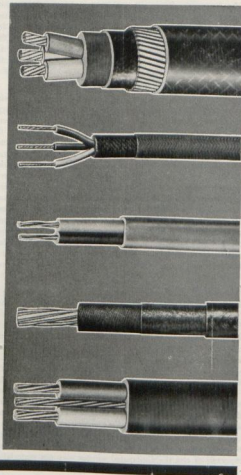
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Guards, but included in his unit was a South African Railways Unit. They were lying in the trenches in North Africa, very inactive, and the colonel was afraid that they would get out of practice, so he gave orders that the next morning there would be a practice charge. When the command was given, this division had to get out of the trenches and charge the imaginary enemy.

The next morning at sunrise, the command came, crisp and clear, and there was the colonel himself giving the example right at the spearhead. He gave the command, and said, "Up Guards, and at 'em!" Everybody charged except the South African Railway unit. So the colonel turned round and he was very annoyed about this. He said, "What blatant disobedience of a command. Why didn't you charge when I gave the order?" And the spokesman of the Railway Unit said, "Ja, maar ons is nie guards nie, ons is engine drivers!" (Laughter.)

I trust that there will not be the 'engine driver attitude' this afternoon, Mr. President.

A paper on the economic aspects of municipal electricity undertakings has long been overdue and it is therefore gratifying that a person of Prof. Smith's calibre was chosen, and agreed, to deliver such a paper. He rightly gave it the title: *Some Aspects of Electricity Supply Economics* because it is impossible to cover all the aspects in a paper of this nature, because economics cover such a wide field.

Scientists find it difficult to define economics and also to decide whether it is a science.

In "The Economics of Private Enterprise" Jones writes: "Is economics a science? The question does not admit of a categorical reply, for the simple reason that people are not agreed as to the meaning of science. It is at least a scientific study, that is, its method is scientific. It observes, classifies and as far as possible explains phenomena, thereby achieving a deeper understanding of conditions, actual and possible. It is a study of cause and effect. Since many of the phenomena with which it deals are capable of quantitative measurement it is rapidly becoming in part a study of quantities. But if (as some people contend) the test of a science be found in the power of prediction, economics in that respect, must be regarded as in its infancy. It is not an exact science, though its demands upon reason and judgment are not on that account, any less exacting. Its boundaries are hard to define. Essentially it covers the problems of organising and valuation and in recent years the tendency has been made towards further restriction of scope, the resulting gap being filled by newer science such as human geography and sociology".

Prof. Smith should be congratulated on the clever and unbiased way he tackled this most controversial subject, viz. a centralised authority for the generation and distribution of electricity, which in effect means nationalisation. It is as if we have been afraid to discuss this economic aspect or problem in the open. There appears to be a secrecy attached to it which to my mind is a bad omen.

A number of countries have nationalised their electricity undertakings, of which Britain is perhaps the best known to us. Why can we not discuss our problem frankly and attempt to predict the economic pros and cons for our country by analysing the economic repercussions in these other countries? What exactly are we afraid of? Has Britain benefited

economically by nationalising generation and distribution? Has the consumer benefited through nationalisation? I do not think so. I believe that in some areas in Britain, charges for electricity had to be increased after nationalisation. The Liverpool area, is a case in mind.

As for the creation of a central authority for electricity generation, I think that we have the writing on the wall. The economic advantages are such that we cannot argue them away. On the other hand, in South Africa we have centralised control of generation to a high degree. Escom is for all practical purposes a central generating and transmission authority. It is only in the larger cities and the smaller outlying towns with comparatively small communities that we have municipal generating stations. The larger city units are economical units and are tied up with Escom through bilateral agreements. In the case of the smaller units in outlying communities I do not see any advantage in the central authority taking over and I do not think they wish to. They are also run as economically as possible, since their staffs are used economically for other purposes as well, such as meter reading, water reticulation, road construction, house wiring, storekeeping, etc.

Where the central authority has come within reach to supply such communities in bulk, they have done so, but distribution has always remained with the local authority. Distribution of electricity to the consumers within the area of jurisdiction of a local authority is I feel the responsibility of that local authority and I do not think that a strong case can be made out for a central authority.

We have lately read in the papers that the higher authorities in Transvaal will probably investigate the advantages of a metropolitan system for certain services. In a densely populated area such as the Reef, where boundaries of the various authorities are often common, it has great advantages, more so where such services are unprofitable for one local authority, or the capital outlay will be larger for a very small return. This however, cannot be said of the electricity undertakings, because every single one of them situated in this complex is an economic unit, contributing to the relief of rates of their respective communities.

Admittedly there will be economic advantages such as standardisation, superior technique, increased dimensions, increased specialisation—all mentioned in Prof. Smith's paper. Should, however, these undertakings be placed under a central authority, their contributions to relief of rates will fall away and the communities will have to pay substantial increased rates.

What then is the benefit? Where is the economic advantage to the communities? Is it not merely robbing Peter to pay Paul, for the sake of claiming that we have technically complied with the laws of economic science?

The Honourable members on the other side of this house may reply that it is a national duty to supply electricity as cheaply and economically as possible to the nation and therefore claim that local authorities should not make the profits they do. In fact, it is said that some make exorbitant profits. If this is so, and now I am addressing Councilors, then I say they must heed the writing on the wall, but municipal trading, be it electricity, water, gas, is defensible and so is a reasonable profit from these trading activities. I will give my reasons later.

A safeguard against local authorities overcharging for electricity is the fact that their tariffs have to be competitive, except the smaller rural areas, because all are in the scramble today to attract industry. Not only industrial tariffs must be competitive, but domestic rates must also fall in line, because industry must have a contented labour force, living under modern conditions. Industrial developers always look at this aspect of a local area's economy.

Municipal trading has its origin in:

- (a) *The services are natural monopolies*, i.e. they are dependent on some systems making competition difficult and unprofitable.
- (b) *The protection of Public Interest* appears to demand that these monopolies should not fall into the hands of private enterprise through fear of exploitation.
- (c) *Investment of capital* is high in comparison with returns which might be expected — therefore little inducement for private capital.
- (d) *The ideal of service* is of prime importance and not profit.
- (e) Another important point in the origin of "trading" by local authorities is the fact that they can *raise capital at very much cheaper rates than private enterprise*.

Interest on this form of capital is fixed for long terms, whereas that on private capital fluctuates according to the word of the market.

Municipal profits (which aid the rates) are invariably less than the margin between the cost of public and private loans.

W. A. Robson in "A century of Municipal Progress" wrote:

"The concept of public utility involves the idea of an essential service requiring either public ownership or public regulation in the interest of the consumers and of the general public. It also implies the existence of privilege or monopoly rights."

We may ask: What are essentials? Luxuries of yesterday are essentials today. This is particularly so with electricity.

What are the objections to Municipal trading:

1. *Unfair competition.* Municipalities are at an advantage and are depriving honest traders of their livelihood. This is more a socialist bogey. It certainly cannot be applied to municipal trading in supply of electricity or water.

2. *Municipal Inefficiency.* Municipal organisations are often condemned as inefficient, extravagant and levying extortionate charges. These are the usual wide statements with no proof attached. In fact, the opposite has been proved in the U.S.A. where private enterprise has shown up badly compared with municipal undertakings. There, the greatest abuse and corruption, where public ownership was unknown resulted. Bribery and corruption for franchises were the order of the day, resulting in the City Manager system — please Mr. President, gentlemen, I am not making any inferences!!! Our municipal electrical engineers and their technical staff have established that they are men of high integrity, economists by training and tradition and they run their undertakings on very efficient lines, always on the look-out for economies in staff and material. Their consumer relationship is usually very harmonious.

3. *Bureaucratic control*, which means curtailment of civil liberties through red tape, or the growth of an attitude of nonchalance and discourtesy on the part of officials towards the public.

Can this not be said of a central authority and then possibly in a greater degree?

Arguments in favour of Municipal Trading.

1. *Bring monopolistic*, the cost of competition is less, i.e. advertising, duplication of delivery services.

2. *The ideal of service to the public.*

Many electricity services are extended which are not payable propositions, e.g. agricultural holdings, rural schemes etc. Would a central authority consider undertaking such schemes?

3. *Financing.*

Prof. Smith remarks that in the financial factor the balance lies heavily with the large undertaking. I submit that owing to the soundness of its credit, i.e. the rateable property of its ratepayers, municipalities are just as able (if not better) to finance its schemes as cheaply as private enterprise, and it also obtains supplies at lower rates than the private sector.

Interest rates on Escrow Stocks are always a shade higher than those of the large Municipalities. This implies that investors have more confidence in municipal enterprise than in quasi — state monopolies.

The arguments for a local authority's undertaking to make a profit are:

1. It is a compensation for risk of the ratepayer's assets. Losses will mean increased taxes. It is the reward for the entrepreneur factor.

2. It must sell at competitive prices, because with the aim of industrialisation today, municipalities vie with each other for industries. Profits over and above may be regarded as a reward for outstanding efficiency.

3. If higher charges are levied it is calculated to cultivate a greater sense of responsibility among the non-ratepaying element who always demand more and more services and amenities.

We all agree that profits should not be exorbitant. A good formula is that the ratepayer is entitled to a return on the security he gives, the security being the revenue from rates levied on his rateable property. A very fair return would be 7% on the outstanding capital debt. This can be regarded as the reward for the production factor "entrepreneur".

I have submitted these arguments to try and establish the right of local authorities to trade and make profits through the generation and distribution of electricity. To me there does exist the clear cut case for a centralised generation authority, but, I submit, we have such an authority for all practical purposes. The few large centres not controlled by such a body are co-operating through bilateral agreements. The few smaller ones in isolated areas do not appear to have any economic advantages for a central authority.

As far as distribution is concerned, I am of the opinion that it should remain with the local authorities.

I have often wondered how electricity undertakings could play a bigger role in the economy structure of our country

through what is known as the *acceleration principle and the multiplier*.

The acceleration principle states that an increase in the demand for consumers goods or services causes a greater percentage increase in the demand for production factors, consumers goods or stocks.

The multiplier again is an instrument which can be applied to stimulate an economy during a recession or depression. A public expenditure of say 100 units of money is, after it has been absorbed into the income of the various productive factors, partly spent on consumers goods and partly for discharging debts and for savings. If $\frac{1}{3}$ is spent on consumers goods 66.7 units flow back into the stream of income. $\frac{2}{3}$ of that again i.e. 44.5 units flow back and so on.

Thus adding up to ad infinitum, we find that the 100 original units result in an expenditure of 300 units. The multiplying factor is therefore 3.

Together with the principle of acceleration a declining economy can be stimulated by public spending.

In practice however, we find that electricity undertakings are forced to expend heavily during boom periods. If at all possible, planning should be done during boom periods and spending on extensions and new projects should be undertaken during recessions, to cater for the coming boom periods. Over the last 200 years recessions or depressions were followed by boom periods and there is as yet no proof that "managed money" is going to change this cyclic occurrence.

If the persons in charge of large undertakings can organise their undertakings in such a manner that they can meet boom periods without the usual frantic and often uneconomical expansion programmes and use these periods for further forecasting and planning and execute such planning during recession periods, then electricity undertakings will do the country an immense service.

I would like to hear Prof. Smith's opinion on this aspect. Prof. Smith mentions the capital revolving fund now being enforced in the Cape Province. This fund however, is a compulsory contribution and if necessary, local authorities can levy a rate of up to 1/10 cent in the rand on all valuations, i.e. land and improvements. Local authorities may invest all balances of their accounts but *shall* invest all revenue from sale of fixed assets. This principle can be overdone. Circumstances may make borrowing more profitable.

Mr. President, gentlemen, it has been a privilege for me to have been asked to propose a vote of thanks on Prof. Smith's paper. He has very tactfully introduced a subject which may in the near future become a very controversial one, affecting the routine lives of many of us. I am now thinking of the expected report of the Commission of Enquiry into the Financial Relationship Between Central, Provincial and Local Governments (The Borckenhagen Commission). I know that they also have this subject of generation and distribution of electricity on their programme.

Prof. Smith's paper has long been overdue and we are grateful to him for introducing us to some economic principles in such a clear manner. We are also indebted to him for introducing this controversial subject of a centralised authority in such an objective yet factual manner. It warrants a thorough study by all electrical engineers and Councillors and may it

provoke the deep thought in them that the subject warrants. I trust that it will inspire greater efficiency, greater economy and in some cases perhaps less profit.

I now formally propose the vote of thanks to Prof. Smith and ask you all to show your appreciation in the usual manner.

Thank you. (Applause.)

THE PRESIDENT: Thank you Mr. van der Walt, for your most thought-provoking contribution. May I have a seconder to Mr. van der Walt's proposal?

Mr. J. E. MITCHELL (Honorary Member): Mr. President, it is with some real trepidation that I rise to second the vote of thanks to Prof. Smith, so ably proposed by Mr. van der Walt. But I want to assure all delegates present that I haven't written another paper! (Laughter).

Generally I have a rooted objection also, to following anybody so low in the municipal scale as a Town Clerk, but in view of the fact that for the first time in history we have elected an Honorary Member of this category, perhaps it is just as well, and is only right and proper that he should have precedence.

Secondly, after hearing his vote of thanks, I realise just the position into which Van has got himself. He realises now that if there is no profit to be made from electricity, his own salary is in jeopardy!

Also, and this is quite honest, I feel that, following one so versed as Van in the economics of electricity supply, I am like the man who married the widow with 12 children — he has left me very little to do! (Laughter)

I would also say, Mr. President, that under normal circumstances I would take the dimmest possible view of you making me work at this Convention, when I had hoped to sit back and jeer at the Executives as they dashed down their breakfasts and hurried off to their morning meeting.

However, I said "under normal circumstances" and circumstances are not normal, in that we have been presented with a most excellent paper by Prof. Smith and I deem it therefore an honour, and not an unwanted task, to be asked to second the vote of thanks.

The economics of electricity supply in the field of detail is, as Prof. Smith says, very complex, and it is different from other industries, mainly due to the one feature, namely that we are dealing with a commodity which is incapable of being stored, although some attempts have been made to store its end product in hot water, thermal storage cookers etc. It has always been one of my greatest difficulties to explain to laymen that the demand in thermal generation costs is more than for the units, and the demand in hydro generation, with certain qualifications in respect of load factor, the cost is nearly all that of demand, and not of the cost of the units supplied.

In considering the cost of electricity I like to think of it in the form of Ohm's law, in which current, resistance and pressure are all inter-dependent so with electricity economics you cannot discuss the cost of electricity independently of demand, units, and load factor.

There is, however, one other factor, the diversity factor, and although Prof. Smith did not speak of this as a term he

did in fact dilate on this aspect in debating the advantages and disadvantages of large undertakings versus small undertakings.

It is not my intention, however, to comment on this major portion of Prof. Smith's paper, as I am certain it is the one which will provoke the greatest debate from the floor. I will only say in this connection that I disagree with any suggestion of equalising tariffs throughout a country, so large, and with such widely different conditions as the Republic or the Federation.

For purely physical reasons, electricity supply must inevitably be a monopoly in any one area where the cost of supplying each individual consumer does not vary too greatly and I have no doubt that our friend Jack Berry, here, having at last got to his question 13, from 1958, in Cape Town, even if it is a little disguised, will no doubt give you a treatise on that subject. I cannot agree that any electricity consumer should subsidise another by giving uneconomic supplies.

To equalise the tariffs for electricity over the whole of the country without doing the same for all other commodities such as water and coal, would be an unfair tax on electricity and to do this with any of these commodities would upset, in my opinion, the natural balance of the country's economy by encouraging industries to set up in areas where, but for those subsidies, they would be much better situated elsewhere.

I remember another colleague of mine, Mr. Sibson, mentioning this feature once before, I think he actually mentioned it at a Convention. If you, for instance, made electricity as cheap in Cape Town as it was on the Rand, and somebody who wanted a factory and used a lot of electricity, decided to set it up in Cape Town because his wife liked Cape Town better than the Rand, that would be the reason why you'd have the factory there; it would cost a lot in subsidising electricity.

Actually the electricity content in most industries other than mining and electrolytic processes is so low that a 25% increase in cost would not make all that difference to the overall price of the finished article.

Because of this, I feel that elasticity is zero when applied to any extent to electricity supply.

I remember at a Paris Exhibition, many years ago, in order to illustrate the value of one unit of electricity, they had a bicycle on a stand, and attached to the back wheel was a dynamo, and the electricity generated from that dynamo was passed through a meter, and the meter registered on the prevailing tariff of supply. The notice said that anybody could have the amount of electricity which he could generate. I think one youth pedalled all day and earned one farthing.

That illustrates just what you get in electricity for the price at which we sell it at the moment. To my mind electricity has always been sold too cheaply. Although it may be too late in the day to go back to Public Utility Companies, financed by capital from the private sector, paying dividends which are taxed by the State, I would advocate an increase in price at least to cover one function mentioned both by the author and the President in his address.

One of the drawbacks to Municipal Electricity Undertakings is the lack of finance for development. In a paper given to the last World Power Conference at Madrid by a member of the World Bank, he illustrated the fantastic amount of new

capital which would be required for the Electricity Supply Industry to cater for a development doubling every ten years.

The amount of capital required was £75,000,000 and that gives you some idea of the amount of capital that is required.

Capital can only come from labour, and labour isn't producing sufficient capital for that kind of development today.

I am of the opinion that if electricity was sold nearer to its true market value and at a sufficiently higher price gradually to meet all new capital expenditure from revenue, there would be little reduction in the demand, for there are very few cheaper methods of doing the same things which are done by electricity today.

I know someone will shout about cylinder gas, but I feel its use is very small in the nation's overall employment of electricity.

The general manager of the Federal Power Board, who is here, can tell you that his organisation already has to operate on the basis of finding at least 50% of new development capital expenditure, and in the British Isles 42% has to be found. This latter is not over and above redemption of present loans, as advocated by the World Bank, but is certainly a step in the right direction.

Although these economic concepts of which we have heard from Prof. Smith today will obviously play their part in the future, I feel they are not exactly on the horizon. Now, and I must disabuse Prof. Smith's mind that we ever have any secondary units — all ours are "eerste klas".

I think I told you the story of the lecturer in economics who had some students in for their final examination. After the examination he went into their studies to have a look at the questions that had been set and he was quite surprised to see that the questions were exactly the same as he had had to answer in his finals five years before. He went to see the Professor of economics and asked, "What's the idea, — do these questions come up every five years in cycles?" The Professor said, "No, nothing like that." So he looked at him for a bit and said, "Don't tell me you set the same questions every year." He said, "Well, as a matter of fact we do." "But," he said, "That's silly. The students will get to know, and then they'll know the answers before they go into the examination room." "Oh, no," he said, "they won't. The answers are different every year!" (Laughter.)

Prof. Smith has included in his paper so much material and so much of which I am sure he, possibly more than anyone else, realises is controversial, that almost each paragraph has provided material for debate, and because as I have humourously tried to illustrate, the picture is continually changing, I would welcome some short paper on this subject every year.

Prof. Smith I have not, I realise, done anything like justice to your paper, but I can assure you that it will be read many times by the delegates to this Convention.

I think I am right in saying that this is the first time that anyone has given a paper on this subject, and as such it will become one of reference.

In seconding the vote of thanks so ably proposed by Van, I would like to add my own personal ones for your giving of your time, and of your knowledge to us here, and producing what I am sure is what you and we wished for; a paper which will rouse considerable discussion. (Applause.)

THE PRESIDENT: Thank you Mr. Mitchell. The views you express obviously show that you have changed your vocation from municipal to business methods!

The paper is now open for discussion, gentlemen.

Mr. T. C. STOFFBERG (Pretoria): Mr. Mitchell has said that every paragraph could give rise to discussion, and I would like to read one short paragraph which I would like to discuss.

Prof. Smith said that if an asset is depreciated by a fixed amount being written off its book value every year, and the sum equal to this amount is invested outside the undertaking, there will, at the end of the life of the asset be a sum available for its replacement.

Now if prices have risen during the life of the asset it may well be that the accumulated funds will be insufficient to finance the replacement of the asset. The problem which arises is that prices rise during the period separating the time when we set aside for depreciation, and the time when the money is eventually used for the purchase of replacement plant.

The harm caused by increasing prices occurs during the period when depreciation funds are invested outside the undertaking. As soon as the money is safely invested out of the City Treasurer's hands, and into the plant of the undertaking, further price increases only increase the value of the department's assets, and the price rise is therefore no longer a hazard.

I would therefore appreciate it, Mr. President, if Professor Smith would explain whether it would not be a good idea to invest depreciation funds in the purchase of new plant immediately these funds become available, rather than to make the interim investment outside the undertaking.

This seems especially feasible in the case of distribution plant, which comprises a large number of individual assets, each representing a small fraction of the total asset of the undertaking.

THE PRESIDENT: Thank you Mr. T. C. Stoffberg.

Mr. W. H. MILTON (Escom): Mr. President, ladies and gentlemen, I prepared a written contribution to the discussions, which I think I should hand to the author of the paper which might invoke the replies which are more illuminating than the questions, but there were one or two features raised by the proposer of the vote of thanks which call for a reply from me, as the author cannot be expected to deal with them.

In the first place, may I just mention that the question of lower interest rates paid by municipalities for loans, when compared to those paid by 'Escom's', occurred at the time when interest rates were dropping rapidly, and municipalities borrowed after E.S.C.O.M. but in no case has a municipality borrowed money at a lower rate than E.S.C.O.M. at the same time.

We could actually get lower rates, but in the natural interest it is not advisable that we should do so.

There was another aspect of the rate of development, the depressions, the slumps, and the 'booms', raised by the proposer of the vote of thanks. Having fired one bullet at me, I think I can offer some comment there on my observations and studies. Most of our depressions, so called, in other words decreasing rates of growth, can be forecast over fairly narrow limits, as well as the 'booms'. On the basis of studies which I

myself undertook some time ago to determine why it was that these curves of growth are not straight lines on logarithmic paper I came across the rather peculiar, and to me surprising fact, that the rate of development is cyclic. If you study the cycles of the rate of development of the domestic type of supply, and then also study the industrial supplies, you will find that they vary cyclicly but the period of cycle differs.

With the difference of period you do get a coincidence of increasing rate at certain times, a coincidence of decreasing rate at other times; with the coincidence of decreasing rate you are involved in what we refer to as a depression or slump, and with the coincidence of increasing rates you have your boom. And in between, where the two cycles are, to some extent, offsetting each other, you get that apparent steady rate of growth, but in point of fact there is that different rate of growth from the two sources of our loads, which is of importance to my way of thinking, and I would like to know whether the author, in his studies, has encountered similar indications.

The seconder of the vote of thanks touched on selfborrowing which was another point to which I wish to draw attention.

WRITTEN CONTRIBUTION

Mr. President, ladies and gentlemen the paper presented by the author is one of great interest, particularly as the development of the Electricity Supply Industry amongst the members of this Association is proceeding very rapidly.

The author has touched upon a very delicate subject in respect of the unification of electricity supply.

Quite apart from the difficult aspect introduced by "pride of ownership", we will also learn that unification might result in a concern of such proportions that it becomes inefficient — in other words top heavy.

In terms of the Electricity Act Escom is required to report to the several Provincial Administrations with an eye to the co-ordination of generation (in particular) and also is required to state whether or not Escom could supply with advantage to the ratepayers and consumers of the Urban authority in preference to expansion or continued local generation.

Escom has suggested certain co-ordination from time to time but those suggestions have not been adopted except in the cases of the Pietersburg and Potgietersrust Municipalities, and of Warmbaths and Nylstroom Municipalities.

As time progresses and the loads in the separate areas increase, the possibility of linking between load centres is increasing.

The indication of the progress made in Industrial and Mining supplies is also illuminating. Industrial supplies have increased at a rate of approximately 10% per annum accumulative during the 13 years quoted whilst Mining supplies only increased by 6.85%. The combination shows an increase at the rate of about 7.85% per annum whilst the total number of units sold increased at the rate of approximately 7.7% per annum. Excluding the Industrial and Mining supplies, the remainder increased at the rate of approximately 7.1% per annum.

This latter rate of progress is well in line with the development of well developed areas but, in the case of the Republic, the rate at which industrial supplies have increased is, to my mind, of considerable importance.

There is a tendency to consider the rate of development in the Republic as being exceptional and to hold the view that future progress is not likely to be at a rate in excess of 7% per annum. I do not agree with this view because I think our industrial expansion is still in its early stages.

It would also appear that the nature of our industrial expansion is not such as to increase the expansion rate of the requirements for other purposes.

I would much appreciate the author's views on these particular aspects as there seems to be a tendency to underestimate future requirements which, in turn, introduces the necessity for restrictions and hurried development when loads are to be met. This is not conducive to encouraging expansion.

I do not think that the representatives from East London have welcomed the remarks of the author on the possible effect of an increase in the cost of electricity in East London. You will probably find that their reaction is that they would decrease their use of electricity appreciably if electricity becomes dearer. I make this statement although gas is not freely available!

As regards the author's remark that an increase in railway rates would lead to a great many business seeking alternative forms of transport, I expect a considerable reaction to the statement. In my own case I have encountered the difficulty of employing an alternative means of transport, not on grounds of cost but on the grounds of satisfactory delivery.

Needless to say it was not possible to employ the alternative means of transport and my decision was to abandon the project. Others have probably had similar experiences.

The author has mentioned the aspect of profit which a monopoly could enjoy and indicates that an Electricity Undertaking could be such a monopoly in a particular area in which no substitutes for electricity existed. In the case of the Republic this aspect of a monopoly is only applicable when the Electricity Undertaking can be established without requiring to comply with full control of its prices under the jurisdiction of the Electricity Control Board. The Electricity Act paid particular attention to this aspect and prevents the enjoyment of complete freedom of price fixing.

The only authorities not under the control of the Electricity Control Board are the Urban Local Authorities and I think the author will agree that these are not privately owned monopolies but rather co-operatives if the Council of the Urban Local Authority genuinely operates in the interest of the people it represents.

When such authorities supply outside their areas of jurisdiction they, in turn, come under the control of the Electricity Control Board which is able to prevent price fixing on the basis of maximum profit. They are therefore controlled monopolies.

That control is such that the Electricity cannot be charged at different rates to different groups of consumers or when it is used for different purposes unless there is complete jurisdiction for such discrimination. In other words the discrimination is not solely at the discretion of the supply authority, the discrimination being again controlled.

The illustration given by the author in regard to the well dressed and ragged customers is most illuminating and it is surprising how many well dressed industries represent them-

selves to be of the ragged variety when it comes to the cost of electricity!

Once again the author has referred to a proportion of an Electricity Undertakings cost as being "fixed". I do not like this phrase because those very fixed costs vary with the increasing demand and all healthy electricity undertakings are growing. It is for that reason I prefer the term "demand related". These charges do vary with the level of output or activity in one sense namely that of the demand. The costs which also vary in relation to output are those associated with the other form of output namely the actual energy supplied and that quantity can vary very appreciably notwithstanding a fixed level of demand.

No Electricity Undertaking can expand its generation and distribution equipment concurrently with the increasing demand thereon and in direct proportion thereto while the expansion is taking place. It is very necessary to provide the equipment in stages and it is usually found that, if those stages occur at 5 year intervals then the maximum sized unit has been installed which can be justified. On the other hand if the units require to be added to each year, then the installation of larger units will normally be found to result in lower costs. There are, of course, occasions when the maximum size of unit available decides the frequency of additions, such cases being rare.

In normal circumstances, therefore, Electricity Undertakings usually have a surplus of plant capacity available from time to time, varying in percentage referred to the actual demand with the passage of time between the intervals at which additional plant is added.

For that reason if for no other it is advisable to assess costs over a period of at least 5 years in order that tariffs based on costs may remain stable for such periods.

It is noted that the author states what he considers to be the ideal in regard to the operation of electricity undertakings namely that there should be no surplus remaining.

This condition is very closely approached by Escom as will be seen from its balance sheets. Although the amounts may seem large, when referred to the gross revenue they are exceedingly small in the way of surpluses and deficits.

The author touches upon self financing and states that it is a fairly complex procedure. Notwithstanding this complexity the urgent necessity for such procedure is becoming more and more recognised throughout the world.

The author has again touched upon a very delicate issue of the transfer of surpluses from Electricity Departments towards the relief of rates. I am not intending to join in the discussion, which may ensue on this aspect!

The author draws attention to the steps being taken to establish a revolving fund in the case of Municipal ownership in the Cape Province. He assumes that the purpose of this fund is to help finance short term capital.

He goes on to deal with the aspect of depreciation with due regard to the increasing price levels of the depreciating assets.

Having dealt with sinking funds, I would be pleased if the author would clarify his remarks on this subject. As I interpret his paper he implies that, notwithstanding having provided an adequate sinking fund account for the repayment of original

loans, a depreciation fund should be established out of which an asset may be replaced. In this connection he also draws attention to the residual value of assets.

If a sinking fund is adequate and, in addition, a depreciation fund is accumulated out of which a replacement of the old asset can be achieved — without involving further capital expenditure from new loans — the result should be a steady downward trend in the annual cost.

Bearing in mind that plant which requires renewal is not usually replaced by a unit of the same size as originally installed, but by larger and more up to date units best suited to operating conditions, an undertaking would reach the stage where its outstanding loan commitments bearing the burden of interest, redemption and depreciation would cover only those extensions dealt with during the loan period.

If carried forward over a long period of time this would mean that the plant required for expansion over 20 years would be carrying such capital charges and all prior plant would involve no such charges except, possibly, repeated depreciation costs.

I would very much appreciate further comments from the author in expansion of the remarks made in his paper.

In conclusion, Mr. President, I wish to add my congratulations to the Author for his interesting and instructive paper.

THE PRESIDENT: Thank you very much indeed, Mr. Milton.

Gentlemen, we now must adjourn.
(Convention announcements followed).

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SECOND DAY

Convention resumed at 9.30 a.m.:

THE PRESIDENT: Good morning, ladies and gentlemen.

My duty this morning is to make certain announcements to the Convention. Firstly I'd like to refer to Mr. Chris Downie of Cape Town. Yesterday when we called for nominations to the Executive Committee, Mr. Downie declined nomination because he will be leaving the Municipal Service before the expiry of the year of office of the Executive.

Now Mr. Downie has been a most stalwart and staunch operator in our Association; he has been a tower of strength on the Coal Allocation Committee, he has presented papers to the Association and I feel that we cannot allow this particular moment to pass without the President thanking Mr. Downie for his past services to the Association and hoping that he won't entirely sever his connection with us in the future.

Mr. Downie, you kindly accept our thanks for what you have done for the Association. (Applause.)

Now the Executive Committee this morning appointed certain members to act on other committees:

The Electrical Wiremen's Registration Board: Mr. R. W. Kane.

The S.A. Bureau of Standards: Mr. C. Lombard and Mr. G. C. Theron.

Wiring Regulations Committee: Mr. J. C. Downey and Mr. Dirk Hugo.

The Recommendations Committee for New Electrical Commodities: Mr. C. Lombard and Mr. R. W. Barton.

The Rights of Supply to Industrial Consumers: remains as previously, as does the Finance Committee.

The S.A. National Committee of the International Electro-technical Commission: Mr. D. J. Hugo.

The S.A. Institute of Electrical Engineers Committee investigating the Overhead Lines Report is Mr. C. Lombard. In this connection the Association has not received any advice of the progress of the report of the S.A. Institute Committee, and we would commend any representative here of this committee to give us a report either now, or during the Convention.

Mr. A. W. LINEKER (Johannesburg): Mr. President, "you have caught me on the bounce"! I happen to be the Chairman of the Committee which has been charged with the revision of the Overhead Lines Code of Practice but unfortunately I have had rather "a lot on my plate" for the last couple of years and I haven't been able to get down to it. There has been a meeting of the main committee which has given authority for the Drafting Committee to proceed with the work and I will give you the assurance that there will be some result before your next Convention, — but as to just how soon before your next Convention, I'm not going to commit myself.

THE PRESIDENT: Thank you very much Mr. Lineker; I'm sorry I "caught you on the bounce"!

Ladies and gentlemen, my next duty is a sad one, and it is to announce the names of the members of the Association who have died during the past year.

Mr. Andrew Taylor, who, for many years was Secretary of this Association and who did sterling work for us; Mr. Arthur Rodwell, Honorary Member and Past President of the Association, — one of the early workers, who built up the foundations of our Association; and lastly Mr. G. A. H. Schaftenaar who, in his life time was Electrical Engineer of Graaff Reinet. All these gentlemen had distinguished careers in the municipal field, and I now ask you to rise as a tribute to their memory and as an expression of sympathy to their relatives.

(The Convention rose for a moment's silence in tribute.)

Thank you ladies and gentlemen.

Now, ladies, and gentlemen, I have very great pleasure in calling upon Mr. A. A. Middlecote to present his paper "The Effect of Standardisation on the Economy of Electricity Supply".

Mr. A. A. MIDDLECOTE (Pretoria): Mr. President, ladies and gentlemen, it gave me great pleasure when Percy asked me to address this Convention — I was deeply honoured — and in view of the emphasis placed by this Convention on management and the economy of Electricity Undertakings, I considered it probably most apt to try and indicate the position of standardisation in the community of engineers and its effect on the economy of all the projects which they undertake.

The Effect of Standardisation on the Economy of Electricity Supply

By A. A. MIDDLECOTE, B.Sc.(Eng.), M.(S.A.) I.E.E.

Electricity Supply has been clearly shown to be one of the most important single contributions to the well being of any country. Examination has indicated that the varying stages of development reached by different countries and the inequalities in the standard of living of their people correspond fairly closely with the consumption of electrical energy per head of population. Thus we observe that highly developed countries such as the United States of America and Britain have consumptions per head of 4 Mwh and 2 Mwh respectively while a developing country like India has a consumption of 1.40 Mwh. On the other hand the rate of increase of the national supply of electricity in highly developed countries is usually 8 per cent. per annum which means that the electricity supply is doubled every ten years, whereas in developing countries such as India and China the rates of increase vary between 16 per cent. and 20 per cent.

Here in South Africa if we consider the white population alone the consumption per head is of the order of 2 Mwh but if the total population is considered the value is about 0.5 Mwh. The recent rate of increase has been about 8 per cent. This would indicate that South Africa, while to a degree highly developed, is still a developing country particularly when one considers the current programme for development of Bantu Areas. In fact one is often tempted to consider the Republic as having developing areas within a highly developed country. With this in view it is highly probable that the rate of increase of electricity supply in the Republic may well exceed 8 per cent. per annum in the future.

Since, generally speaking, the electrical equipment used in supply undertakings has a service life of 20 years or more, this means that the volume of work for the industries manufacturing such equipment as transformers, switchgear, insulators and cables depends to a large extent on this annual increase of electricity consumption. With the natural tendency for much of this equipment to be manufactured locally it is in the supply industries interest to ensure that such manufacturers are of the requisite quality and reasonably priced. After all, the whole success of electricity as an energy supply to the community has been based upon its ease of transmission and conversion, its reliability and low cost. Encouragement of standardization in the manufacturing industries as well as the supply industries themselves can contribute much towards maintaining this.

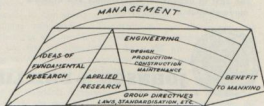
STANDARDIZATION AND ITS RELATION TO GROUP ACTIVITY

Production of Electricity itself is a group activity in which all the members concerned are responsible for its success. As is the case with all engineering and industrial activity it is concerned primarily with developing the ideas of fundamental research for the benefit to mankind. To be successful, this development must be done in as short a time as possible and must result in a reliable economic benefit. To best sum up

the main factors involved in this accomplishment I should like to summarize the field of group industrial activity in a simple diagram to make this point clear.

In this diagram the direct progress from fundamental research is shown as via applied research or development, and engineering (design, maintenance, construction, production, etc.). This progress is monitored throughout by certain accepted directives, the most important of which is standardization. Over all these, like a third dimension comes Management with its vision and co-ordinating functions. These separate sections must work together to ensure achievement in the fields of speed and economy. Speed or time of development has become of the utmost importance these days. One-hundred-and-fifty years elapsed from Copernicus' discovery of the laws of the pendulum till Galileo made the first pendulum clock. Only 19 years elapsed from the time even Rutherford considered there was no practical future for fission until Calderhall went on the bars. Such is the importance of the time factor these days. At the same time cost must not be forgotten. Much has been said about the part scientific management, applied research and general engineering plays in this activity, but the less obvious, nevertheless important contribution of standardization, is frequently forgotten. Possibly this is because it is a factor rarely written directly into the normal scientific formulae upon which engineering design is based. It exists as a guide to prevent a design from becoming economically unsound in practice. As such it must be borne in mind throughout the applied research, development and production stages of a project and since it must never delay the progress of such a project it must in itself be dynamic and keep pace with the rapid technological changes taking place today. Always it must be such as to ensure that the ultimate project will be in the best economic interests of the community.

To illustrate its mechanism one might consider the most common electrical engineering design activity—that of design voltage. The best voltage for a given system or apparatus is the most economic one and there are numerous factors which decide this. When one has inserted these factors in a formula and differentiated this, one can arrive at the most economical voltage. But there is a relevant fact that such a formula cannot include, it is that machinery and apparatus becomes more expensive with every increase in the number



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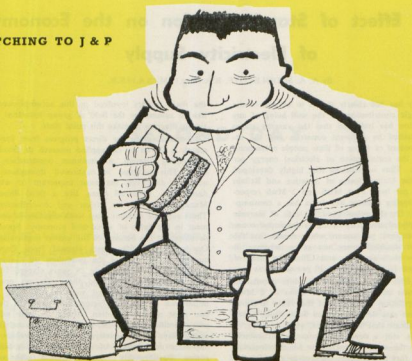
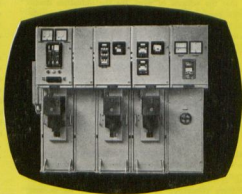


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of different voltages for which designs are provided. The curve that relates voltage to cost is very flat in the region of its minimum and the effect on the manufacturing cost of an unnecessarily large number of different system voltages is to raise the whole curve. This effect on cost may be greater than that of choosing the nearest standard voltage to that which occurs at the minimum of the cost curve.

Leaving our field of electrical engineering, perhaps a better illustration is given in the following extract from an article in the New York World Telegram.

STANDARDIZATION NEEDS FOR SPACE PROJECTS

Several things have come to light that explain why the United States is lagging in space despite superior overall U.S. science and technology.

These United States mistakes and omissions explain why a Russian will probably get to the moon first, even though the \$2 billion the United States has spent on space is considerably more than the Russians have poured in. The \$20 to \$40 billion U.S. moon programme is considerably more ambitious than the Soviet plan.

First—There are strong indications the Russians are ahead on key basic instrumentation. There is reason to believe the Reds can measure high temperatures more accurately. They can measure great thrusts more precisely. They can measure extremely heavy weight more closely. They can measure some electromagnetic waves more finely.

Second—The Russians have shown a greater willingness to *standardize* in all aspects of their space work.

This standardization results in more reliability and less cost. It means that any particular space project can be accomplished more quickly.

The United States has more or less tailor-made every job. The U.S. tends to build a separate vehicle for almost every space pay-load. We thus have too many varieties of stabilization systems for satellites, too many different types of power supplies for our satellites and space vehicles. We have too many different varieties of telemetering systems.

Tailor-making complicated electronic space gadgetry means creating new variations, each with a series of bugs that must be ironed out before the project can go ahead. The cut in reliability as a result of this variety is tremendous.

The successful application of standardization in the U.S.S.R. is no doubt to a large degree due to the ideology of the country. In a totalitarian atmosphere, when dealing with a group activity, incentives can be fed where incentives are considered necessary, directives can be dictated. In a free community such as our own standardization in a group activity can only succeed through co-operation and a full understanding of its objects by all concerned. This necessity for co-operation cannot be overstressed.

STANDARDIZATION DEFINED

Perhaps, having seen where standardization exists as a controlling directive in group activity, it might be desired to have standardization defined. Possibly the most comprehensive definition of standardization has been given by STACO as follows:

"Standardization is the process of formulating and applying rules for an orderly approach to a specific activity for the benefit and with the co-operation of all concerned, and in particular for the promotion of optimum over-all economy taking due account of functional conditions and safety requirements.

It is based on the consolidated results of science, technique, and experience. It determines not only the basis for the present but also for future development, and it should keep pace with advances.

Some particular applications are:

- (1) Units of measurement
- (2) Terminology and symbolic representation
- (3) Products and processes (definition and selection of characteristics of products, testing and measuring methods, specification of characteristics of products for defining their quality, regulation of variety, interchangeability, etc.)
- (4) Safety of persons and goods."

This standardization has to function in the industrial and engineering world where there are three main factors, the producers, the distributors and the consumers. It is common-knowledge that competition often drives the elder manufacturers to give up all idea of economic production and to make not only their own particular design of commodity but also those of their competitors. As to the distributor, his problem is possibly even more complicated. He has to carry an enormous variety of patterns or sizes of each commodity. Then there is the consumer, who wants something efficient yet easily replaceable and at the same time economic, but who may be confused or coaxed into bad buying habits by having too wide a choice.

Rationalization of such a situation is difficult because the manufacturers cannot easily approach the distributors and certainly not the customers. The distributor cannot easily approach the manufacturers or the consumers and yet these three sections have in reality a community of interest and their well being is interdependent. Standardization seeks a solution to this problem by functioning in four distinct phases—simplification; standards of quality and performance; testing and quality control and finally monitoring of standards. These phases are perhaps best understood when considered separately.

SIMPLIFICATION

The first phase of standardization is concerned with simplification whereby the interests of all concerned are brought together with a view to reducing unnecessary variety of articles or commodities for one and the same purpose. Clearly, standards activities which lead to simplification—that is fewer models, easier assembly, greater production—contribute greatly to our ability to take advantage of the unit cost—volume relationships. Standardizing on dimensions, on tolerances and on the characteristics of purchased materials is one familiar contribution. So is the work which reduces the variation between component parts and sub-assemblies and permits of flexible interchange. Simplification is a basic responsibility of the individual enterprise despite the work done by the standards organization on the national or international level. In the case of electricity undertakings for example, the

benefits of actively supporting efforts to simplify insulators even to the extent of dimensional standardization must result in simplicity of design, ease of maintenance, reduced stocks of spares and ease of tender adjudication—all of which paradoxically add up to a reduction in costs.

STANDARDS OF PERFORMANCE

The second phase of standardization is directed towards the co-ordination of the requirements of producers and consumers through the setting up of standards of quality, and performance so simplifying production and distribution and thus bringing about more equity in the purchase and sale of industrial materials and apparatus. For electrical equipment, quality is a vital ingredient second only to safety and any lowering of the standards would necessarily result in a sacrifice of efficiency and a shortening of the life of the equipment, apart from endangering the lives of consumers of electricity. To ensure that standards are dynamic and able to keep pace with rapid technological changes the accent in present day standardization work is on the performance requirements of specifications.

It is, however, in regard to this phase of standardization that most difficulty is encountered. In this connection I would refer to the practice of certain electricity supply undertakings, not only in this country, of framing their own distinctive specifications, obviously to meet their own special requirements. These special requirements may be based on time-honoured practice within the undertaking rather than on real technical or economic justification. However reasonable this may seem to be from the undertakings own point of view, their specifications may not conform in many respects to the national standard. This approach which is entirely against the philosophy of standardization and all that it stands for is one which I hope will soon vanish. Authorities sometimes use the national specification for a commodity, but add to the specification requirements of their own. This is equally contrary to the spirit of standardization since if a requirement is necessary it should be included in the national specification. Such difficulties have been encountered in South Africa particularly with products such as miniature circuit breakers. It must be accepted however that established custom frequently proves a stumbling block to the amount of standardization which can be achieved. In a free economy this problem can only be solved by co-operation.

TESTING AND QUALITY CONTROL

The third phase is that of testing, the establishment of standard methods of test and encouragement of quality control. Apart from the need for standard test methods as the only true means of comparing the performance of commodities this phase also includes that of continued testing of commodities manufactured to a specification to ensure that these do in fact comply. This may be achieved by consignment acceptance testing or in some cases more economically by the support of a standardization mark scheme. This phase is probably of more apparent advantage to smaller electricity undertakings which cannot afford to maintain test laboratories or the necessary technical experts.

MONITORING OF STANDARDS

The fourth phase concerns the monitoring of standards to ensure that they are in fact succeeding in the object for which

they were created and also to ensure that the standards are dynamic. Any industrial enterprise would be in danger if it failed to recognise that its healthy existence in a highly competitive world depended on continued and careful consideration of new designs available in the light of rapidly changing technology.

Such technology can overthrow tradition, change the customers' requirements, and abruptly realign the relative importance of resources available, e.g., nuclear fuel. Such dynamic technology therefore demands dynamic standards. To obtain truly dynamic standards two things are necessary. Firstly at all levels of standardization we must learn to regard every standard we adopt, not as a law of the Medes and Persians, but rather as a record of the currently optimum method. We must expect standards to change and have a mechanism to revise them promptly in order to record a newer and better method. In the second place we must standardize for the future as well as the present.

While this monitoring can to a degree be achieved by constant liaison between the standards body, manufacturers and consumers, a much more efficient and economic system exists in a standardization mark scheme. Apart from the value of such a scheme in a market in which the main final customer is more or less a layman in any case with little knowledge of the essential requirements of the commodity concerned, a standardization mark scheme can ensure the dynamics of the standard concerned. When a standardization mark appears on a commodity, and that commodity fails to give satisfaction, complaints will be raised with the standards body responsible as opposed to the resignation that one has made a "bad buy" when failures occur on a commodity without the mark. Such complaints if rationally analysed will lead to the necessary "dynamic" revisions. In fact the whole world of manufacturers and consumers becomes the specification committee. Monitoring of stands also educate the consumer. Thus analysis of complaints levelled against a standard product often reveals a misuse of the product by the consumer. For example complaints regarding cables might indicate poor cable jointing or termination technique; complaints regarding electric storage water heaters might reveal poor plumbing practice.

In many cases it is best to deal with such situations by drawing up a Code of Practice for the use of the product concerned.

STANDARDIZATION MARK

At this stage it might be in order to say a little more about the standardization mark scheme being undertaken by more standards bodies every year. This is not a particular phase of standardization but a tool of standardization with which certain of the phases are dealt with. As has already been pointed out it exists as a means of monitoring the correct application and dynamics of the standards themselves. It also helps the layman who has no means of assessing the quality of his purchases. Finally it offers to large undertakings, even to those with the necessary know-how a more economic system of checking purchases of material and equipment than the consignment inspection and testing undertaken by the purchaser himself.

Perhaps the last point could be made clearer by a simple example. To examine a consignment of a given commodity correctly in order to ensure reasonable compliance with specifications, it is usual to test samples drawn from the consignment. The size of a sample is determined statistically in accordance with reasonable consumers risk (i.e. the risk that a faulty consignment may be accepted) and producers risk (i.e. the risk that a satisfactory consignment may be rejected), and varies with the size of the consignment.

A typical sampling in a specification for miniature circuit breakers might be:

No. of breakers in Consignment	Number to be Tested
100	5
101—500	10
501—5000	15

In such a case if the consumer were to test the consignment himself and such a consignment were 100 units and the cost of each test RX then the increase in cost of a unit would be R 5X or R0.05X per unit.

100

If a standardization mark scheme were resorted to the authority responsible would, in the simplest form of such a scheme, test larger consignments. Taking 2000 as a typical value the increase in cost of a unit would be R 15X or

2000

R0.0075X per unit. This represents a considerable saving.

In practice a properly controlled standardization scheme would be a combination of quality control of the production line and modified sample testing which gives an even lower cost per unit than this as well as greater assurance of conformity. It also encourages the application of quality control in industry.

It is difficult to give exact figures but it has been calculated that the cost of consignment inspection will vary from 1 per cent. to 7 per cent. according to the size of consignment whereas the cost of a standardization mark scheme is between $\frac{1}{2}$ and 1 per cent. A further rationalisation which accompanies the acceptance of a standardization mark scheme concerns the difficulty of dealing with the costly so-called "type tests". In specifications it may be most desirable to verify certain performance data but at the same time very costly to do so. Examples are the ability of large transformers to withstand the mechanical forces imposed by short circuits, the capacity of components of a power system to withstand surge voltages such as those generated by a surge generator and the rupturing capacity of circuit breakers. If scientific considerations alone had to be met, there would be no doubt concerning the desirability of standards for all such performance data together with standards for the means of verifying them.

But there is often a wide gap between what is scientifically ideal and what is economically wise. This has usually been overcome in the past by accepting such tests as type tests

which once having been carried out on a sample submitted by the manufacturer are accepted for all time. This is not always reliable. Here one might quote the type tests on ceramic insulators. Although these do rely to a large degree on the inherent design of the insulator they do also depend on the characteristics of the "body" or actual ceramic used and this can vary with the source of supply of the raw materials and the quality control in the factory.

In such cases the standardization mark scheme permits of such type tests to be done at regular intervals without adding considerably to the cost of the tests for the individual consumer.

When all these phases and tools of standardization are made the responsibility of a single standardization authority such as the South African Bureau of Standards in South Africa it is quite obvious that large laboratories, testing facilities and the necessary expert laboratory staff are essential requirements of such an organization. In South Africa the extensive S.A.B.S. laboratories at Pretoria have done much to promote standardization in South Africa.

VOLTAGE STANDARDIZATION

The most fundamental aspect of standardization in the electricity supply industry is that of standardization of power supplies. A most important characteristic is that of frequency. It is unfortunate that from the international point of view Europe chose 50 hertz and North America 60 hertz. At least here in South Africa we have managed to standardize on 50 hertz.

Such is, however, not the case when system voltages are considered, particularly those below 1000 volts. The International Electrotechnical Commission when faced with the large amount of different voltages used throughout the world has, as a compromise, recommended two series of voltages as follows

127—220—380—500 and

120—208—240—277—415—480—600

and stated that only one of the series should be used in a country and that, for the second series a choice should be made between 240—415 on the one hand and 277—480 on the other.

In South Africa the situation is disappointing, for despite the declaration of 220—380 as the standard system voltage in the Electricity Act the variation in system voltages in the country not only includes voltages from both of the international series but additional voltages such as 200, 230 and 250 which appear in neither series.

It is, however, significant that approximately 145 out of 176 undertakings in Southern Africa have standardized at 380/220 volts and therefore obvious that the standard voltage for this country should remain at this. One is fully aware of the difficulties involved in making this change for some undertakings. At the same time one must be convinced that no sacrifice is too great to achieve this end and the sooner it is done the better, not only for the power supply and undertakings but even more so for the consumers and manufacturers. The direct cost to an undertaking and its consumers of going through

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a voltage rationalization scheme today would be a small fraction of the gains which consumers of the future would get, not to speak of the far reaching advantages to the electrical manufacturing industry and its development of both the supply industry and electrical manufacturing industries of countries which are developing as fast as the Republic. Simplification particularly in the motor, transformer and lamp industry depends on this.

The same situation, though to a lesser degree, exists for voltages in excess of 1000 volts and a programme of rationalization here to the series 3.3—6.6—11—22—33—66—88—132—275—380 kV would undoubtedly be to the economic advantage of the country.

TRANSFORMER STANDARDIZATION

Perhaps one of the most interesting fields in which standardization has benefits to offer is, that of that maid of all work on distribution systems, the distribution transformer. There are at present over 12,000 of these in the Republic and since at least 13 firms have started manufacturing them locally it is felt that everything should be done to promote their standardization.

In the first instance, the benefit of system voltage standardization when rationally applied to the winding connections, voltage tappings and voltages can result in simplification. It is possible, however, that confusion regarding the difference between the declared voltage of a distribution system and the rated secondary voltage of a transformer has added to the difficulties which already exist because of variations in system voltages. Thus some authorities having a system voltage of 220/380 might order transformers having a rated secondary voltage of 220/380. Others might order 230/440 rated secondaries to cater for average regulation. It should be decided once and for all what the relationship between system voltage and rated transformer voltage should be. Probably the relation of 220 to 230 is legitimate.

This agreement is also necessary before any attempt can be made to standardize on voltage tappings and doubtless such standardization would be beneficial.

Standardization of accessories could go far towards the prevention of unnecessary ordering by those who believe "the more gadgets the better". This refers particularly to the fitting of unnecessary dual thermometers, buchholz relays, etc on small transformers. For example if a national directive could be given as to when a conservator tank should be fitted it would do much to help the purchaser who cannot quite make up his mind and specifies one just in case. The consensus of opinion appears to be that conservators are not necessary on transformers smaller than 200kV.

Other contentious points centre round such questions as whether desiccators should be fitted to free breathing pole mounted transformers and whether the additional cost of fitting explosion vents is justified in view of the doubts as to their useful function.

Standardization of features such as rollers, skids, mounting devices in the case of pole mounted transformers and critical overall dimensions could be of immense help to the con-

sumer by ensuring interchangeability of units purchased on an open competitive market.

Insulator bushings are not usually manufactured by transformer manufacturers themselves. With standardization of these the insulator manufacturer could reduce costs since a wide variety of bushing for different transformer manufacturers would no longer be necessary and the small multifarious demands of individual transformer manufacturers would become large simplified demands from the industry as a whole. The electricity supply undertakings themselves would also have a direct saving by carrying smaller stocks of spare bushings for maintenance and repair purposes—in fact they could in many cases carry no stocks at all as the standardized bushings would be readily available.

Standardization of the ratings of these transformers would help to take advantage of the unit cost—volume relation. There is often false economy in the belief that transformers cost RX per kVA—which assumption often results in an odd rating as being the most economic proposition. In practice an 87.5 kVA transformer costs little if anything less than a 100 kVA transformer and is in fact a source of unnecessary annoyance to the production line manufacturer.

STANDARDIZATION OF LOSSES

Transformer losses possibly provide the greatest single cause for the large variety of transformers manufactured in South Africa.

This is due to the fact that the purchase price of transformers is generally based on some sort of capitalization formula whereby the annual costs of supplying the losses of a transformer are capitalized over its life. This sum is added to the primary cost of the transformer forming a capitalized cost which is used ultimately for tender adjudication purposes. These formulae vary considerably between different purchasers, the result being that the transformer designer has to design transformers against each capitalization formula. A typical argument is as follows:—

"For the transformer under consideration let:

Wf be the iron loss in kilowatts

Wc be the copper loss in kilowatts

f be the load-factor of the transformer

d is the cost of a unit of electricity in pence per k.w.h.

a be the annuity factor corresponding to the assumed useful life and the rate of interest

The annual cost of supplying the losses = $R72.4 (Wf + fWc)$

The equivalent capital cost of losses = $R72.4 a (Wf + fWc)$

This must be added to the price of the transformer to get the total equivalent capital cost."

While this argument is all very well when applied to large, expensive transformers it is felt that attention must be directed to the following dubious factors in the capitalization equation, which can be misleading when applied to small distribution transformers.

In the first case the purchaser has to assume a value of the load factor. It is doubtful whether many engineers can give an accurate value for the load factor of the average distribution transformer save that it is probably between 0.2 and 0.35. The effect of this uncertainty on the legitimacy of the capitalization formula can possibly be demonstrated by the following example.

A transformer A costs R1,200 having a copper loss of 4,000 W and an iron loss of 900 W. A transformer B costs R1,240 having a copper loss of 3,250 W and an iron loss of 1,000W.

With an energy cost of $\frac{1}{4}$ d. per unit it will be seen that transformer A will be the more economic proposition by the capitalization clause if the load factor is 0.2, but transformer B will be the more economic if the load factor is 0.35.

In the second case the life of the transformer is assumed.

This presumes that all transformers have the same life. Finally the cost of electricity and interest rate are taken as constant over the life of the transformer.

The simplest alternative to this approach—and one which will reduce variety of units—is the acceptance of standardized losses on distribution transformers. This has, in fact, been done by the Central Electricity Authority in the United Kingdom and has been favourably accepted by the majority of manufacturers. This approach would also considerably simplify tendering procedure both from the manufacturer's and consumers' point of view.

The main argument against such acceptance is that this would not take into account the large variation in energy costs in South Africa—a problem not encountered in the United Kingdom. While this claim is legitimate in theory, in practice over 75 per cent. of the units sold in South Africa are sold at a unit cost variation not much different to that in the United Kingdom. Should not therefore the advantages of standardized losses be made available to the majority, leaving the minority to resort to the capitalization formula?

This very contentious question should be tackled as soon as possible in the best interests of the country. If standardized losses are found to be unacceptable, at least the variety of types of capitalization formulae should be reduced by accepting one as a standard.

CABLES

A fruitful field for standardization exists in the cable industry. Indeed it could probably be stated without fear of contradiction that it is an industry in which co-operative standardization has played an important part for many years. A very good example of the value of standardization in this field occurred recently when excessive trouble was experienced with 11 kV cables. During the investigatory period the cable industry had to face up to a large variety of different standards being set by different consumers to deal with the situation. This had anything but beneficial effect on the manufacturing costs of the cables. Co-operative standardization resulted eventually in a standard being established which it is hoped will be supported with resultant beneficial economic effects. In addition the process of standardization indicated a misuse of cables by many consumers but it is hoped that education in this regard—as pointed out one of

the phases of standardization—must eventually also have a beneficial economic effect.

Standardization can continue to be of benefit in this field particularly with the rapid development of the newer types of plastic cables. Their extended use in the supplies in native townships is alone a fruitful field. Standards of quality and performance to cover exposure to the severe climatic conditions in the Republic should be determined nationally by co-operation of all concerned and the maximum benefits of simplification of types and sizes achieved. We have here many factors which force us to depart from certain international recommendations which it is normally advantageous to accept. These factors are high temperature, high humidity, sunlight, rodents and termites to mention some. However, these should be considered in a national specification and not in individual specifications.

It is quite interesting to note that when considering developments in such new fields one of the fundamentals that we come across in evolving electric standards is the much discussed question whether standards for a particular product should come first or whether the setting up of that industry or the start of production of a new product should take precedence. One cannot afford to be dogmatic on this point but it would seem that for a developing country with targets set for rapid progress it would be more advantageous by and large to evolve standards even in advance of the product. This would be of help to entrepreneurs to set about establishing the industry on the right lines. It could also prevent a situation arising where two or even three factories manufacturing the same product are tied to two different overseas standards. These standards might be widely different and make it impossible for a single national standard to be set without adversely affecting one or both manufacturers. Situations such as this create many tender adjudication difficulties. In fact market chaos can result.

CONCLUSION

The exact products used by the electricity supply industry where standardization can lead to economic benefit are unlimited. The major category naturally covers those which are mass produced and comprises electrical accessories, wires and cables for use in domestic and similar installations, fuse gear, miniature circuit breakers and appliances, tools and other apparatus for domestic and similar general use. Apart from essentially electrical commodities items such as paints, poles, lubricants and oils, solder and protective clothing are concerned—particularly so since even the best electrical engineer has no expert knowledge of these. But, it must be repeated that, without the co-operation of all concerned, standardization cannot succeed. With this necessary support electricity supply undertakings can be assured of many economic benefits. The task for standardization is a compelling one. It is hoped that this paper has indicated the many challenges involved which demand that co-operative effort for standardization must rise above simple compromise of separate interests.

It must seek instead to melt those interests into new common denominators which all parties concerned can share enthusiastically. These are obligations which have to be undertaken for the economic welfare of all mankind.

With this in mind I should like to end by quoting from the Third Le Maistre Memorial Lecture delivered by Prof. R. D. Kapp.

"A standard specification could be perfectly logical, comprehensive, clear, attractively worded, constructed in the most methodical manner; it would still be useless if it had not been prepared with a due sense of what is relevant to the situation. If engineers did not take the whole world of reality into consideration, with all its faults and blemishes, if they did not hospitably welcome to their debates all relevant facts, including the troublesome ones, the regrettable ones, the ones that contradict their most cherished convictions, they would be as far from reaching agreement among themselves as are the philosophers."

THE PRESIDENT: Thank you very much indeed, Mr. Middlecote.

May I call on Mr. Chris Lombard to propose the vote of thanks to Mr. Middlecote.

Mr. C. LOMBARD (Germiston): Mr. President, ladies and gentlemen, first of all I would like to apologise for my lack of voice this morning. I feel rather like the out-of-work husband whose wife wrote to the unemployment department, "Please send me money, milk is wanted for my baby and father is unable to supply it."

I consider it a great privilege to be called upon to propose a vote of thanks to Mr. Middlecote for his interesting and thought provoking paper, which is of the usual high standard that we have come to expect of him.

With regard to the subject of the paper, I cannot think of one more suitable to the talents and enthusiasm of the author, who is also to be complimented on the manner in which it was summarised.

Our Association has, of course, encouraged and actively supported standardisation for many years, and most of us present here today have had experience of the benefits and advantages of standardisation. In a sense, the author has therefore been preaching to the converted. It is, however, just as well to be pointedly reminded from time to time of the effect of standardisation on the economy of electricity supply, and the author has rendered valuable service to the A.M.E.U. and its members by doing that today.

As stated in the definition, quoted by the author, the purpose of standardisation is the promotion of optimum overall economy taking due account of functional conditions and safety requirements.

As far as many of our local electrical manufacturing industries are concerned, the limited extent of our local market is a serious obstacle to the achievement of the optimum overall economy in production. The local demand for electrical commodities is often not sufficient to provide a high plant utilisation and to make full use of the existing productive capacity. While standardisation in such cases will undoubtedly lead to lower production costs, this will not necessarily be the complete answer and may even lead to a lower plant utilisation. In order to make up for the difference between local demand and local productive capacity, there is therefore an urgent need for such industries to find markets for their products outside our borders. However, many of the benefits of standardisation would be lost if they had to produce com-

modities to our own national standards as well as to the standards of other countries.

It would, therefore, be advisable to harmonise our standards as far as is practicable with those of other countries forming part of the western world, and although it is realised that this would present many difficulties and problems it should be borne in mind when standards are set up.

The author has quite rightly criticised the practice of certain supply undertakings of framing their own distinctive specifications, which do not conform with the national standard and also those undertakings which add certain requirements of their own to national specifications.

I do think, however, that manufacturers are also partly to blame for this state of affairs and that they should, in such cases, adopt the policy of the late Henry Ford, who, in his day, probably achieved the ultimate in mass production and standardisation, at that time, with his famous Model T. Ford and he used to tell his customers that they could have their cars in any colour provided that it was black!

The author has stressed the fact that today's dynamic technology demands truly dynamic standards in order to keep pace with the rapid progress and developments which are being made and that the accent in standardisation work today is therefore on the performance requirements of the specifications.

I am sure that we all agree with this but it is inevitable that there will always be a considerable time lag between changes and new developments made as a result of technological progress and it is difficult to see how it could be otherwise. After all, standardisation can only be applied to commodities which are in fairly common use and a new or a modified article has to prove itself in service before it finds general acceptance.

The author's remarks concerning standardisation of losses will no doubt provoke much discussion. He mentions that the main argument advanced against the acceptance of standardised losses on distribution transformers, is that this would not take into account the large variation in energy costs in South Africa.

I would like to say that another reason for the opposition to standardised losses, is that supply undertakings feel that they should not be deprived of the opportunity of taking advantage of improvements in technique and materials which may become available and which would result in a reduction of transformer losses. Furthermore, they also feel that there should be some incentive for manufacturers to improve transformer efficiencies.

On the subject of capitalisation formulae, I admit that they vary between purchases but so do cost and other factors. With regard to the statement that such formulae are based on assumptions which may not always be in line with actual operation conditions, I think the same may be said about many standard specifications which often stipulate service conditions which are rarely, if ever, met with in practice. However, the point is that unless all tenderers offer transformers with identical losses (which never happens in practice), comparisons must be made which take into account the difference in losses when tenders are adjudicated.

Such comparisons can only be made on the "Capitalised cost basis" or alternatively on the "Annual Cost Basis".

The author has made no mention in his paper of "Annual Cost Basis" formulae and it would be interesting to know whether this method would be more acceptable to him as it does away with at least one of the uncertainties which are causing him so much concern, as I shall point out later.

Mr. Middlecote quoted an example of a typical capitalisation formula in his paper. If it is implied that supply undertakings use this formula, I must protest, as it would definitely not be acceptable to such undertakings.

In this formula, the author has omitted "d", the cost of electricity in pence per unit. To calculate the annual cost of supplying the losses, he has used the product of f and Wc (W copper) f being the load factor of the transformer, and Wc the full load copper loss in kilowatts. This is, of course, inaccurate as the copper losses are not proportional to the load factor under varying load conditions and for this reason supply undertakings multiply the full load copper loss; Wc , by a fraction known as the "loss load factor" which is derived from various formulae such as $(.3f + .7f)$ ($.2f + .8f$), etc. With a load of say .30, the loss load factor will therefore be .53. I thereby make it that the formula for the equivalent capital cost of losses should be $R73$ a.d. ($Wf + fWc$) where f is the *loss load factor*.

It is also normal practice to calculate the cost of supplying the losses on the basis of the demand and unit charges instead of at a flat rate as in the example quoted in the paper. The maximum load on transformers does not in all cases coincide with the System Peak Load, in other words, there is some diversity in the demands caused by transformer copper losses and in calculating the demand cost of the copper losses, suitable allowance should also be made for this diversity.

It will by now be clear that the effects of inaccuracies in the assumed load factor used in capitalisation formulae are considerably less than the author would have us believe.

The author also implies that it is incorrect for the interest rate to be taken as constant over the life of the transformer. However, if comparisons are made on the "Annual Cost Basis" this objection falls away as the interest rate will only have a bearing on the annual capital charges which will remain constant during the period of the loan.

From the question posed by the author, I gather that he considers that the advantages of standardised losses should be made available to the majority of purchasers, leaving the minority to resort to the capitalisation formula. Although I see it in a different light, I am in favour of provision being made in the standard specification for standard loss transformers. Those supply undertakings who wish to evaluate transformer losses and who also wish to consider the purchase of low loss transformers, could then ask for alternative quotes for such transformers when calling for tenders.

It is admitted that such a procedure will, to a certain extent, be contrary to the spirit of standardisation, but it will nevertheless be a step in the right direction and should ultimately lead to a reduction in the cost of standard transformers compared with the present day cost of the equivalent trans-

formers. If standardisation is as effective in reducing costs as we believe it to be, standard loss transformers should more than hold their own and should find more general acceptance in the course of time.

Mnr. President, dames en here, ek dink u sal met my saamstem dat mnr. Middlecote vandag 'n baie interessante, leersame en waardevolle referaat op 'n uitstekende wyse gelewe het en waar ons hom nou daarvoor dank, dink ek dat dit ook gepas sal wees om hulde te bring aan die Suid-Afrikaanse Buro van Standaard vir die baie waardevolle werk wat hierdie liggaam gedoen het en nog steeds doen om kwaliteit en standaardisering in ons land te bevorder.

Dit is dus vir my 'n genoë om 'n mosie van hartelike dank aan Mnr. Middlecote voor te stel vir sy interessante referaat.

THE PRESIDENT: Thank you very much indeed, Mr. Lombard.

May I ask Mr. John Wilson to second this vote of thanks.

Mr. J. WILSON (Pretoria): Mr. President, ladies and gentlemen, it gives me great pleasure to second this vote of thanks to Mr. Middlecote, which was so ably proposed by Mr. Lombard. Listening to Mr. Lombard, (although I did have a glance at his notes yesterday), I realise he has stolen much of my thunder. I hope you will bear with me therefore if I go through my notes, and see what I can use!

I'd like to endorse all that Mr. Lombard said in his opening, and in his concluding remarks, because I feel that most of us do feel that there are great advantages to be gained from standardisation. However, I feel also that here and there we do need to sound a note of warning.

Without doubt the principal scope for standardisation lies in the field of well established and well developed products, for here it can provide the stability and other ingredients which can yield the greatest economic advantage to both manufacturer and consumer.

However, if applied outside such fields and too widely, there is always the danger that it may in fact have a retarding influence on development for this can only be safeguarded by the constant vigilance of human beings, who, apart from being fallible, can be hampered by other influences.

I think it is almost a truism to say that standardisation can have no part in basic research and while the author has quoted an extract from the New World Telegram in support of his arguments, is it not possible that the real reason why Russia is at present ahead of America in its space projects is that the former, to whom science is almost a post-war novelty, has been comparatively unfettered by standardised ideas in its approach to these projects?

The author has raised the question of whether, in considering developments in new manufacturing fields, the standard or the industry should come first. Where the product is a well established one, such as paper insulated cables, there can be little doubt but that the advantages lie with laying down the national standard first. Such a standard would obviously be based on existing standards in other countries and on the universal experience of manufacturers and consumers.

Where, however, the product is a comparatively new one, such as the recently developed plastic insulated cables, it would

certainly appear to be highly inadvisable to force a rigid specification on the manufacturing industry, when research and development are far from having been exhausted, and where techniques of manufacture are still largely a matter of trade secrets and patents.

In such cases a standards' institution can function best as a co-ordinating body with the ultimate object of producing a national standard only when ideas have been stabilised.

There is indeed wide scope for standardisation in our own field of electricity supply. The greatest benefits can derive possibly in the standardisation of secondary distribution equipment, covering transformers, low voltage line equipment, consumers' services, and the materials used in consumers' installations, for the annual investment in such equipment is probably at least R10,000,000 so that a modest saving of only 5% would yield great economic benefits.

On the question of the standardisation of the ratings of transformers and their accessories, Pretoria has already experienced considerable economic advantage by standardising on two unit sizes for urban distribution, viz. 500 KVA and 200 KVA, only the 500 KVA units being equipped with conservators, desiccators and Bucholtz relays. The 200 KVA units are fitted with only a free breathing device while no thermometers, tappings or tapping switches are fitted on either size of unit.

However, in regard to the question of standardisation of transformer losses and capitalisation formulae, we do not see "eye to eye" with the author and feel a note of caution should be sounded.

In the first place, the cost of supplying the losses is not as might be inferred from the author's remarks, a negligible factor. Taking, for example, the losses quoted for a 500 KVA transformer in the draft S.A. Standard Specification, the supply authority would have to provide generation and distribution equipment of a present day value of some R2,000 to meet such losses, — a figure comparable with the present day cost of the transformer. In addition, the cost of the extra fuel burnt to supply the energy loss must be met.

Then again, sight must not be lost of the basic differences between industrial concerns and utility undertakings in regard to the financing of the initial cost and the annual operating costs. In industry where capital is a comparatively scarce commodity, investment must yield a relatively high return of the order of perhaps 15% or more, and the initial cost is therefore of prime importance, since any saving by reduced losses could not be expected to match the required yield on the investment. A low cost high loss transformer is therefore acceptable. In a utility undertaking, on the other hand, there is an absence of the profit motive and the emphasis is therefore on lowest overall cost taking into account both initial cost and operating costs. Capitalisation is therefore justified.

In regard to loss capitalisation formulae, while there is probably something to be said for some form of standardisation the cost structure used should at least be realistic and take into account both demand related and energy related cost factors, and not just a meaningless average cost per unit such as that quoted in the paper.

Two undertakings might well have the same so-called "average cost per unit", but the true cost of supplying the losses could be very different in the two cases.

It is interesting to note the author's reference to the load factor of the average distribution transformer and the figure quoted of between 0.2 and 0.35. While this may be reasonable as applied to the daily loss load factor, the life loss load factor, which is the correct one to use, and which takes account of the annual load curve and the life load curve of the transformer will invariably be much lower. In Pretoria, for instance, it is only slightly in excess of 0.1.

While on the question of figures, I would appreciate it if the author could elaborate on the consumption per head of white and total population quoted in the paper, for, unless I have misread the figures published by the department of Census and Statistics, their actual figures are something like three times as high as those quoted by him.

In conclusion I would like to say that I support, with Mr. Lombard, Mr. Middlecote's appeal for the co-operation of all concerned in this matter of standardisation, because of the benefits that it can yield.

Thank you Mr. President.

THE PRESIDENT: Thank you, Mr. Wilson.

CONVENTION ADJOURNED FOR TEA.

On resuming:

THE PRESIDENT: Ladies and gentlemen, I now have much pleasure in calling on Mr. John West to present his paper. Mr. West has come all the way from Rhodesia to indicate that costs and tariffs apply in Rhodesia as well as in this part of Southern Africa.

Mr. J. H. WEST (Salisbury): The Chairman, ladies and gentlemen, my paper had its origin about two years ago when a certain large undertaking in the Federation applied for a tariff increase. Its application was supported by a mass of evidence which demonstrated that the new tariffs were based strictly on the costs of supplying the different categories of consumer. The evidence was so convincing that the application was approved with much less opposition than had been anticipated. Indeed it stimulated a feeling that all applications should be based on cost analysis and there was even a suggestion that the Electricity Act should be amended to make such a procedure mandatory.

I felt that whilst cost analysis was vital, it would be wrong to eliminate all other factors having a bearing on tariff formulation, so I wrote a paper advocating what seemed to me a more balanced approach.

Shortly afterwards I attended the 1961 Convention and showed the paper to a Councillor friend who was also a delegate. He said that it was just the sort of thing that would interest councillors, very few of whom had the technical knowledge to understand the more advanced papers written by professional engineers. This view was accepted by the Executive Committee and the paper was placed on the Agenda for 1962. This background information will, I hope, put the paper in its proper perspective, and I will now summarise it.

Electricity Costs and Tariffs

By JOHN H. WEST, M.B.E., B.A. (Com.), M.Econ., F.I.S.,
Under Secretary, Ministry of Finance, Federation of Rhodesia
and Nyasaland.

In the last financial year the revenues of all public undertakings in the Federation amounted to £11,704,000, which was only £44,000 more than their combined expenditures. One undertaking, namely the Southern Rhodesia Electricity Supply Commission, made a substantial loss, and one undertaking, namely the Federal Power Board, made a substantial profit. Government-owned undertakings as a whole made a loss of £82,000, whereas Municipally-owned undertakings made a profit of £126,000. The Federal Power Board is obliged to make sufficient profit to pay for half the cost of constructing Kariba Stage II. The Federal Government's two Supply Commissions are required to ensure that revenues cover costs taking one year with another, costs being defined to include increases in the cost of replacing assets. Municipalities generally sell at prices which permit a contribution to the general rates fund, though some municipal undertakings in Northern Rhodesia are subsidised by the Government. Nevertheless the losses and subsidies are intended to be temporary and on balance it can be said that electricity prices are largely governed by the cost of production.

Thus the Federation does not in principle subscribe to the theories of people such as Gunnar Myrdal⁽¹⁾, who believes that national planning cannot rationally be made in terms of costs and profits of individual enterprises. It may well be true as he says that "every new investment and enterprise has another and additional sort of yield besides the expected money return and that . . . investment in power can very well provide that decisive stimulus which will permit a country to jump what has been called the take-off into sustained growth, enabling it to lift itself by its shoe strings⁽²⁾".

This is a philosophy which has a strong appeal to the Government of an under-developed territory relying to a large extent on loans from affluent countries and financial institutions overseas. Despite the attractiveness of this philosophy it has not been adopted by the Federation, which broadly speaking has accepted the principle that each electricity undertaking should pay its own way. In a sparsely populated country not yet covered by a comprehensive transmission system and with distribution largely in municipal hands, it would be difficult to follow any other policy. It must be admitted, however, that the existence of 26 public undertakings in the Federation, each operating as an individual identity, produces some arbitrary effects. A large undertaking usually has lower costs than a small one, and a hydro installation usually has lower costs than a steam plant. Thus the price paid by a consumer depends on which undertaking serves him. Householders in small towns like Hartley and Marandellas who are supplied by the large Southern Rhodesia Electricity Supply Commission pay less than those in Ndola and Lusaka who are supplied by relatively small undertakings.

Consumers in high tariff areas naturally argue that all costs should be pooled so as to make possible a unified national tariff. This could be done either by nationalisation, or by subsidies to high cost producers financed from levies on low cost producers, or from general taxation. The political feelings for nationalisation is not strong however, and the majority of consumers—who are supplied by the big low-cost undertakings—would naturally resent being levied for the benefit of consumers in other areas. It also seems wrong in principle for part of the cost of electricity to be met from taxation, particularly since (without nationalisation) a unified tariff would involve subsidies to all undertakings except the one with the lowest costs. There is also the argument that to subsidise certain undertakings would remove one of the economic factors affecting the location of industry and population. This could react on the costs of electricity since the effect might be to transfer demand from the low cost areas to the high cost areas, thus increasing the national average cost and reducing the nation's real income.

Electrical engineers group costs into those which are fixed and those which are variable⁽³⁾. Sometimes the words "overhead" and "incremental" are used in place of "fixed" and "variable". Fixed costs are those which in the short run are independent of output and have to be borne whether an undertaking operates at its maximum level or at only a fraction of that level. They include interest, loan redemption, depreciation, and the wages of those personnel who must be employed if any output at all is to be produced. There is clearly room for differences of opinion as to the precise composition of fixed costs but the concept is generally accepted even if its interpretation is not always clear. Fixed costs can thus be regarded as constant in total in relation to a given installed capacity—whether of generators, transmission lines, distribution systems or staff—which in a well planned undertaking should be closely related to the peak load. Fixed costs are therefore a short term phenomenon since they change with any change in installed capacity.

Variable costs are those which vary with the size of output, e.g., coal, water, oil, ash disposal, etc. Here again there are differences of opinion as to what should be included under this head particularly when it comes to such items as the wages of meter readers, billing clerks and so on. Variable costs can be considered as constant per unit of output but fluctuating in total from hour to hour and from day to day in accordance with the quantity of electricity generated or distributed. The electricity supply industry. In some measure it applies to

The concept of fixed and variable costs is not peculiar to the electricity supply industry. In some measure it applies to all industries but for several reasons it is of particular relevance in electricity supply. One is that both power stations and distributing undertakings normally produce a single homo-

(1) *Economic Theory and Under-developed Regions*, London 1957, pages 85-97.

(2) *The Problem of Energy in Underdeveloped Countries*, World Power Conference, Belgrade, 1957.

(3) There is a third category, namely consumer costs, but to the extent that they are covered by connection fees and capital contributions, they do not affect the arguments in this paper.

geneous product, so that some other cost problems such as by-product costing or allocating costs over a range of products do not arise, and attention can be more concentrated on fixed and variable costs than is the case in most other industries. Another is that electricity supply is normally operated as a public monopoly and the absence of direct competition means that prices can be based more on costs than on other producers' prices. A third is that electricity supply requires a high capital expenditure per £ of sales (£11 of capital to every £ of sales in the Federation in 1959/60). This means that fixed costs, which are the ones that cause most difficulty, are a higher proportion of the total than in most industries.

Undertakings in the Federation do not publish figures showing costs split into fixed and variable, and the Ministry of Power's Annual Census are more concerned with the split between generation and distribution costs. It is usually agreed that imported power (when purchased at a flat rate per kWh) can be included under variable costs. So can fuel and water. Interest, depreciation and redemption are equally clearly fixed costs. The problem arises in allocating other generation and distribution costs and administration and general expenses. If we take roughly 60% as fixed and 40% as variable, then the results for all public undertakings in the Census Year 1959/60

<i>Overhead (or Fixed) Costs.</i>	£000
Generation	540
Distribution	561
Interest	2,331
Depreciation/Redemption	1,682
Administration and General	558
Total	5,672

Incremental (or Variable) Costs.

Imported Power	100
Fuel	1,812
Water	166
Distribution	374
Generation	350
Administration and General	372
Total	3,184

Thus the fixed costs represent 64% of the total and variable costs 36%. This may not seem very precise but a lot of time can be spent on increasing precision without any commensurate return. This is so simply because costs are not constant. If fixed costs are scientifically ascertained to be 64% today, then tomorrow, with an increase in output they may be only 62%. The length of the period under consideration is also an important factor. If a power station has surplus capacity now, there may be economic advantages in obtaining new loads at prices which cover little more than incremental costs. It does not follow that such loads would necessarily be economic later, when the installed capacity has to be increased and the additional fixed costs have to be paid for by other consumers. In the long run all costs must be covered. Indeed in the long run all costs may be said to be variable.

In the short period fixed costs are closely related to the peak load. It is the demand for electricity at one particular hour during the year which determines the capacity which the undertaking should have available, and therefore in a sense the whole of the fixed costs are attributable to the peak whereas the variable costs are attributable to the whole output during the year.

This theory is so simple and attractive that its practical implications have interested economists and engineers since the early days of the supply industry. As long ago as 1892 Hopkinson argued that consumers should pay for electricity on a two-part tariff. The first part would be related to the fixed costs and would therefore be a function of the maximum demand. The other part would be related to the variable costs and would therefore be a function of the number of units consumed. There are, of course, some practical difficulties in devising such tariffs even if one starts from the assumption that all consumers should pay exactly the cost of supplying them. One is that maximum demand meters are expensive and can only be justified for relatively large loads. They would be quite inappropriate for domestic consumers and for most commercial and farming consumers for instance. Another is that the fixed costs are related to the annual peak load on the undertaking whereas the consumers' peak load often occurs at a different time. A rough allowance for this can be made by measuring the diversity factor of the group of consumers concerned but this is not always practicable and is usually costly. Moreover it does not avoid inequity as between individual consumers.

Hopkinson's two-part tariffs—despite the fact that they cannot be mathematically precise—have nevertheless become very popular and now number 35 out of the 185 public supply tariffs in the Federation. Of the remaining tariffs 113 are of the block type which involve high charges for an initial quota of consumption, normally with some relevance to the undertakings' fixed costs. The other 37 tariffs are either flat rates applicable to small consumers or special tariffs, e.g. off-peak.

Because of the inability of either two-part, block, or flat rate tariffs to reflect an exact allocation of costs, many economists have urged the adoption of time of day tariffs. The essence of such a tariff is that energy consumption during peak hours is charged at a much higher rate than energy consumed during non-peak hours. Some people regard time of day tariffs as merely the converse of off-peak tariffs, but this is not so. Off-peak tariffs are offered to a relatively small number of relatively large consumers whose load characteristics are such that with a little financial inducement they can shift their demand to off-peak times. Thus an off-peak tariff is merely one specialised scale out of many. The protagonists of time of day tariffs have in mind that practically all consumers will be on the same tariff with no distinction between domestic, commercial, mining, farming, industrial, etc. Only energy would be measured—not power—and at peak times the price would be something like seven times⁽¹⁾ the price at non-peak times. Each consumer would have two meters, the switching between them being controlled either by a clock or a ripple relay system.

(1) According to H. S. Houthakker, *Electricity Tariffs in Theory and Practice*, Economic Journal March 1961.



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Time of day tariffs would no doubt reduce peak loads and improve load factors, thus reducing capital costs and maximising utilisation. They would probably result in a lower average cost per unit of electricity. But the fact that hardly a single undertaking in the world has adopted them suggests that they have more disadvantages than advantages.

One major drawback is that it is easy to talk about the peak but not so easy to define it. I. M. D. Little⁽¹⁾ who is one of the chief advocates of time of day tariffs admits that "only after the event can the entire marginal capacity cost be attributed to a single half-hour in the year or at least to a few half-hours". Obviously neither supply undertakings nor consumers would wait a year before deciding the price of electricity. Little continues, "the capacity costs must be allocated between the different hours according to the probability that each hour will be the peak hour for the system. . . . Only about 600 hours per annum have any chance of being the peak." According to his calculations the proper cost of electricity in England was 8.1d. per unit at the December peak hour ranging down to only 0.46d. on a summer evening. An immediate objection to time of day tariffs is therefore that if costs do vary in this way then a dual price system would be unlikely to match costs any better than a two-part or block tariff. Another is that to define the peak is a matter of opinion unless one means the single hour in the year when demand is greatest. This would obviously be inequitable as the effects would be quite arbitrary. Moreover all consumers would do their best to dodge the peak. But if one is considering a much broader peak then who is to say whether 600 hours in the year is a more appropriate period than say 400 hours?

In practice time of day tariffs would have to take some simplified form, e.g. a low rate throughout the year and a high rate from say 7 a.m. to 7 p.m., during the three winter months. This would involve expensive meters in every consumer's premises and of course by definition the revenue from non-peak use would be small. For this reason the Clow Committee, while appreciating the merits of peak period pricing, recommended merely a surcharge of 0.35d. per unit during the winter quarter and a reduction of 0.1d. in the remaining three quarters. This was actually tried in the United Kingdom but was abandoned after the first year because it was generally considered to be harsh and unfair and also because it apparently had no effect on the load at the critical peak hours. This of course was in the days when coal was rationed and consumers without coal had to use electric fires or freeze. A less obvious objection to peak load pricing is that it is not altogether fair to allocate the overhead costs strictly according to the peak load. If it were not for the fact that there were troughs as well as peaks—particularly seasonal troughs—it would not be possible to maintain the plant and have it all ready to meet the anticipated peak.

It would seem, therefore, that time of day tariffs are no more efficient than two-part tariffs as a method of allocating costs equitably to consumer groups.

Basically there are only two methods of allocating overhead costs in proportion to peak load, namely on maximum demand or on energy consumption during the peak period. But clearly

there can be variations on these two themes and in 1945 the British Electrical and Allied Industries Research Association reported⁽²⁾ on an analysis it had made of nine recognised methods:

- (1) *Consumption* — Costs are allocated to each consumer in proportion to the energy consumed during the peak hour.
- (2) *Peak Responsibility* — each category of consumer pays its share in proportion to its maximum demand during the undertakings' peak hours.
- (3) *Maximum Demand* — each category pays according to its maximum demand whenever it occurs.
- (4) *Punga* — a compromise based on an average of (2) and (3).
- (5) *Lauriol* — based on the use of each set at each hour, in terms of energy.
- (6) *Phantom Consumer* — based on allocating unused capacity in proportion to the excess of each consumer category's demand at the peak over its annual average demand.
- (7) *Complete Peak* — a mixture of (5) and (6), but based on a longer peak extending over the whole portion of the load which on the peak day exceeds the average load for the year.
- (8) *Greene's Method* — based on consumption and maximum demand regardless of diversity.
- (9) *Potential Peak* — based on maximum demand and consumption during potential peaks, i.e. a long period excluding all troughs but including all minor peaks.

Taking typical categories of consumer the Research Association then worked out how the overhead costs would be allocated in accordance with each of the above methods. The extreme degree of variability is indicated in the following table, in which the percentage refers to the proportion of total overhead costs attributed to the consumer category and the figure in brackets refers to the methods listed above:

ALLOCATION OF OVERHEAD COSTS

Category of Consumer	Lowest Proportion	Highest Proportion
Lighting	9% (2)	30% (9)
Heating	11% (1)	45% (2)
Industrial	20% (3)	33% (2)
Off-Peak	Nil (2) and (9)	27% (1)
100% L.F. Load	9% (4)	27% (1)

Each method can be justified on theoretical grounds and each has its supporters. Number (3), the maximum demand method, originally suggested by Hopkinson, is the one which has become most popular, though it can only be applied to consumers big enough to justify the installation of special meters. Method No. (2) is the one used by the Southern Rhodesia Electricity Supply Commission in principle, though in the absence of special meters or ripple systems to record demand at the undertakings' peak hour, each consumer category's own peak is adjusted by a diversity factor.

(1) *The Price of Fuel*, Clarendon Press, Oxford, 1953, Page 57.

(2) Technical Report, K.T. 109, London.

Of course even if an undertaking can establish to its own satisfaction how the costs should be allocated to the consumer groups there still remain the practical difficulty of doing so in an acceptable way. Where special metering can be justified it is relatively easy to determine a charge per kW or KVA of maximum demand, applying appropriate factors where necessary to convert from annual to monthly billing. For small consumers — who constitute the majority — reliance has to be placed on block tariffs, the object being to design the blocks so that the average consumer pays an amount equal to the overhead cost of supply per consumer, and each category of consumer as a whole pays an amount equal to the total overhead costs for that category.

It may be concluded that any attempt to charge consumers precisely the cost of supplying them does not permit of an unequivocal solution.

But should this be the object? The usual argument is that to base prices on costs is the only way to avoid discrimination between consumer groups. Yet it has been demonstrated above that cost allocation is a matter of opinion and the various methods produce widely varying results. Moreover there are other principles which should influence the prices which consumers pay. They are:

- (a) Value of Service;
- (b) Ability to pay; and
- (c) Stimulus to improved utilisation.

The first refers to the fact that a unit of electricity is worth a different amount for each of its uses. Consumers are ready to pay a high price for electricity used solely for lighting because there is no real substitute. It costs no more to supply a unit of electricity for lighting than for heating but suppliers would be foolish to charge the same price, as this would mean sacrificing revenue which could be used for development. A unit used for power purposes is also much more valuable to the consumer than one used for heating, but in both cases the cost of alternative forms of energy is a factor which should be taken into account in fixing the price.

The second principle, ability to pay, is called by the railways "charging what the traffic will bear." For some consumers the cost of electricity is a trivial part of total expenditure whereas for others it is a major cost. In economic terminology the elasticity of demand of the former group is low whereas for the latter it is high. Electricity prices should therefore reflect the different elasticities, being high where elasticity is low and low where it is high.

The third principle refers to the economic advantages of increasing total output and of improving load, power and diversity factors. A large undertaking almost invariably has lower overall costs than a small one, and in present circumstances in the Federation it is vitally necessary to expand sales since every additional unit generated at Kariba costs practically nothing. In normal circumstances it is as important to improve load factors as to increase total output since this results in spreading the overhead costs over more units. In the Federation, however, there will be a considerable surplus of capacity for the next few years and it is difficult — in the national context — to see any immediate need for improvement of load, power, or diversity factors if this inhibits any expansion of total output.

This paper might be regarded as an argument against cost analysis and in favour of using less tangible principles of tariff formulation. The writer therefore wishes to make his position clear. He is strongly in favour of cost analysis and considers that much more should be done to establish the true cost of supplying various loads. In particular the incremental cost of supply should be calculated and no consumer under any circumstances should be charged a lower follow-on rate than this. The overhead costs of supplying different consumer groups should also be studied and more use should be made of sampling methods to determine their loads at peak periods. But having calculated costs on whichever method happens to be preferred (preferably on more than one), undertakings and regulating authorities should remember that the other three principles are also important, and due weight should be given to them in the formulation of tariffs.

Discrimination is thus not an evil but something to be recommended provided it does not go too far. In fact "discrimination is the secret of success."⁽¹⁾ It enables the supply industry to absorb some of the consumer's surplus which flows from the principle of marginal utility, and above all, it enables supply authorities to finance some of their development from funds contributed by the electricity consumer instead of from the nation's strictly limited loan funds.

THE PRESIDENT: Many thanks indeed, Mr. West, for your paper. As you can see, the Association has enjoyed it very much, and I think you put your points in a most becoming manner!

I'd like to call on our old friend Walter Milton to propose a vote of thanks to Mr. West.

Mr. W. H. MILTON (ESCOM): Mr. President, ladies and gentlemen: it is a privilege to be called upon to propose the vote of thanks to the author for a valuable contribution to the Association's annals, particularly on this contentious subject.

The brief review of the views of other people on the method of charging for electricity supplied, with particular reference to the manner in which the costs should be distributed in total or in part, is a most useful exposition of the main aspects giving rise to the different viewpoints. Quite a thesis could be written on the many widely different aims expounded on this subject by economists and others.

It will have been noticed that the Federation has accepted the principle that each Electricity Undertaking should pay its own way. This is also clearly laid down in the Electricity Act in terms of which the Electricity Supply Commission of the Republic is required to operate. There is, of course, a different incidence in the arbitrary effects created by the presence of a number of public undertakings bearing in mind that in the Federation they have only 26 operating as individual entities. There are many more in the Republic.

It is not surprising that the same problem of long standing faced the Federation as has faced other power supply authorities with extensive fields of operation. I refer to the plea for pooling of costs to establish very widespread standard tariffs, naturally put forward by those consumers situated in high cost areas and opposed strongly by those located in the low cost areas.

(1) J. M. Clark. Studies in the economics of Overhead Costs. University of Chicago Press 1923.

It does seem strange that so many people who are interested in the development of their particular locality plead for what is virtually subsidized development when, on thorough investigation, it is abundantly clear that such subsidies would inevitably have to remain permanent to support the development encouraged by the original stages of subsidy.

It is not for me to comment on the national aspect of such development, which may be supported by the intangible indirect benefits claimed in its support, but it seems clear to me that a sword of Damocles must hang over the heads of any industrialist who takes advantage of such subsidies because he must always bear in mind the effect of possible removal of the subsidy.

The cost of electricity seems to be singled out for requests for unification because it is the easiest to attack. Surely the unification of one item of the cost structure would inevitably lead to a demand for unification of all other costs, though not from localities where such costs are favourable, the request always coming from areas which would benefit.

Considering two such widely separated areas as that of the Cape Peninsula and the Witwatersrand, the result of a uniform tariff, requested from the Cape Peninsula, would obviously be with the object of increasing the extent of development of electricity supply in the Cape Peninsula. Such development would involve increased generation in that locality at the prevailing higher cost (otherwise uniform tariffs would not have been sought). Such development would inevitably again increase the uniform price level in order to maintain uniformity. Such considerations as these are never considered by those pleading for such uniformity — why should they care!

When mentioning the subdivision of electricity undertaking costs under three main headings, the author mentions the two principal groups as being those costs which are fixed and those which are variable (or incremental). He also refers to the fixed costs as sometimes being called over-head costs.

As no costs are really fixed — a point to which the author draws attention — I prefer rather to group the costs under the nominal headings of those which are consumer related, demand related and energy related. By so doing one avoids creating the false impression that the so called fixed costs are in fact fixed when in reality they are almost entirely related to the demand which must be met and which is therefore associated with change.

Whilst the author remarks that the concept of demand costs and energy costs (the terms I prefer) is not peculiar to the electricity supply industry, I feel that he should have drawn attention to the fact that this concept is essential to the electricity supply industry but not necessary to other industries. To my mind, this is so because the electricity supply industry cannot readily provide for storage of its commodity so as to meet peak demands from installed primary generating plant capable of generating a demand below such peaks. Most industries can accommodate the articles produced in some form of storage which can be drawn when necessary to meet peak demands in excess of plant rated output.

I have not lost sight of the various reversible power flow systems which can be used, in theory, because the availability of such potential facilities is far from general and, in most instances, of relatively little effect in respect of the overall peak requirement. It may therefore be said that the electricity

supply industry must instal sufficient primary equipment to generate the supply demanded at the time of the maximum peak requirement and, in that respect, it is therefore unfortunately rather unique as regards the costs incurred.

With recent trends of costs it is becoming more and more apparent that this cost of installed generating plant, coupled with the concurrent capacity of the transmission and distribution mains, is becoming by far the most predominant item in meeting the requirements of the consumers supplied.

For a different reason this predominance is most evident where the major portion of an installation is comprised of hydro electric equipment.

In this respect, the author also has made the point that the electricity supply industry involves a relatively high capital expenditure in relation to the revenue from sales. He gives the figure of £11 of capital to every £1 of sales in the Federation in 1959/60. It may be of interest to indicate that for the year ended 31st December, 1960, Escom's operation required a return of £1 from sales to a very little over £6 of its loan account, in order to meet cost. I cannot give figures of more recent date because Escom's report has not yet been submitted to the Minister.

On the other hand I feel that these figures are misleading because they represent the overall picture resulting from an accumulation of investments over a long time. They are not related to the modern price conditions. On the basis of modern prices a considerably higher capital investment is involved.

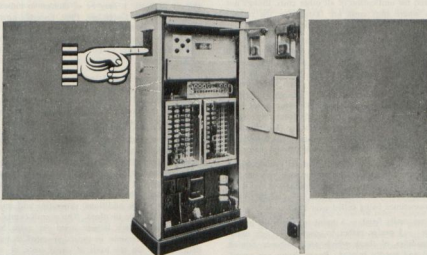
For a long time and, in some cases even today, it was quite usual, for the purpose of a rough analysis of the revenue required to justify capital expenditure, to find that a 20% return on capital invested in a distribution system was necessary if that extension was to be regarded as "payable". The overall capital would then, naturally, exceed £5 per £1 of revenue because, in stages, additional generating and main transmission facilities would be involved. The overall capital involved therefore depended very largely upon the ratio between capital invested in generation to capital invested in transmission and distribution. On the basis of equal costs, of course, the rule of thumb amounted to a requirement that revenue be at least £1 for every £10 of capital invested in the Undertaking.

That these relationships have changed appreciably in recent times and are probably still changing, is perhaps amply demonstrated by the figures which are given in the author's paper where it will be found that approximately £4,000 out of a total of £5,672 of the fixed costs arises from capital charges and, these figures are related to an overall cost of £8,856 (these figures are in terms of thousands of pounds) thus almost 50% of the total cost, in this case, arises from capital charges and it therefore follows that unless there is a proportionate rise in all other departments of cost, the increasing price per kVA of plant and equipment coupled with the hardening of interest rates must call for a higher return in revenue per £1 of capital investment.

The author then turns to the subdivision of costs between the demand related and energy related sections and arrives at the approximate proportion of 64% of the total as demand related and 36% as energy related. He, however, makes the point that a lot of time can be spent on increasing the precision of allocation without any commensurate return.

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I am not inclined to agree with this statement because, when costs are allocated in this manner of approximation of losses sight of the effect of future provision for future requirements.

It is quite probable that the approximation recommended by the author is acceptable because such approximations may be fully justified if the departure from more accurate determination can be visualised and, more particularly, if it is known that the approximation is favourable to the extent that future trends are in the direction of decreasing price. This occurs when there is a considerable margin of unsold capacity and also when it is known that the cost of the expansion programme will not exceed average present day costs.

There is another difficulty introduced by this form of generalisation which arises when the costs differ quite widely in the different areas in respect of which those costs must essentially be calculated.

For example it would not be safe to generalise on Escom's Undertakings in the Republic, where the incidence of various costs in relation to each other varies very widely from Undertaking to Undertaking.

I have always contended that it is most unwise to derive low tariffs in order to please the community served, unless one is satisfied that such a tariff structure is not likely to bring about false development. This is particularly important when dealing with marginal competitive industries which may be encouraged to develop on a small margin only to find that that margin is reversed in its incidence due to the necessity of increasing prices because of the increasing demands.

Any consumer who is encouraged to establish a venture on a special tariff basis cannot be expected to face proportionate costs at some later date unless, of course, the low cost is known to be applicable for a limited development period to enable the new consumer to establish a venture which is capable, after such initial development, of meeting proportionate costs without trepidation.

If a supply authority is called upon to exercise its judgement in such cases and the marginal difference between proportionate costs and the development charges to be raised against the new consumer must be large, a grave responsibility is placed upon a Supply Authority.

When dealing with the proportions of the two groups of cost the author draws the conclusion that, indeed, in the long run, all costs may be said to be variable.

Whilst admitting that this is a statement of fact, the use of the word variable is, to my mind, misleading because in a paper such as that presented by the author, one is lead to associate the word variable with costs which are distinct from what I refer to as the demand related costs — the impression being created that electricity may be sold purely on the basis of the charge for the energy supplied, without appropriate regard to the allocation of the demand related costs, which differ widely from consumer to consumer relative to each consumer's use of energy.

The author then proceeds to deal with various forms of tariff which have their protagonists, many of whom, to my way of thinking, are theorists who, whilst realising the impossibility of the practicable application of their theories nevertheless persist in arguing the theoretical derivation of the tariffs they put forward.

As the author states, it has been recognized for a very long time that the so called two part tariff probably provides the most equitable method of costing supply to a consumer. Various methods of applying this basis are in use and each when applied to small loads includes some equivalent of the measurement of a consumer's probable maximum demand.

Many authorities apply what is termed the "Room basis" assessment to cover part of the probable demand whether in the form of a definite charge per assessed room or on a high unit rate or a quota of units per room. A portion of the demand costs is allocated to the energy charge and this assumes a basic standard load factor. There are, of course, many other tariff designs which make some attempt at the allocation of the cost on a demand basis.

Where the use is for domestic purposes, in respect of which these tariffs are most commonly applicable, such an allocation was reasonably accurate while the type of domestic installation was much the same in all premises. To my mind the most obvious error which occurs nowadays in the application of this form of tariff is introduced because the tariffs fail to take into account the diverse load which occurs in premises of the same assessed size.

As I have said on other occasions during Conventions, the load per domestic installation has increased tremendously with the passage of time, possibly, to a large extent, due to the encouragement given by supply authorities to the desirability of filling in the valley periods. The charge for the supply for equipment which it was felt would be used largely during valley periods, was designed to cover very little more than the incremental cost. I would venture to suggest that, today, much of the load of the domestic supplies in any given area gives rise to peaks which are attributable to these very loads which were designed for valley periods and the old time peak arising from the lighting load now represents only a proportion of the peak load which is being met.

It is common to hear of an average load of from 3 kilowatts to 5 kilowatts per domestic installation at the time of the peak load on a distribution station serving a residential area in this country and loads averaging 8 kW are not uncommon in America. That peak is not caused by the lighting load. Nevertheless many tariffs which are applied at the present time have been carried forward from those days when the charges were based on the lighting load.

It has been said that, when the tariffs are calculated from time to time, the cost of serving the domestic load is taken into account and therefore we are still operating on sound lines.

I do not think that this argument is tenable because there is a much larger variation between premises in the load imposed per room than was the case when lighting was supplied to a group of consumers. This may prove grounds for an argument on the relative merits of tariffs but I think as far more important aspects which is being neglected is that the consumer of electricity is not made aware, through the bills he receives, of the aspect of his use habits which result in the bills he is called upon to pay.

When kept in the dark on these aspects, one cannot expect any consumer to take such action as is within his powers to improve his position financially.

I contend that, if a consumer is made aware of what he is being charged for the peak load which he imposes, as distinct from what he is being charged for the energy he uses, it will follow that many, possibly the majority, of the consumers supplied with electricity who are aware of these features will take some steps to make more economic use of electricity both from the point of view of the user and the supply authority. This would only be true if each consumer is able to effect a saving to himself as a result of his personal effort, which is not achieved by "limited demand" methods.

Many years ago the "Reason" meter was introduced as a cheap means of determining ampere maximum demand but, for some reason unknown to me, these meters have not been widely used.

Other methods of measuring the ampere maximum demand of small loads have, in the past, proved so expensive — as pointed out by the author — that their use could not be justified on the basis of the possible results which could have been achieved. There is no use investing a considerable sum in capital and maintenance for measuring instruments unless equity demands that expenditure which, in turn, implies either, that the expenditure to be distributed is large and must be equitably distributed, or that the resultant of the use of such meters will show a saving after taking into account the cost of the meter installation.

Nowadays I am satisfied that this latter condition can be achieved and I am sure that there is, among the members present at this Convention a number who could justify my opinion by factual demonstration. In these circumstances I do not agree with the author when he states that maximum demand meters are expensive and can only be used for relatively large loads.

One hears the counter argument that the use of ampere demand meters is not fair on the consumer because it has no regard to the voltage element. Whilst admitting the statement of fact, I contend that something which is far more accurate than the present arbitrary measure should be adopted for practicable application in the interest of equity, although it may not be a precise measurement of the quantity to be measured. Surely it is better to be "more precise" than to be completely arbitrary. In the circumstances I do not think that ampere demand meters are inappropriate for domestic consumers and for relatively small power uses which include most commercial and farming consumers.

It would seem that the adverse criticism levelled against the use of demand meters is based, to a great extent, on the relative value of their use in relation to the equity of the distribution of costs. This, to my mind, is the least of the results of their use. By far the most important aspect is that their use is likely to bring about an improvement in the load factor with corresponding overall reduction in the cost of supply of electricity to the consumers. At the same time, they should result in a much more equitable distribution of the cost between individual consumers. It is important to bear in mind that consumers charged on this basis would pay their fair share of the costs incurred in serving them. Those consumers who take adequate steps to cut down their peak loads, thus increasing the supply capacity of the entire network and generating plant serving the community, would pay lower prices whilst those consumers, who are prepared to meet the cost incurred by them

when they desire to use electricity without concern for the peak they create, would be entitled to continue their behaviour in that fashion. In other words the consumer is provided with a *motive* to reduce costs and is *not compelled* to do so unless he so desires. He is therefore free to use all the equipment at his disposal in the manner which he himself thinks best — at the same time realising that he is paying for the privilege of freedom of action or enjoying a personal saving because that right is granted by the supply authority. This is most important.

The author also deals with time of day and off peak tariffs. I do not propose to comment upon these beyond expressing the view that off peak tariffs may constitute a very real hazard where small developing Undertakings are concerned. As the author implies, they can only be offered to large and selected users because there is a limited period of off peak and the tariffs must not be so open to acceptance that the time of peak can actually be transferred. This was the experience of more than one of the members of this Association!

As the author states, any attempt to base charges on consumers on their actual contribution to the load at the time of an undertaking's system peak could not be applied in practice because no consumer would give what is virtually a blank cheque to the supply authority and then just hope for the best.

I was pleased to note that the author indirectly indicated that consumers having a one hundred per cent load factor are not as welcome as they feel they should be, because some variation in load is essential to enable sundry maintenance work to be carried out when that work is not an immediate necessity but nevertheless must be done within a reasonable time. The valley period provides time for such work, which would require additional machines if no valley existed.

The author compares the resultant cost to different types of consumers depending upon the theory adopted for the purpose of cost allocation and he reviews nine such theories.

I feel that he should have mentioned that No. 9 (potential peak) is the theory recommended by the technical report to which he refers, and that the data assumed for each load should have been given. Their relative peaks, load factor, and timing are important for realisation of percentage cost distribution.

It may be of interest to place on record in these proceedings that, in addition to the 30% for Lighting and Nil for off-peak in case of theory No. 9 mentioned, the percentage allocations are to Heating 31%, to Industrial 26.4% and to the 100% load factor load 12.5%. Incidentally in this last connection the lowest proportion is given by theory No. 3 at 7.5% and not by theory No. 4 which is 9%. Thus the theory No. 9 results in allocations which approximate the average of the highest and lowest resulting from other theories, except in the two cases where they are specifically listed by the author as the highest and lowest.

As I have said, to have full significance, the foregoing percentages should be related to the relative peak loads (and other information) used in the example for which the calculations have been made. That information is contained in the technical report to which the author refers.

In my own opinion the refinements often taken into account in designing tariffs which attempt to allocate to each class of consumer the cost for which he is theoretically responsible,

are not fully justified because the habits and resultant proportions of load of the classes of consumers change quite rapidly. Such changes are still occurring in the Republic and, I would suggest, in the Federation. The effect of many of these refinements is small in relation to the cost of electricity to individual consumers and I feel, therefore, that simplicity with safeguards should be the aim of tariff designers in these two territories for some time to come.

The principal adopted by the Electricity Supply Commission of the Republic is that of allocating costs on the basis of maximum demand, that basis being applied to the various classes of consumers as groups before being broken down into the final tariff form. This method allows the benefits of varying diversity applicable to various classes of consumers to be passed on to those classes and approaches as closely to equity as is possible under our present day conditions of development.

In the case of the consumers supplied by Escom (in the Republic), there is very little difference between the potential peak responsibility method of allocation (No. 2) and the maximum demand method (No. 3) because in all undertakings the most substantial load establishes a potential peak period which embraces the times when other types of present load may create peaks.

A further aspect which affects the treatment of this problem in these territories is that the length of the daylight hours does not vary to a marked extent, such variation being extreme in the European countries from which most of the theories under our consideration have emanated.

In support of his arguments for greater freedom in the design of tariffs, with his emphasis upon the indisputable fact that no consumer should be charged less than the incremental cost of supply, the author proceeds to introduce factors which should influence the price which consumers pay but which, in my opinion, are extremely difficult to apply.

The factors which he mentions as influencing the prices are:—

- (a) Value of service;
- (b) Ability to pay; and
- (c) Stimulus to improve utilization.

Bearing in mind that electricity supply is largely furnished on the basis of monopolies, and may almost be regarded as a monopoly once established, the evaluation of these three aspects would always be open to challenge because of that very lack of competition.

On the other hand, these monopolies within the Republic are very effectively controlled in the case of private ownership and, even in those cases, they only lack some degree of control when they are very small.

Escom is controlled by the Electricity Act to the extent that it is required to operate as nearly as possible at neither a profit or a loss. The tariff of charges only becomes applicable after approval by a separate body, the Electricity Control Board.

Municipal Undertakings are monopolies but, again, they are controlled by the Urban Local Authority which must be presumed to represent the electricity consumers.

For the foregoing reason these monopolies must not be confused with a privately owned monopoly whose shareholders have complete freedom of action in fixing their prices which

normally may be expected to aim at a maximum profitable return on the investment. This is a very important feature and it might be preferable to refer to such electricity undertakings as controlled monopolies since they lack complete freedom.

Any application of the three factors to which the author draws particular attention would require to result in the same overall total revenue which means that the adjustments would be upward where the value of service is greatest with due regard to the ability to pay and downward when the conditions are reversed but the additional revenue from the increment in price would require to be balanced by the decrement resulting from a reduction and, of course, any stimulus decided upon would require to have due regard to the balance between revenue and expenditure required. The absence of a profit margin creates great difficulty in deciding degrees of differentiation.

The views of the supply authority and of consumers on the evaluation of each of these factors may never be the same and demands for special treatment and protests in connection with the estimation of the quantities by the supply authority would be numerous. These remarks are particularly applicable to the first two factors.

I think most of us are aware of the attitude of sections of our community in regard to their ability to pay and the value to them of our service. The electricity cost may be a very small portion of an industry's cost of production, and relatively large profits may be made by that industry, nevertheless any increase in price is met with strong protest and often a claim of inability to pay. Such is human nature!

In my own opinion a supply authority would be trading on very dangerous ground if, in the absence of an external authoritative directive, it attempted to adjust its charges on the basis of these two particular factors, and still operate at neither profit nor loss each year.

If differentiation is admissible, then decisions on these two factors should require to be made by somebody capable of controlling the prices charged by the electricity supply authorities, and willing to undertake the responsibility for the effects then produced, as well as the responsibility for coping with criticism and requests from consumers.

These factors are taken into account in railway rating policies which are monopolies. If one cares to analyse the effects which have been produced as a result of those policies, I venture to suggest that they have produced adverse effects with the passage of time. The tragedy is that, once having developed a community on the basis of the application of these two factors, it is difficult to change their application without resulting hardship. Alteration may be prevented in such circumstances or have to be so minimised as to be almost ineffective.

A feature of these factors which is very important is the author's conclusion that discrimination, with apparent reference to these two factors, enables supply authorities to finance some of their development from funds contributed by the consumer instead of from a nation's limited loan funds.

This aspect of providing capital funds from revenue has been the subject of very serious study by economists for a considerable time. It has been proven that, for healthy development, it is necessary that expansion be financed to a considerable extent from "personal savings". In fact all development is actually financed in this way because, if there were no

"savings", no development could occur — no money being available for the purpose.

In general, it appears advisable that each section of industry etc., should acquire at least a portion of its future capital funds from savings it is able to achieve itself, rather than increase savings elsewhere as a result of its activities. The latter savings then accumulate elsewhere and it is not wise to rely upon drawing from such accumulated savings (in the form of loans from exterior sources) when such funds are necessary. It also seems evident that it is not desirable that all expansion projects should be financed entirely from the particular expanding industry's own savings but rather that a pool of savings should remain available for general use.

Numerous articles have appeared on this subject and reference made to it in at least one United Kingdom White Paper and also in the reports of the Central Electricity Board of Great Britain.

I think it will suffice to mention a few. One is an article by Miss Barbara Ward which appeared in the Evening Post of the 14th May, 1960, where she proves conclusively the need for savings to be used in a development programme. Spottiswood of the International Bank for Reconstruction and Development in a paper which he delivered during the World Power Conference in June, 1960, also stresses the advisability of financing capital extensions to some extent from savings.

He stated that in the case of "investor-owned" power companies, which comprised 76% of the generating facilities, about 35% of their capital expenditure was financed through depreciation, reserves, and retained earnings in the form of "self-financing". This system receives rather more than his approval and the indication is that it might be a pre-requisite to borrowing. He also mentions that it is surprising how small is the increase (in revenue) that is required to provide from 20% to 50% of forward capital expenditure.

The White Paper, under the heading the Financial and Economic Obligations of the Nationalised Industries, to which I referred, which was printed in April 1961, also draws attention to this necessity and recommends that in addition to meeting other costs, provision should also be made from revenue for an amount to cover the excess of depreciation calculated on replacement cost over depreciation calculated on historic cost. This is in addition to a recommendation for adequate allocations to general reserves which will be available *inter alia* as a contribution towards capital development and as a safeguard against premature obsolescence and similar contingency.

In short it is clearly recommended that a profit should be made by Electricity Undertakings, that profit being reserved for the purpose I have mentioned. When profits are made, then there seems to be considerable justification for obtaining those profits from the sources most able to furnish them.

As regards the stimulus to improve utilization, we have already suffered from the application of this principle in order to develop the loads of water heating and electrical cooking.

It is obvious that the aim of every electricity supply authority should be to provide some stimulus to utilization but the stimuli adopted must follow from a very careful study of probable ultimate repercussions.

If one stimulated the use for a given purpose, it would be unfair, if not morally wrong, to create the desire and the

market knowing full well that an increase in price of appreciable proportions will become necessary if the consumers reaction to the stimulus is substantial. After all, substantial reaction is always what is required, otherwise the proposition is of minor significance.

The author has apparently expressed his views in these connections with due regard to the vital necessity for expanding the sales in the Federation on the grounds of the available capacity from Kariba, the cost of which is apparently to be carried by the actual load presently supplied. The author points out that there will be a considerable surplus of capacity for the next few years and, in such circumstances, one can understand the necessity for a stimulus to be applied. The lowest tariff which could be applied effectively for the purpose without risk of future repercussions would appear to be a tariff based upon the costs likely to result after absorbing that surplus capacity, the cost then being averaged over the total load supplied which produces that condition. Any lower tariff would be embarrassing in the event of extension becoming necessary due to the stimulated development of load.

I was very pleased to hear that the author is strongly in favour of cost analysis. In the absence of reasonably accurate cost analysis, approximations may be dangerous because they may not be beneficial in the long run, and only as the result of experience of the application of such approximations can it be determined whether or not they fall below true costs.

However, I disagree with the author in his suggestion that having calculated the costs on preferably more than one basis, the Undertakings and regulating authorities should remember the three principles outlined as (a), (b) and (c) viz. ability to pay; value of services; and provision of stimulus. To my mind it is not for the undertaking but for the regulating authority to assume such responsibilities.

The crux of the problem rests in the statement that discrimination is not an evil but something to be recommended provided it does not go too far — the sting is in the tail.

Having had the benefit of reading all the papers for presentation during this Convention, it is now evident that this Convention will be regarded as one dealing extensively with an evaluation of demand related costs in tariff application and also with the problem of self-finance. The author is therefore to be congratulated on covering this extensive field very effectively in his paper.

In conclusion, with apologies for having gone to such great lengths myself, on a subject which is, however, very important, I have very great pleasure in congratulating the author on his exposition of the problem, which is a very valuable contribution to the proceedings of this Association, and in proposing a very hearty vote of thanks to the Author.

THE PRESIDENT: Thank you very much, Mr. Milton, for your searching contribution.

I call on Mr. Jackson of Cape Town to second the vote of thanks.

Mr. A. JACKSON (Cape Town): Mr. President, Mr. West, ladies and gentlemen,

"There are nine and sixty ways in which the user pays And every single one of them is right."

It is close on a quarter of a century since Mr. Bolton said this, and although in the United Kingdom, the country of its

origin, much has been done to standardise and simplify tariffs, in Southern Africa, at least, the theory and practice of tariffs and tariff design remains a never-failing source of controversy.

We are indebted to Mr. West for his paper and for the outlook which he, as an economist, has brought to bear on the subject of electricity costs and tariffs, and particularly for the presentation which he as a humourist has given us here this morning.

In terms of the Electric Power Ordinance the controlling authority for Municipal Electricity Undertakings in the Cape Province is the Administrator, whose approval must be obtained to the tariffs of all Municipal Electricity Undertakings in the Province, with the exception only of Cape Town.

As you know, Mr. President, it was for a number of years one of my duties to advise the Administration in regard to the electricity tariffs of local authorities. At the Convention in Johannesburg in 1959 I enunciated the four guiding principles used by the Administration when considering tariffs and the tariff proposals of local authorities. To me these principles are absolutely cardinal in the design and application of tariffs, and I would like, if I may, with your permission to review certain points of Mr. West's paper in the light of these principles, without, I hope, repeating too much of what has been said by Mr. Milton and in other papers.

The first of these principles is that the tariff must be financially sound, i.e., that the total annual revenue should balance the total annual expenditure, or as Mr. West put it, that each undertaking should pay its own way.

The second principle is that the tariff must be equitable. That is to say that there should be no undue discrimination between consumers or between consumer groups or classes. If this were not so some consumers would be subsidised at the expense of others, and one would be faced with the very onerous task of deciding which consumers or consumer groups should be subsidised and which should be levied.

Mr. President, I would say that during the period that I was associated with a regulating authority I found examples of consumers in every conceivable group who considered that they were being overcharged. Electricity supply is a monopoly, and it is an essential public service. If a policy of discrimination is permitted, and there is no clearly laid down legislative policy, as to how it shall be practised, I think that not even the judgment of a Solomon could decide which consumers should be discriminated against, without incurring resentment and objections from them. With a price policy based on equity, however, the talents of judgment required are but those of normal mortals to determine at what stage discrimination ceases to be reasonable and becomes undue; and the resentment of any consumers may be reasonably met if they can be satisfied that the tariff is designed to be equitable and without undue discrimination.

As to how a tariff can be designed on the basis that it should be equitable and show no undue discrimination, I would like to return to in a few minutes.

The third fundamental principle of tariff design is that the tariff should promote the economic development of the undertaking. The reason being that this is an essential service which should be made available as widely as possible and at as low an economic price as possible.

The fourth principle is that of simplicity. This principle, however, should be qualified because there is likely to be a conflict between it and the second and third principles. Nevertheless, the tariff should be as simple as is practicable, and it should be easily understood and administered.

Mr. President, I would like now to return to the question of discrimination and the principle of equitableness.

If the tariff is to show no undue discrimination the revenue derived from each consumer group or consumer should recover the actual cost of supply to that consumer group or consumer. I qualify this by adding the words "in so far as is reasonably practicable." Mr. West has extensively discussed this problem of accurately relating the price charged to the actual cost of supply, and he concludes that it does not permit of a precise solution. I am afraid that I cannot disagree with him! But, even if there is no precise solution, there is a range of solutions, the range may be broad or narrow, but there is what one may term a probability curve of acceptable solutions, beyond which a solution is no longer acceptable and discrimination becomes undue. It is at this stage that tariff design ceases to be purely scientific and becomes an art, and it is particularly here that a judicious exercise of judgment, and, as Mr. Milton has mentioned, of experience, is required to best satisfy the further principles of promoting the further economic development of the undertaking, and of simplicity.

It is at this stage also that the policy of charging what the traffic will bear "rears its head" — whether it is an ugly head or a beautiful head, will depend on the point of view.

It is in my view, reasonable to regard all consumer groups and all consumers as inter-dependent on each other, and it is, Mr. President, a coincidence that where electricity is consumed for a purpose which has a high use-value to the consumer, such as for example for normal lighting, a high price can usually be justified by this inter-dependence, and such cost-allocation characteristics as load and diversity factors. In municipal undertakings tariff designers generally seem to take full advantage of this coincidence to apply the policy of charging what the traffic will bear.

One task of a regulating authority, within the framework of the principles I have mentioned, is thus to ensure that excessive advantage is not taken of this coincidence and that discrimination is kept within limits that can be shown to be justifiable by reasonable methods of allocating costs.

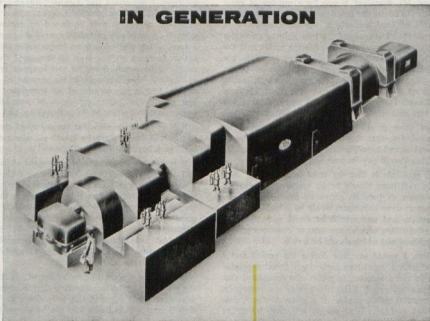
Generally, as Mr. West says, fixed costs are closely related to installed capacity and thus to peak load, but this is not always the case. Particularly where undertakings with low fixed costs and high running costs change to high fixed cost and low running cost undertakings can this situation arise. Where for example, a small undertaking with diesel generation becomes connected to a large system such as Escom and it must meet the high capital costs of a transmission line, its fixed costs may be substantially independent of peak load, up to a point. A similar condition arises where an undertaking has a considerable surplus of capacity, and an analogous position appears to exist at present in the Federation with a surplus of high fixed cost, low running cost power available from Kariba.

In circumstances such as these, the difficulties of "correct" tariff design and cost allocation are aggravated by the predominant importance of the third principle, viz. that of

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promoting economic development, but this can and surely should be done without sacrificing the principle of equitableness.

It would be interesting to learn how the Federation approaches this problem. Is a uniform demand rate applied to bulk consumers, or is there a step rate with a lower incremental price. If there is a lower incremental price, does it commence at different points for different consumers? In simplest form, if a price of say, £2 per kw is necessary to recover costs at the existing level of demand, and this figure reduces to say £1 per kw with future increased demand, is there a step in the rate from approximately £2 per kw to approximately £1 per kw, and, if there is, does the amount of demand at which the lower price is introduced vary for different consumers? Alternatively, is there a uniform rate of say approximately £2 per kw? Further, in assessing the allocation of costs, does the Federation take into consideration the cost to consumers under pre-Kariba conditions. Should this not be done, and if done would this be tariff making on the basis of what the traffic will bear, or on the basis that this is an equitable way to allocate costs? The subject Mr. President, is a fascinating one, and opens up a most intriguing vista for investigation. It could surely form the subject of a paper in itself. These points illustrate some of the problems encountered in the application of principles to practical tariff design.

When you did me the honour of inviting me to second this vote of thanks, Mr. President, I read first the conclusion to Mr. West's paper. I find that with the exception of detective stories and thrillers, and particularly with reports on tariffs, it often pays to start at the wrong end, but in this instance I may say I was dumbfounded. How had Mr. West arrived at this, to me extraordinary, conclusion that discrimination should be advocated in tariff design? On further study of his paper, however, and on hearing it presented this morning, I was relieved to find the clearly set out views in the first paragraph of his conclusion, the second last paragraph of the paper.

On discrimination itself I have commented already. May I briefly consider the conclusion that it is discrimination which enables an undertaking to make a so-called profit which can be used to finance further development? To my mind, this does not follow at all. I would suggest that this so-called profit, or savings, should be allowed for in the first instance as an allocation to a reserve or similar fund for the generation of capital, and as such that it should be included in the estimates of annual expenditure. It becomes then part of the normal overhead costs included in the total annual expenditure, which must be met by annual revenue, and it is then for the tariff designer to determine how these costs should be allocated in accordance with the four principles that I have mentioned.

I would have liked to show some graphs which illustrate the low elasticity of demand of consumers as a whole on electricity supply undertakings, and of the effect of tariff increases, but unfortunately we do not have the facilities available here. It will suffice, therefore, to mention the salient points of these. In Graaff-Reinet, for example, a very drastic tariff increase of 50% in 1956 produced a downward trend of sales for two years. It took a further two years to regain 1956 conditions. In other, similar sized, undertakings, very drastic tariff changes have also influenced sales. In the case of larger undertakings with lower cost, however, tariff increases of as much as 33%

have shown no appreciable effect on sales growth. For example a 33% increase in Port Elizabeth in 1954, and a 15%, increased to 33%, increase in Paarl in 1952/3 showed no significant effect on sales at all.

Mr. President, my remarks have mainly been centred on a particular theme. Mr. West's paper bristles with other points of stimulating interest, and many of these have been capably dealt with by Mr. Milton. This paper is one of vital interest both to Engineer and to Councillor Members, and it has been presented in a manner that really does call "a spade a spade", and puts across the points in what is perhaps the most effective method—the method of entertainment.

It is with the very greatest of pleasure that I second Mr. Milton's vote of thanks to Mr. West. Thank you very much, Mr. West. (Applause.)

THE PRESIDENT. Thank you Mr. Jackson.

Gentlemen, it has already been said by Mr. West, and I think we all agree that Prof. Smith's paper and Mr. West's paper are complementary in a sense, and in other senses they overlap. Prof. Smith, unfortunately, has had to return to Grahamstown, and anybody contributing to the discussion will have their remarks forwarded to him for a written answer.

However, I now open to the Convention the discussions on Mr. West's paper, and Prof. Smith's paper.

Mr. G. R. PETERSON (Salisbury): This must be a room full of practical tariff makers, and I would like to speak both about Prof. Smith's paper and about Mr. West's paper.

We have had the advantage of having two expert economists look at one sphere of our work. Now one thing which interested me, particularly in Mr. West's paper, was his references to a number of quotations, some of which went back quite a long way in history, and I would like to go back a little further and give you a mis-quotation which you can put right, if you know my native country better than I do.

"God gie us grace to see oursel's as others see us".

These economists have certainly seen us in a very extraordinary light. Do we really involve ourselves in such appalling complexities in trying to determine equitable electricity tariffs?

For instance, in the famous list of 9 forms which the E.R.A. gave I find one called the "laurel" form of tariff; has anybody ever seriously applied that? I don't know what would happen here in East London if a consumer went down to the Electricity Showrooms and asked how he was going to be charged and was told that he would be charged on the basis of the use of each set at each hour in terms of energy. I don't think he'd have the slightest idea of what that meant. I haven't the slightest idea what it means!

Have we not, perhaps, got lost in an obsession to try to determine first precisely what are true costs? And having done that, to try to apportion those true costs fairly between the consumers?

I think one can go very much too far down that road. To start off with, how do you determine what true costs are. What do you include in your costs? And what costs are you talking about, Are you talking about marginal costs, or are you talking about average costs? Should your costs include for a measure of self-financing? (A point mentioned by Prof. Smith yesterday.) In my view it is perfectly right and proper

that they should, and in the Federal Power Board we are under an obligation to provide for 50% of self-financing.

Should they provide for any contribution to rates? This is a subject on which I am not quite so keen, but it is not one which affects me directly — but there are many who do feel that costs should be taken to include a contribution to rates.

Then what about depreciation? What depreciation policy are you to follow in determining your "true" costs? Is your depreciation to be based upon historical cost, or replacement cost?

I mention these factors to show that it is extremely difficult even to determine what the "true" costs are, and when you have got the "true" costs (if you ever have), you have then got the problem of apportioning those "true" costs in what you consider to be a fair manner between your various customers, which is a formidable task.

I really wonder sometimes whether we don't get ourselves unreasonably involved in all these sorts of complexities. Does the grocer retire to his bedroom at night and work out, in great detail, what the cost of apples is to him, and having worked that out, does he then work out a tariff for the sale of apples to the consumer in an absolutely fair way? I suggest he doesn't. He just looks at his apples and says, "I think those'll fetch 2/6 a pound" and he marks them 2/6 and that's that!

I don't want to elaborate that theme more seriously, but I think you get the point. You can go too far in attempting to determine precisely a thing which is not susceptible of precise determination.

There are many other things I could speak about on Mr. West's paper. I'd like, incidentally, to take this opportunity of congratulating him on the presentation of the paper, which I thought was amusing, excellent, and brief.

There is however one small point which I would like to mention, because I think he may be misleading some of my consumers! He says in the Federation, as there is a considerable surplus capacity for the next few years, it is difficult to see any immediate need for improvement of load, power, or diversity factors.

Well, there is a need in certain cases to pay some attention to Power Factor, The Receiving end Power Factor of some of our long lines is, in fact, a significant matter, but this is not a technical paper so I won't elaborate that.

On the question of Load Factor, there is a possibility of misunderstanding here. There is an advantage in obtaining a higher Load Factor in the Federation, because the higher the Load Factor we can obtain, the higher the proportion of energy which we can obtain from Kariba, whose incremental cost is almost zero.

There is also the point that a Supply Undertaking has to plan its plant extensions "several years" in advance, so the fact that it has surplus capacity for "several years" does not mean that it is not an advantage if by improved Load Factor the expected peak demand for which provision must be made at the end of those "several years" can be confidently reduced.

THE PRESIDENT: Thank you Mr. Peterson.

Mr. J. BERRY (Johannesburg): I would, in the first instance, Mr. President, like to thank your Executive Committee for the courtesy in inviting me, a person who is now

no longer associated with the industry in any way whatsoever, to be with you at this Convention.

Mr. President, ladies and gentlemen: I would like to congratulate your Executive Committee — in including in your programme this year the paper that was given by Prof. Smith, and I would like to congratulate Prof. Smith on the paper he presented. The very scope of that paper indicated the complexity of the problem, and I do hope that Councillor Members will pay great heed to what appears in it because Councillor Members are those who are principally concerned with the cost of Electricity Undertakings in this country, after, of course, E.S.C.O.M. and in this regard I would suggest that when they get back to their homes they ask whatever responsible official in the council is concerned to buy for them, for their study, a copy of Parkinson's "The Law and the Profits". I suggest a study of that is probably more valuable than most of the books on economics that you may read.

I will tell you what the first sentence says: "Expenditure will rise to meet income. That is Parkinson's second law!"

Engineer members are usually more concerned in the quality of their undertaking, and often they pay more attention to that without due regard to costs.

I would like to make some comment on the financing and costs which are referred to on Page 28 of the Programme. I suggest that probably one of the words here is incorrect. In the paper it said, "Ideally, a public utility undertaking, after meeting its current operating costs, and providing for depreciation, the creation of reserve funds, and the servicing of loans and sinking funds, should have no surplus remaining."

I should be a little surprised if it had to provide for all those: surely you don't have to retire a loan and at the same time have a depreciation fund and a reserve fund. I just raise that point.

But in this connection I would plead with all you gentlemen who are concerned with the prices you charge for the services you render, not to deal with this problem as a matter that can be isolated from the rest of our economy. And in this connection, Mr. President, there is a difference between the conditions for our friends in the Federation, and the conditions in the Republic. We have an economic situation in the Republic which, I suggest, doesn't exist anywhere else in the world. At the present time, and for some considerable time ahead, we are to a considerable extent, dependent on our gold mining industry, and anyone who is concerned with costs in this country, and the prices charged for services, should pay due regard to that factor. I would ask every Councillor Member here to get a copy of the Gold Mining Taxation Report of December 1945. (It may be difficult to get that, but find someone who will give you copies of paragraphs 5, 8, 9, and 22). In that report it tells that since mining is of considerable importance to this country, the costs of mining give us what the report calls "a valuable measuring rod of policy". And it points out that if we disregard that factor we shall die it to our detriment.

Now this bears on the question of self-financing. What a private firm may do cannot be regarded in the light of the proper functions of a supply undertaking in this regard. If you are going to go in for a policy of self-financing it means that this generation is providing the capital for development for

posterity. While there may be considerable merit in that form of financing in other countries, in this country, I suggest, it is dangerous for this reason: the gold mines are being worked today. If you increase the charges for power and other essential services, greater than is necessary for today's needs, it means that the costs of mining will be increased and gold mines will close down when there is still gold in the ground which could have been worked if your costs had been less. Therefore, you are not helping posterity by making the provision now.

You should go on to the market for funds in future years. This does not mean that your financial arrangement should not be such as to cover all the requirements of keeping the undertaking in a satisfactory condition.

But I do suggest that the problem in this country, in the Republic, is totally different from the problem in perhaps any other country in the world.

In this regard, the question will be that you must calculate the costs of having possibly to pay a higher rate of interest at some future date with the cost to the industrial activity in this country by charging more than is necessary at this time, and in determining this, I suggest with due respect, you take into account one thing and one thing only, and that is the public interest as defined in our Monopoly Legislation. With regard to the mention which Prof. Smith makes of surpluses which arise usually being taken for the relief of rates, in South Africa that is one of the most harmful things that could happen to our economy. It has been said here that the ratepayers are entitled to something comparable to the reward of the entrepreneur, but considering what our gold mining industry means to us, (and if you read that report you will realise the danger of following this policy), then any municipalisation that follows such a policy is, to quote the words of that report, "sacrificing this country's patrimony".

In Prof. Smith's paper he mentioned that one of the advantages of a centralised authority is to have a common tariff. Here again this is one of these things which creep in, in countries like ours which claim to be a capitalist country and practice totalitarian methods. This is a form of subsidising one section of the community to the detriment of another.

Examine the position, if you allow one section of the community to pay a lower rate for its power than that power is actually costing to deliver there, you are not only disturbing the comparative advantage of other parts of the country (because those costs have to be paid by somebody), but I suggest you will put up the price of land in another part of the country which will, in the long term, negative that advantage you have given.

And we in the Republic (and I can't say anything about the Federation, because their conditions are different from ours), must take heed of what is happening in Europe. If the European economic community is a success, it will be necessary for us, in South Africa, to carefully review the costs of all our productive activity, because the European economic community may be the end of economic nationalism. It may mean that goods and services will be produced at the point where you have the comparative advantage, and though we may not be members of it, though we may never be able

to be members of it, if we wish to trade with it, we will have to follow similar policies.

In this paper, (and I want to make it quite clear Mr. President, I am not, and I am sure Prof. Smith was not saying this had happened, — he merely mentions it and we must accept it as a possibility—) speaking of the disadvantages of a Centralised Authority he said it could become "the tool of political interests to a much greater extent than a number of smaller undertakings". And if there is ever a possibility in South Africa of these several undertakings being put under one Central Authority it would, I presume, require amendment to legislation, and if that ever should come, might I suggest that the Act be also amended to ensure that the controlling authority, whatever it may be, is appointed in such a way that political influence can't enter into the appointment in any way whatsoever. You may wonder how this can be done; I would refer you to Section 1 of the London Passenger Transport Board Act. There a public authority was established, it was under government control, but the government did not make the appointments to that authority. And I suggest we in South Africa should give attention to that method, particularly since boards in this country seem to spring up like mushrooms after rain!

And here, if I may (and I hope Mr. Milton will not take this amiss) refer to a comment he made which I thought was unfortunate. He spoke of objectionable forms of monopoly. If there are objections in monopoly, all monopolies are objectionable. Monopolies in public utilities, in telephone systems, railways, power systems, are accepted because they are inevitable for technical reasons, but they are operated by human beings, and we are all alike — we are all subject to the same capacity for greatness, and, of course, the same capacity for doing the wrong things, — and once a person has the power, if he is not subject to some control, he will use it in some way that isn't to the benefit of the public interest as defined in the Monopoly Act.

There are three other small points in Prof. Smith's paper to which I would like to refer. He mentions that one of the advantages in a Centralised Authority is that it is able to do research which will be much more useful.

I suggest there could not be any statement (and I am referring now to research in plant) that has greater dangers in it. Research should always be of a competitive nature.

For that reason the research that takes place, or the major part of it, with regard to plant, I suggest, should be left with private manufacturers.

If you don't have competition in research you are not going to get the best results. And speaking from a little knowledge of research work, you should never have a system where the person who has the power to say what plant shall be used shall be responsible for the design of that plant. We are all naturally vain. We all feel that something we may have designed, or made, whether it is a circuit, whether it is some form of plant, even if it's a child, we think it's the best in the world — and therefore, if the person who has designed a thing has the choice to say which thing shall be used, there is a tendency to choose his own design and that may not necessarily be in the public interest.

I would like to ask Prof. Smith what he means when he speaks of a "normal profit", because I think we may hear something of this tonight. I don't know what a "normal profit" is. Someone told me yesterday it was a "reasonable" profit. I don't even know what a "reasonable" profit is. In a competitive market, the market determines the price, and the most efficient producer is the man whose costs are the lowest, so the most efficient person in a competitive enterprise is the man who makes the greatest profit. I hope you will never take that reward away from efficiency.

There is just one thing — on this question of profit, — it must be understood that in a public utility like the power systems, like our railways, like the post office telephone service, your organisations, if I may say so, don't make profits. What you do is, you have the power to charge more than the costs, and since you have the power to make that charge, it is a form of taxation.

I was a little surprised to hear mention of charging what the traffic will bear. Charging what the traffic will bear, I suggest, is perfectly legitimate in a competitive enterprise, but when it isn't a competitive enterprise, I think you will admit it is a form of taxation.

Might I suggest another very small matter where you can or may be able to get the benefits of rationalisation in one of your activities. I refer to cable laying. Not only by the power industry but also by the telephone industry. I suggest, when a large number of individual units have their own plant to do these major cable laying works, it must necessarily result in a certain amount of plant being idle at any given time. If this work were let out to private contractors, I suggest it could be done at lower costs, and not only lower costs to the authorities concerned, but lower costs to the country as a whole, which means that there will be less capital invested in that plant.

Thank you very much, Mr. President.

*EXTRACTS FROM THE REPORT OF THE
COMMITTEE ON GOLD MINING TAXATION 1946.*

"5. In view of the large proportion of its natural endowment in the form of minerals and the relative poverty of the surface, a correct policy in regard to the development of mineral resources is of greater importance to the Union of South Africa than to any other country in the whole world. A wrong policy — a policy which fails to make the most economic use of mineral resources — can be more fatal to the long-range interests of the Union than of any other country. In following such a policy the Union can dissipate its patrimony, much as a spendthrift son lives on the hard-earned capital bequeathed to him by a frugal father, till none is left."

"8. We would, however, emphasise as strongly as we can that any action which depresses gold deposits below the pay limit deprives the country of part of its natural assets, reduces its capacity for employment and has the same effect as living on capital. In our opinion not sufficient attention has been devoted in the past to this valuable measuring rod of the soundness of policy. The very existence of this fairly accurate index is an asset; an asset for the guiding of public affairs which few other countries possess."

"9. We are therefore of opinion —

(a) that, wherever possible, taxes which increase costs should be repealed and where it is necessary to recover the same amount of revenue, this should be raised from taxes falling on profits;

(b) that in considering other matters of public policy where there is a free choice between burdening costs and achieving the desired result by other means, the Government should bear in mind that every increase in cost is tantamount to throwing away part of the country's patrimony;

(c) that inasmuch as the working of marginal ore calls for a very fine balancing of income and cost a permanent feature of the fiscal policy should be that the full value of the product is paid to the mines."

"22. All expenses entering into the cost of producing gold have therefore an exceptional public importance in South Africa. To the extent that they are necessary and unavoidable costs they must be accepted as the price of the product. One cannot make an omelette without breaking eggs. To the extent they harm the broader national interest."

LONDON PASSENGER TRANSPORT ACT 1933

Section 1:

(1) For the purposes of this Act there shall, as soon as may be after the passing of this Act, be established a public authority to be called the London Passenger Transport Board, consisting of a Chairman and six other members from time to time appointed by a body (in this Act referred to as the Appointing Trustees) consisting of the following persons:—

The Chairman of the London County Council

A representative of the Advisory Committee as hereinafter defined

The Chairman of the Committee of the London Clearing Bankers

President of the Law Society

President of the Institute of Chartered Accountants in England and Wales and

In the case of appointments to fill vacancies in the Board at any time after the first constitution of the Board, the Chairman of the Board or some other member of the Board nominated by the Board for the purpose.

The appointments to be made by the Appointing Trustees shall be made after consultations with such persons as they may think fit.

(2) The Chairman and other members of the Board shall be persons who have had wide experience and have shown capacity in transport, industrial, commercial or financial matters or in the conduct of public affairs, and in the case of two members shall be persons who have had not less than six years experience in local government within the London Passenger Transport Area.

(3) A member of the Commons House of Parliament shall be disqualified from being appointed or being a member of the Board.

(4) A member of the Board shall hold office for such term not less than 3 years nor longer than 7 years as the Appointing

Trustees may determine at the time of his appointment: provided that a member may resign his office by notice in writing under his hand given to the Minister of Transport.

(5) Where any member of the Board is absent from the meetings of the Board for more than six months consecutively, except for some reason approved by the Minister or becomes disqualified for being such a member or becomes bankrupt or makes a composition or arrangement with his creditors the Minister shall forthwith declare the office to be vacant and shall notify the fact in such manner as he thinks fit, and thereupon the office shall become vacant.

(6) The Minister after consultation with the Appointing Trustees may remove any member of the Board from his office for inability and misbehaviour.

(7) A member on vacating his office at the expiration of the term thereof shall be eligible for re-appointment.

(8) Subject to the provisions of this section the provisions contained in the first schedule to this Act shall have effect with regard to the constitution and proceedings of the Appointing Trustees.

Section 107:

"Advisory Committee" is defined in this Section as "The London and Home Counties Traffic Advisory Committee as constituted from time to time under the London Traffic Act 1924 as amended by this Act".

The first schedule

This contains:—

- (1) Details regarding the appointment of the representative of the advisory committee
- (2) The means of convening a first meeting of the Appointing Trustees
- (3) Provisions re Chairman
- (4) Voting rights — simple majority, Chairman casting vote
- (5) Quorum 3
- (6) Minutes to be conclusive
- (7) Otherwise Appointing Trustees to regulate their own procedure
- (8) No act or proceeding to be questioned on grounds of invalidity of any Appointing Trustee's appointment.

THE PRESIDENT: Thank you Mr. Berry.

Could we have another contribution before we adjourn?

Mr. C. E. R. LANGFORD (Johannesburg): I'll try and keep this as short as possible. I would like to comment on Mr. West's paper. He is to be congratulated on this paper which contains a great deal of "food for thought". The question of tariffs is always one that is sure to give rise to discussion. But it is almost certain that the deeper the subject is investigated the more academic it becomes. As Mr. West himself says in his paper, — "it may be concluded that any attempts to charge consumers precisely the cost of supplying them does not permit of an unequivocal solution".

I am a little surprised that Mr. West did not make any reference to the two different categories of suppliers, since both Rhodesia and this country do have the "setup" where there is a large generating authority as well as local authori-

ties, buying in bulk and distributing, i.e. the wholesaler and the retailer.

Although the basic problem is the same, — i.e. the costs are X, what is to be done to obtain X + a little — the approach to tariff formulation is not necessarily the same. I venture to say that the case of the local authority (and that applies to most of the members of this Association) is the more complex.

In my view the multitudinous theories of allocation and responsibility are virtually impossible to apply in practice, and the Engineer is brought back to the fundamentals of the problem as summed up by Mr. West (a) the value of service, (b) the ability to pay, and (c) stimulus to improve utilisation. To which I would add (d) simplicity of application.

These headings are deserving of some analysis, and I venture to advance some thoughts on them which possibly are not altogether what Mr. West had in mind, and I think are particularly applicable to municipal undertakings.

Firstly the value of service could be taken to apply to the domestic consumer. In a town or city electricity today is more than a utility, it is virtually an indispensable part of his way of life. Power should therefore be made available continuously, and as cheaply as possible, to this class of consumer, bearing in mind the overall costs involved.

The implementation of keeping these costs to a minimum is the proof of a good engineer.

The second category, the ability to pay, should, to my mind, be taken to apply to the business or small industrial consumer. To him electricity is part of his stock in trade; it helps him in the execution of his business, and it goes down as part of his working costs. It is this section of the consuming public to which the engineer should look to making any profit that is required by his department.

Then there is the third category, which is the stimulus to improved utilisation, and this I think might have a wider application in the municipal picture than that of merely improving sales. This is the encouragement of large industrial consumers. The large industrialist generally is an asset to the municipality. He provides employment for a large number of people, but most important of all he brings revenue to the community from outside. In this way he increases the wealth of the municipality and is a stimulus to the community. On these grounds the Electrical Engineer should do everything possible to attract the large consumer by offering electricity at the lowest possible cost, and here, by judicious use of diversity, it might even be possible to offer a suitable industrialist, a tariff that is lower than that of the supply authority from whom the municipality is buying it.

These three basic principles combined with a tariff that is simple and easy to apply should, in my opinion, form the fundamental approach to the problem. It is when one tries to go into the detailed analysis of apportioning costs that simplicity disappears. The pitfall here is that complicated tariffs set the unproductive treasury costs "skyrocketing", and before one knows what is happening the application and administration costs have far outrun any possible consumer benefits.

Only a day or two ago I heard of one undertaking where, in a matter of just a few years, the Treasury Departmental

costs to the Electricity Department had trebled.

There is no doubt that two objectives should always be in the Engineer's mind — an efficient supply and an economical one.

The first is not difficult on its own. The complication comes with the second. The question of efficiency really comes within the scope of other papers being considered at this Convention, and I would just conclude by saying that the only safeguard that the consumers have in the achievement of these two objectives is the publishing annually of full and detailed particulars, both technical and financial, of the complete operation of the undertaking, because if these are not

available, publicly, the consumers themselves can never be sure that they are getting a square deal.

THE PRESIDENT: Thank you very much, Mr. Langford.

CONVENTION ADJOURNED FOR LUNCH

On resuming at 2.30 p.m.:

THE PRESIDENT: Gentlemen, will you kindly take your seats?

I have very great pleasure in calling upon Mr. Y. E. O. Barratt of Queenstown to read his paper, "The Development of a Power Station for an Isolated Community".

The Development of a Power Station for an Isolated Community

by

Y. E. O. BARRATT,
Electrical Engineer, Queenstown.

1.0. Queenstown celebrated its centenary in 1953 and by then had grown to a town with a total population of 26,788, of whom 9,017 were whites. It is situated in the heart of the Border, remote from comparable or larger towns, for East London lies about 138 miles by road to the south, Aliwal North 101 miles to the north, Cradock 89 miles to the west and Umtata 147 miles to the east.

1.1. The Municipal Electric Light Scheme was inaugurated on 9th November, 1912. The late Mr. W. Bellad-Ellis had consulted for the scheme and, eventually became the town's first Electrical Engineer. Incidentally, he was a Foundation Member of this organisation and, at the first Congress of the Association of Municipal Electrical Engineers, held in Johannesburg from 15th to 20th November, 1915, read a Paper entitled "Diesel Engines and Liquid Fuels".

2.0. The original capacity of the Power Station was 100 K.W. D.C. with diesel prime-movers. There was also a battery to take care of the light night loads. A further 50 K.W. D.C. diesel-set was installed in 1915. This 150 K.W. was able to supply the needs of the town through the first World War period and on till 1921, when two steam-driven reciprocating engine/alternator sets of 75 K.W. each were installed. The supply to part of the town was now changed over to alternating current.

2.1. Early in 1925 it had become apparent that further extensions to the power plant would be required to keep abreast of the steadily increasing loads. It was ultimately decided to abandon diesels as prime-movers, to move the Power Station to a site where a siding was available, and to use steam-driven prime-movers.

2.2. On the 29th May, 1927, new plant was commissioned, at the new site and, on 9th September, 1927, the new Power Station was formally opened. The plant installed here consisted of two new 250 K.W. Belliss and Morcom reciprocating sets as well as two 75 K.W. Browett-Lindley sets transferred from the original Power Station, and two Babcock and Wilcox water-tube boilers with an evaporative capacity of 8,800 lbs./hr. each. The supply to the whole town was now on alternating current.

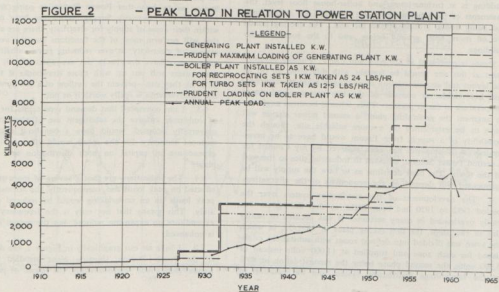
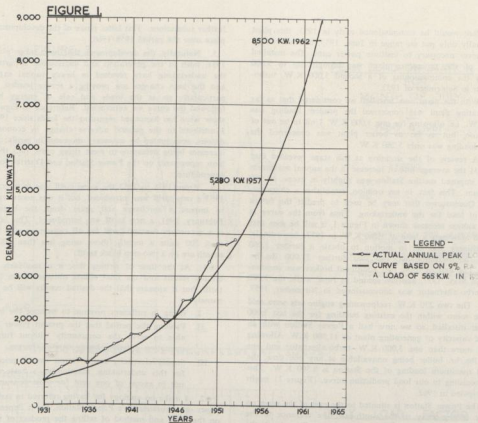
2.3. The history of any electricity undertaking serving a progressive town records continual expansion, so that, with Queenstown falling in this category, it was not long before it was necessary to add more generating plant to that already installed in the Power Station.

2.4. During 1932, two Belliss and Morcom turbo-alternators of a capacity of 1,250 K.W. each were installed, together with two Babcock and Wilcox boilers, and the two 75 K.W. Browett-Lindley sets were disposed of. The boiler plant now consisted of four Babcock and Wilcox water-tube boilers, of a total evaporative capacity of 44,000 lbs./hr. — the evaporative capacity of the two original boilers having been increased to 11,000 lbs./hr. each. These extensions were officially opened on 24th August, 1932; the installed generating plant capacity of the Station now being 3,000 K.W.

2.5. Plans were being made during 1938 for a further extension to be carried out in 1940, but this was delayed by the outbreak of World War II, and the necessary plant was not completed until 1943, when a 3,000 K.W. turbo-alternator, supplied by the British Thomson-Houston Company was commissioned in April. There had, however, been no increase in boiler plant.

2.6. With the continued progress and growth of the town, it became apparent that additional plant would be required in 1950 and, to that effect, preliminaries were started in 1948, when the Consulting Engineer's first report in this connection was presented.

2.7. Post-war difficulties, however, had resulted in longer delivery periods for heavy machinery and, in March, 1950, it became necessary through lack of boiler capacity to place restrictions on the installation of power consuming appliances, such as stoves, motors, etc., throughout the town, in an endeavour to obviate power cuts by keeping peak loads within the capacity of the plant available. In addition, to ease the situation, a Lancashire type boiler with an evaporative capacity of 8,000 lbs./hr., available ex stock in South Africa, was installed in a temporary position outside the boiler house, and commissioned by August, 1951. It was in operation until June, 1953, after which it was disposed of. These restrictions were lifted in November, 1952, for it was anticipated that additional



boiler plant would be commissioned early in 1953; this plant was actually only put on range in June, 1953, but fortunately it was never necessary to institute power cuts. The installed capacity of the generating plant was brought up to 9,000 K.W. by the commissioning of a second 3,000 K.W. turbo-alternator in September of 1953.

2.8. With the plant now installed we considered that as far as generating plant was concerned the prudent loading was 6,000 K.W., i.e. allowing for one 3,000 K.W. unit to be out of commission, but as far as boiler plant was concerned the prudent loading was only 5,280 K.W.

2.9. A review of the situation at this stage revealed that since 1931 the average rate of increase in the annual maximum demand imposed on the Station was slightly in excess of 9% per annum. This fact, in my opinion, establishes a characteristic of Queenstown that may be used to predict the future growth of load for the undertaking. Thus from the curve at 9% per annum increase shown in Figure 1, it will be seen that we could anticipate a load of 5,280 K.W. in 1957. Accordingly, the machinery was set in motion to obtain a further 3,000 K.W. turbo-alternator set and two further 22,000 lbs./hr. boilers. The first of these two additional boilers was commissioned in May, 1957, and the second in June, while the 3,000 K.W. turbo-alternator was commissioned in November, 1957.

2.10. The two 250 K.W. reciprocating engine sets were sold to make room within the existing building for the last 3,000 K.W. set installed, so we now had a Power Station with an installed capacity of generating plant of 11,500 K.W. Allowing for not more than one 3,000 K.W. turbo-alternator and one 22,000 lbs./hr. boiler being unavailable at any one time, the prudent maximum loading of the Station is 8,500 K.W. This load, according to our load prediction curve, (Figure 1) might be anticipated in 1962.

3. The Power Station is situated to the east of the town on a slope falling away to the south-east, the entrance to the building is at turbine-house and boiler-house floor level, the basements of both being hewn out of solid rock at this end, but being above ground at the far end. The cooling ponds are on more level ground below, and to the south, of the buildings.

Steam is generated at 220 p.s.i. and 630°F. Further development at this site would be fraught with difficulties as far as the layout and accommodation of additional plant is concerned, and inadvisable on account of the low pressure and steam temperature in use at present. Thus, when it becomes necessary to augment the generating plant, a second power station will have to be established on a more suitable site, though the possibility of a supply from Escom would have to be investigated. A 25-acre site has been reserved by my Council for a second Power Station, adjacent to industrial sites to the west of the town. The final decisions as to how the supply will be augmented will depend on the economies of the alternatives.

4. The development of the distribution system over the period 1932 to 1950 had been slight, so that the system was badly overloaded in many sections. It was decided to rectify this in two steps, the first taking place in 1951/52, in which the town was divided into defined zones with substations established for each zone and supplied at 11,000 volts instead of 3,300 volts; the second phase being the reconstruction of 80% of the low-voltage distribution system and the addition of

further substations. This latter phase of the development taking place over the period 1958/1960.

5. Naturally, the developments that have taken place since 1951, both in the generation and distribution departments of the undertaking have resulted in heavy capital expenditure and the loan charges are proving a severe burden. This is particularly so as the loads and sale of energy have not followed the curve we anticipated. Reference to Figure 5 will show what has happened regarding the loads since 1953. This I attribute to the general adverse change in economic conditions, accentuated by necessary increases in tariffs; the tariff increases being necessary to meet rising costs, plus the annual loan repayments on the Power Station and Distribution capital expenditure.

6. From 1938 to 1953 the same tariff was in operation. In 1953 a new tariff was introduced, but it was necessary in 1958 to impose a surcharge and again, from the beginning of February, 1961, a new tariff was introduced. This latter tariff is a maximum demand tariff for all consumers who use more than 200 units a month; those using less than 200 units a month are on a two-step block tariff.

6.1. At the time of writing this, it is too early to show all the results and the final effects obtained from this latest tariff, but it appears that the desired results will be obtained, namely —

I. Bring in sufficient revenue to balance the budget.

II. Prolong the period that the present Power Station is able to serve the community without further augmentation entailing heavy capital charges.

III. Supply electricity at the lowest overall price possible for this undertaking, maintaining a basic unit price not in excess of one cent for most consumers.

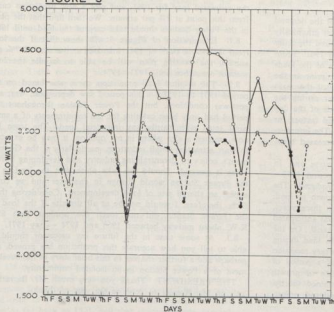
6.2. I make no apology for having referred to tariffs in this paper on a community's Power Station, for it depends largely on the price and method of selling the product of the Power Station as to how that Power Station is going to develop. Although the Electricity Supply Authorities have monopolies within their areas of supply for electricity, there are alternatives that will perform most of the functions that the average user expects of electricity, at ever reducing prices, albeit the alternatives may have drawbacks not encountered with electricity, many users will put up with those drawbacks if they can—or think they can—prevent the outflow of a few cents, whether the inconvenience is really worth it or not.

6.3. I am convinced that demand type tariffs for all classes of consumer enforced the intelligent use of electricity and; if universally adopted, would have a beneficial effect on our national economy, for the result would effect savings in the expenditure of capital on both distribution and generation plant.

6.4. The indications are that a saving of more than 20% is effected on peak loads and, consequently, the normal growth of peak loads on an undertaking would be reduced proportionately. This means that not only is the frequency of capital expenditure on expansion reduced, but the output of the asset is enhanced.

7.0. I have set out graphically in Figure 2, the development of the Power Station, showing plant installed against the annual peak loads. Unfortunately, the record of peak loads is

FIGURE 3



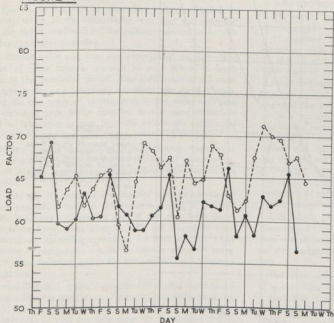
**PEAK LOAD ON STATION
FOR
MONTH OF JULY
IN
1960 & 1961**

LEGEND

1960 ———
1961 - - - - -

- HIGHEST LOAD FOR 24 HOURS IN EVENING.
- MORNING & EVENING PEAK LOADS IDENTICAL.
- HIGHEST LOAD FOR 24 HOURS IN MORNING.

FIGURE 4.



**DAILY LOAD FACTOR
AT
POWER STATION
FOR
MONTH OF JULY
1960 & 1961**

LEGEND

1960 ———
1961 - - - - -

	LOAD FACTOR FOR MONTH	AVERAGE DAILY LOAD FACTOR
1960	47.29%	61.28%
1961	57.91%	65.27%

only available from 1931. It will be seen that all the boiler plant was required to meet the peak loads of the years 1949 to 1953.

7.1. Two of the effects that the introduction of the demand tariffs have had on the Power Station are shown graphically in Figures 3 and 4. In the former, I have compared the daily peak loads for the month of July 1960, with July 1961. From this it will be seen that one of the characteristics of the loads on the station is undergoing a change, in that, prior to the introduction of the demand tariff, we experienced the main peak load of the day but once or twice a year during the evening, whereas now, the majority of peak loads of the day occur in the evening. In Figure 4, the daily load factors for the month of July in 1960 and 1961 are shown. The improvement shown is gratifying in that it shows the increased beneficial use of the plant on load.

8.0. Figure 5 is my latest load prediction curve and, in addition, it shows what has happened in the period 1953—1961, i.e. since my first prediction curve was produced. The years 1954 to 1956 followed the anticipated growth in load, but then the load fell away sharply for the next three years, recovering slightly in 1960. The fall-off in load during the years 1957, 1958, and 1959, were but a temporary recession and that the rise in 1960 was the beginning of a period of recovery which would have resulted in the rate of growth established during the preceding years being attained shortly, then from the time the demand tariff was introduced, adjust-

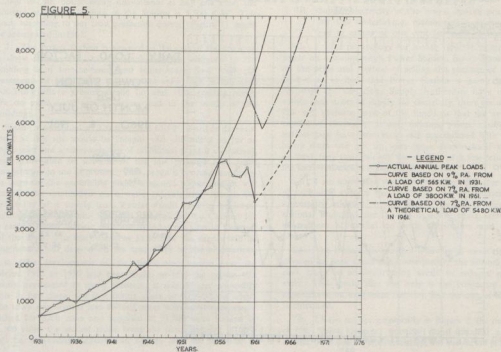
ments should be made to the original prediction curve, i.e. allow for a drop of 20% for predicted load for 1960 to obtain the estimated load for 1961, and plot a new prediction curve from this point at 7% per annum. We then find that the plant in the Power Station should take care of the load until 1968.

8.1. Examination of Figure 5 will show that if the load from the actual peak of 1961 increases at the rate of 7% per annum, the existing plant will be able to handle the load without assistance until 1973—1974.

8.2. The original load prediction curve was based on the period 1931 to 1953 — this period saw depression, war, and post-war conditions, but the Power Station throughout this period had only been catering for the requirements of a small rural town with hardly any industrial load. The town has now reached a size when, in my opinion, it may be expected to start attracting small industries, particularly if the Government's policy of decentralising industry and developing border areas is pursued. Should this take place then the loading on the Power Station would change in character and we could expect an altered rate of load development. Considering these facts, therefore, I would not be at all surprised if the load on the Power Station did not reach the prudent limit 8500 K.W. about midway between 1968 and 1974 — say 1971.

8.3. At some time in the future my successor should be able to tell you how accurate this prediction has proved, and perhaps add a further chapter to this brief story of the development of a Power Station in an isolated community.

THE PRESIDENT: Thank you very much Mr. Barratt. I call on Mr. Rossler to propose the vote of thanks.



Mr. W. ROSSLER (Kroonstad): Mr. President, ladies and gentlemen: I would like, on behalf of yourselves the members, and the visitors present, to congratulate Mr. Barratt on the paper he has just read to us.

At the outset, I may mention that the two towns, the author and I have the honour of serving, have a good deal in common. They were established at approximately the same time. In other words they have both celebrated their centenaries. Until recently we were both relatively isolated communities and were both approximately the same distance from larger cities, and we have very many characteristics which are much the same.

The author mentions that the municipal electric light scheme inaugurated in 1912, comprises diesel-driven direct current generators with a battery to take care of the night loads. In this regard, I think his council was fortunate. I am reminded of my first municipal appointment, where I served a town which had installed suction gas engines. The operation of these was not easy, and being a comparatively inexperienced engineer I can recall days when the mixture in the producer was altered which resulted in a series of such hefty detonations in the engine room that the uninitiated might have thought that the cylinder head of the engine and roof of the building were about to be blown off.

What struck me was that, despite the fact that Queenstown is only 138 miles from East London, and where the railgane on diesel fuel is very low in comparison with centres very much more remote from the coast, that the town council had already changed over to a partially coal fired station, used the local products as far back as 1921, and that it was already decided in 1925 to abandon the diesel engines.

In this regard it would be interesting to know whether in the early stages of the undertaking, any coal was obtained from the Indwe coalfields — the colliery referred to by His Worship the Mayor yesterday.

Mr. Barratt states that they also experienced the difficulties of lack of plant capacity peculiar to most towns in South Africa, at that particular period. The installation of a Lancashire type boiler as a temporary expedient was decided upon. Having the two types of boilers, namely the water tube and the Lancashire type boiler installed in the same station, it would be interesting to hear from the author the experiences relative to the two types for power generating purposes.

Were any detailed records kept of performance, reactions to rapid increment of loads, and particularly to coal consumption. It would be very interesting to hear further particulars in this connection.

Not only was the author's municipality progressive relative to steam generation, but it is noted that in regard to distribution, the bold step of changing part of the town from direct to alternating current was taken in 1921 and the whole town was placed on alternating current as far back as 1927 when most towns of comparable size in the country were still being served by direct current, and in the still smaller cases a battery for night loads.

It is observed, that, whilst a good deal of capital expenditure was incurred on the installation of steam raising and generating capacity, that the development of the distribution system over the period 1932 to 1950 has been slow. In the normal course

of procedure, I should regard it as prudent to develop distribution systems to the same extent by which generating capacity is being augmented. If additional electricity is generated, it should be distributed in an equally efficient manner.

It would be interesting to know from the author the lowest voltage value recorded during 1950 on the low tension side, most remote from the point of supply and, if possible, the mean and maximum range of variation in each zone.

In common with other Electricity Undertakings, the author's forecast of the increment has been too optimistic and the rate of growth has not followed the curve anticipated. This feature will, however, result in the postponement of the date where further capital expenditure is required. It is not an inherent defect in the method of forecasting over a long period.

The author states that for 15 years the same tariff applied. This in a rapidly developing undertaking, would seem to have been a very long time, as changing conditions require a revision of tariffs at very much more frequent intervals. He mentions that the new tariff is a maximum demand tariff. I would be interested to know, (a) whether this is a purely ampere-demand tariff or (b) what demand tariff for fixed charges and energy charges applies above, and if so what is this future?

Mr. President, we have heard so much in the last two papers of these terms that it would be interesting to hear facts of this nature.

I should further like to ask the author whether any other forms of control, such as frequency control, of load, or excess consumption meters, were examined, before the demand tariff was decided upon.

The results achieved and depicted in Fig. 3 and 4 are very illuminating.

The author appears optimistic about the possibility of attracting small industries. If I may state my modest opinion on this issue, I should like to utter a word of warning. We have been in this position, and on the very brink of getting the odd industry on a number of occasions in the past, but it has just proved the case of "there's many a slip twixt the cup and the lip". However sympathetically any government or local authority may view such a matter, the final say is still in the hands of "the man who pays the piper — he calls the tune" — and he is the entrepreneur. However, I hope the author and his council will be much more successful than our council and we have been in this regard.

Speaking on behalf of us smaller undertakings, Mr. President, let us have no illusions on the issue — it is certainly not easy to attract an industry to a small town, I can assure you.

Uiteindelik, in die punte beskrywe in die referaat moet die Queenstown se stadsraad geluk gewens word met hulle versienendheid waarin die elektrotegniesestadsingenieur, sy staf en die raadgewende ingenieurs seerseeker hulle deel bygedra het.

Ten slotte wil ek weer eens mnr. Barratt geluk wens met sy goeie lesing en dit is vir my 'n baie groot goeie namens u hom baie te bedank vir sy bedrag tot die verrigtinge, en ek vra u almal om op paslike wyse mnr. Barratt daarvoor te bedank.



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THE PRESIDENT: Thank you Mr. Rossler for your proposal to and vote of thanks. Now I will ask Mr. Gripper of Knysna to second the vote of thanks.

Mr. H. J. GRIPPER (Knysna): Mr. President, Mr. Barratt, gentlemen, my attention was drawn in the first place to part of Mr. Barratt's title — "an isolated community". We know of course that he means electrically isolated. This Association, from its very earliest days, has consisted first of all of engineers and then of Engineer and Councillor Members all drawn from comparatively small towns at today's standards, and every one of them was in a sense isolated, as is understood in this paper. Most of these towns started off with direct current supplies in the central area. Later they developed an alternating current supply, also possibly in a central area, and then by transformation, again in the electrical sense to higher A.C. voltages which meant an all-round increase in the distribution area. However, their growth was still that of an isolated community in the electrical sense, though their isolation in any other conception was fast disappearing with the development of telegraph, telephones, roads and railways. This electrical isolation resulted in many pioneering installations bringing in their turn a wide variety of types of generating plant, a variety of systems and voltages, of distribution and usage. In this paper Mr. Barratt is probably closing a chapter which in the past half century has been compiled by a number of our members whose contributions have made the pages of our proceedings both interesting and descriptive.

This gradual change from a number of isolated communities to a lesser number of larger undertakings is rather like our concept today of atomic fusion, wherein the atoms continue to provide a rapidly growing total force. This fusion of communities is following in the wake of communications, and it is as well to bear in mind that it was Sir William Hoy, the General Manager of the South African Railways, who foreseeing the need for railway electrification was in a sense, a founder of the Electricity Act and therefore of E.S.C.O.M.

Incidentally it is important to note that improvement of communications must go hand in hand with development of power supplies, and our national road system should not be allowed to develop any further without provision being made for high voltage power lines along their route.

Mr. President, I repeat, I feel that the national road system in this country should not be allowed to develop further without provision for high voltage power lines along the route.

Allow me, Mr. President, to submit for a few moments to the nostalgia aroused in me by this paper. I first saw the light of night in Queenstown! It was candles and paraffin lamps admittedly; later acetylene. As a schoolboy I was so impressed by the inauguration of Queenstown's electricity scheme that my future career was determined then and there.

I have with me some photographs, which I took in 1921 of those 3 diesel units, consisting of 50 K.W. Mirlees, Bickerton and Day engines driving G.E.C. dynamos. The centre piece in the power station was an item of illumination. It consisted of an array of 4—60 watt lamps in opal shades mounted on the top of the central dynamo frame in the place of the eye bolt!

Another photo taken at the same time shows the G.E.C. switchboard, a mass of regulators, knife switches, meters, fuses, and, standing in front of this board, on an old paraffin box, is a desk fan blowing hard on the main fuses!

The erection of the two 75 K.W. steam driven alternators was just about completed at that time, but not quite — hence the fan.

Engineers will find the meat in this very interesting paper in the manner in which the Queenstown load has grown and been met. Met, at first with difficulty, and later with the judicious application of the demand tariff.

This demand tariff now, apparently, operates so well that it causes no pains or irksome restrictions, and the plant as installed today looks like being able to carry the load anticipated for another 10 years — a truly magnificent legacy for the coming generation of Queenstown ratepayers. This, as must be expected, has been achieved at a price, such as must be paid in the case of an isolated community, but also largely as a result of Engineer Council co-operation aided by the manufacturers of first class British plant, and a succession of wise consultants.

Mr. President, I now come to a couple of questions, which I would like to put to the author. Mr. Barratt states that the peak load is moving now towards the evening on many days of the months and appears to imply that this is due to the demand tariff. That may be so, but I am rather wondering whether Queenstown isn't possibly growing like so many other towns, and business men just don't go home to lunch. Perhaps Mr. Barratt could enlarge on that.

My second question, strange as it may seem was posed to this Convention in 1949, when I produced a chart on which undertakings were asked to ascertain where they stood in relation to one another, and where they stood this year in relation to last year. I would like Mr. Barratt to tell me where he is on that chart today. This is determined by plotting the number of units sold per consumer against the number of units sold per rand of capital expenditure.

Those two figures provide quite a useful indication of how the undertaking is progressing and from them we obtain, what I should like Mr. Barratt to inform us the total capital in rand per consumer.

That figure, at the time that I last put it to this Convention, was in the neighbourhood of £60 to £100. Today it is normally between R200 and R300 for an undertaking with a generating plant, for reasonably good practice. If distribution only is to be considered, the figure per consumer is roughly between R80 and R120. These figures can jump about very considerably in the same undertaking throughout the year, according to the amount of capital that is put into the undertaking, and the stage of growth.

If it is above the yardstick figures I have mentioned, one can consider that the undertaking is of more value to its owners than it is to the consumers — by "owners" I mean the ratepayers. If it is below R300 per consumer, it is of greater value to the consumers than to the ratepayers.

There is another point. Watch out how your undertaking suffers, in its revenue and expenditure account through the possible and, as we so frequently consider, iniquitous robbings of the revenue of the department for the relief of rates.

We have always known and felt that there is a just amount payable. Whatever that is, I would urge that engineers in all undertakings see that the contribution is a direct one, and not an insidious withdrawal of the funds of the electricity department by a nominal charge for street lighting, or excessive charge for some service of another department. We all know how that can be done, and I know of one instance where the amount contributed to the treasury for meter readings etcetera is greater than the amount allowed for salaries in the department itself.

I would like to close Mr. President on the subject of competition. In an isolated community undoubtedly you will find that competition has grown slowly and it is the Engineer's job to watch this growth. Today we have in our midst a friend who was beginning to settle down in the old days, not as such a great competitor, but his name comes up again now, I refer to gas. Not in cables this time, not in council chambers, but in bottles, and it is available to so many consumers in such a handy form that it behoves us to watch the extent to which it is boring, as it were, into our revenue and I feel Mr. President that the Association may well through the proceedings, or better in the bulletins, keep us informed of the cost of gas in domestic appliance use. I have worked it out in all instances and examples that have come my way, and it is still far more expensive than electricity but let us watch it, and do not let us find that it has got such a hold that the ladies can say "I would much rather be able to light the gas ring because I can burn the feathers off the chicken".

Thank you Mr. President. I am very pleased now to thank Mr. Barratt for his interesting and very useful contribution to our proceedings, and, as I say, it may close a chapter in this type of illustrative and historic description of pioneer undertakings in Southern Africa.

I have very much pleasure in thanking you Mr. Barratt and in seconding the vote of thanks for your paper from this Convention. (Applause.)

THE PRESIDENT: Thank you very much, Mr. Gripper, for your fascinating investigations into the past history of Queenstown.

Mr. Barratt's paper is now open for discussion, gentlemen.

Mr. T. C. STOFFBERG (Pretoria): Mr. President, gentlemen: the author has stated that the average rate of increase in Queenstown's maximum demand was slightly in excess of 9% per annum over the period of 1931 to 1953, and he has concluded that this establishes a characteristic of Queenstown that may be used to predict the future growth for the undertaking.

I would like to suggest that the statement as well as the conclusion are possibly not fully justified. The compound growth curve which is based on a constant yearly percentage rate of increase and is represented by a straight line on logarithmic paper is by no means an inexorable law of nature, and it would in fact be a noteworthy exception if this applied in Queenstown. The assumption of a constant yearly percentage rate of increase in load magnitude generally has merit for short term forecasting, but it has great dangers if the extrapolation extends over more than a few years.

Mr. Milton yesterday afternoon mentioned his difficulties in reconciling load data to this exponential curve and he told

us of a rather, I thought, complicated theory of his own which would ascribe these variations to unsynchronised cyclic variations in the rate of growth of domestic and industrial load components.

It is probable however that the long term equation of all Electricity Undertakings will be found to exhibit a regressive feature in that the annual growth expressed as a percentage gradually diminished, although the actual magnitude in K.W. or M.W. of the annual growth may, nevertheless, be a progressively increasing quantity.

I have fitted a fourth degree polynomial to the load data given by the author in Figs. 1 and 5, and I have a number of copies of this graph which purports to show that this alternative growth equation provides a better fit to the given load data over the whole, or any portion, of the period 1931 to 1961 than the 9% growth equation preferred by the author.

This alternative equation of growth, which as I have alleged is an improved fit to the load data, also has the usual regressive feature, in that the percentage annual growth gradually diminishes from 10.4% in 1930 to 8.4% in 1940, 7% in 1950, 6% in 1960 and a predicted 5.2% in 1970.

The important point is that the extrapolation of this alternative growth equation would result in rather lower future load estimates than those which would be anticipated by the author on the assumption of a continued constant growth at the rate of 9% per annum.

The load growth in Queenstown, incidentally, also shows an interesting relationship to that of the Pretoria Undertaking, in that the two curves appear for practical purposes to coincide if the Queenstown time axis is moved backwards by 15 years and the Queenstown load magnitudes multiplied by a factor of 70.

A second point which I would like to submit is that the author may have introduced unnecessary hazards into his study of the Queenstown load growth by neglecting the elimination of the influence on load magnitude of factors other than the effluxion of time. Variations in weather conditions are probably the most important of these factors, and other typical disturbing influences are the incidence of school holidays and the effect of a particular day of the week. Of course the factor that normally gets the blame and may also have some influence is variations in economic conditions.

An annual growth of 6 or 7% can easily be obscured or distorted beyond recognition by the variations caused by these spurious factors over the short term. The erratic influence of varying weather conditions can be considerably lessened by the simple expedient of basing the study of load growth trends, not on the annual peak which occurs on but one isolated day in a given year, but rather on the average June and July week day peak magnitude for respective years.

Due to the fact that Queenstown remains insufficiently isolated from the attractions of East London as a friendly city and a holiday centre, it is also desirable to exclude the school holiday periods in the determination of these average winter week day peak load magnitudes.

A rather more elaborate statistical analysis of the daily peak load magnitudes given by the author in Fig. 3 for July 1960, and the corresponding average Queenstown temperature values,

as supplied by the Weather Bureau, leads to the conclusion that the Queenstown weekday peak load during July increases by some 2.1% for every degree centigrade drop in the daily average temperature below 10.3 degrees Centigrade, and that the load is depressed by the same percentage for every degree rise in the daily average temperature above 10.3 degrees centigrade.

In this analysis a rather striking degree of association was found to exist between weekday peak load magnitudes and the corresponding daily average temperature values, and the high correlation co-efficient of 92% was obtained. This is considerably higher than the correlation co-efficient determined from a similar study of the Pretoria load and weather data, and suggests that the effect of weather conditions on Queenstown load magnitude may perhaps be profitably studied with a view to determining whether the high load values in 1956 and 1957 together with the unexpectedly low peaks of 1958, 1959 and 1960 were not due to variations in the weather rather than economic factors.

Reference has already been made on various occasions to the undeniable, and generally accepted, fact that the average weather conditions in East London are sunny, calm and warm. We know from first hand experience, however, that there can be spurious and erratic variations from these desirable average weather conditions in East London!

The same probably applies to Queenstown, with corresponding effects on load magnitudes.

In conclusion Mr. President, I would like to join in congratulating Mr. Barratt on his most interesting, provocative and timely paper. (Applause.)

THE PRESIDENT: Thank you very much indeed, Mr. Stoffberg, for your contribution.

Mr. R. S. DUNSTAN (Port Elizabeth): Mr. President, Mr. Barratt has given us a paper today which will increase in value as a record of the state of the Queenstown Undertaking in 1962 as the years pass, but there is one thing in it that perturbs me, and that is the drop in his load curve.

Admittedly he has applied a maximum demand tariff to his consumers, and that is the explanation for the drop, but I would like to point out from Figs. 3 and 4, that he has also reduced very considerably his sale of units of electricity.

On the surface he will say he has improved his load factor, but I am afraid I am not happy about the application of a maximum demand tariff to the smaller consumers. I know there will be a lot of opposition. There are apparently 18 Undertakings who are applying it, and also Mr. Milton and Mr. Clinton will be opponents of mine.

Nevertheless I am very unhappy because if you look at Fig. 5 there is a drop in the maximum demand — a very serious drop in the maximum demand — that merely indicates that the plant at Queenstown will be able to supply the load for a few extra years; but in the meantime there has been a very, very serious psychological effect on consumers. You are destroying their desire to use electricity, and that is far more important than the actual factors that are normally recorded in a paper of this type.

It is so in the case of Queenstown because consumers there are disposing of their electric stoves. I know that is a fact. Mr. Gripper, in seconding the vote of thanks to the paper,

mentioned the question of gas competition, and which is also becoming very serious. The people who sell the gas stoves are starting their sales talk now with, "It is much cheaper than electricity". In a few years' time the position may be worse, and I would suggest that those who are applying maximum demand tariffs to their domestic consumers think very hard whether they are on the right track, and I would also say that if they have any doubts that they are not on the right track, they be honest about it, and if necessary change the policy.

Thank you. (Applause.)

Mr. L. LEWIS (Mossel Bay): I wish to add to what Mr. Dunstan has said, and I would also express my doubts as to the wisdom of applying a maximum demand tariff to the smaller consumers, particularly the domestic consumer and particularly when it is measured with a maximum demand ammeter. My experience, too, is that the peak load drops, but are we really to believe that that peak load drops and just disappears?

I found that the larger part of that peak load has been diverted into gas stoves, and paraffin stoves, wood stoves, and other types of appliances that can be bought.

What it amounts to in my opinion is that a consumer throws out, say, an electric stove which costs £80 and he then buys a gas stove for another £80. The Supply authority puts in a meter which costs £5, and to install it probably spends another £5. As soon as the consumer has thrown out his stove the meter becomes redundant anyway, and there is an investment of about £90 on this transaction.

Now if you consider, say, 100 consumers doing this you'll get an investment of about £9,000 to reduce your peak load. You probably reduce it by about 90 K.W. To install 90 K.W. in the Power Station will cost about £9,000 so, what we come down to is this, is it to the benefit of the general population to spend £9,000 on their own, or is it more beneficial to give that £9,000 to the municipality, or the supply undertaking, to invest it in power plant at the power station. I think we should investigate it from that point of view. If it is more economical for them to spend their £9,000 on gas stoves, we are quite happy; we are not out to prevent the gas people making a living. If on the other hand it actually represents a greater expenditure than they need for their (in this case) 90 K.W. then I say we should not encourage that expenditure on other types of appliances.

That is all I wanted to mention, Mr. President. Thank you.

THE PRESIDENT: Thank you Mr. Lewis. Any contributions to Mr. Barratt's paper?

Mr. M. H. L. BOSHOFF (Graaff-Reinet): Mr. President, gentlemen; I come from a town which is called a Rebel Town. We had the very first republic in this country! It happened in my great-great-grandfather's time, I believe, but nevertheless we always seem to be ahead of the times.

Maximum demand meters are being discussed here this afternoon, and very unfortunately so, because I sympathise with a colleague of mine, Mr. Max Clark of Somerset East, who has still to give his paper tomorrow! But, if I may tell Mr. Clark something, I would say to him what the one coal said to the other coal, "Let's go out tonight and make a little ash!"

The real reason why I wanted to speak here this afternoon was, because of that approach of the people or the consumers, who live in the isolated communities — you'll find that in Graaff-Reinet, for instance, the majority of consumers are people who are at the retiring, if not retired, age, and these consumers do not want to be taught how to use electricity. They want to use electricity whenever they want to, whenever they like, without having to pay for it — if they could.

Now if you come with a maximum demand meter rate based on circuit breaker, or ampere basis, registered by a meter, whether you charge 5 cents per amp or whether you charge 30 cents per amp, that consumer is not satisfied, because he will tell you "You are charging me a double rate". "You charge me for the units I use, and now you charge me for the amperes I use." In other words, it's like the taxation I have to pay. I am being taxed on the tax that I pay!

It is rather difficult to try and explain to those consumers that the reason for the maximum demand tariff is the most equitable tariff to the consumer. Well, you as an engineer, may know that. You as a councillor may know that. But the consumer does not want to know that; with the consequence that the transition period should you bring in maximum demand meters, it takes much longer than what was originally anticipated, and you have, (and I can confirm what has been said here), the moving of the stove first, because the consumer comes back and he says, "I'll install this stove which has also got attached to it a water cylinder, therefore I now also get rid of my electric geyser". So, taken by and large, it will be found that a tariff has to be made whereby he has to compulsorily pay without feeling it. In the case of P.E. the tariff is judged on the actual ratable value of the property. In other words, if the property is worth £5,000, or rated at £5,000 as far as the municipality is concerned, I don't know what I am going to pay for an electricity charge as far as the fixed charge is concerned, I am only concerned with the unit charge. But when the ampere charge comes in you significantly point that out to the consumer — and he doesn't like it. He really does take exception to it.

And I can assure you, if you'd like me to come back to the A.M.E.U. Conference next year when it is held at Margate, you must not ask me to go and install maximum demand meters in Graaff-Reinet, because I have told you, it is a Rebel Town. (Applause.)

THE PRESIDENT: Thank you Mr. Boshoff.

Any further contributions?

Mr. W. H. MILTON (Escom): Mr. President, ladies and gentlemen it was pleasing to hear the author fearlessly state his conviction that the demand type of tariff for all classes of consumer enforces the intelligent use of electricity and that, if universally adopted, it would have a beneficial effect on the national economy.

This is a view which I have held for a long time but the issue is often fogged by taking into account the cost of demand meters and the potential reduction in revenue which would result from their application with no allowance for the effects on costs of production.

It is most unfortunate that, in many cases, plant has been installed to meet the demands of consumers whose habits are bad.

When plant has been installed and, thereafter, steps are taken to encourage the improvement of load factor with consequent initial stages of reduced demand, we are faced with a surplus capacity in the installation.

It is this aspect of the problem which leads to wrong conclusions being drawn.

In the case of one of our members, the effect of demand metering was such that additional generating plant then on order was clearly indicated as being unnecessary for several years. That order could not be cancelled because cancellation charges made this uneconomic.

To my way of thinking, the owners of Electricity Undertakings embarking upon this form of metering should be prepared to cut their losses.

What I have in mind is that the tariffs should be designed on the basis of the ultimate effect after the improved utilisation of assets has been achieved and not on the basis of securing the same revenue at the time of the introduction of the tariffs, as was enjoyed from the application of previous tariffs.

If the latter proposal is adopted then the ampere demand charge is unreasonably high and restrictive. This brings about a severe consumer reaction and it is no use telling the consumers that, after a year or two, the effect will be such as to enable those charges to be reduced.

When tariffs are wisely designed they have in mind potential future expenditure and, in consequence, may result from profits required to accrue immediately they are introduced, those profits later being dissipated in meeting the costs of extensions.

This averaging is very necessary if stability of prices is to be achieved and such stability is very necessary if the consumer is to make his decisions on expansion etc., without fear of the effect of immediate increments in cost of electricity.

If we are justified in calculating and applying tariffs in this manner namely to allow for a future increase in cost and therefore budget for a surplus at certain stages, I see no reason why we should not adopt the same principal when introducing the demand tariff.

In other words, when the tariff is first introduced the designers should have an eye to the resultant lower average costs of production which will result in time while still giving satisfactory service and therefore an interim deficit should be accepted with equanimity.

After all, if the supply authority introducing demand tariffs is not satisfied that there will be resultant benefits in lower costs of production, those tariffs should not be introduced. The fact that they are being introduced indicates satisfaction as to savings and therefore justification for introducing them on the basis of a deficit at the outset.

It is noteworthy that the author states that the indications are that a saving of more than 20% is effected on peak loads which, with the development rate of say 8% per annum will defer plant extensions by two years or more. It also means that the costs arising from the demand sold will be reduced by 20% and this is a very appreciable item of cost to the consumer.

Unfortunately the changes which took place from 1956 up to the time of introduction of the new type of tariff will have the effect of discounting the evidence to be produced later

as representing the achievement from the introduction of the new tariff. On the other hand the author may furnish further details as regards the period 1956 to 1960 indicating the sections of the community whose decreased use resulted in the demands shown in that period, there apparently being direct evidence that the new tariff resulted in an appreciable drop from 1960 to 1961, some recovery having been indicated as between 1959 and 1960. Had curves been shown to indicate the rate at which the sale of energy had changed, I feel that the illustrations by diagrams would have been enhanced.

I join in congratulating the author on a very valuable paper.

THE PRESIDENT: Thank you Mr. Milton.

Mr. J. A. VAN DYK (Graaff-Reinet): Mr. President, I really didn't want to speak this afternoon because I came along to listen, but seeing that my Engineer has turned round and said Graaff-Reinet is such a Rebel Town, I thought I must give a better impression, and tell you gentlemen that that is the gem of the Karroo. You can come there at any time and we'll have no fights with you. They just happen to fight with Engineers, and Councillors at times. Engineers have in fact said here that Councillors know very little about electricity.

Well of course, that we appreciate, but we in the small towns are more fortunate, because we are constantly reminded of electricity in so much that we get our bills and they remind us.

I was very pleased to see that the paper that is now under discussion appeared on the agenda and the very high quality of the paper in regard to the costs of electricity, because that is something that is a worry to the Engineer, but is also a worry to the Councillor and to the consumer. A lot has been said about economy as far as electricity is concerned — that we appreciate. On the one hand, one thinks that your Engineer fights to make a profit, and they make a tariff as equitable as they may think it should be, and they want to make a profit, and the very next moment Councillors turn round and they use that particular profit for the relief of rates.

I don't want to argue on that question, whether that should be done, or whether it should not be done. We heard earlier, and rightly so members speaking about gas—gas may become an enemy of electricity in the very near future. Is that not a point — and perhaps these authors at their next Convention could have a paper on it whether it is the right thing to sell at big profits, and use that for the relief of rates, rather than reduce the price of electricity and then, let the consumer, who is a ratepayer as well, let him enjoy that, because as far as the question of demand meters is concerned, in Graaff-Reinet (and I think it is all over) this may be a very equitable one, but if you had to take . . . (I hope the towns I mention won't haul me over the coals for saying so) . . . the same as Queenstown, where you get the curve to drop, I think you have the same at Cradock and I think you have the same at Oudtshoorn. The people don't want to use it, because they are using their stoves and they want to iron at the same time, and do everything at the same time. We appreciate that it puts a load on to the power station, which we appreciate you gentlemen want to avoid, and we appreciate everything you do, but we'd appreciate it more if you would also, see the consumers' side.

Thank you Mr. President. I again ask you gentlemen, don't be afraid, come to Graaff-Reinet — it is the "gem of the Karroo".

Mr. J. L. VAN DER WALT (Vereeniging): Mr. President, it was my intention first to sneak away quietly as a Town Clerk, but unfortunately I was spotted by your very wide-awake Secretary. I was hoping that the report of Mr. Downey on the Recommendations Committee would be dealt with so that I could reply to a nasty remark he made that I had changed my job for a clerical one.

May I take this opportunity now sir, (and I have written a little ditty on this):

There is a man from Springs
Who like to say nasty things
I am sure he will become hysterical
If, after an 'ondersoek',
By Professor Hoek
His job is designated 'clerical'.

Mr. President, unfortunately I am a responsible type of person who can't remain with you engineering types. I have to go and do some work, and I bid you all farewell, and everything of the best for this Convention. Thank you very much for a lovely few days I have had with you. (Applause.)

THE PRESIDENT: Goodbye, Mr. van der Walt. Happy journeys!

Are there any further contributions to Mr. Barratt's paper?

Mr. W. H. MILTON (Escom): I'm sorry Mr. President, there is one remark I should have made. That is, that Mr. Gripper to my knowledge was the first engineer in this country to introduce the system of demand metering and that was on his rural Worcester schemes, and I feel that should go on record.

Mr. H. J. GRIPPER (Knysna): Mr. President, on a point of order, I thank Mr. Milton for what I think was intended as a compliment, and take it as one, but it was not an amperé demand meter — it was either an M.C.B. or an H.R.C. — that is: a circuit breaker or a fuse. But that is not the same thing. I maintain that there is rather a big difference. The consumer does not like to see two meters — thinking he is being charged on "Daardie meter en daardie meter". By all means, charge for the size or rating of the service. He expects to pay for that in his water service too. If he asks for a half inch main he pays for a half inch main. If he asks for a one inch main he pays for it. He doesn't mind paying on the meter as well but he must not have two meters!

THE PRESIDENT: Thank you Mr. Gripper. It looks as though the meter manufacturers are going to go out of business if Mr. Gripper gets going.

If there is no further discussion on Mr. Barratt's paper, I'll ask him to make a short reply.

Mr. V. E. O. BARRETT (Queenstown): Mr. Chairman, gentlemen, Mr. Rossler asked if we had ever tried using Indwe coal in our power station. Mr. Ashley tried it out. I never ventured thereafter to give it a try, because it was so "shaley", that as soon as the fire got up to temperature, the whole grate banketed and they had a terrific lot of trouble clearing the grate. But all of us in this area have great hopes that that

was just the surface coal, and that the coal that is in the lower seams will prove of a much higher quality.

Mr. Rossler, I'm sorry I can't give you a comparison of the performance between the two types of boilers for the simple reason that the Lancashire boiler was installed in a temporary capacity, in the simplest of simple matters, and to keep a tally of the coal that we used, we had to count the number of coco pans that went into the hoppers.

The lowest voltage which I had recorded in Queenstown — was quite phenomenal — it was 138 volts. Fortunately the consumer had a type of refrigerator that used a heating element and not a motor.

We didn't adopt the ampere demand type of tariff without a tremendous lot of investigation. I don't think that there is one of you here who will argue that any electricity tariff should take care of the two portions of the charges, viz. the demand related charge, and the energy charge.

We have all sorts of attempts to meet those two portions of the charge, from square footage to valuation, (so far, no one has got as far as basing a tariff on what the consumer earns); still there is always some evasion of the ideal. Why not go for the ideal? We know it is the best thing, so go in for ampere demand type of tariffs, that is a true demand type of tariff. Don't use some equivalent that is nearly as good, because it is never just as good, nor just as fair.

I have no doubt, Mr. Gripper, that the shifting of the loads, causing our demand to occur in the evening and not in the morning, is definitely due to the introduction of the demand tariff, for so many years the occurrence of a daily demand on the power station at night time was something that was really noteworthy. In the years preceding 1961 if we had it more than three times in a year, it was something outstanding, whereas immediately after the introduction of the demand tariff the incidence of peak loads shifted to the evening.

Your queries Mr. Gripper about the units per consumer sold and the units per rand of capital expenditure, I shall have to answer later, I haven't that information available here.

Mr. Dunstan's query about the dropped unit output. Yes! — when you introduce any increase in tariff, or if you introduce a tariff that is not completely understood then to consumers the apparent increase may be more than the real increase, and you do get consumer resistance which results in a "fall off" of units sold. But that is not as great a factor as many might anticipate. If I remember the figure correctly, in a comparison of the years 1960 and 1961 it was 3.6%. That isn't great. Recovery has started to take place already. In the first few months of the introduction of our demand tariff, comparing month for month of 1961 with 1960, we started the year by having a drop of 9.4% in unit output over the month. By the end of the year that had grown to a plus of 6% and that tendency has continued during this year.

I have no doubt whatever that in a very short time our actual unit output will have caught up and surpassed that of the preceding year.

It is true, too, that quite a number of people disposed of stoves and hot water cisterns, but no-one ever hears a word about those people who, having rashly done that, before they had found out what the demand tariff meant, who had done

that through fear — fear of the unknown, and the misunderstanding — have quietly had the contractor back to put in an electrical geyser, or an electrical stove.

In Queenstown we carried out quite a campaign to educate the users of electricity—particularly the domestic consumers—who, though they may not individually use as much as the larger users, comprise the greater number of consumers. I addressed more meetings then than I had ever in my life before — that is in that six month period before the introduction of the demand tariff. But the most rewarding talks I gave were to different women's organisations just after the demand has been introduced, and our staff spent many days running here and there in response to urgent calls such as "the demand shot up — it shot up just when I turned that switch on", which of course wasn't true. The lads went round and they were able to show the consumers what to do.

It may be strange, to you, to hear that in 1960 when demand tariffs were being talked of and had not yet been introduced, we had very few electric stoves installed. However, during 1961, the number of stoves installed had increased and the same tendency has been followed this year. I have no fear that even though we have a demand tariff, and even though the opposition product, bottled gas, is gaining a hold in many fields, that electricity, and the use of electricity for domestic purposes will be ousted as far as the town dweller is concerned.

I think those are all the answers I can give straight away. Thank you gentlemen. (Applause.)

* * *

Written Reply to Questions Raised During Discussions on the Paper by V. E. O. Barratt, Queenstown.

During the discussions, Mr. Gripper asked three questions that I could not answer, as I did not have the information available at the time. The replies to his questions are—

1. The number of units sold per consumer for 1961 is 4,672.
2. The number of units sold per Rand of total Capital Expenditure on the Generation and Distribution Departments of the Undertaking is 7.19.
3. The total capital expenditure in Rand per consumer is R649.25. This figure is high on account of the recent heavy capital expenditure in both the Generation and Distribution Departments but will drop over the coming years, as, until further generating plant is needed in about 1971, the only increase in capital expenditure anticipated will be in the Distribution Department, when further developments to the town take place.

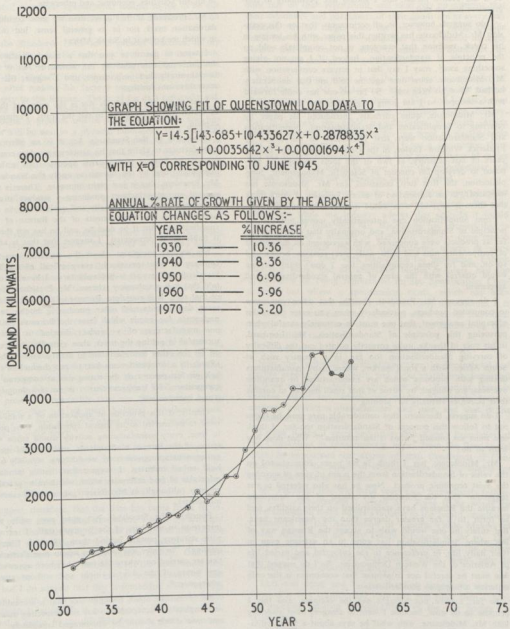
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THE PRESIDENT: Thank you Mr. Barratt. Gentlemen, you have shown your acclamation how much we have appreciated the hard work that Mr. Barratt has put into this paper, and I wish to thank all the contributors to the discussion. I would now ask you to congratulate Mr. Barratt by acclamation. (Applause.)

I think now that we have time to enter into discussion on Mr. Middlecote's paper.

Are there any contributors?

Mr. D. G. SUTHERLAND (Pietermaritzburg): Mr. President, and gentlemen: Mr. Middlecote has given us, in his usual inimitable manner, another excellent paper. He has not



only selected a most interesting subject, he has not only written the paper clearly and concisely, but his presentation of it has been a model, and I should like personally to congratulate him on that.

I do suggest, however, in all seriousness, that on this occasion Mr. Middlecote has written this paper with his tongue in his cheek, realising that everyone is not completely sold on the principle of standardisation. Indeed, if I am not giving something away, may I say that in private conversation with Mr. Middlecote, some time ago, he told me that deliberately he had "shot his neck out". So far no-one has come forward with a chopper, so I am going to give him the first chop.

Mr. Middlecote, quite correctly, introduced his paper by referring to Simplification and Standardisation. Simplification and Standardisation were first introduced to the world by Frederick Winslow Taylor, in the United States, in the closing years of last century, as two of the tools whereby he proposed to develop his concept of Scientific Management. Simplification, the first step, consisted, (as Mr. Middlecote has indicated), in an elimination of excess varieties. I don't think that there is anybody who would quarrel with that intention.

From Simplification one automatically moves towards the principle of Standardisation, and originally that started off, as far as products were concerned, with agreement on dimensions of components, nuts and bolts, nails, steel sections, bricks, and so on, and for these commodities, too, I don't think anyone would quarrel with the idea of general standardisation and agreement.

I do suggest, Mr. President, though, that when you come to completed products, particularly when you enter the realm of capital equipment, that one must be extremely careful when pursuing this principle of Standardisation. Mr. Lombard, in his vote of thanks, quite correctly pointed out the difficulty of carrying Standardisation too far, in a country such as South Africa, with a small market, where many manufacturers dealing with products which are manufactured in quantities overseas, are obliged, by virtue of that small market, to confine their activities virtually to "jobbing".

I do suggest, therefore, that considerable care must be taken not to follow this concept of Standardisation too far. I think one must ask oneself "what is the criterion?" What does one want to do?

Mr. Middlecote, has, I think, in his paper, concentrated on the value of Standardisation from the point of view of securing the most economic product. Now he has also referred to the suggestion that the Russians are ahead of the Americans because the Russians have standardised on their satellites, and so forth, to a far greater degree than the Americans have. But surely no-one would wish to accept the Russian way of life where Standardisation has gone to an extreme even in their daily life, in preference to the colourful and varied life of America or the Western Democracies. So I do suggest that one must be careful not to assume that economics is the only criterion to apply to Standardisation.

So far, I have not brought out the chopper, and this I propose to do now, because I want to disagree most violently with Mr. Middlecote, with what he says about a Standardisation mark. I appreciate that this paper was written mainly as an interest to the producers and distributors of electricity, but

I think, although I may be wrong, that Mr. Middlecote also wrote it in the wider context of Standardisation as applied to all our activities, economic and otherwise.

Mr. President, if that is so, then we must consider a Standardisation mark not in its general sense, but in the sense in which we know it in South Africa.

I want to put it to you that a Standardisation mark as designed and controlled by the Standards Act is bad. It is fundamentally bad in principle, and I suggest that there are several reasons for that.

First of all, the Standards Act is the only Act that I know of which makes it a crime to tell the truth. Perhaps I should explain.

According to the Standards Act it is an offence for any manufacturer to claim that his article or product complies with one of the Bureau of Standards Specifications, unless he has been authorised by the Bureau to apply the Standards Mark. Mr. President, that is just plain nonsense. There is nothing to prevent any manufacturer producing a product or a piece of equipment which dimensionally and qualitatively, in every way complies with the requirements of the Bureau of Standards specifications. But if he does so, and he has not the mark, he is liable to be prosecuted. I suggest that that is absurd.

My second complaint about the standards mark, is that contrary to what practically every official of the Bureau of Standards will say, it is not voluntary. I have so often been told that it is a voluntary scheme. Mr. President, it is nothing of that sort. It is coercion. Because of the practice of government departments and other purchasing bodies to afford a preference for goods which bear the Bureau's mark, if any one manufacturer of a product decided to apply, and is successful in getting the mark, then virtually it places an onus on all the other manufacturers to do the same. They cannot afford, in a competitive market, to put themselves two and a half, or five percent on the wrong side as compared with their competitors. So I suggest that it is not a voluntary scheme, it is a coercive one.

Thirdly, if this principle of application of a standards mark were to be carried to its logical conclusion, then presumably, in time, every manufacturing activity would come within the scope of the Bureau of Standards, which would mean that a government sponsored body would have virtually a stranglehold on all industry. I suggest that that is inimical to the principles of free enterprise which we claim to practice in this country (although, as Mr. Berry said, in many cases that is a misnomer).

Fourthly, the Standards Act gives very wide powers of inspection to members of the Bureau's staff. It permits them, with statutory powers behind them, (I think I am right in quoting), "to enter any premises where manufacturing activities are carried on, where the mark has been approved, during any hours of the day or night and without any warning whatsoever."

Mr. President, again I suggest that that is a condition which is completely unacceptable to any self-respecting manufacturer, and one which should be discouraged completely.

I must admit that now the members of the Bureau's Inspection Staff do exercise these rights with reasonable courtesy but

and discretion, but it was not always so, and some years ago I fought quite a hard battle with certain members of the Bureau's staff to protest against what seemed to me to be not only arbitrary action, but exceedingly discourteous action on their part.

Again, the Standards Mark as at present practised, in my opinion, leads to a far too academic approach to inspection. With the increasing number of products coming within the scope of the Bureau's inspection, the tendency is for an inspector, after making his factory inspection, to take some samples away to the Bureau. There, as far as I can make out, because the Bureau is growing rapidly, and is sub-divided into many sections, a product will be virtually dissected, and bits and pieces will be sent to a physical laboratory, to a chemical laboratory, and so on, where members of the staff, who have no interest in the final product at all, and who have no knowledge of the product as a whole, will examine and inspect the particular component or part in the light of one particular clause in a specification, and that, again, I suggest is not fulfilling the purpose for which specifications are designed, which is to ensure that the final product will do its job.

Finally, I suggest that a standards mark has really no place at all for capital equipment. Sometimes it has been argued that it is a protection to the man in the street. I want to suggest also that the man in the street is not in any way interested in the Bureau of Standards mark. May I just quote an example of that. Some time ago, when I attended a meeting of the Natal Permit Holders Association which was presided over by either the Director or the Deputy Director of the Bureau (they were both present), when there was considerable talk by them of the public being made "mark conscious". I put it to them that they were talking very much in the air, and that the public, as a whole, was not interested in the Bureau's mark. To try and prove that, I said, "Mr. Chairman, let us take some simple commodity that concerns everyone present. Let us take a pair of shoes. May I ask you to ask everyone present, (presumably they are all interested in the mark, because they are all mark holders), whether or not, when they go to buy a pair of shoes they ask for one which carries the Bureau's mark."

Mr. President, needless to say the Chairman had not the courage to put that question to the meeting. I challenge Mr. Middlecote to put a similar question to the members here present, just to see to what extent the Members of this Association, and affiliates, are "mark conscious".

I do suggest, therefore, that the time has come for a reconsideration of the mark scheme altogether. I believe I am right in saying that the Standards Act was passed, and the Bureau of Standards was created at a time when goods of South African manufacture were of very inferior quality. One must give credit to the Bureau of Standards for the work which they have done; and for their part in the improvement of that position, but I do suggest that that is something which belongs to the past. South Africa is now being proclaimed to the world as an industrial nation. It is no longer in its infancy industrially, and it seems to me the time has now come when one should revert to the traditional principle, that manufacturers are responsible for the quality of their own goods; and particularly does that apply in the case of capital goods, even more

particularly in the case of electrical equipment, in which all of us are in some way or other interested, where manufacturers must rely on their reputations, and must rely on ensuring that their customers and purchasers of their goods are in every way satisfied. We no longer need the "wet nurse" of an outside body like the Bureau of Standards, and I would strongly suggest that the time has come to amend the Standards Act and to abolish the standard mark altogether.

Now, if I may come back to one particular aspect of Standardisation. Mr. Middlecote has included in his paper a short paragraph dealing with electric cables, and I think I may say, on behalf of my friends and colleagues in the industry, that in general the cable manufacturers of South Africa welcome standard specifications for the types of electric cable that are in common use, although I put a reservation there and say that in some cases, where very special types of cables are required, it is better to leave it for the manufacturer and the user to decide for themselves what is wanted.

In general, for the vast number of sizes and types of cables in common use, we welcome standard specifications. But may I say that while the industry adopts that attitude it would appear (and I think that Mr. Middlecote has stressed that in his paper) that a number of users will not, for some reason or another, accept standard specifications which, in some way or another, they were responsible for producing. I think that this body, and all interested bodies or users, had the opportunity of being represented on the Specification Committees, but where a specification exists, which has been accepted by the vast majority, it is not only uneconomic, it is extremely inconvenient and irritating, when various individual supply undertakings and users will insist on introducing their own pet little variations.

It is not in the interests of Standardisation at all.

Now, the Technical Specifications cover the dimensional and quality aspects of a product, and I am particularly interested in those covering electric cables, but Mr. President, there is another aspect too, which one cannot disassociate from a contract between a manufacturer and user, and that is the Conditions of Contract.

I think it was 3 years ago under Mr. Kane's Presidency of the Convention in Johannesburg, when, from the Presidential chair, he announced that copies of draft Conditions of Contract covering the supply of electric cables were available for the consideration of members.

Mr. President that was three years ago. Immediately following that announcement I asked Mr. Kane if he would be good enough to make copies available to the Joint Consultative Committee of the Association of Electric Cable Makers of South Africa, and he very kindly arranged to do so. That body appointed a sub-committee to consider all the clauses with a view to making suggestions which might help to produce a more satisfactory document.

That was done, and various detailed suggestions were put forward a very considerable time ago, and since then I think one meeting between representatives of the two bodies has taken place.

Might I, through you, Mr. President, appeal to Mr. Kane to get a move on with that, and let us have a standard document which everybody can use.

I always divide our customers into two main categories: Government Departments, Municipal Electricity Departments and Consulting Engineers, who indicate their requirements in a very massive document; and the Mining Industry, and general industry, who indicate their requirements in a very very simple document, and it has always remained a mystery to me why it is necessary when purchasing one product why one class of customer must go to extreme lengths, and take up a tremendous amount of their own time, and also the manufacturer's time, whereas the whole job could be done quite simply by other means.

If, Mr. President, such a document as is under consideration at the present time, could be finalised, all that would need to be done would be to specify that document as a standard document for the Conditions of Contract, and one of the Bureau of Standards' documents as the standard document covering the dimensions and qualitative requirements, and life would be very much simpler for all concerned.

Thank you. (Applause.)

THE PRESIDENT: Thank you very much Mr. Sutherland.

Mr. R. W. Kane stated that he had intended to discuss Mr. Middlecote's paper mainly on the aspects of transformer Standardisation and the "mark" but we would afford that Mr. Sutherland either purposely or in all innocence had somehow been misled in the afternoon in his reference to the "mark". Mr. Kane said that he himself had only appreciated some 18 months ago that the "mark" only existed for the quality specifications and no "mark" whatsoever was available for the safety specification. He has discovered this in the amended requirements for the sale of appliances through the Johannesburg Hire Purchase Scheme wherein all articles now had to comply with the relevant S.A.B.S. specification. He has been amazed to discover how many articles of poor quality were in fact manufactured in the Republic and how many imported articles of apparent quality did not even comply with the B.S. specification. In a plea for an extension of the "mark" in some form, to cover the safety specification he referred to the possibility of imported articles arriving in the country in exchange for pig iron.

He stated that the manufacturers were by no means the quiet innocent hard done by people that they would like us to believe and quoted some aspects of the controversy over the current ratings of p.v.c. cable.

He agreed with Mr. Sutherland's remarks over the delay in discussions on cable tender documents, apologised for the delay but pointed out that the municipal engineers were subject to control by the Town Clerks, Treasurers and finally the Provincial Administration.

Regarding Standardization of transformers he agreed with Standardization for dimensions etc. but not in performance particularly losses and impedance and pointed out that the smaller transformers were in total capacity far in excess of system loading and therefore the losses were a very important aspect to be considered.

He considered that too great an aspect of Standardization may result in some of the manufacturers being put out of business. He referred to the possible so-called manufacture

of hand meters in the Republic, the rumours that one factory only may supply the needs of the country and pointed out that for 35,000 of such meters imported annually, local assembly (so called manufacture) would cost suppliers at least R140,000 extra to save only a portion of the R50,000 now leaving the country. (Applause.)

Mr. J. A. MORRISON (Johannesburg): I speak, not only as an affiliate representing a manufacturing company, but also as the delegate appointed by SEIFSA — which body embraces all the larger manufacturers in the Republic.

The only way to combat overseas competition is for local companies to establish their production on mass assembly lines, but, as has already been pointed out, the limited market in Southern Africa precludes this step. Accordingly, most manufacturers operate on the basis of meeting the market's requirements as they arise and, generally speaking, few are able to plan production more than four months ahead.

A solution to this problem would be to make in bulk up to six month's output and to sell from stocks held, but unfortunately, the South African engineer is an individualist who writes into the specifications, personal requirements that preclude the "standard product". Mr. Lombard has suggested that manufacturers should insist upon the acceptance of a standard design and many have tried to do so, only to be told "Well, if you cannot be bothered to manufacture to my particular wishes, Smith & Co. are, and I am prepared to pay a little more for what I want!"

As a result, instead of establishing a production run of 1000 units, the manufacturer is forced into a policy of assembling only 250 and keeping the balance in the form of sub-assemblies to meet such contingencies.

This, gentlemen, is not conducive to efficient production and we would welcome any assistance towards some simple form of Standardisation, provided that it does not stifle initiative in design.

In this respect, may I quote the help received from the Bureau of Standards in the local production of Bulkhead Fittings.

The problem was that the glass manufacturers were unable to produce economically unless the quantity runs exceeded 50,000 off. As this figure represents the probable annual usage throughout Southern Africa, it was decided to establish one design of glassware which would be made available to all. The effect of this Standardisation has been to reduce costs and to assist local production.

The second problem confronting South African manufacturers relates to the utilisation of local materials, which is the only criterion to be followed if we are to make our country self-sufficient.

In their planning, local manufacturers have to develop their products so that the minimum number of components are imported. Sometimes this necessitates a modification in an established overseas design — although in nearly all cases, improvements are incorporated by doing so.

Naturally, the Municipal Electrical Engineer is suspicious of such changes and is reluctant to accept any alteration in the construction of an item that he has used for years.

I suggest, therefore, that it would be in the interests of both parties to have an independent body to whom all such

products could be submitted for consideration. Exhaustive tests could then be carried out and, if found to be completely satisfactory, recommendations made to the A.M.E.U. for the establishment of Standard South African Designs.

Mr. President, perhaps your Council could consider enlarging the scope of the Recommendations Committee for New Electrical Products to embrace this aspect.

One final thought — the finest example of Standardisation was achieved when Adam lost his seventh rib and the beauty of the female form was created. No doubt there are many engineers who could suggest improvements — but there is nothing that we producers can do and somehow we manage to get along with it — as standard!

THE PRESIDENT: We now adjourn until this evening, when the Engineers' Forum will be in the hall, and I hope you will all attend this evening at 8.15 p.m.

CONVENTION ADJOURNED.

* * *

PRÉCIS — MEMBERS FORUM

On resuming at 8.15 p.m.:

QUIZMASTER (Mr. R. W. Barton, Welkom):

Question 29: Is a retail organisation such as a local authority to which certain responsibilities are delegated a reasonable form of organisation for the distribution of electricity?

Question 30: What are the factors which should govern the selection of a form of organisation for the electricity supply industry in South Africa? For example, what objects should guide the selection of a particular type of organisation?

Question 31: The Reef towns in future, as already to some extent, are likely to be fully developed for industrial, residential or commercial purposes to the limits of their areas of jurisdiction. These geographical boundaries may not coincide with the most economic layout of superimposed networks from which a supply of electricity to them will have to be given. Is a form of organisation, similar in some respects to that of the Rand Water Board, becoming a necessary feature to deal with the problem of supply to a conglomeration of towns?

Question 32: In the case of rural networks which become an important feature of the load and responsibility of a local authority, are they best handled by:

- (1) A central local authority;
- (2) A national state organisation; or
- (3) separate farmers' co-operative societies as encouraged by the Rural Electrification Administration of the U.S.A.; or
- (4) Peri-urban local authorities?

Question 33: Is a form of organisation such as that adopted in the U.K., of area boards, the best solution to the problem of distribution of electricity in South Africa?

Mr. J. BERRY (Johannesburg) suggested that the problem underlying these questions is how distribution should take place in a service which, because of its nature, has got to be operated as a monopoly. A monopoly should not be operated

for private gain and therefore should not be in private hands. In a closely knitted complex of towns, a statutory body would be better than a consortium of municipalities, and better than a national body, since local knowledge was important. Where towns are widely separated, the municipality is eminently suited to the task, provided that it does not charge more than is necessary to cover costs. The idea of reticulation by a farmers' co-operative society should be rejected entirely, since, like any similar body, they would be guided by their own requirements, and not the public interest.

Mr. W. H. MILTON (Escom) said that Escom prefers that it should supply electricity in bulk, and leave it to the urban authority to distribute amongst its consumers. However, the weakness in this arrangement lay in the tendency of local authorities to increase electricity tariffs in order to make substantial profits. He cited an instance in the Cape where Escom had undertaken distribution to final consumers in a complex of towns and sketched the difficulties if the municipalities either individually or as a consortium had undertaken the task, but agreed with Mr. Berry that some form of body other than Escom may be desirable for the purpose. With regard to the Reef, there was still room for intensive development by the municipalities in their own areas, and Escom usually facilitated such expansion, provided that the consumers to be taken over were protected against arbitrary increases in tariffs.

Rural distribution could well be undertaken by farmers' co-operative societies if these were sound financially, adequate guarantees had been provided and their administrators were made fully conversant with all the requirements for the satisfactory operation of the service. However, Escom had established a separate department dealing with rural reticulation which was entirely suited to the task.

The system of area boards such as that in Great Britain was ideal in a large scale complex of towns with complete electricity inter-connection, but would not be effective in this country with its, except in a very few cases, long distances between urban areas.

Mr. J. E. MITCHELL (Hon. Member) felt that the difficulty in deciding which organisation should reticulate electricity lay in the fact that one could be just as good, or as bad, as the other. It depended on the administrators. However, municipalities were at a great disadvantage since they regarded all engineers, whether civil, mechanical or electrical, as engineers and paid them all alike, whereas electrical engineering had gone ahead much faster than the other branches, and because of the higher and more obtruse mathematics required, students preferred the other branches, resulting in fewer and fewer electrical graduates being produced. Also more and more electrical engineers were leaving municipal service for greater rewards elsewhere, and unless municipalities were prepared to run their major trading undertakings on totally different lines and totally different scales to the others, they would find themselves in great difficulty. The ideal, if it were possible, would be to extract the electricity undertaking from the general municipal set-up and run it independently but still under an electricity committee.

Mr. C. LOMBARD (Germiston) was of the opinion that an organisation similar to the Rand Water Board was quite

unnecessary to serve the conglomeration of Reef towns, since Escom's power lines criss-crossed the area and, due to the reduction in mining load, would be adequate for many years with only minor strengthening and alteration. Generally, towns could tap Escom networks at more than one point if they so wished. He mentioned also that the legal position on the Reef was that municipalities had a co-existent right with Escom to supply industries, and that as specialists in the retailing of electricity they were not afraid of competition and quite able to hold their own.

Question 3: What progress has been made in the development of ploughing by electricity? Are forms of equipment available? Should research be sponsored by the A.M.E.U.?

Mr. W. H. MILTON (Escom) said that this was a matter in which the agricultural unions of Southern Africa had shown interest. While there had been developments in the use of electricity for ploughing, this was restricted to areas where labour is scarce and expensive and farming is intensive. The A.M.E.U. would be well-advised to leave the education of farmers on the subject to the Government Department concerned, which was much better-equipped to handle it.

Mr. G. J. MULLER (Bloemfontein) felt that there were no possibilities in South Africa for electric ploughing so long as farmers insisted on using unskilled labour. He had read of electric ploughing in Germany, using two self-propelled portable winches with temporary connections, but was of the opinion that the ordinary farm labourer in this country could not cope with it.

Question 8: In several of the larger centres, facilities have now been provided by the Technical Colleges for the training of Engineering Technicians. Would members please comment on their experience regarding the training and employment of Engineering Technicians as a means of alleviating the shortage of engineers?

Mr. V. F. CHECKETTS (Pretoria) stated that the Steel and Engineering Industries Federation of South Africa (SEIFSA) had formed a committee to promote a system of training similar to that existing in most industrial countries, which would be a valuable supplement to the training given by universities and technical colleges, and contribute greatly to the availability of technician engineers. The "sandwich course" started by some technical colleges had not been entirely successful and the SEIFSA committee is working on a college based scheme operated by the technical colleges, which should attract youths who are suitable for engineering training but who are at present lost to other non-technical occupations.

Mr. H. T. ASPINALL (Pretoria) welcomed the assurance given by Mr. Checketts that active support in the training of technicians would be forthcoming from SEIFSA. It was too early to say that "sandwich-course" training, which was very successful overseas, would not be equally successful here in the years to come. However, the general lack of support from the municipalities, with the notable exception of Johannesburg was very disappointing. Possibly the A.M.E.U. could sponsor a scheme, say for college-based students, to overcome the loss of boys of outstanding ability in towns throughout the Republic.

Prof. A. F. P. J. HEYDON (Stellenbosch) agreed that there is a great need for the technician engineer, but felt that

the sandwich course should be replaced by full-time intensive training at technical colleges, since it is a prolonged agony for a man to follow two professions, the one of working for his firm and the other of learning.

Mr. J. E. MITCHELL (Hon. Member) said that one should distinguish between Technician Engineers and Engineering Technicians, and claimed that the apathy shown by municipalities in the Republic was not true of the Rhodesias, where a scheme similar to that proposed by Professor Heydorn had been set up. The student stays at school for one year after matriculation taking advanced mathematics and physics, after which he spends another year full-time at a technical college, taking Part I of the I.E.E. examination. He is then sponsored as pupil engineer by an industry and goes on to Parts II and III. If he only gets Part II, he still makes a first class technician engineer. However, there was a dearth of suitable applicants due to the low standard of mathematics in the secondary schools. Coming to the Engineering Technician, power systems have more and more instruments and devices requiring men with a high degree of technical knowledge as well as skill for their operation and maintenance. There was also a great lack of such people, in spite of the existence of excellent courses of training in the Republic.

Mr. A. A. MIDDLECOTE (Pretoria) felt that Mr. Mitchell had interpreted Technician Engineer as a man who had become a professional engineer without attending university. This was incorrect. There was only one grade between artisan and professional engineer, and whether he was called a Technician Engineer or an Engineering Technician he was in fact an Engineering aide.

Mr. R. W. KANE (Johannesburg) said that when the scheme was first started it was hoped that it would enable boys with the ability, but without the finances to go to university, to ultimately reach professional status through membership of the appropriate Institute. However, there was some doubt whether either the universities or the Institutes would accept what has gone so far, resulting in some discouragement to the youngsters.

Mr. M. H. L. BOSHOFF (Graaff-Reinet) pointed out that many capable men were lost to the profession because they could not attain degree status by part-time study, and because they were denied corporate membership of the Institutes through lack of facilities for laboratory training. Apprentices who progressed as far as possible in their studies felt that they were neither artisans nor engineers.

Mr. H. T. ASPINALL (Pretoria) expressed sympathy for the views of the previous speaker and said that there were courses available in South Africa leading to a technician's diploma in mechanical or electrical engineering which was of a standard equal to but much broader than the National Engineering Diploma. A further two years' part-time study led to the higher National Diploma which is equivalent in standard to that of the London Institutes. The department of Education, Arts and Science was considering the introduction of a further two-year part-time course leading to the Diploma in Technology which would be of a standard comparable with the overseas Diploma. It was vital that the youth should have continuity of study at the technical college. While the possibility of introducing an extra-mural B.Sc. (Engineering)

degree course was negligible, it was felt that Mr. Boshoff would be more than satisfied with the introduction of the scheme outlined.

Mr. G. J. MULLER (Bloemfontein) expressed the view that one of the municipalities' difficulties in supporting the sandwich scheme arose from the wide variety of staff employed. Others would complain if one section was favoured. He supported Prof. Heydorn's idea of relatively short intensive training. It was also possible for an apprentice to complete his indentures, save his money and put himself through university.

Prof. A. F. P. J. HEYDORN (Stellenbosch) said that the Technician Engineer was mid-way between the artisan and the professional engineer. His training should be devised accordingly — the ordinary apprenticeship was not required. Sponsorship by firms or municipalities was wrong. If bursaries were needed they should be provided on merit.

Mr. A. JACKSON (Cape Town) put it that we did not suffer from a shortage of engineers. We suffered from a shortage of people to take the burden of work off engineers and allow engineers to get on with engineering work.

QUIZMASTER said that the means for the training of technician engineers were in existence but that it needed a great deal of enthusiasm from employers and youngsters alike to get the system moving.

Question 22: Profit by public utilities has come to be regarded as anti-social. Is this a correct view of current opinion and if so, can the system of free enterprise work without it? In other words, can an integrated economy combine successfully public utilities working without profit and the remainder of the economy doing so?

Will not the public utility which does not include profit on capital employed in the expenditure to operate, say a foundry, always be able to prove to its Board or Council that it can produce castings cheaper than any concern in the private sector? If so, does not the inference follow that slowly (or fast) the one swallows the other? When that happens, will not profit be restored by the State as is necessary in a collectivist system as practised in Russia?

Mr. J. BERRY (Johannesburg) thought that this was a matter of far wider importance than to the A.M.E.U. Public Utilities that took more for their services than the costs of production plus the financial charges they have to meet on capital outlay were not acting in the public interest. Such profits were really a form of tax.

A public utility operating say, a foundry, would almost certainly not get its costs as low as a private enterprise which was subject to competition. There was no question of the former diverting the latter out of business, however since there were a number of other people in the country requiring its services. But the latter's possibilities of getting into the export market would be prejudiced.

Mr. W. H. MILTON (Escom) agreed with Mr. Berry that public utilities should not enter into competition with private enterprise in fields which formed a small part of the former's business but a large part of the latter's. Regarding profits, he felt that the Electricity Supply Industry was expanding so rapidly that it must provide funds from its sales similar to the

reserve funds maintained by private companies to meet some of its capital requirements, since capital from other sources was limited.

Mr. T. C. STOFFBERG (Pretoria) asked Mr. Berry whether he regarded ISCOR as a public utility and whether the "ploughing back" of ISCOR profits into development and expansion constituted indirect taxation. If not, would he not accept kindly the same procedure being followed by ESCOM and by the Municipal Electricity Undertakings?

Mr. J. BERRY (Johannesburg) replying to Mr. Milton, pointed out that in his previous remarks he emphasised that the costs of public utilities included capital charges, while in private enterprise they did not. The reserve fund in private enterprise was justified.

With regard to Mr. Stoffberg's question, ISCOR was not a public utility. It was a company, the shares of which were owned by the state, and was quite different to ESCOM or any municipal undertaking. ISCOR could legitimately create reserves from profits, in the manner of other companies.

Mr. J. E. MITCHELL (Hon. Member) thanked the Quizmaster for his efforts.

WRITTEN CONTRIBUTIONS TO QUESTIONS 18 AND 21

Question 18: Have any attempts been made to introduce plastic insulated H.T. power cables in the Republic? It is understood that this type of cable is at present being used on the Continent and the U.S.A. up to 15 kV, and in the United Kingdom up to 11 kV.

Mr. J. A. MORRISON (Johannesburg) wrote that neither the suppliers nor the users were really confident in the long term life of these cables, in view of the susceptibility to discharges in void space of plastic materials. The difficulty was to maintain the very exacting specifications under mass production methods. Engineers in South Africa would be well advised to wait until greater manufacturing and practical experience had been obtained.

Mr. V. H. WOODS (Vereeniging) wrote that PVC insulated cables for 3.3 kV earthed neutral system were now standardised (B.S.S. No. 3346) and manufacture of these presents no difficulties.

PVC insulated cables for use above 3.3 kV were not likely to be standardised owing to the high dielectric losses inherent in plasticised PVC. Attention was being turned to the use of extruded polythene for 11 kV cables, but probably many years would elapse before high tension plastics cables could offer any serious competition to paper insulated cables.

Question 21: The short circuit ratings of paper insulated power cables is generally determined by the temperature rise of the cable conductor. The figure which has so far been accepted as a safe maximum temperature is 120 degrees centigrade which was originally recommended by S. W. Melson of the C.M.A. in his discussion on the I.E.E. paper "Safeguards against Interruptions of Supply". (Journal I.E.E. 1939, 82, p479).

Considerable savings are possible if this temperature barrier can be increased. Distribution Engineers in Britain are in favour of the barrier being increased to 160 degrees Centi-

grade especially now that the results of the extensive tests carried out by Gosland and Parr under the instructions of the E.R.A., have become known (E.R.A. — report, reference F/T 195:1960). What are the comments, especially from the point of view of the cable manufacturer?

Mr. V. H. WOODS (Vereniging) warned that there was insufficient reliable information available from local sources to support an increase in the figure of 120 degrees Centigrade. The mechanical effects, i.e. conductor expansion and electromagnetic disruptive forces, as well as thermal effects in the lead sheath due to fault current must also be considered. The final conductor temperature of 120 degrees Centigrade had given a reasonable margin of safety and engineers would

be wise not to deviate from it without full investigation of all factors concerned.

Mr. D. G. SUTHERLAND (Pietermaritzburg) advised that the paper by Messrs. Gosland and Parr entitled "A Basis for Short-Circuit Ratings for Paper Insulated Cables up to 11 kV" covered only belted type cables and further work would require to be completed before similar information on screened type 11 kV cables could be published. It was therefore recommended that the short circuit ratings for belted type paper insulated cables with copper conductors up to 11 kV should be based on the limits given in the E.R.A. Report F/T 195 (Table 10), with the additional requirement that the minimum time for clearance of a short circuit should be taken as 0.2 second.

THIRD DAY

On resuming:

THE PRESIDENT: Gentlemen, it is my first duty this morning to welcome members of the Association who have recently joined us. We accept their presence here at this Convention with great pleasure.

ENGINEERING MEMBERSHIP: The first one is Mr. A. D. Kinsman, Deputy City Electrical Engineer of Durban; Mr. J. D. van Niekerk, Town Electrical Engineer of Alberton; Mr. T. H. Baillie, Town Electrical Engineer of Broken Hill; Mr. E. E. Steele, Town Electrical Engineer, Ndola; Mr. R. J. G. Stanton, Deputy Town Electrical Engineer, Ndola; Mr. E. H. Surtees, Electrical Engineer, Dundee; Mr. M. H. L. Boshoff, Town Electrical Engineer, Graaff-Reinet; Mr. G. T. Honiball, Town Electrical Engineer of Windhoek; and Mr. D. L. Rishworth, Town Electrical Engineer, Odenaalrus.

ASSOCIATE MEMBERSHIP: Mr. A. Rossler, Electrical Engineer, Cradock and Mr. S. J. Liebenberg, Electrical and Mechanical Engineer, Department of Bantu Administration and Development.

ASSOCIATES: Mr. F. de Witt, Town Electrical Engineer, Adelaide and Mr. G. A. Huysamen, Electrical Engineer, Postmasburg.

The Councillors which have joined us, are the Municipal Associates and Councils of Broken Hill, Northern Rhodesia; the Borough of Dundee; and the Municipality of Adelaide.

Gentlemen, we welcome these Engineers, Associated Members and Councils, into the body of our membership and we trust that they will derive as much value from attending the conventions as we do ourselves.

A short announcement—it comes from Cape Town. Should any of our members be proceeding to Cape Town after this Convention, you may be interested to know that the Cape

Western Local Centre of the S.A. Institute of Electrical Engineers will be having its monthly meeting at Electricity House, Strand Street, Cape Town, next Thursday evening at 8 p.m. when a very interesting paper on "Street Lighting" will be presented.

If you look at the Agenda and Programme you will see on Page 49 the Annual Report of the Secretaries. I take it you have all read this report by our very efficient secretaries. If there are any questions I hope that I don't have to answer them!

The report covers Obituary, Thirty-Fifth Convention, Membership, Finance, Executive Council, Regional Branches, and so on.

Would anyone like to say anything about the Secretaries' Report — either in helpful criticism or wishing any alteration to be made. Don't ask for additional information because it costs a lot of money to print it.

If there is no discussion, I will call on Cfr. W. F. Meyer to propose a vote of thanks.

Cfr. W. F. MEYER (Welkom): Mr. President, I would like to extend a vote of thanks to the Secretary and his Staff for all the hard work which they have done in the past year.

In this respect I must also thank him for his generous co-operation with the Executive. The minutes were always in order and on time, and arrangements which were made by him in regard to conventions were perfect. I have read through Mr. Ewing's report, but I could not find anything remarkable to comment upon. This does not necessarily mean that Mr. Ewing is not a capable man. To my mind he is remarkable in two respects: he has his firm of business in Johannesburg, but he lives a few miles away from East London, and yet he runs his office perfectly. Secondly, he appears at Executive Council meetings with a beautiful edition of the opposite sex at his side, and although several delegates

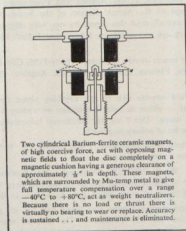
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have attempted to discover the origin of his sources of supply he has managed to keep it secret.

Mr. die President, hy het 'n enorme hoeveelheid werk in die samestelling van hierdie Konferensie ingesit en meeste van tyd het hy agter die skermes werk. Maar sy werk tot nou toe was 'n groot sukses en hy het alles perfek gereël vir hierdie Konvensie.

The Report appears to be in order and the accounts reflect a handsome balance. I therefore move that we adopt the Annual Report and Accounts of the Secretaries, and that we pass a hearty vote of thanks to Mr. Ewing and his Staff.

THE PRESIDENT: Dankie Raadslid Meyer. I call on Mr. J. C. FRASER to second the vote of thanks.

Mr. J. C. FRASER (Johannesburg): Mr. President, ladies and gentlemen; it gives me great pleasure in seconding the adoption of this report. And in doing so I would like to extend my personal thanks to Mr. and Mrs. Lombard who had a very successful year of office, and to you, sir, and Mrs. Giles for a happy and successful year.

In dealing with the report I would like to refer to two of our old and faithful members who have passed on to higher service during the last year, Messrs. Taylor and Arthur Rodwell, with whom I have been closely associated for many years. I wish to refer to them as General Manager and Chief Clerk of Electricity Department in Johannesburg, which was very honourable, but for the work they have done for this Association.

I can well remember the time when Arthur Rodwell was battling very hard to keep this Association going, particularly in the 1944-45 period when most of the other senior members had other work to do.

I was responsible for asking Andrew Taylor to take over the secretaryship of this Association, and I think he did a remarkable 10 years' service. When he felt he could not carry the job any longer, he helped me to find and acquire the

secretary whom you have today — and I don't think you have any complaints.

Sir, I think we older members feel that you do not pay sufficient attention to the work that has been given to the association by the older members, and I would like to suggest if I may, that the Executive Committee make a proper and fitting memorial such as a photograph and write-up, either as a separate budget, or in the journal which you are going to issue for this Convention, and, in doing so, send one to each of the widows of the deceased with a letter from the President.

I was pleased to read the report and I find that the papers that you had at Livingstone were apparently the forerunner of getting somebody to move in this land, particularly the papers on hydro-electric power station. Whether it was a coincidence or not, since then we have heard about what this country is going to do about hydro-electric schemes.

I appreciate the remarks made by the Secretary in connection with the finances; they are in a healthy condition; and also the work done by the Secretaries during the interval between Conferences, as that is where the work is usually done.

Mr. President, ladies and gentlemen, I have much pleasure in endorsing the remarks made by the Councillor from Welkom, that we adopt the Annual Report of the Secretaries.

THE PRESIDENT: Thank you.

I will be glad if you will acclaim the Secretaries' Report, and show Mr. Ewing how much we appreciate his hard work in the usual way. (Applause.)

THE PRESIDENT: I have to thank you on his behalf! Thank you gentlemen.

I now have to put to you that we appoint the Auditors for the accounts for the ensuing year. The previous Auditors, (their names appear on Page 52) are Savory, Brink, Cremer & Co.

(The appointment of the Auditors for the ensuing year was unanimous.)

Annual Report of the Secretaries

To the President and Members of the Association,
Mr. President, Gentlemen,

It gives me great pleasure to submit to you the Annual Report of your Association together with the Revenue and Expenditure Account and Balance Sheet for the financial year ended 28th February, 1962.

OBITUARY :

I deeply regret having to record the passing of Members and others who have been connected with the Association.

Firstly, I wish to refer to the passing of Mr. Andrew Taylor who occupied the position of Secretary of our Association from December, 1945, to 30th June, 1955. Mr. Taylor joined the Electricity Department, Johannesburg in 1902 and rose to the position of Chief Clerk. He retired in September, 1945. He saw active service during the First World War from August, 1915 to April, 1919.

Jaarverslag van die Sekretaris

Aan die Voorsitter en Lede van die Vereniging,
Meneer die Voorsitter en here,

Dit verskaf my groot genoë om aan u die Jaarverslag van u Vereniging tesame met die Inkomste- en Uitgawerekeninge en Balanssaat vir die boekjaar geëindig 28 Februarie 1962 voor te lê.

STERFKENNIS :

Met groot leedwese moet ek melding maak van die heengaan van lede en ander wie aan die Vereniging verbonde was.

Eerstens wil ek die afsterwe meld van Mnr. Andrew Taylor wie die betrekking van Sekretaris van ons Vereniging beklee het vanaf Desember 1945 tot Junie 1955. Mnr. Taylor het by die Johannesburgse Elektrisiteitsdepartement aangesluit in 1902 en gevorder tot die posisie van hoofklerk. Hy het in September 1945 afgetree. Gedurende die Eerste Wêreldoorlog het hy aktiewe diens gedoen vanaf Augustus 1915 tot April 1919.

In the passing of Mr. Arthur Rodwell, the Association has lost one of its best known and beloved characters. Mr. Rodwell was president of the Association in the years 1936/7 and 1944/5 having joined the Association in 1924. He was appointed an Honorary Member in 1945. Mr. Rodwell was born in England in 1884 and immigrated to South Africa in 1906 where he joined the Johannesburg Electricity Department. He retired from the position of General Manager of the Electricity Department of that City in 1944, having held the position since 1930.

Another Engineer Member of the Association, Mr. G. A. H. Schaftenaar of Graaff-Reinet, also passed away during the year under review.

THIRTY-FIFTH CONVENTION :

The 35th Convention of the Association was held in Livingstone from Monday, 1st May, 1961. Delegates were welcomed to Livingstone by His Worship the Mayor, Councillor Slutzen. A welcome was extended to the Convention by the representative of the City Council of Germiston, Councillor C. R. Paintin. The Convention Proceedings were officially opened by the Hon. G. W. R. l'Ange, C.B.E., M.P., Federal Minister of Works. The total attendance of members, delegates, representatives, officials, visitors and ladies numbered 353.

On behalf of the President, members of the Association and all others who attended the Convention, I have pleasure in recording appreciation to His Worship the Mayor and Town Councillors of Livingstone for the hospitality extended by them. I also wish to extend sincere thanks to Mr. W. Beesley and other officials of the Municipality for their unstinted assistance in the organisation of the Convention. It is also my pleasure to record the appreciation of all concerned for the assistance and support given by the City Council of Germiston to the Convention. To the President, I have much pleasure in placing on record the appreciation of all concerned for his efficient and pleasant discharge of his duties. Our grateful thanks are also extended to Mrs. Lombard for her support and with her name I wish to couple that of Mrs. Beesley.

A highlight of the Convention was the visit by practically everyone present to the Kariba Power Station and our grateful thanks are extended to the Chairman and members of the Federal Power Board who together with members of their staff made the visits possible.

The Papers presented to the Convention dealt, to a great extent, with Hydro Electric generation. Those dealing with this aspect were "The Kariba Project" by Mr. G. R. Peterson, B.A., M.I.E.E., M.I.Mech.E., M.Rhod.I.E. and "The Utilisation of Hydro Electric Power in the Union of South Africa", by Mr. C. E. R. Langford, M.I.E.E., M.(S.A.)I.E.E. These Papers proved to be of outstanding interest. The Paper "Supervisory Remote Control of a Distribution System" by E. Brod, Dipl. Ing., A.M.I.E.E., which dealt with the system adopted by the City of Salisbury, was of practical interest and brought forth instructive discussion. The Paper "The Application of 'Audiofrequency' Remote Control on an Electricity Supply Undertaking's Distribution Network" by J. K. von Ahlfen, B.Sc., B.Sc.(Eng.) resulted in animated discussion of a most informative nature. The high standard of members' Forum was again well maintained and our thanks are

Met die heengaan van Mnr. Arthur Rodwell het die Vereniging een van sy bes bekende en mees beminde karakters verloor. Gedurende die jare 1936/7 en 1944/5 was Mnr. Rodwell Voorsitter van die Vereniging nadat hy in 1924 by die Vereniging aangesluit het. In 1945 is hy as Erelid aangestel. Mnr. Rodwell is in 1884 in Engeland gebore en het na Suid-Afrika emigreer in 1906 en by die Johannesburgse Elektriese departement aangesluit. In 1944 het hy as Algemene Bestuurder van die Elektriese departement van daardie stad afgetree nadat hy daardie posisie sedert 1930 beklee het.

Nog 'n Ingenieurlid van die Vereniging, Mnr. G. A. H. Schaftenaar van Graaff-Reinet is gedurende die jaar onder oorsig oorlede.

VYF-EN-DERTIGSTE KONVENSIË :

Die 35ste konvensie van die Vereniging is gehou in Livingstone vanaf Maandag 1 Mei tot Donderdag 4 Mei 1961. Afgevaardigdes is in Livingstone verwelkom deur Sy Edele die Burgermeester, Raadslid Slutzen. Woerde van verwelkoming is aan die konvensie gerig deur die verteenwoordiger van die Stadsraad van Germiston, Raadslid C. R. Paintin. Die konvensie is amptelik geopen deur Sy Edele G. W. R. l'Ange, C.B.E., L.V., Federale Minister van Werke. Die totale opkoms van lede, afgevaardigdes, verteenwoordigers, besoekers en dames het 353 beloop.

Namens die Voorsitter, lede van die Vereniging en alle ander persone wat die konvensie bygewoon het wens ek met genoeë ons waardering uit te spreek teenoor S.E. die Burgermeester en Raadslede van Livingstone vir die gasvryheid van hulle ontvang. Aan Mnr. W. Beesley en ander amptenare van die Munisipaliteit ook ons opregte dank vir hulle oorvloedige hulp by die organisasie van die Konvensie. Met genoeë wil ek ook die waardering van alle betrokke aantekening vir die hulp en bystand deur die Stadsraad van Germiston aan die konvensie verleen. Teenoor ons Voorsitter wil ek ook graag die waardering van ons almal uitspreek vir die doeltreffende en vriendelike wyse waarop hy sy pligte uitvoer het. Ons dank ook aan Mev. Lombard vir haar hulp en saam met haar naam wil ek ook dié van Mev. Beesley noem.

'n Glanspunt van die konvensie was die besoek deur feitlik almal teenwoordig aan die Kariba kragstasie en aan die Voorsitter en Lede van die Federale Kragraad wie in samewerking met lede van hulle personeel die besoek moontlik gemaak het gaan ons hartlike dank.

Verhandeling wat by die Konvensie aangebied is het grotendeels gegaan oor hidro-elektriese kragopwekking. Die wat oor hierdie aspek gehandel het was „The Kariba Project" deur Mnr. G. R. Peterson, B.A., M.I.E.E., M.I.Mech.E., M.Rhod.I.E. en „The Utilisation of Hydro-Electric Power in the Union of South Africa" deur Mnr. C. E. R. Langford, M.I.E.E., M.(S.A.)I.E.E. Hierdie besings was van uitstekende belang. Die verhandeling „Supervisory Remote Control of a Distribution System" deur Mnr. E. Brod, Dip. Ing., A.M.I.E.E., was gegaan het oor die stelsel aanvaar deur die Stad Salisbury was van praktiese belang en het leersame bespreking uitgelok. Die verhandeling „The Application of Audiofrequency Remote Control on an Electricity Supply Undertaking's Distribution Network" deur J. K. von Ahlfen, B.Sc., B.Sc.(Eng.) het 'n lewendige bespreking van baie leersame aard uitgelok. Die hoë standaard van die Ledeforum is weer goed gehandhaaf en ons dank geen weereens aan Mnr. J. Mitchell vir sy bestuur daarvan. In my vorige verslag het ek gewag gemaak

again extended to Mr. J. Mitchell for conducting the Forum. In my previous report, I referred to the fact that arising from the Forum at the 34th Convention, the Executive Council considered the possibility of giving greater opportunity for a discussion on the economic aspects of Municipal Electricity Undertakings. It will be noted that by the choice of Papers to be presented at the 36th Convention, this suggestion has been given effect to.

It was unanimously agreed to accept the invitation of East London to hold the 36th Convention in that city.

MEMBERSHIP :

The following new members were elected during the year ended 28th February, 1962.

Councillor Members :

Viljoenskroon Municipality.
Bedfordview Village Council.

Engineer Members :

W. F. Ploos-Van Amstel (Viljoenskroon).
G. D. Wiehahn (Bethlehem).
A. C. T. Franz (Cape Town).
W. P. Rattey (Orkney).

Associate Members :

J. A. Magowan (S.R. Electricity Supply Commission).

Affiliates :

Lodge Cottrell (Afrika) (Pty.) Ltd.
Farad (Pty.) Ltd.
The following resignations took place:

Councillor Members :

Gwelo Municipality.

Affiliates :

Aberdare Construction (Pty.) Ltd.
Morganite S.A. (Pty.) Ltd.

Associate Member :

Mr. A. B. Cowen (S.R. Electricity Supply Commission).
Comparative membership figures are as follows:

	1960/61	1961/62
Councillor Members	124	125
Engineer Members	118	122
Honorary Members	13	13
Associate Members	29	29
Associates	10	10
Affiliates	85	85

FINANCE :

The Income and Expenditure Account for the year under review and the Balance Sheet as at 28th February, 1962, which are submitted to you reflect an excess of income over expenditure for the year, of R457.00 (£228). The Accumulated Funds of the Association now stand at R9,377.00 (£4,688), which we consider a satisfactory position.

Messrs. Kane and Downey continued to constitute the Finance Committee for the Association during the year under review and once again, I thank them sincerely for their assistance. The support of the advertisers in the Proceedings is once again acknowledged with appreciation.

van die feit dat, voortspruitende uit die Forum by die 34ste konvensie, die Uitvoerende Raad die raadsaamheid van 'n beter geleentheid vir besprekings oor die ekonomiese aspekte van Munisipale elektrisiteitsondernemings oorweeg het. Opgemerk sal word dat aan hierdie voorstel uitvoering gegee is by die keuse van verhandelings wat by die 36ste konvensie aangebied sal word.

Daar is eenparig besluit om die uitnodiging van Oos-Londen om die 36ste konvensie aldaar te hou te aanvaar.

LIDMAATSKAP :

Die volgende nuwe lede is gedurende die jaar geëindig 28 Februarie 1962 verkies:

Raad Lede :

Viljoenskroon Munisipaliteit.
Bedfordview Dorpsraad.

Ingenieurlede :

W. F. Ploos-Van Amstel (Viljoenskroon).
G. D. Wiehahn (Bethlehem).
A. C. T. Franz (Kaaopstad).
W. P. Rattey (Orkney).

Deelgenootslede :

J. A. Magowan (S.R. Elektrisiteitsvoorsieningskommissie).

Geaffilieerdes :

Lodge Cottrell (Afrika) (Edms.) Bpk.
Farad (Edms.) Bpk.
Die volgende bedankings is ontvang:
Gwelo Munisipaliteit.

Geaffilieerdes :

Aberdare Construction (Edms.) Bpk.
Morganite S.A. (Edms.) Bpk.

Deelgenootslede :

Mnr. A. B. Cowan (S.R. Elektrisiteitsvoorsieningskommissie).
Vergelykende lidmaatskapsyfers is as volg:

	1960/61	1961/62
Raad Lede	124	125
Ingenieurlede	118	122
Erelede	13	13
Deelgenootslede	29	29
Deelgenote	10	10
Geaffilieerdes	85	85

FINANSIES :

Die Inkomste- en Uitgawerekening vir die jaar onder oorsig en die Balansstaat soos op 28 Februarie 1962 wat aan u voorgelê word weerspieël 'n oorskot van inkomste oor uitgawes vir die jaar van R457.00 (£228). Die Opgehoopde Fondse van die Vereniging staan tans op R9,377.00 (£4,688) wat ons as 'n bevredigende posisie beskou.

Mnr. Kane en Downey het aangehou dien as die Finansiële Komitee van die Vereniging vir die jaar onder bespreking en ek wil my opregte dank aan hulle betuig vir hulle bystand. Die ondersteuning van adverteerders in „Proceedings“ word weereens met waardering erken.

Association of Municipal Electricity Undertakings of Southern Africa

BALANCE SHEET — 28th February, 1962.

1961		£	R	1961		£	R
R8,920	ACCUMULATED FUNDS — —	4,688	9,377	R2	PRESIDENTIAL BADGE — —	1	2
9,490	Balance at 28th February, 1961	4,460	8,920		Nominal Value		
570	Add: Excess of Income over Expenditure for the year	228	457	99	FURNITURE AND FITTINGS— at cost less depreciation	45	89
	PROVISIONS — — — —	166	331	8,309	INVESTMENTS — — — —	3,569	7,138
180	Agents Commission — — — —	84	167	2,000	200 6% Permanent Paid Up Class "B" Shares of R10 each, fully paid — — — — —	1,000	2,000
178	Sales Commission — — — —	82	164	3,994	Fixed Deposit — — — — —	2,106	4,212
	SUNDRY CREDITORS — — — —	58	117	2,315	Savings Account — — — — —	463	926
992	SUBSCRIPTIONS IN ADVANCE — — — —	—	—	2,099	DEBTORS — — — — —	1,172	2,345
3,702	DEPOSITS ON LIVINGSTONE CONVENTION TRAVELLING EXPENSES — — — — —	—	—	182	PAYMENTS IN ADVANCE — — — — —	70	140
500	GRANT RECEIVED IN ADVANCE FOR LIVINGSTONE CONVENTION EXPENSES — — — — —	—	—	20	DEPOSIT — — — — — Davidson & Ewing (Proprietary) Limited.	10	20
				3,761	CASH AT BANK — — — — —	45	91
R14,472		£4,912	R9,825	R14,472		£4,912	R9,825

Davidson and Ewing (Proprietary) Limited
per R. G. EWING
Secretaries.

C. LOMBARD, President.

Report of the Auditors to the Members of the Association of Municipal Electricity Undertakings of Southern Africa.

We report that we have examined the books, accounts and vouchers of the Association for the year ended 28th February, 1962; we have satisfied ourselves of the existence of the securities and have received all the information and explanations we required. In our opinion the above Balance Sheet is properly drawn up so as to exhibit a true and fair view of the state of the affairs of the Association as at 28th February, 1962, according to the best of our information and the explanation given to us and as shown by the books of the Association.

Johannesburg, 15th March, 1962.

SAVORY, BRINK, CREMER & CO.,
Chartered Accountants (S.A.), Auditors.

Association of Municipal Electricity Undertakings of Southern Africa
 INCOME AND EXPENDITURE ACCOUNT for the year ended 28th February, 1962.

1961			1961				
38	Audit Fee	35	70	380	Income from Investments	206	412
—	Bad Debts—Advertising in Proceedings	80	160	78	Profit on Sale of Proceedings	84	169
28	Bank Charges	18	37	2,769	Subscriptions and Attendance Fees—Affiliates	1,139	2,278
3,882	Convention Expenses	1,316	2,632	3,492	Subscriptions—Council and Other	1,779	3,559
11	Depreciation—Furniture and Fittings	5	10	—	Sundry Revenue	5	9
726	Executive Council Expenses	222	443				
18	Insurance	5	10				
138	Postages and Telegrams (General)	66	132				
350	Printing and Stationery (General)	161	322				
1,800	Secretary Fees	900	1,800				
30	Subscriptions	15	30				
25	Sundry Expenses	110	219				
87	Telephone	52	105				
570	Excess of Income over Expenditure transferred to Accumulated Funds	228	457				
<u>R6,563</u>		<u>£3,213</u>	<u>R6,427</u>	<u>R6,563</u>		<u>£3,213</u>	<u>R6,427</u>

EXECUTIVE COUNCIL :

During the year under review following their resignation from their respective undertakings, two members of the Executive Council tendered their resignations. The members concerned were Messrs. J. E. Mitchell and J. L. van der Walt. The appreciation of the Association to these gentlemen for their services will be conveyed to them in Convention at an appropriate time but, at this stage, I wish to place on record our very sincere thanks to them for their support in the past and also to convey our best wishes to them in their new spheres.

REGIONAL BRANCHES :

The Regional Branches in the Eastern Cape and Natal continued to function satisfactorily during the year under review.

MID-YEAR EXECUTIVE MEETING :

Germiston acted as host for the Mid-Year Executive Meeting in 1961. On behalf of all concerned, we conveyed thanks to His Worship the Mayor and Councillors of that city for the hospitality extended on that occasion.

SUB-COMMITTEES AND REPRESENTATIVES :

Once again it is our pleasure to convey the appreciation of the Association to members of the various Sub-Committees as well as Representatives to other Technical Committees and Organisations for their invaluable work on behalf of member undertakings during the year under review.

To you, Mr. President and all Members of the Executive Council I express sincere thanks for the assistance and courtesy extended to us during the past year.

To the Association and all its Members we extend best wishes for 1962/63.

R. G. EWING,
for Davidson & Ewing (Pty.) Ltd.

15th March, 1962.

Secretaries.

UITVOERENDE RAAD :

Gedurende die jaar onder bespreking het twee lede hulle bedankings ingedien as gevolg van hulle bedankings uit hulle respektiewe ondernemings. Die betrokke lede was Mnr. J. E. Mitchell en J. L. van der Walt. Die Vereniging se waardering aan hierdie twee here vir hulle dienste sal op 'n gepaste tyd in konvensie aan hulle oorgedra word dog in hierdie stadium wil ek ons oprepte dank aan hulle betuig vir hulle ondersteuning in die verlede en hulle ook die beste toewens in hulle nuwe werkkringe.

STREEKSTAKKE :

Gedurende die jaar onder bespreking het die Streekstakke in Oos Kaapland en Natal steeds bevredigend funksioneer.

HALFJAARLIKSE UITVOERENDE VERGADERING :

Germiston het as gasheer opgetree vir die halfjaarlikse Uitvoerende Vergadering in 1961. Namens alle betrokke persone wil ons Sy Edele die Burgermeester en Raadslede van daardie stad vir hulle gasvryheid by daardie geleentheid bedank.

OIDERKOMITEES EN VERTEENWOORDIGERS :

Weereens wil ons met genoë die Vereniging se waardering uitspreek teenoor die verskillende Onderkomitees sowel as verteenwoordigers na ander tegniese komitees en organisasies vir hulle waardevolle werk ten behoeve van lidmaat ondernemings gedurende die jaar onder bespreking.

Aan u, Mnr. Voorsitter en al die lede van die Uitvoerende Raad my innige dank vir die bystand en hoffikheid aan ons gedurende die afgelope jaar betoon.

Aan die Vereniging en al sy lede ons beste wense vir 1962/63.

R. G. EWING,
namens Davidson & Ewing (Edms.) Bpk.,

15 Maart 1962.

Sekretaris.

ASSOCIATION OF MUNICIPAL ELECTRICITY UNDERTAKINGS OF SOUTHERN AFRICA

Schedule 1

PROCEEDINGS

Advertising (gross)	---	---	---	---	---	---	---	---	1,683.00	
Sales	---	---	---	---	---	---	---	---	438.00	2,121.00
<i>Less:</i>										
Cost of Printing	---	---	---	---	---	---	---	---	1,690.91	
Provision for Sales Commission	---	---	---	---	---	---	---	164.30		
<i>Less:</i> Overprovided 1961	---	---	---	---	---	---	---	16.00	148.30	
Provision for Agents Commission	---	---	---	---	---	---	---	167.00		
<i>Less:</i> Overprovided 1961	---	---	---	---	---	---	---	54.39	112.61	1,951.82
Net Profit on sale of Proceedings	---	---	---	---	---	---	---	---	---	R169.18

Gentlemen with your concurrence, we will continue with reports of the sub-committees and representatives. The first matter that we will be dealing with is the Electrical Wiremen's Registration Board. Can I call upon Mr. Kane to say something?

ELECTRIC WIREMEN AND CONTRACTORS AMENDMENT BILL 1962.

My report on the activities of the Electrical Wiremen's Registration Board was completed and in the hands of the Secretaries prior to the introduction of the above Bill during March, 1962, but it is felt that a brief summary of the alterations will be of interest and I also wish to raise a further aspect concerning the registration of wiremen.

The amending Bill sees the conclusion of the representations made by this Association and others at the request of the Board in 1953.

Summary of 1962 amendments.

(a) In the definition of wiring work the exemption for supply authorities' premises (but not their reticulations) has been deleted and additional exemptions include radio, telegraph, telephone installations and the cutting and threading of conduit.

(b) The minimum voltage has been altered from 110 volts to 40 volts thus conforming to the Wiring Regulations.

(c) An apprentice in his final year need not be subject to direct personal supervision. The expression "continuous supervision" has been altered to "direct personal supervision".

(d) A supply authority need not inspect elevator or escalator installations nor need he inspect work done by Government, Provincial or Railway authorities.

(e) Contractors throughout the Republic must be registered by supply authorities but an introductory period of one year applies. Note that this is Republic wide and is not confined to determined areas. A registered contractor can operate on one licence throughout the Republic but if he opens premises in more than one supply authority's area then a corresponding number of licences are required.

(f) Registered wiremen are no longer required to report their existence, addresses or active participation in wiring work annually as in the past.

The spirit of our representations in 1953 has now been accepted in this and earlier amendments to the Act with one exception wherein we suggested that the Wiring Regulations should be included in the regulations of the Act. As you know another approach to this problem has been adopted in the suggestion submitted to the U.M.E. that the Provinces adopt the practice of Natal.

The further aspect that I particularly wish to bring to your notice and I hope I will receive a directive in this matter, concerns the total determination of the Republic thus ensuring that nearly all wiring work is done by licensed wiremen.

During February and March of this year the Board considered the complete determination of the Republic and apart from requesting the Labour Department to express its views and examine the implications of such a step, it was also agreed that the members of the Board should approach their parent organization for an expression of opinion.

The Act has been in operation for over 20 years in certain determined areas and for a lesser period in other areas. Since the Act is primarily designed to promote the general safety of all electrical installations it is felt that the whole of the Republic should be determined. If this takes place it will not apply once again to Government, Provincial and Administration work nor to any installations where a supplier of electricity is not involved. By that I mean any person generating electricity for his own use and not for supplies to others will not be affected.

Mr. R. W. KANE (Johannesburg): Mr. President, and City, Water and Electrical Engineers — I take it Mr. President, I can touch on all the various aspects of this Report.

I don't know whether the meeting wants me to go into detail through this supplementary report about the Wiremen's Act, but the amending Act was read for the third time roughly a fortnight ago, and apparently it will soon be law.

In the report which has been handed round, the summary of the 1962 amendments, there are one or two corrections I have to make.

When I say a Supply Authority need not inspect elevator or escalator installations, nor need he inspect work done by the Government, Provincial, or Railway Authorities, I should add, "... the supply authority need not inspect work done by or on behalf of the Government Provincial, or Railway Authorities ..."

Coming to the Registration of Contractors throughout the Republic, I give the impression here that the Registered Contractor only needs to have one licence unless he takes out or opens more than one premises. That is incorrect. Anybody wanting to work in any area must be licensed or registered by that supply authority. In other words if a man, for argument's sake has premises in Cape Town and wants to work in Springs, he has still got to take out the Springs registration, but Springs does not have to worry about his premises. They should accept the Cape Town premises. On the other hand, if he wants to open premises in Springs, then the present procedure applies.

I refer to the one exception where we originally suggested the Wiring Regulations should be accepted as regulations in terms of the Act.

For your information it was mentioned at the last Convention that we should do something about approaching the Provinces in connection with this promulgation of the Wiring Regulations, and your Executive during the year accepted that some approach to the Provinces should be made.

We have, in fact, prepared a memorandum which was submitted to the United Municipal Executive who have accepted this memorandum and commended it, the idea being that they should approach the four Provinces and suggest to them that they should adopt a common standard, or common application throughout the Republic, more or less on the lines of the Natal setup.

The Natal Ordinance has been altered I believe, and now states, apart from bye-laws for other building work, the Council may, in accordance with any bye-law in connection with premises prescribe, the requirements of the Electrical Wiring thereof, merely by reference to the Standard Regula-

tions of the Wiring of Premises by the South African Institute of Electrical Engineers incorporated, and reference is made to the necessity of keeping copies of the regulations at the principal offices of the Council and these to be available on inspection.

Although many of us feel that, to apply the regulations as a Code of Practice of the Wiremen's Act is the preferable method, nevertheless, there are many of the smaller authorities who would prefer to see these regulations more or less law.

We hope to persuade the four provinces to adopt the common practice of merely saying that these regulations are the requirements in passing wiring work.

The other advantage is that if the Wiring Regulations Committee in turn modifies any regulation, it can immediately take effect.

Finally, I'd like you to consider the possibility of the complete determination of the Republic in terms of the Wiremen's Act.

As you all know, when the Act came into force, about twenty odd years ago, some of the major centres were immediately determined, which meant that only licensed wiremen could operate in those centres. Since that time a number of other cities and areas have been determined but I believe 20 years ago they felt that a reasonable period would be necessary before complete determination was applied. One of the reasons was the possibility of the shortage of licensed wiremen.

With the amending Act (and the registration of contractors) completely throughout the Republic and with the recent possibility of compulsory standard specifications, and finally the adverse publicity in connection with electrical accidents throughout the country recently, it was felt that since the whole idea of the Wiremen's Act is safety every member of the Board has been asked to go back to their parent body and ask for an expression of opinion on the possibility of desirability of the complete determination of the country.

It doesn't mean another Act or anything like that. It means approaching the Minister for permission to determine the whole country.

I understand the Electrical Contractors are very keen on this. I have seen a report of the Trade Unions concerned, and they are also very keen on it. They seem to think there will be no hardship. And I, in turn, am asking you good people, who appointed me to the Board, for your opinion. I may get it today, but I would certainly like to get it by tomorrow.

The Act, as such, if a complete determination did take place, would mean that anybody supplying electricity would have to make sure that licensed wiremen were employed and by 'anyone', I am referring to even, shall we say, a small town where the local garage is the supply authority, if he supplies electricity anywhere else, only licensed wiremen can be employed.

On the other hand, in some of the towns, there is possibly the risk of hardship to certain existing employees. I can't speak for the Board; I can't promise anything at all, but since the Act was amended in a minor form some years ago, which gave the Board the right to supply certificates of

limited scope, these certificates of limited scope have been used in such cases where it would appear that a man has been doing the job for 20 years, but still hasn't got a licence. They have granted a certificate of limited scope for the specific job. Whether they will continue this practice with complete determination in the country, I don't know, but the Act provides for some help in cases of hardship.

I think I have covered those points Mr. President I would like to answer any questions if anybody has anything to raise.

Mr. J. L. McNEIL (Stranger): Mr. President, I was very interested in the paragraph in connection with the registration of contractors, because of an anomalous position we have at Stanger. Following a recent amendment in the Ordinance to Licensing By-laws, a contractor who is licensed in one Municipal Area may operate without a further licence in another Municipal Area.

But, for Municipalities supplying outside the Municipal Area, in our case the By-law necessitating the application for a licence would operate, and I would be very pleased to know whether this new amendment to the 1962 Electrical Wiremen and Contractors Act would eliminate that.

Mr. J. C. WADDY (Pietermaritzburg): Mr. President, I would like to get some additional information from Mr. Kane regarding the 1962 amendments, but first I would like to express appreciation for the effort he has put in over a period of about 9 years to sort these matters out at the meetings of the Board. The long time spent on this may perhaps qualify him to become a member of the Press Enquiry Commission, so it looks as though we might lose him in addition to our other two executive members.

The first point is the exemption of the supply authorities' premises, which is no longer to be allowed, and the fact that Government-owned premises will no longer have to be inspected by the suppliers. The fact that Government Premises will not have to be inspected may perhaps decrease our responsibilities but on the other hand there are aspects of it which may cause some difficulty. One of them is that neither the Government nor the Provincial Authorities appear to insist on wiremen being registered. Only recently, in Pietermaritzburg, one of the local contractors, through pressure from the Electricity Department, insisted on one of his wiremen getting a certificate but the man refused to do so and tendered his resignation, saying that he had been offered a position in the Provincial Administration where he would be able to work for the rest of his life without any difficulty of registration.

Whether the Government consider that public servants are expendable or not, I don't know, but for those of us who sometimes have to wait for up to two years for a reply to a letter to a Government Department in Pretoria, this may cause further difficulty. It might be a good thing if these employees were electrified but one wouldn't like them to be electrocuted!

Another point is in connection with provisional certificates. Provision was made a few years ago for these certificates to be issued for periods up to a maximum of two years but according to our local contractors considerable difficulty is experienced when their men apply for provisional registration. There appears to be quite a lot of delay and I am informed that a minimum educational requirement of N.T.C. II is now insisted upon. That is probably not unreasonable, but I would

like to know the requirements of the Board for the issue of provisional certificates.

Mr. R. W. KANE (Johannesburg): I think I should answer these as they come forward, if you don't mind.

First of all Mr. McNeil refers to licences. I frankly can't tell you what you can do in Natal. It is a question of dealing with your own Town Clerk, I think. But I do know that there is the ordinary business licence. I happen to know that, in Johannesburg, if a man has a retail business selling appliances and also running a contracting business, he has to take out the normal business licence plus contractor registration.

But if he is a pure and simple contractor, he hasn't to take out, to the best of my knowledge, the normal licence, but he has got to be registered by the town. I don't think that aspect of it can be dealt with here. It is a local problem. I'd like to put it this way: if a man comes to you to do a job of work in your area of supply, he has got to come to you for permission to do the work, and he has got to come to you to test it, so you register him, as a contractor in your area of supply, if he has got registration elsewhere. I think it is a matter for you to deal with with your own legal people.

Coming back to Mr. Waddy, "local authorities installations no longer apply" . . . The original Act quoted certain exemptions to wiring work and that exemption, or one of them, included supply authorities' premises. I think the intention was quite clear at that stage. They seemed to think that the Wiremen's Act need not apply to the inspecting body, and that would take, I should imagine, your power station, and your own offices, but when you find an official of the Council applying it to the native areas because it comes under the Council and the Council is the supply authority, and you find any building in the town that belongs to the Council not complying with the Wiremen's Act, we think it was being rather abused, and I have made it rather clear that your reticulation doesn't or isn't defined as wiring work. But any wiring work, whether it belongs to the Council or anybody else, and even the Government Buildings, are still defined as wiring work.

When you come to the provincial problem, or government problem — I think for many years people in this Association have complained bitterly about the Government bodies. Provincial bodies' attitude over certain installations. We know that, in the normal case, the P.W.D., G.P.O., the Railways, and any other authority, they do a first class job of work, but sometimes they are in trouble, they forget to notify you that they have done the work, they don't worry about licensed wiremen, because they can't get one, and then they adopt the attitude that the Act doesn't apply to them in any case.

The Act, as worded, still made it compulsory for the supply authority to test and take the responsibility, and all we've done in this amendment is to hand the responsibility back to the people to whom the Act did not apply! In other words they have got to take the responsibility for their contractors, or their own workmen.

I think in principle the Government Departments where they can will work to the principles of these various Acts.

The provisional licences — I seem to sense in this the same old story from any local contractor. He always seems to have very peculiar difficulties when he is trying to get something

done the easiest way. I think in the first place, and perhaps Mr. Groenewald will support me, or add what I fail to say — when a man applies for a licence it is necessarily first of all for him to prove that he has done wiring work. Then he is given permission to take the examination. If there is a case of hardship, out of work, and there is no doubt about it that he appears to be quite capable and has served his apprenticeship as a wireman, the board may provide a provisional licence, but certainly very seldom to a young man who has had ample opportunity through his apprenticeship, and in subsequent years, to even apply for permission to sit. Many of them don't do anything about it till the last moment and then they expect everything to come to a standstill just because they are in trouble.

On the other hand, those that have taken certain evening classes, or Technical School classes, and passed certain aspects, Electricians II, and have proved by their qualifications that they have gone somewhere along the line regarding the wiring regulations, those youngsters have no difficulty in getting a provisional certificate. But they get hammered if they work for six months without making any attempt to sit the examination during this period.

Sometimes the second or the first renewal of that certificate is refused.

I think you'll find that the contractor who has been complaining, if you investigate the full circumstances, could have looked after themselves a lot earlier.

Mr. A. JACKSON (Cape Town): Mr. President, I am very disturbed to hear Mr. Kane say that supply authorities will no longer inspect work done not only by Government and Provincial Departments, but work done on behalf of Government and Provincial Departments. I really think this is a retrograde step.

I would like to know whether that means work done on behalf of Government Provincial Authorities will not be bound by supply authorities' regulations. I think if that is the case and if this is what the Association has asked for, it is a very great mistake.

Provincial (and I speak particularly of Provincial authorities, because that is the work I have been acquainted with) . . . Provincial authorities employ ordinary contractors to work for them, and if there is any suggestion that a contractor, in doing work for Provincial or Government Department, can do work that doesn't comply with regulations, can do work in such a way that he gets away with things, because it isn't inspected, firstly it is going to encourage "slipshod" work for the Province or Government, and usually provincial and government buildings are public buildings, so that is not in the interests of safety.

Secondly, it will encourage the contractor to do "slipshod" work, not only for provincial buildings, but for private people generally. I am personally very disturbed to hear that supply authorities will no longer have to inspect that type of work.

The second point Mr. President, is in connection with the adoption of wiring regulations on the lines adopted in Natal.

I think there is one possible point of difficulty — certainly as far as the Cape is concerned—and that is to get unanimity amongst the municipal undertakings that they are happy with the regulations. I think at present that it is the main stumbling

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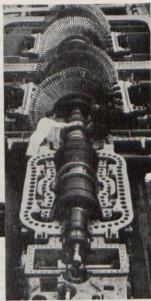
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block in the Cape, that, as far as I know to date there is not yet unanimity amongst the large undertakings, that they all agree as to what they want. If they do agree as to what they want, it makes things much simpler.

Mr. R. W. KANE (Johannesburg): I think the aspect of municipal regulations, wiring regulations, and many other requirements of the local supply authorities, have never really applied to any government or provincial body, and I wonder whether Mr. Jackson is admitting that the Province and the Railway and the Government have looked upon the supply authorities to do the check — the Clerk-of-Works' check — of their particular specifications.

Surely the government themselves initiated the specification, and must decide (whether it complies with the wiring regulations or not) that what they have paid for is according to their specification.

I don't think the supply authority comes into the picture at all.

I do want to make this point though — the Association did not ask, initially, for complete exemption from the responsibility of these inspections. The Association did ask that the Act should apply to all Government bodies and Provincial bodies, and that, at that time, brought the house down! That was some years ago. Your Government and Provincial bodies were not the least bit interested in toeing the line to any supply authority.

I mention one exception in our original requirements and that was a question of wiring regulations being regulations of the Act. This was one of the exceptions in a sense — just as in the lift installations, you have the farcical position of our inspectors who are not trained to deal with the modern installation of escalators and lifts, particularly with electronic devices, solemnly passing this installation with the Labour Department in the background conducting a thorough inspection, issuing a certificate, and continuing to inspect. You get a form of dual responsibility, and the Act as it stood initially made it very clear that the supply authority was responsible for all those different installations. We really had no control of them. And consequently if we couldn't apply the regulations to the Government Departments, the best thing to do was to let the Government Departments look after their own problems, and take the responsibility away from the supply authorities.

Mr. W. H. MILTON (Escom): As regards the determination of the Republic, I think it would be a very good step. All too frequently supply authorities dealing with areas outside their area of jurisdiction, find themselves in the position of having to accept wiring work done by non-registered wiremen in portions of the territory which they control, whilst right next door they have premises where the work must be done by registered wiremen.

Right From the very outset I maintained that provided we gave a reasonable amount of time for registration, registration should be universal where wiring work was being done, no matter how small or how large the place.

I think it has been proven in practice that until registration becomes compulsory no attempt is made to obtain registration by the individuals doing the work, and any of those who indicate that they are going to go for registration, as wiremen,

in a district where registration is not required, are looked upon by their colleagues as black legs, and trying to "pull a fast one" on them, and I think that human attitude is one which we must now overcome. I see no reason why people who are carrying out wiring work satisfactorily in terms of the wiring regulations as they are required to do cannot obtain registration with a little effort. I think we must force them to make that effort.

As regards the provincial registration, that of course is quite common when new requirements of this description are introduced, and I might remind you gentlemen of the introduction of the requirement of the certificate of competency. When that requirement was introduced, those people practising, and practising satisfactorily were given provincial certificates. Mind you, they were restricted to operation in the particular area in which they were employed at the time, they were not for general application. Therefore I see no reason to take any exception to the Registration Board's decision that it will issue such certificates in those particular circumstances, and, once again, in view of the type of work and the nature of the qualification required, I think they can go a little further than they did with the Certificate of Competency and grant those registrations for rather restricted periods.

In the case of the Certificate of Competence of course it was realised when the Act was introduced requiring the certificate of Competency that there were a number of older men who were operating in responsible positions who would find it virtually impossible to do the necessary theoretical work and study to pass a written examination for the certificate. So those certificates were for unlimited periods. In the case of wiring I don't think that difficulty really arises, and no matter how old a man is who is undertaking wiring work, I think he can obtain that certificate — given a little time.

Insofar as the question of Government Department inspection are concerned, we, in common with other people, have had difficulty.

On the other hand there is this difficulty which many of us are apt to overlook. The State cannot sue the State.

Infringements which may lead to "a case" — and "a case" becomes necessary that case would be instituted by the State — against whom? The State. So that you meet the ultimate difficulty, viz. if you were to have the authority, and it was necessary for you to test and approve wiring work done by the State, or any State Department for that matter, and turned it down, you reach the deadlock that if the State then connects its installation to your system on its own, you could not institute proceedings. So to avoid that debacle, I think it is necessary that the State be excluded from the provisions of the Act.

In the other hand a point which Mr. Kane did not draw attention to, and on which I would like his further comments, I note in his report he says that you "need not inspect that wiring work". One therefore presumes that if the State is having wiring work done by a wiring contractor, the State would be entitled to request you to inspect the premises. So that it is really up to the State, if the State is employing contractors to do its job, to say "we'd like you to test and inspect this work".

I don't think the provision of certificates by a consumer can be accepted as a valid indication that the work has been done in accordance with the regulations. Although it has been suggested on some occasions that such certificates should be produced before the work is inspected by the supply authority, the difficulty then arises as to the value and validity of any such certificate.

Mr. R. W. KANE (Johannesburg): First of all I'm sorry, I missed a point Mr. Jackson raised.

I think that was to do with the wiring regulations and the doubt in some authorities' minds to accept these regulations, because they don't apply or comply with their pet theories.

I think what has been proposed is a lot better than that which exists in the country at the present moment. I should say that until recently practically everyone in the country had promulgated by "The Red Book". In the Transvaal quite a few of us had de-proclaimed the Red Book but then using the Wiring Regulations as a code of practice in terms of the Act.

There were others who have not rescinded the Red Book, and when they were in trouble would use the Red Book, but in practice they were using the best out of the supplementary editions.

The same thing applied in the Cape, Natal and the Free State. Recently the Cape partly adopted the 1955 edition, to the best of my knowledge the 1955 regulations. But that was followed by the 1950 edition, and the wiring regulation: the committee of the Institute wasn't too popular because they dared to issue a revised edition when the two provinces, after three years, decided to promulgate an out of date edition. I think that we are proposing to do — whether the supply authorities accept it or not is another matter — is to have a common, easy way of making these regulations law, and this will be to the benefit of the country.

Coming to Mr. Milton's query: I think he referred to the testing of government installations on request. It will depend on the individual engineer and the circumstances of the case, but I do want to say this: that if you do test that installation you are then accepting the responsibility that that installation is perfectly safe and in order.

If they won't comply with the full requirements of the Act, why shouldn't they take the full responsibility in accepting any installation and take it away entirely from the supply authority?

The amendment as such says that there is no need to test work done by the government departments, or on their behalf, and therefore a contractor working for a government department, will be responsible only to the government department and not to the local authority. I don't say you shouldn't test, but I think it would be inadvisable to take that responsibility.

Mr. W. H. MILTON (Escom): Mr. Chairman, I must rise to speak again on a point raised by Mr. Kane which, to my way of thinking, is very misleading and very dangerous, and that because a supply authority tests, inspects and approves an installation, it does not involve that supply authority in any responsibility whatsoever in a court of law.

That was a point which the late George Swinger made in regard to the requirements for these regulations, which he pressed for in the very early days of this Association. He

insisted that such inspection was merely to ensure, as far as was humanly possible, that the work done had been done effectively, but it did not place upon the supply authority any legal responsibility for any damage or loss of life or injury which might arise as a result of faulty workmanship which had passed inspection. I think that is a most important point.

If you read the Act, and its amendment, I think you will be convinced that the Act is guarded on that point — not to place the responsibility on the supply authority, other than to carry out an inspection and a test.

So much of our wiring work is completely concealed and cannot possibly be inspected over every inch of the installation. The object of the tests is to determine, as far as possible, that the work has been done in accordance with certain minimum requirements for safety. But I do stress the fact that it does not place any responsibility legally on the supply authority for any resultant or consequent damage or injury.

Mr. G. J. MULLER (Bloemfontein): Mr. President, may I just ask a question? Perhaps Mr. Kane and/or Mr. Milton, — the point raised by Mr. Milton — can they tell us whether this has been established at law, that the supply authority is not responsible, legally, for work that has been inspected? The point has cropped up in quite a minor way.

We normally inspect all installations and on a re-inspection (we have routine inspections — and this installation must have been inspected about 10 years ago) the inspector found that one of the plugs had not been earthed. Whether somebody removed the earth or otherwise, I don't know. This owner claimed that we had inspected it and therefore he was not liable for the contractor's costs in putting this matter in order, and for lack of legal advice (this matter did not involve over much money) we smoothed it over departmentally, but it may involve at a later date something much more serious, and I would really like to know whether this has been legally established.

Mr. R. W. KANE (Johannesburg): I quite sympathise with Mr. Milton — and agree with some of his comments, and Mr. Muller's somewhat parallel problem, but I don't think it has been established in law that no responsibility exists with the supply authority. In many of our by-laws we state that we test for our satisfaction and nobody-else's; there is no guarantee of the quality of the installation, but I think one overlooks the fact that where an accident takes place there is such a body as the Labour Department who come in and conduct an inspection.

A particular member of this Association, some years ago, went to court because of an accident in his town, because of a failure to comply with the Wiring Regulations. There is a risk, and perhaps here we could hear from Mr. van der Walt what his version of this would be.

It is dangerous to talk in generalities. That is the point I am trying to make. There are certain accidents, and if they can prove that your inspection took place in a "sliphod" way, and not done properly, somebody is going to "get it in the neck"!

THE PRESIDENT: Thank you gentlemen, I suggest we now adjourn for tea.

CONVENTION ADJOURNED FOR TEA.

On Resuming:

THE PRESIDENT: I now call on Mr. Max Clarke, from Somerset East to read his paper.

Mr. M. P. P. CLARKE (Somerset East): Mr. President, ladies and gentlemen, in a Convention of this type where we have had a theme running through our papers, nobody would be particularly surprised to find a certain amount of overlapping taking place. I, personally, am very surprised to find

myself standing in the shoes of Jimmy Mitchell's gentleman, in the joke, the man who married a widow with 12 children, although I have been left something to do, but because of a certain amount of the coverage of my paper has been handled in discussions, and by the contents of some of the other papers, I propose rather to offer a few general comments and explanations on some of the points I have tried to get across, rather than read it verbatim to you.

(Applause.)

Load Factor and Consumer Maximum Demand

By M. P. P. CLARKE, B.Sc. (Eng.)

Town Electrical Engineer, Somerset East.

1. INTRODUCTION.

In common with most smaller Municipal Electricity Undertakings, Somerset East has experienced periods during its development when shortages of generating and distributing plant have resulted in difficulties and inconvenience for the consumers of electricity, and loss of revenue for the Undertaking. One such period was the winter of 1954, when rationing of electricity was resorted to on a large scale in order to reduce the system peak loads to the limits imposed by generating plant capacities. Coupled with the necessity for revising the then inadequate and uneconomic tariffs which existed, this proved to be a suitable time to give practical consideration to the introduction of a maximum demand type of tariff, which, as a means of reducing peak loads, was considered to be the most suitable method for the conditions obtaining in Somerset East and that likely to induce the greatest improvement to the load factor of the system.

The paper outlines the experience which has been gained since the introduction of this tariff and goes on to give details of the results which have been obtained over the years. Where possible, results have been collected from Undertakings that have been using a similar tariff for a number of years and, the whole question of load factor is discussed in an effort to focus attention to what is undoubtedly a subject of vital importance to all attending the Convention.

2. PLANT UTILIZATION.

It is difficult to imagine what our civilisation of mid twentieth century would be like without the machines and mechanical contrivances that make our modern living-conditions a reality, and yet, outside of the engineering profession, men and women pay amazingly scant attention to the machinery which they encounter in their day-to-day living. In a few cases, and the modern motor car can be included in this, the machines are treated to some thought as far as routine maintenance is concerned, but for the most part a machine is looked upon as something that would be nice to have for this or that purpose, or, that is put into service when required for some particular operation — and pity the machine that does not operate satisfactorily when called upon! One point is certain and that is, very few of the mechanical contrivances that are purchased by men and women are acquired after thorough examination of the real usefulness to which the particular machine can be put; to the majority of people far more thought is given to the problem of how to finance the transaction than to the basic economics of the matter.

Engineers, be they mechanical, electrical or civil engineers and employed by public bodies or private enterprises, are always faced with the twin problems of efficiency and finance and so the acquisition of machines has always been a matter for careful consideration to them. In the electricity supply industry in particular engineers pay careful attention to the proper utilisation of the costly plant and machines under their control, but whether this has been given all the attention which the subject deserves is a matter of opinion. Certainly, a fundamental term has been defined and brought into general use for gauging the extent of this utilisation, and, it is also certain that engineers apprehensively calculate system load factor at the end of each year and are greatly pleased if it is increased, and dismayed if it is decreased, compared with the previous performance of their particular undertaking. Furthermore, there are those who have pursued one or more of the accepted methods of reducing peak loads and applied them to their particular system; that these are not more extensively applied is proof enough that much thought and time must still be given to this problem.

Clearly, in an industry requiring a capital investment of the order of R15-00 per rand of income, from the sale of electricity — compared with an income sometimes as much as R45 for the same investment in most commercial and industrial establishments—there is every need for concern with improved utilisation of plant and equipment for, not only does the improvement in load factor mean the deferment of the installation of extra plant and the capital expenditure involved, but also, there is a direct effect on the economy of the Undertaking. Higher load factors are synonymous with higher off-peak loads, this in turn means higher efficiency of conversion in generating plant and the consequent overall improvement in energy and production costs.

In discussing the Nationalised Electricity Industry in Great Britain, Kelf-Cohen(*) expresses himself very strongly in this matter.

Discussing load factor on the British grid system (Table 1) he makes the following comments:

"... looking at the 10 years figures, one cannot resist the conclusion that since nationalisation nothing has happened to the load factor; if anything it is worse than ten years ago..."

and he follows by saying:

"Electrical Engineers are anxious to use the most efficient stations and classify them most scrupulously... But to

search for ways and means to maximise the use of the vast plant under their care does not seem to concern them. To do so would require some unorthodox thinking and departure from tradition. There would have to be some drastic modifications in tariffs; all this would not be easy and rather unpopular in the industry."

He reasons that with the vast capital expenditure involved in the British Electricity System the load factor, which has remained sensibly constant at about 50%, should have attracted much more attention than it has.

And yet, in a published report of the British Supply Industry^(*) in 1952 there is specific reference to the research then being done to eliminate or minimise the poor load factor on the grid system; the results as far as can be judged from Table I are not encouraging.

On the other hand, American Utilities seem to be in a somewhat better position and load factors of the order of 60% are usual.^(*)

The published statistics for South African Electricity Undertakings are not particularly encouraging when viewed overall; the latest^(*) published figures for the five largest municipal undertakings show the highest load factor to be 56.3% and the lowest 43.1%. Only five of the 320 odd municipal undertakings in Southern Africa have load factors of 60% or higher and about 250 have load factors below 50%.

Statistics for the generating stations on the Electricity Supply Commission's network are considerably better than those on our municipal systems and figures of 70% are produced.

3. CONDITIONS AFFECTING THE UTILIZATION OF PLANT.

It has been said that man is a creature of habit; for better or for worse we live within the broadly defined limit of our habits. The division of our day between wakefulness and sleeping, working and playing, sets into motion a chain of circumstances and conditions which have a bearing on the utilisation of the plant and machines which provide the requirements of our living. Geographic and climatic conditions and domestic and national characteristics all combine to play their part in affecting the load factor of electricity

supply systems; in America it was found that the extensive use of refrigeration plant and air-conditioning equipment, and the absence of electrical space heating load, materially assists in improving the load factor on the electrical utilities.

The trend to shorter working hours in commerce and industry and the greater use of higher electrical loadings in electrical appliances combine to minimise the use of installed equipment in electrical systems, while the improvement to be obtained by supplying industrial loads using the three-shift system of working can hardly be more graphically shown than by the figures mentioned above for the E.S.C. stations. These stations benefit from the large mining loads which are supplied from the network and, from the fact that on a large integrated network the diversity between groups of consumers is improved by geographic considerations.

This phenomenon of diversity between the loads of groups of consumers has very recently been taken to its logical conclusion to the benefit of the supply networks concerned, with the commissioning of the cross-channel cable link between Britain and France. But, while these conditions contribute to the better utilisation of generating plant, one must not lose sight of the fact that poor load factor on individual sections of an integrated network of this type may well exist and, that quite large items of distribution plant or equipment can be found on these systems for which the extent of utilisation leaves much to be desired.

Whether the natural diversity between consumers or groups of consumers that already exists, or which will develop by virtue of the more diverse use of electrical equipment of all kinds, can keep abreast of the downward trend in load factor caused by higher loadings of that equipment and by the influence of the equipment on our standard of living, as more and more electricity is consumed, is clearly a matter for speculation.

4. IMPROVEMENT OF LOAD FACTOR.

Any effort to make better use of the plant in an electricity supply undertaking must necessarily take into consideration that, firstly, there must be an improvement in the load factor of the individual consumers being supplied and secondly, either as an alternate to this or complementary to it, there must be greater diversity between the peak loads of these consumers. If a system of peak load control is applied to a group of consumers then clearly the load factor of the group will improve—and in general this is desirable and economically advantageous to the group—but obviously there will be sections of the network and individual items of equipment where the utilisation has not improved to the same extent. Systems are in use in which portions of the load of individual consumers is remotely switched to suit load conditions on the system as a whole; others again rely on the structure of tariffs to induce consumers to reduce individual peak loads, in either case an improvement in the load factor of the individual consumers results and there is an overall improvement to the systems.

Clearly, as the load factor of individual consumers increases there is a reduction in the diversity between their peak loads and therefore, while specific items or portions of plant and equipment may be utilised more fully it is possible, at least theoretically, that there will be no improvement at the central supply point. That an overall improvement does take place

	ELECTRICITY LOAD FACTOR	
	(1) Based on maximum demand supplied.	(2) Based on estimated maximum potential demand.
1947/48	48.4	45.8
1948/49	49.4	47.3
1949/50	48.1	43.1
1950/51	52.5	45.0
1951/52	51.3	47.6
1952/53	49.0	45.1
1953/54	46.3	43.8
1954/55	48.2	46.3
1955/56	48.1	44.4
1956/57	47.9	—

TABLE I: Load Factors on the Central Electricity Authority British Grid System.

was clearly illustrated in a paper read to the Convention at Livingstone, in which a description was given of the application of audio-frequency remote control on a distribution network. The paper made mention of one of the alternative methods of load control namely, the use of multiple tariff metering, and it is to this method that attention is now turned.

5. MULTIPLE TARIFF METERING.

For many years it has been accepted practice to use two or three-part tariffs as the basis of charges for electricity supplied to large power users. Whether this was motivated by a desire to improve the load factor of the system or merely to recover the costs of supplying the power in the most equitable way is not relevant; the fact is that the introduction of maximum-demand type tariffs provides the incentive for a consumer to reduce peak loads. The extent to which a reduction will be achieved will depend as much on the use to which the power is being put as on the relative cost of the "demand" portion of the tariff when compared with the tariff as a whole. The high cost of M.D. metering equipment has largely prevented this type of tariff being applied to the smaller individual consumers but the advent of more competitively priced demand meters and the introduction of miniature circuit breakers have undoubtedly assisted the introduction of these tariffs.

Some two-thirds of the energy supplied by our Municipal Undertakings is to domestic consumers and it is therefore obvious that a suitably designed M.D. tariff for smaller consumers must be of real value in improving the utilisation of plant on our systems. Of the 320 municipal electricity undertakings listed in Southern Africa there are now 18 using multiple tariff metering in one form or another for their smaller consumers; five years ago there were only four. That the introduction of miniature circuit breakers has assisted in promoting this type of tariff can be gauged from the fact that 12 of the 18 use these as the basis of their tariffs. No doubt the controversy "circuit breakers vs. ammeters" will continue for many years but an essential feature to either of these devices is that they can only succeed in the function of improving consumer load factor if the correct balance is maintained between the consumer's "demand" costs and his "energy" costs. It is obvious that a disproportionately small demand charge will provide little or no incentive for a consumer to reduce his peak load and therefore to improve his load factor, and that he will be content to pay that little extra in demand charge which may be necessary to ensure his continued unfettered use of the commodity.

Contrary to widely held beliefs the introduction of multiple tariff metering to smaller consumers is neither difficult nor particularly involved and within a matter of weeks the consumers adapt themselves to the changed conditions. As far as domestic consumers are concerned some difficulty arises in those installations using the modern heavy-loading electric stoves but even in these cases the sum of the loading of the oven and one plate can generally be maintained as the upper limit of the consumer's demand. In Somerset East one of the most widely adopted practices that was resorted to by domestic consumers, was to switch off the water heater as soon as the stove was required; in some cases the consumer was inconvenienced by a shortage of hot water, having forgotten to switch on again, but it is now possible to effect both of these operations automatically with a relatively inexpensive relay connected in the stove circuit.

6. RESULTS OBTAINED.

Table 2 shows the annual load factor of four towns in which some form of multiple tariff metering has been in use during the past five years. While each case shows clearly that there has been an improvement in load factor, it is important to realise that the loading on these networks is of a very mixed type; not only is there industrial and commercial load in varying amounts, but also, the domestic consumers other large numbers. Certainly in Somerset East, where only approximately one-third of the domestic consumers fall into the "all-electric" category, the improvement in system load factor has been contributed to by the development of various additional loads as well as by the introduction of the multiple tariff metering system.

On account of this, and in an effort to establish the extent of the improvement in the utilisation of equipment on the distribution network in those areas in which the load is predominantly domestic, since the introduction of multiple tariff metering, tests were carried out on selected feeders which supplied more or less exclusively domestic consumers having all-electric installations.

Table 3 shows the results obtained from these investigations. It should be noted that the Somerset East tariffs are based on the use of miniature circuit breakers and that figures for installed demand per consumer are readily obtainable. Also, the measured After Diversity Maximum Demands which are shown are those recorded during peak conditions in the winter period.

	ANNUAL LOAD FACTOR %									DOMESTIC CHARGE c/amp.
	1951	1952	1953	1954	1955	1956	1957	1958	1959	
WALMER			34.0	34.1	41.8	41.8	42.5	41.8	43.5	13
WINDHOEK			28.9	31.8	38.0	37.0	42.4	45.3	44.6	30
OUDTSHOORN			29.4	29.0	32.8	32.6	31.5	31.7	31.8	10
SOMERSET EAST	41.7	42.0	48.9	43.6	44.2	47.5	44.3	44.6	46.6	15

Table 2: Annual load factors for various undertakings.
Note: (i) 41.8 indicates introduction of M. T. metering.

(ii) Domestic maximum demand charges in cents per ampere from published figures for 1960/61.

From the table it will be observed that Feeder B has an average installed demand per consumer (12.9 amps) which is quite considerably lower than either Feeders A or C. All 29 consumers supplied from this feeder live in a Municipal housing scheme and these consumers fall into the "middle" or "lower-middle" income group; in the case of the other feeders the consumers can best be classified in the "middle" and "upper" income groups. The figures for the average annual consumption per consumer also give some guide to the nature of the consumers in each of the particular areas.

One has only to page through copies of the Proceedings of this Association to appreciate that A.D.M.D.'s of the same order as those shown in Table 3 are seldom attained; in fact some of the lowest will be noted in the 1959 proceedings, in the discussion on a paper based on reticulation in Montgomery Park, Johannesburg, where, in one area in Ladysmith, Natal, figures of 2.5 to 3.5 kW have been obtained with the use of load limiters.

During the five year period 1955 to 1959 the sales of electricity on the Somerset East system increased at an average rate of about 11% per annum and the sales for domestic purposes 3.7% per annum. The fairly high rate for the increase in total sales is due in part to expansion of the system into new areas of sunnily while the increase in the use of electricity for domestic purposes is almost entirely due to greater usage by existing consumers and the conversion of non-electric cooking and heating installations. There will be many engineers present who are acutely aware that the cost of running all-electric domestic installations in our smaller towns is considerably higher than that in the larger centres, and, that, as a consequence, the alternate forms of heating and cooking find a ready market. In this regard it is particularly interesting to record that the heavily insulated, continuous-burning, anthracite-fuelled cookers have enjoyed great popularity for many years and this, in spite of their initial cost.

7. CONCLUSION.

Electricity supply is an industry in which plant and equipment are available for almost continuous use; it is one in which the raw materials required for the generation of power—in the case of steam plant in South Africa—run to an annual expenditure of the order of two-thirds of that required to meet the charges for the loans which are required to acquire this plant. There is therefore a strong case to be made for developing ways and means to improve the utilisation of this equipment to the advantage of all, on an individual and a national level.

There can be no denying that developments have gradually taken place over the years, and, that methods have been evolved for the reduction of peak loads and the improvement of load factors, but if the issue is to be faced squarely it must be acknowledged that there is much room for improvement. Individual consumers should have greater incentives for improving the load factors of their own installations whether small or large, and in this respect engineers in the supply undertakings must take the lead.

Clearly, if the consumers of electricity have need for appliances or machines which have higher load factors in themselves or, in conjunction with other equipment within their installations, the suppliers and manufacturers of this equipment will develop ways and means of meeting this requirement.

From the experience and the results which have been obtained in Somerset East, I have no doubt that the development of a low loading continuously energised electric cooker would materially benefit electricity distribution networks and, in those cases—as in Somerset East—where the domestic peak overlaps the commercial and industrial peak, the load factor of the undertakings. These benefits, along with that obtained by the greater use of thermal storage space heating equipment and other "off-peak" consuming devices must reflect advantageously in the economy of the communities being served and justify a bolder and more imaginative approach to the problem, than that which has existed in the past.

In conclusion, it is hoped that this paper will assist those engineers who may have been contemplating various methods of load factor improvement but who have been unable to decide on the method, or combination of methods, most suited to their particular system requirements, and, I would like to record my thanks to the Municipal Council of Somerset East for affording me the opportunity of presenting this paper to the Association and to my friends and colleagues for their encouragement and assistance in its preparation.

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FEEDER	NO. OF CONSUMERS ON FEEDER	AVERAGE INSTALLED DEMAND AMPS/CONS.	CALCULATED KVA/CONSUMER	MEASURED A.D.M.D. KVA/CONSUMER	AVERAGE ANNUAL CONSUMPTION UNITS/CONS.
A	8	17.2	3.79	1.87	5,172
B	29	12.9	2.34	1.64	4,464
C	25	16.6	3.65	2.36	6,360

TABLE 3: Summary of consumer statistics.

THE PRESIDENT: Thank you very much, Mr. Clarke.

Mr. Muller would you kindly propose the vote of thanks to Mr. Clarke?

Mr. G. J. MULLER (Bloemfontein): Mr. President, I have read Mr. Clarke's paper, and I have listened to his summary with much interest. If it is any consolation to him I can assure you that not only some of the smaller but also some of the larger undertakings have had difficulties in meeting peak demands during the period 1946/56, and quite a few are still "saddled" with tariffs which could well do with an overhaul, for both economic and administrative reasons.

In the good old days, some 30 to 40 years ago, much was said and done on the subject of load building, and to the efforts of those engineers the credit must be given that, as referred to by Mr. Clarke, electricity is now a sine, qua non in the civilised life of our day. We must therefore be duly grateful.

At the same time, we cannot help thinking that they have also landed us with one or two problems. Mr. Clarke has dealt with one of these. Plant and money was cheap and I have a suspicion that there was considerable competition in maximum demand between different undertakings, with little more than a passing thought of load factor and incidence of load. Much time and effort was spent in promoting sales of electric radiators and fires, which in due course began to build up an ever-widening gap between winter and summer loads.

With plant at least three times the former price (that is pre-war), higher interest rates and the fact that the public expected the price of electricity to remain unchanged in the face of the soaring of other costs, it is now our problem to reduce this gap to a minimum without causing undue annoyance to the consumers, or embarrassment to our respective councils.

I dare say the problem would have been much easier if this latter condition had not been attached!

Mr. Clarke has attacked the problem from a tariff angle, with considerable success I gather. A two part tariff based on demand and energy costs brings home to the consumer the effect of demand on the overall cost of energy and the reduction of demand then becomes a common concern of both consumer and undertaking.

I was pleasantly surprised to learn of the number of undertakings making use of miniature circuit breakers to determine the demand charge. I am still interested in its possibilities and advocated it on various occasions at conferences, (I think I started the racket). And I may even introduce it in Bloemfontein before I retire.

My interest in miniature circuit breakers, as a means of fixing demand charges for tariff purposes, originally arose from the need to find a simple and inexpensive means of applying a tariff which could apportion fixed costs to consumers on a fairer basis than is possible by any means short of demand metering, and at the same time, facilitating accounting by providing a flat rate for all metered units.

It can be expected that a tariff of this nature would have a considerable effect on consumer load factor, while spreading of load and consequent reduction of diversity, would

progressively reduce the effect as we proceeded, from the consumer, to the feeder, to the substation, and the main feed point or power station bars.

It would appear from Mr. Clark's findings that a fair improvement is still available at the latter point.

Our short winter, with somewhat isolated cold spells, raises some concern however about the effect of such a tariff applied to all consumers on the system. In the first place a metered demand tariff may not remove the possibility of a surprise peak on very cold days, while leaving a train of disgruntled consumers when the accounts come home.

Secondly the more astute consumers may start looking for alternative means of providing peak heating to offset the price increase due to the short isolated peaks.

Thirdly, if fixed costs are to be recovered from the demand charges, the average may be increased unduly to compensate for a few high peaks in the winter, as unfortunately these peaks decide the capital investment required.

I feel that Mr. van Alphen's paper of last year should be read in conjunction with the one now presented by Mr. Clarke. With the demand tariff and centralised load control ideal conditions for load factor control could be created I think. That is getting the most out of the system at the least cost.

With these comments, Mr. President, I have much pleasure in congratulating Mr. Clarke on his excellent and informative paper and in proposing a hearty vote of thanks, from this Convention, to Mr. Clarke. (Applause.)

THE PRESIDENT: Would Mr. Dunstan of Port Elizabeth kindly second the vote of thanks.

Mr. R. S. DUNSTAN (Port Elizabeth): Mr. President, I would first like to thank you for the honour you pay in asking me to second this vote of thanks to Mr. Clarke. I would also like to thank you for giving me a few weeks' warning to do a little bit of homework and prepare some notes, but having gone to that trouble and prepared the notes, in the last day (particularly yesterday) one of the points I have been using. That, of course, is the unfortunate result of being probably one of the last official speakers at the Convention, but I also notice that in our agenda there is no time allowed for discussion of this particular paper, and on behalf of the delegates who come from the smaller undertakings, and whom we have not heard very much, I would like to commend to the Executive, during the coming year, that they try and provide a "muzzle" for Milton, and a chance for the rabbits! (Applause.)

WRITTEN VOTE OF THANKS BY MR. R. S. DUNSTAN
(Port Elizabeth).

I must thank Mr. Clark for the very interesting paper he has presented to us today. He has given the results of a type of maximum demand metering by the use of miniature circuit breakers which is growing in popularity even though there is a strong body of opinion opposed to it. This opposition is based mainly on the contention that the consumer is entitled to use what he likes provided he is prepared to pay the price.

It is an interesting point that the miniature circuit breakers being used were not designed for load limiting purposes but for the isolation of circuits under fault conditions. Their

accuracy and consistency therefore with currents close to or slowly rising above their rated current cannot be expected to be high and this point was recognised some years ago by a member of the Association who claimed that by selective testing and re-rating he could grade the breakers into groups of acceptable accuracy. However, in spite of the technical drawbacks the breakers appear to have worked reasonably well from the technical aspect for load limitation in the case of domestic electricity supplies. However, has anyone taken into account the effect of the loss of goodwill sustained by the electricity undertaking and the exasperation caused to the consumer which might encourage a change to the use of an alternative fuel?

When an attempt is made to use miniature circuit breakers for peak load limitation of supplies to industrial or business consumers serious problems arise. Domestic consumers in rural towns and predominately residential townships adjacent to large towns are normally stable residents and the rate of movement of consumers and the change in their electricity requirements is small. However, this does not apply in the case of small industrial and commercial consumers and the use of miniature circuit breakers to control their loads leads to an unending request for breakers to be changed or complaints that charges are too high. Very similar results would probably arise if load limitation by miniature circuit breakers was to be applied to flat dwellers and the poorer domestic consumers of large towns where the most prominent characteristic is the speed with which they move from one dwelling to another.

Table 2 of the paper gives details of the improvement in load factor which has been achieved in towns where the type of load limitation discussed has been applied. It is interesting to note that the introduction of load limitation gave improvements in load factor varying from 4 to 7%. However, after this initial improvement there was no further substantial change and this seems to be the limit of gain obtainable.

This result serves to emphasize that our main function and the best use that can be made of the plant we control is to sell units of electricity — not kVA or kW.

The way to achieve this object is to have a constant load as great as possible and merely lopping off a peak in the load curve may make the load more constant but does not increase the number of units sold. Clearly the best action is to fill up the valleys to equal the peak load. This was the basis of the magnificent drive for the electrification of domestic premises initiated by the late Mr. Swinger about 1927 in Cape Town and which was imitated in modified form by most of the large municipal undertakings between 1930 and the outbreak of the second world war. This period saw the general introduction of domestic electric cooking and of the domestic storage water heater. Progress on a similar scale may not again be possible but it is interesting to note the suggestion made by Mr. Clarke that a low loading continuously energised electric cooker would assist electricity undertakers and reduce the cost of electricity. Will manufacturers accept the challenge and will consumers adapt themselves to changed cooking habits?

Mr. Clarke has presented a paper which should lead to a great deal of discussion to which smaller undertakings could contribute. If this is achieved Mr. Clarke will have reaped

the reward his paper deserves. It gives me great pleasure to second the vote of thanks to Mr. Clarke for his paper.

(Applause.)

THE PRESIDENT: Thank you Mr. Dunstan.

CONTRIBUTION TO LOAD FACTOR AND CONSUMER MAXIMUM DEMAND.

Mr. President, Ladies and Gentlemen the author is well known to me and it is to my regret that he decided to choose other fields for his endeavour. I think his choice was wise as it has certainly expanded his field of experience.

His observation that a disproportionately small demand charge would provide little or no incentive for a consumer to reduce his peak is noteworthy. On the other hand, if that charge is large, there may be a tendency to economise in equipment rather than to approach the use of electricity on the basis of improved load factor.

It was very pleasing to note the author's view that the introduction of multiple tariff metering to small consumers is neither difficult nor particularly involved and that within a matter of weeks the consumers adapted themselves to the changed conditions. He has not mentioned the Treasurer's reaction to this type of tariff as compared with others. Some remarks from him on that point might prove illuminating although I would not blame him if, in the interests of peace, he refrains from expressing that opinion.

He draws attention to the ability of a domestic consumer to avoid high maximum demands by the use of relays which are designed to disconnect the water heater (as an example) as the demand increases. I have always felt that this would be a normal consumer reaction if the consumer is sufficiently well educated by the supply authority serving him. I also contend that it is much more reasonable to permit — not force — the consumer to adopt these steps. I note that the author states that such relays are relatively inexpensive.

The data submitted by the author indicating the effect of the maximum demand tariffs on load factor are enlightening.

Although I believe the author has some experience of two types of demand tariff, the one being what may be termed the limited availability tariff and the other the measurement tariff, he has not made any comment on the relative merits of these two forms in achieving the desired result. His remarks on this aspect would be much appreciated.

As I have said previously, it is my opinion that measurement is preferable to limitation because limitation makes the consumer select the maximum limit on the basis of his potential maximum requirement which then takes no account of possible seasonal variation which introduces increased diversity.

Just as in the case of the room basis tariff, if a fixed payment is made each month for a potential demand, there is no incentive to control the demand when this could be done because there is no abatement of charge at those times. In these circumstances a consumer must decide on what he may be compelled to do under the worst conditions in creating the highest demand he is likely to establish. Having done so, and being called upon to pay for that demand indefinitely, he can forget about any steps which he might take at other times to avoid those high demands.

If he is charged on a measured maximum demand from time to time, then he is aware that such steps as he may take to avoid creating a high demand in any month (or other fixed period) will be recompensed by a lower bill.

I have had considerable experience of the limited availability tariff and know full well that each consumer notifies his possible highest requirement though avoiding extreme peaks — when he is prepared to take precautionary measures — and then normally falls well within the selected demand although seldom actually creating a demand even approaching that figure. Thus the only step taken by such consumers which is potentially beneficial is the avoidance of extremely rare very high peaks. The diversity between consumers in respect of those very rare exceptionally high peaks is extremely large and it is doubtful whether they have any real significance on the monthly demand in any distribution area or group of such areas. The largest factor in increasing demand is the complete freedom which a consumer actively exercises when he is called upon to pay for a demand whether he creates that demand or not.

I believe that in the cases of Oudtshoorn and Somerset East Municipalities maximum demand measurement is applied whereas in the case of both Walmer and Windhoek the tariffs are based on the use of limited demand (miniature circuit breakers being used for that purpose).

Although the author has expressed the view that he hopes his paper will assist those contemplating various methods of load factor improvement, I feel that if he will add to his paper his views on the relative merits of load limit and demand measurement he would greatly increase the value of his paper in the direction he desires.

In conclusion I would like to add my congratulations to the author for the most able manner in which he has dealt with his subject.

Mr. H. J. GRIPPER (Knysna): It is clear to most of us what is meant by the improvement of Load Factor and, in a comparatively small town it may even be possible to make it reasonably clear to a fair number of consumers. However, by and large, it is unfair to expect the average domestic consumer to interest himself or herself in the concept of kVA or ampere demand let alone the time constants associated therewith in methods of metering.

Throughout the papers and discussions at this Convention there has been a serious lack of distinction between the terms DEMAND and AVAILABILITY when applied to charges intended to replace those, to my mind iniquitous, charges based on irrelevant factors such as the number of rooms, the ratable value or installed horsepower.

A "demand" tariff is designed to encourage load-spreading. It is accepted by large consumers, industrialists and the like as being restrictive. I maintain that it is NOT suitable for small consumers.

The "availability" charge (based only on the rating of a main fuse or circuit breaker) is purely a self-imposed restriction no different from a fixed charge for water based on the size of the incoming connection. The consumer is free to "buy" or "rent" the size of connection that will best suit his purse and social aspirations.

Mr. G. S. MULLER (Bloemfontein): Mr. President, if you will permit me, I have a series of questions from my deputy, Mr. Hafele. I won't trouble you by reading them, but I would like to hand them to Mr. Clarke, and may I ask that we could have answers, as far as he can, before the publication of the Proceedings.

Thank you Mr. President. I'll hand these to the secretary.

THE PRESIDENT: Well, if Mr. Clarke is prepared to do some homework . . . ?

I do think that Mr. Dunstan has made a point in regard to the discussion. This depends entirely on the Convention when you wish to have the discussion. Do you think you will all be recovered from the Ball by tomorrow morning? In which case I suggest we meet here at 9.15 a.m. instead of 9.30 a.m. and we can discuss Mr. Clarke's paper? Is there anybody who disagrees?

All right gentlemen we will assemble tomorrow morning at 9.15 for discussion on Mr. Clarke's paper.

I shall be glad now if you will accord Mr. Clarke your acclamation now for his wonderful paper. (Applause.)

Mr. West, who wrote the paper on electricity tariffs yesterday, has unfortunately to leave for Rhodesia, and with your concurrence I propose to devote a quarter of an hour to discussions on his paper. If Mr. West will come to the rostrum he will be given the opportunity to answer.

In regard to Mr. Kane, we started off with the Electrical Wiremen's Registration Board, we moved on to the Electrical Wiremen's and Contractors' Amendment Bill and then on to the Standard Regulations for the Wiring of Premises.

Immediately we finish Mr. West's discussions, I propose to resume Mr. Kane's proposal. Does the Convention agree to that? Thank you.

Now, gentlemen, Mr. West is on the platform, so would somebody care to resume the discussion on Mr. West's paper? I think Mr. van Dyk would like to say something.

Mr. J. A. VAN DYK (Graaff-Reinet): Mr. President, actually most of the points have been answered by the discussion on the other papers, but there is one I would like Mr. West to answer. I notice that he included interest, and then he said redemption, and it was mentioned yesterday afternoon, and I also mentioned in my paper, that it happened to be a common practice in larger cities, but I would like to know whether in small municipalities, he would regard it as practicable to have a high charge for electricity and then use that for the relief of rates. There are two points about this question. One side you find, as it has been said, if there is a profit and it is the only authority supplying, therefore one can regard it as a form of tax, and you can, in cities where you get people who are actually taxpayers, they are the people who have to pay for the taxes of the city, and if you give it back to them in a form of a contribution from the electricity fund, it may ease it and it may be a form of taxation to those people who are not property owners, and if I may say so, you even find that, from the administration side, and the government find in certain cities, and smaller towns, you have public buildings which are not ratable. Therefore, one could argue and say that those people do pay towards the community in rates, as far as the electricity is concerned. Therefore I would like an answer on that question if possible.

Mr. H. J. GRIPPER (Knysna): The author disposes too lightly of the third factor in the costing of electricity supplies. "Consumer costs" are not covered by connection fees and capital contributions as stated in the footnote. These costs comprise meter reading, billing, accounting, statistics, servicing and such costs which are proportional to the number of consumers and not to the demand or unit consumption. They must be added to the availability or demand charge payable by each consumer.

I do not agree that discriminatory tariffs are not an evil. If any form of discrimination exists in the tariff "make up", it must be such that a consumer is free to change from one category to another, after giving reasonable notice, simply by altering his method, or degree, of use of electricity. If a man can afford to pay more, let him take more. Do not ask him to pay more for the same thing.

THE PRESIDENT: If there is no further discussion, I'll call upon Mr. West to reply.

Mr. J. H. WEST (Salisbury): Mr. Chairman, ladies and gentlemen: First of all I'd like to express my appreciation to Mr. Milton for proposing the vote of thanks. He did it very ably and I was most appreciative of his remarks.

Mr. Milton had some comments on the chart I put on the board about Waterloo Station, and he said that there was obviously no use in having off-peak rates on the Railways. I would like to read a little extract from the Financial Times which has some relevance to this. There was a key statement in the 1960 Annual Report of the Transport Commission. "Since it is the volume of service catered for during the peak which determines the total quantity of rolling stock, terminal capacity, the standard of track, and signalling required, and even, to a large extent, the number of staff who have to be employed, it can be argued that the bulk of the fixed costs can fairly be charged against peak hour travel which is therefore unlikely to be remunerative at the average level of fares". Broadly this means that peak hour services should, under a commercial fares policy, be raised far enough to carry virtually the entire loss which the British Railways has been making on its passenger services". Then the article goes on to say that the increases recently made were long overdue, that during most of the early 1950's the basic fare was hardly increased at all. "During much of this period the Railways were forced, very reluctantly, to look for extra revenue from the many below ordinary fares designed to encourage travel at off peak times. The workmen's ticket, the evening excursion, the day return, and others. More recently the opposite and healthier trend has set in again.

Mid-week returns, for instance, now show a saving of 25% over the ordinary fares, and regional managers who have freedom within limits to adjust these concession rates to what will best encourage the traffic, have been introducing some new concessions.

It is clear that the Railways, who are also a public monopoly, rely to a large extent on filling in the troughs by giving special concessions, always providing that the minimum rate which they charge is equal to the incremental costs, and anything which they can get over that, as a contribution to the overheads, is regarded as desirable.

I feel myself that whilst costs are a vital element in determining tariff, they should not be used to the exclusion of all

other factors, and it is of great importance, especially in these days (I am speaking particularly for the Federation), that undertakings should do everything possible to provide funds for their own future development. The loan market is drying up, and although in the Federation we are building up quite a reasonable money market, it isn't anything like big enough, for many years, to finance the development which should take place.

It is, in my view, therefore, incumbent upon electricity consumers to play their part in providing for the development of their own undertakings. It has been mentioned during the conference that quite a small increase in prices results in a large accumulation of reserve funds which can be used for development, and I feel that undertakings and regulatory authorities should bear in mind these other factors which have been mentioned today, in deciding what tariff should be adopted. To adhere too rigidly to costs may be mathematically attractive, and may, as in the case I mentioned the other day, enable your application to go through your control board much more quickly, I think, nevertheless, that Control Boards are manned by very reasonable people who have the interests of the undertaking and of the consumers at heart, and therefore that undertakings should have plenty of revenue for their future development.

Mr. Milton dealt at some length with amperé demand meters and there has been a lot of discussion. They do, of course, offer a rather better means of providing revenue on a fair basis — than say, a room quota method — but whether it is worth the trouble of having a completely new installation in a whole category of consumers premises is, I think, a doubtful question. The difficulties of explaining it to the consumers have already been touched on, and I think it is a "loss-up" as to whether it is a good thing or not.

To Mr. Jackson, who seconded the vote of thanks, I would also like to express my appreciation. Mr. Jackson agreed with me that there is no unequivocal solution to the question of cross-based tariffs.

Incidentally, coming back to Mr. Milton, you will remember he said that E.S.C.O.M. used the maximum demand method, whereas the Southern Rhodesia E.S.C. uses the peak responsibility method. I think, of the two, peak responsibility is the more appropriate one, but it is only a matter of opinion, and any method will give a different result from any other method.

Mr. Jackson mentioned that I have not dealt with the problem of the very large central generating authority. I agree I haven't touched on that in the paper, nor had I dealt with the particular problems of a small distributing undertaking which becomes connected to a central authority.

The answer to him on Kariba bulk tariffs, essentially, is that the tariff to the public supply undertakings is based more or less on the costs of those undertakings just before the connection, so that there is a quota for each undertaking at a basic price, and all extra electricity is supplied at a standard price to all undertakings, the price being £7 per kW and 0.2d. per unit.

Mr. Petersen went even further than I have done in my paper in his view that costs should not be used as the sole basis of tariff making. He felt we spent far too much time being precise in allocating costs, and I naturally agree with that.

Insofar as the Kariba tariff itself is concerned, I agree with him that it is a great stimulus to load factor improvement. The only point on which I think we differ is that I would have preferred that stimulus to have come later, because there is a lot of unused capacity at the moment, and until you get to the stage where that capacity is being used up, then I think a tariff which penalises low load factors is not necessarily in the best interests.

Mr. Berry quoted Parkinson's second law — the first law. I think, is that the volume of work extends to meet the time available in which to do it. My main comment would be that Parkinson is compulsory reading for all economic students.

I'm afraid I don't agree with Mr. Berry that we should charge the gold mines precisely the cost of supplying them. I think they, in common with other consumers, should make a contribution to the development of the electricity undertakings which supply them.

Mr. Berry said regulating authorities should be free of political control. This is a rather difficult one. I think in theory it is desirable that they should be free, but, of course, ultimately the politicians are responsible.

In the Federation what we tried to do was to work out some sort of compromise, which I think has been done reasonably well. We have an electricity council, (control board, you'd call it), for each territory. They are purely advisory and it is the Minister who finally decides whether an increase in price will be allowed. But there has never been a case where the Minister has exercised his authority to differ from the control board, so that we feel we have a reasonable compromise between a completely independent arbitration and wholly ministerial responsibility.

Mr. Langford agreed that there was no unequivocal solution to the question of basing tariffs entirely on costs, and he also mentioned that there was no reference in my paper to bulk supply. I hadn't, of course, intended to cover that point. It was mainly intended to deal with distributing undertakings. He made a very good addition to the four principles which I mentioned, namely the desirability of simplicity of tariffs; we are plagued in the Federation with 185 different tariffs; which, in my opinion, is far too many. I am not saying that everyone should have the same tariff, but I think there is a lot of scope for reduction in the number of tariffs and more standardisation in the sort of tariffs. I was concerned with collecting statistics for quite a long time, and it is extraordinarily difficult to collate statistics from undertakings which have tariffs on a completely different basis, and if for no other reason than that, I think that a degree of standardisation would be desirable. It is also desirable from the point of view of people who move house to a different town and there is a completely different tariff structure which they cannot understand.

Mr. Langford emphasised, and I entirely agree with him, the desirability of having low tariffs for specially large consumers. The great majority of consumers can stand an increase in tariffs. Electricity is a very small part of the cost of most industries. It is a very small factor in the cost of living. But there are a number of industries, the metallurgical industry, and chemical processing industries, where low tariffs are really desirable, and any attempt to produce tariffs for such

customers which will ensure that incremental costs are covered together with some contribution to your overhead costs, is well worthy of study.

Finally Mr. Langford has made a point which I have made myself on many occasions, and it is something which we tried to do in the Ministry of Power, namely the publication of costs and revenues. In monopoly undertakings there is a tendency for a certain amount of insularity to develop and it is, in my opinion, most important that public bodies should produce information and circulate it to undertakings and the public, so that the undertakings can see how their costs compare with other costs.

One must try and introduce an element of competition. I do not believe in nationalisation of distributing undertakings. I think local needs are best catered for by local organisations though this is not necessarily the case with generation. That is a different question altogether. But local needs can be served very well by local undertakings provided they must be given the facilities to look at the costs and problems of other undertakings, and that is one of the most vital functions of the A.M.E.U. It does bring people together, and enable them to discuss their problems.

Mr. van Dyk wanted my opinion as to whether electricity should subsidise the rates fund. My opinion is that it should not. I think that electricity should be run as a trading enterprise quite separate from the rates. His problem is that there are certain areas where an electricity undertaking supplies people who are not ratepayers; in the Federation the accepted solution is to put a surcharge on these consumers and I think that is probably as reasonable a way of dealing with the problem as any.

Mr. Gripper says that consumer costs are not proportioned to the demand or unit consumption yet must be added to the demand charge payable by each consumer. This is of course a matter of opinion but supports my point that there is no unequivocal way of allocating costs. He goes on to say that if there is any form of discrimination in tariffs it must be such that the consumer is free to change from one category to another. Presumably Mr. Gripper means that commercial consumers, for example, should be allowed to classify themselves as domestic if the domestic tariff is lower. I doubt if many undertakings would share this view though I am sure commercial consumers — and others on high tariffs — would be delighted.

Well, Mr. Chairman, those are my comments on the debate, which has been most interesting, and stimulating. I would, if I may, like to take the opportunity of mentioning that I am no longer connected with the Ministry of Power. I had quite a long and happy association with them. I was originally a Treasury man and I was concerned with the raising of the loans for Kariba and various working parties that were established, in the days of the Kariba-Kafue controversy, and with the economic surveys that were carried out at that time. So it was natural that when the Ministry of Power was formed I should go there and deal with their economic and financial matters. Now I have returned to the Treasury after this very happy association with the Ministry, and with you, ladies and gentlemen. This is my fourth conference. I have enjoyed them very much. I have found them extremely useful — most valuable indeed.

In a way, therefore, I am making my parting speech to you, and I wish you continued success, which I am sure is well-merited, and a happy and prosperous future.

Mr. Chairman, ladies and gentlemen — thank you very much indeed. (Applause.)

THE PRESIDENT: Thank you Mr. West for your very kind remarks about our Association, and you may rest assured that the Convention and the Municipal Undertakings Association are greatly indebted to you.

Thank you very much.

Gentlemen, with your concurrence then, we will resume discussion on the Wiring Regulations. Mr. Kane is responsible.

Mr. G. C. MOLYNEAUX (Rhodesia Railways): My general manager wishes me to convey to you, Mr. President, his greetings and best wishes for a most successful Convention.

THE PRESIDENT: I think the Convention would like to adjourn now, and we will continue with greetings at a later stage.

On Resuming:

THE PRESIDENT: Gentlemen, with your concurrence we'll resume discussions on the Wiring Regulations. Mr. Kane is responsible to the Association for reporting on the Electrical Wiring and Registration Board, and reporting on the Standard Wiring of Premises, and also for reporting on the Electrical Wiremen and Contractors Amendment Act. The discussions so far have covered all three of these, and if any members wish to carry on the discussion, now is the opportunity before Mr. Kane closes it.

Mr. H. J. GRIPPER (Knysna): Mr. Chairman, I will not take up much time. I just want to say how much I agree with fears that Mr. Jackson expressed on this matter of the responsibility of government, provincial, and railway installations. The fear that he expressed I think was the possibility of going contra to local supply regulations, some of which, of course, in the Cape have only recently been amended and I must here ask our Executive and our worthy secretaries to keep a watch on our past deliberations on this matter. Our very worthy late honorary legal adviser expressed an opinion quite clearly that the local authority has, and must exercise control, over all installations to which it makes a connection.

If, for instance, a government, or provincial, or a railway installation — it need not be on their own property I presume — it could be a rented property in the town — should create some condition which causes interference — it need not be dangerous interference, but interference which is contra to the local authority's supply regulations — can we do nothing about it?

I wish just to pose that question in view of the proposed new regulations which say we need not inspect, but do they imply that we must connect?

I know Mr. Milton has said that the State in the long run, cannot sue the State, but I would like to leave you all with this thought — can a statesman electrocute a statesman?

Mr. A. F. TURNBULL (Vereeniging): I would like to ask a question regarding apprentices, to obtain some clarity of definition between "continuous supervision" and the new definition "direct personal supervision".

Mr. M. H. L. BOSHOFF (Graaff-Reinet): Mr. President, I find very great difficulty in finding a uniform method of adoption of the Factories Act and the Wiring Act of 1939. In the Factories Act if an alteration is made to the installation, it is required of you as the supply authority to ensure that the earthing and in the case of an overhead connection, an improved means of connection is made. You are allowed by law 30 days in which to have the consumer get that done. Yet in the Wiring and Contractors Act of 1939, if an installation should be disconnected for any reason whatever, voluntary on the part of the consumer, like going on holiday, or the fault of not paying for his electric bill, you are supposed, according to Section 20 of Act 20 1939 as the supply authority to go and inspect, test, and approve that installation before it may be connected, because it says "any wiring must be tested and inspected and approved of before it may be connected to the supply authority's supply lines".

Now if you should not test and inspect but switch on that installation, you have in as much approved of that installation. Should any accident occur at that installation, what is the position, what condition have you created? Should it be proved that the earthing did not comply, should it be proved that there was no approved means of connection, in the case of the overhead, if it was faulty — in other words, exactly where is the engineer; when must he say "I am entitled to switch on", and when must he say "I am not entitled to switch on"? Where does he draw the line? And if Mr. Kane can answer that one for me I'd be very pleased indeed.

THE PRESIDENT: Thank you Mr. Boshoff.

Mr. J. F. LATEGAN (Stellenbosch): Mr. President, gentlemen: there have been quite a lot of comments on the Wiremen's Act of 1939, and I had a circular from the Inspector of Factories in regard to the use of apprentices without supervision, and I made the remark in my reply that I find nowhere in the Act of 1939, the imposition of a fine on these people who disregard the Act, whereas the Factory Act in various sections does make provision for that. Can Mr. Kane please explain why there is no provision made for a fine? It would relieve our engineers and supervising personnel of a large amount of responsibility in that respect. Thank you, Mr. President.

THE PRESIDENT: Are there any further questions? No? I'll ask Mr. Kane to sum up for us.

Mr. R. W. KANE (Johannesburg): I think I'll be brief. As far as Mr. Gripper is concerned, I hope a government official can electrocute a government official!

Mr. Turnbull, I take it that you really want to know what has happened to the apprentices. I don't know if I explained it in my report. First of all, there was a lot of deliberate misinterpretation of the expression "continuous supervision" and now it makes it very clear it is "personal supervision", it is not half a mile away or two towns away. You have got to be on the spot.

But at the same time, a last year apprentice does not need personal supervision. That old bug-bear of the youngster being supervised right up to the journeyman standard has fallen away.

You might have complications, of course, with the artisan test in the penultimate year, but nevertheless, in what we

would term the fifth year the kid does not need to be supervised personally.

Mr. Boshoff, I'm afraid there seems to be some confusion. I may have misunderstood you. The Wiremen's Act does not say that you must reconnect; it is the Factories Act that lays down the 30 days and what one must do if you disconnect, or if someone is disconnected. All the Wiremen's Act says is that (and I am going to quote the proposed Wiremen's Act) "... no person shall make any connection to a source of supply of electricity controlled by a supplier unless such wiring has been inspected, tested and approved by the person or employee nominated for the purpose by the supplier, and permission to make such connection has been given by the supplier".

And I think this little extract covers one or two of the things, on which I may have given you a wrong impression. You may not have to inspect, provided that the provision of this sub-section shall not apply in relation to any wiring work carried out by or on behalf of the Government, including the Railways Administration, and any Provincial Administration, or any wiring work in respect of any lift or escalator. I think the amendment makes it clear that there is no "may" about it. It shall not apply. It is up to you to decide of course, but it doesn't say you may have to do it. I hope I have covered your point.

Mr. Lategan, I'm sorry there is one aspect of all the Acts that I haven't worried too much about, and that is this element of punishment that one may apply. I really don't know anything in the Wiremen's Act about punishing people, but I do know this, that in the past, if you took action against a contractor... action against his licence, or anything like registration, ... and he cared to appeal to the Board, he could also appeal to the Minister. We did not have that right of appeal, but now we have got it. We can also appeal to the Minister against a decision of the Board.

I think, if you have been in trouble with apprentices, I have a feeling that somewhere in that Act the point must have been covered, but you have got to go to the Public Prosecutor to let him do the "dirty work". I hope that covers the points

ELECTRICAL WIREMEN'S REGISTRATION BOARD ANNUAL REPORT 1961

The Board met on 11 occasions during the year in addition to a visit to the examination centre at Olifantsfontein.

Four written examinations were held, 467 candidates writing the examinations. The number of candidates who passed the written examination was 77 or 16.5%.

Nine practical examinations were held and 275 candidates tested. 139 or 50.5% were successful.

340 applicants for registration were considered of which 323 were accepted for the examinations and 17 deferred or refused.

Since the inception of the Act 7,842 certificates have been issued, 5,416 of these by examination.

No new areas were determined during 1961, but 12 applications have been received and are being investigated.

Certain amendments to the Act, mainly in line with those proposals submitted by the Association some years ago, will probably be included in the legislation programme for 1962.

During the year Mr. G. J. Malan was transferred to another Department and Mr. J. J. Groenewald was appointed Chairman of the Board.

R. W. KANE,
Representative.

THE PRESIDENT: Thank you Mr. Kane for your painstaking replies.

Mr. J. J. GROENEWALD (Department of Labour): Mr. President, first of all I would like to thank you for the kind invitation extended to me which has made it possible for me to attend your deliberations for the first time. Being a true civil servant, Mr. President, I do not think I will even attempt to clear up the very considerable confusion that exists as to the responsibility of the town electrical engineer. I do think, when we start talking about particular cases, one must be very careful. We invariably venture into the field of Common Law, which is perhaps better left to the courts. I would, however, like to emphasise the fact that negligence must be proved.

I would like, on behalf of the Electrical Wiremen's Board, to express my thanks to Mr. Kane for the very clear way in which he has explained the implications of the Amendments to the Act. It is very essential, I think, that your Association should be fully aware of the implications, because you are in the first line of controlling the safe installation of electrical wiring.

As regards the complete determination of the Republic for the purposes of the Electrical Wiremen and Contractors Act, I hope that you will express your opinion, and issue a directive to the Board. It is the feeling of my Department that we have come to the stage now where this step should be taken, and subject to your indication of the possible implications and pitfalls, together with the consideration of the submissions by contractors and wiremen, it is the intention to go forward therewith.

THE PRESIDENT: Thank you Mr. Groenewald.

Now we will take the next report — the South African Bureau of Standards.

S.A. BUREAU OF STANDARDS AND RECOMMENDATIONS COMMITTEE REPORT

Mr. President and Gentlemen,

I have pleasure in presenting the report on the activities of the South African Bureau of Standards during the past year.

ELECTRIC ARC WELDING SETS

The Standards Council approved this project on February 12, 1962, and a committee has been appointed.

ISOLATING TRANSFORMERS

The first and second meetings of the committee were held on November 17 and December 12, 1961, respectively.

DISTRIBUTION TRANSFORMERS

Sub-committee meetings were held on April 26 and October 5, 1961, to draw up tables of standard dimensions, ratings and losses. A questionnaire regarding dimensions was circularized to the members of the committee, and a summary of their replies has been prepared. The second draft for the main committee is now in preparation.

SABS 98, PAPER INSULATED ELECTRIC CABLES FOR HEAVY DUTY

This specification has been re-written in order to fall in line with the revised SABS 97. Romeoed copies are now available.

SABS 156, MOUDED-CASE CIRCUIT-BREAKERS

The final meeting of the committee was held on November 26, 1961, and the specification is now in the editorial stage.

SABS 167-1953 (REVISION), APPARATUS CONNECTORS FOR PORTABLE DOMESTIC APPLIANCES

The first meeting of the committee was held on February 16, 1961.

SABS 168 (REVISION), MEDIUM VOLTAGE VULCANISED RUBBER INSULATED CABLES AND FLEXIBLE CORDS FOR POWER AND LIGHTING PURPOSES

The first committee meeting was held on March 23, 1961. At this meeting it was decided that further work on the specification would be postponed until more information in connection with ageing tests and the use of synthetic rubber in cable insulation is available. It was also decided that a separate specification for welding cables, covering dimensions and electrical properties, should be drawn up.

SABS 177, PORCELAIN AND TOUGHENED GLASS INSULATORS FOR OVERHEAD POWER LINES

The final meeting of the committee was held on November 7, 1961. Some overseas comments were received after this date. These were circularized to committee members on January 8, 1962.

SABS 187, HIGH AND LOW VOLTAGE BUSHINGS

The final draft of this specification is now being prepared. The Standards Council has approved the preparation of a separate specification for standard bushing insulators, which will give a range of standard sizes for both the insulating and the conducting components of the bushings.

SABS-03-1952, CODE OF PRACTICE FOR THE PROTECTION OF BUILDINGS AGAINST LIGHTNING

The first draft of the revision of this code of practice is being prepared.

CODE OF PRACTICE FOR THE LIGHTING OF STREETS AND HIGHWAYS

The second meeting of the committee was held on June 8, 1961.

SAFETY SPECIFICATIONS

In the Government Gazette of December 15, 1961, under Government Notice No. 457 of 1961, it was proposed to declare the undermentioned specifications to be compulsory specifications. Interested persons were given a period of two months in which to lodge objections against the proposed declaration.

- SV 124-1960 Manually operated airbreak switches.
- SV 125-1960 Portable electric immersion heaters.
- SV 126-1960 Electric air heaters and radiators.
- SV 127-1960 Flexible cords for power and lighting purposes.

SV 128-1960 Portable electrical appliances for heating liquids.

SV 129-1960 Plugs, socket outlets, and socket outlet adaptors.

SV 130-1960 Electric hand lamps.

SV 131-1950 Electric stoves and hotplates.

SV 132-1960 Lampholders and bayonetcap lampholder adaptors.

SV 133-1960 Lampholder

SV 133-1960 Apparatus connectors for portable domestic appliances.

The Bureau received an objection to SV 124-1960 for manually operated airbreak switches and also SV 129-1960 for plugs, socket outlets and socket outlet adaptors.

In regard to the promulgation of the safety specifications, the AMEU and many Engineer members have received a copy of the document indicating that it was the intention of a certain firm to lodge an objection to the promulgation of the safety specifications No. SV 129-1960 and SV 124-1960. It appears that the objector feels that the specifications should be more restrictive. The safety specifications are the minimum requirements for safety and are not intended to be specifications for quality articles. Your Association has informed the objector that it could not support the objection.

It will be remembered that the AMEU has been pressing for the promulgation of these safety specifications for about ten years, which it is hoped will assist in providing a measure of safety to the benefit of the whole community in Southern Africa.

In conclusion I should like to thank the Bureau officials for their kind assistance during the years, and a big thank-you to the members of the AMEU who have assisted me in keeping up with the activities of the S.A.B.S. technical committees in representing the AMEU on these various committees.

J. C. DOWNEY,

A.M.E.U. Representative to the S.A.B.S.
Technical Committees.

Mr. J. DOWNEY (Springs): Mr. President, ladies and gentlemen, I have pleasure in presenting the report on the activities of the South African Bureau of Standards during the past year. These have appeared in the published version which you have before you of the agenda, but there are one or two things to which I'd like to draw your attention.

First of all, I must admit that the printers must have got the jitters when he got as far as the Bureau of Standards, because there are two mis-spelt words that I can see.

Secondly, is that yesterday we had something in regard to the Bureau of Standards — some complaints. There does seem to be some misunderstanding about quality specs. and safety specs. and the reasons for inspecting. To many of us we all use some of the Bureau's specifications, especially in cable work and the fact that the Bureau issue a quality specification and issue a mark with this, eliminates, in many cases, the need for having inspection on this particular cable by the engineers themselves.

I think most of us today just do not order cable directly, but we order to a particular specification, and knowing that it

carries an S.A.B.S. mark, this gives us some assurance that the standard of quality is there for the cable which we require.

If there is any objection to the quality mark or the method, there are means by which we can rectify it. I don't know of any case where the technical committees have been informed of some difficulty in that, that the matter was not carried forward and we have overcome our difficulties.

Now in the other point on the Code of Practice for the Lighting of Streets and Highways. This is an extremely brief report, but I will quote you an extract which the secretary presented to the Sankey Convention, which I think clears up this very brief report.

It says: "On the 8th June, 1961, the S.A. Bureau committee for street lighting met and decided to abandon the arrangement of having several working groups jointly prepare a code. It was decided that a draft code would be prepared by one working group consisting of seven members. This working group endeavours to meet monthly to discuss the code page by page. That is the code which they are using as the basis for consideration. Three meetings so far have been held and substantial progress has been made. In addition a road test in connection with the minimum luminance requirements for street lighting has been done by members of the working group, and will be repeated in the near future." I was also informed that a meeting had been arranged for one of these road tests the night before I left, but unfortunately the weather was such that they had to abandon the test.

Now we come to the safety specifications, gentlemen, and as you will see, in the Government Gazette of December 15th 1961, under Notice 457 it was proposed to declare the under-mentioned specifications to be compulsory specifications. Interested persons were given a period of 2 months in which to lodge objections against the proposed declaration. You have the list before you.

In regard to the promulgation of the safety specification, the A.M.E.U. and the many Engineer Members have received a copy of the document indicating it was the intention of certain people to lodge an objection. Now the Bureau received more than one objection, but I rather liken these objections to the man who wants to buy a new motor car.

He goes to the showrooms, and when he gets there he finds out that the new model will come out next year, so he decided not to buy the motor car. So each year he repeats this, going back to the showroom and he still decided not to buy a motor car because the new model will arrive next year.

We have another case where the other one goes to buy a motor car but he doesn't find a Rolls Royce on the floor, waiting for him, so he decided to leave it till next year until the Rolls Royce is on the floor. Now that is similar to the two objections we received. One objector objected to the compulsory specifications because, in certain cases, he felt the standard was too low. The other case, the objector felt the standard was too high.

I put it to you, gentlemen, I think those are very futile objections. These specifications have been amended from time to time, and in many cases the amendments have been very little indeed — mostly technical on the legal side.

If you have an objection to the compulsory specification surely a thing objecting to the standard, whether it is too high or too low — that is not the place to raise an objection to the

compulsory specification. The compulsory specification is for the safety of all, and on the basis of principle to object to a specification because it is too high or too low to me seems quite futile.

Let us accept the broad principle of safety specifications, which is so necessary for protecting our women folk at home. If we find the specification is too high, or too low, you can have recourse through your co-ordinating committee, and various representations that you have on that committee, de Beer will call that committee back readily, which they have done on many occasions, and then they can amend accordingly. But let us not try and put a "spanner in the works"; "put the break on", to stop this safety specification from being promulgated. You must remember that we have been battling to get this through for safety for over 10 years.

One thing I want to mention about the question of objections to the specifications. If you remember the use of P.V.C. when it was first introduced, was not readily used in this country for the simple reason that we never had a standard specification for it, but immediately we produced a standard specification I think most municipalities gave permission for its use on their undertakings.

While I was overseas in 1959 it was mentioned to me that South Africa was particularly P.V.C. conscious, insofar as they had readily used P.V.C. more than any other country in the world, and we were really, at that particular time, leading the world in the use of P.V.C.

That shows the necessity for having a specification, and that specification at the time it was completed was considered to be the most stringent specification of all the specifications that had been produced throughout the world at that time.

I don't think there is anything else I'd like to mention, except I'd like to thank the Bureau officials for their kind assistance during the year, and I would like to thank the A.M.E.U. members who have so ably assisted me in keeping up with the activities of the South African Bureau of Standards technical committees in representing the A.M.E.U. throughout the year.

THE PRESIDENT: Thank you Mr. Downey. Would you carry on with the Wiring Regulations Committee, please.

WIRING REGULATION COMMITTEE

As there were no meetings of the above committee held during the year, I have nothing to report.

J. C. DOWNEY,
A.M.E.U. Representative to Wiring
Regulation Committee.

Mr. J. DOWNEY (Springs): This is a very simple one, indeed, gentlemen, as we had no meetings during the year, and I have nothing to report.

THE PRESIDENT: Mr. Downey, would you now carry on with the report on the Recommendations Committee on New Electrical Products.

REPORT ON THE RECOMMENDATIONS COMMITTEE FOR NEW ELECTRICAL PRODUCTS

I have to report that

During the past year the chairman, Mr. J. L. van der Walt resigned from engineering to take up a clerical post. As the

other representative of the A.M.E.U. it has fallen upon me to take the place of the Chairman. In order to fill the vacancy created by the resignation of Mr. Van der Walt, Mr. C. Lombard kindly consented to serve on this committee.

Two meetings of this committee were held during the year and the recommendations have been submitted to the members through the news bulletins.

Applications still continue to be received although in some cases the applications are not considered as there exists a relative S.A.B.S. or B.S. 1 specification for the product.

The committee in its terms of reference can only consider a commodity for which there is no relative S.A.B.S. or B.S. 1 specification.

It has been noted that on occasions some large centres have given permission for use of certain commodities which are subsequently submitted for consideration by the Committee. In order to avoid embarrassment, it is suggested that it would be to the advantage to all concerned if an enquiry were to be submitted to the Secretary before permission is granted.

Our thanks are due to the representatives of the Bureau of Standards, the Electricity Supply Commission, the South African Institute of Electrical Engineers, the Electrical Engineer and Allied Industries Association, the Electrical Contractors Association of South Africa and the Johannesburg City Council for their kind and valuable assistance and service on this committee.

J. C. DOWNEY,
Chairman.

Mr. J. DOWNEY (Springs): Ladies and gentlemen, yesterday we had a discourse — a parting flash from my old friend Johannes van der Walt. He objected to being called a clerk, but what Town Clerk implies I wouldn't know. He should have thought of that before he changed his name from "engineer" to "clerk".

I don't know what I can call him other than a clerk, because his designation is "Town Clerk" and it was "Town Electrical Engineer" before, so I think the thing falls on him to decide that he will have to change his designation.

I do not wish to comment much on this excepting to say that we do meet when necessity arises, but we have been receiving a number of products for which there are specifications, so we realise we cannot consider them. It does become a little embarrassing to the committee at times when one finds that while a new product has been submitted for our consideration, it has been accepted somewhere else, without any reference to the Bureau or any of the members of the Committee.

I would like to thank the representatives, the Bureau of Standards, the Electricity Supply Commission, the S.A. Institute of Electrical Engineers, the Electrical Engineering and Allied Association, the Electrical Contractors Association, and the Johannesburg City Council for their very kind and valuable assistance and service on this committee.

THE PRESIDENT: Thank you Mr. Downey. Can I call on Mr. Lombard to report on the Factories, Machineries and Building Workers Amendment Act?

Mr. C. LOMBARD (Germiston): Mr. President, ladies and gentlemen: as you probably know during the year the Association was requested by the Secretary of Labour to comment

on certain draft amendments to the Factories Act and the Factories Act regulations, and also asked by the U.M.E.. To submit comments on these proposed draft amendments.

Our time was rather limited and by correspondence we managed to get the views of the members of the Executive in the various provinces, and a small sub-committee in Johannesburg then prepared the final draft of our comments.

I think it would perhaps be a good thing if I mention a few of our comments which I think would be of importance as far as municipal electricity undertakings are concerned.

The first one is the proposed regulation 116 which requires all electrical installations and power lines to be provided with suitable controlling apparatus and controlling devices which shall be capable of automatically isolating the power supply in the event of a fault developing on the installation or power line, and so arranged as to ensure the maximum safety of persons.

This Association is not against the provision of protective devices but we have in mind the difficulty of providing satisfactory protection for overhead lines in the event of conductor breakages. You all know that that is a very difficult problem to deal with, and we have therefore suggested that an opportunity should be granted to your representatives to discuss this matter with the Inspector of Factories.

Another draft regulation which will concern us all is the use of 110 volt portable hand tools in conjunction with 220/110 volt isolating transformers. Here our views are that we do not consider that the introduction of an operating tension of 110 volts will reduce the hazards in any way whilst the cost to the country as a whole would be quite considerable. It is felt that the use of portable electric hand tools should be covered by regular inspection and records by a competent person.

The next draft regulation that I would like to refer to concerns overhead service connections. The new draft regulation now makes it compulsory for overhead service mains to consist entirely of approved insulating wire, while the present regulations of course only require insulating wire for those portions of the overhead service mains which pass a building and are within easy reach of the building, or which are accessible from a building or a ladder leaning against it.

It has therefore been the practice of many local authorities to provide overhead service mains which consist partly of bare wires; to replace those portions of overhead service mains which consist of bare wire with insulated wire will be a costly operation for such local authorities and we therefore recommended that the provisions of this regulation should not be made applicable to existing overhead service mains, which were erected in accordance with the present regulations.

Then there is another draft regulation No. 128, Paragraph 3 of which requires a clearance of not less than 10 feet from any building to the nearest conductor of a power line, and there again we suggest that if the operating voltage of the line does not exceed 500 volts, the clearance could be less if the conductors are insulated.

Then we come to Regulation 129 and this concerns the provision of cradling. Attention is drawn to the fact that whereas the existing regulations only require the provision of cradles or duplicate conductors, etc. for power lines in other areas, that is areas outside townships at points where they cross

railways, proclaimed roads, important telegraph lines, or other power lines, no such distinction between power lines within townships and power lines in other areas is made in the new regulation. In the Code of Practice for Overhead Lines certain distinctions are made between low voltage lines and high voltage lines, which cross roads within and proclaimed roads outside townships, whereas no such distinction is made in the new regulation.

It should be noted that "proclaimed road" is not defined in the Factories Act regulations and although it is probably intended that the provision of this regulation should only apply to power lines or power line crossings of government or provincial proclaimed roads outside townships, in the absence of a definition of the term "proclaimed road" there is a real danger that these regulations will apply to low voltage lines inside townships which cross roads in such townships and the provision of duplicate conductors or cradles etc. will therefore be compulsory for such lines at most road crossings. We therefore suggested that the term "proclaimed road" should be properly defined, to make it unnecessary to provide cradling for overhead lines in townships, as the case is at present.

THE PRESIDENT: Thank you Mr. Lombard.

I don't know if Mr. Kane can speak on coal prices in a few moments, or do you want a longer time?

Mr. R. W. KANE (Johannesburg): I will take a portion of that two minutes to tell Mr. Lategan that Section 28(g) of the Wiremen's Act provides for £50 fine or six months, so if he will talk it over with his local prosecutor, he might be able to do something about these youngsters who are working without supervision.

Referring to coal prices, at the end of last year we noticed there was a possibility of an increase in the price of coal. We sought permission from the larger undertakings of this Association to attempt to oppose this increase, and with very little notice Mr. Wilson and I went over to the Price Controller. I think we rather shocked him that we dared to object to any increase in the price of coal. The coal owners said it was none of our business, and it was our duty merely to pay. I don't think we were very successful except that we gave the price controller some food for thought and the point I want to make clear to the Association at the present moment is though we have had correspondence with those members who use coal, we are contemplating going back to the price controller, and, if necessary, to the Minister, to point out one or two little irregularities that we think are gradually creeping into the price control aspect of coal.

I briefly want to say this, that whereas in the past we used to pay about 1d. for a ton of duff, we are now paying 10/7d. I am making that one point just to prove that the rubbish of the mine that we were encouraged to burn is now rapidly approaching the price of normal household coal, and your Association, through your Executive, hopes to take this matter further. Whether we will be successful or not is another matter.

THE PRESIDENT: Thank you Mr. Kane — we do hope you will be successful.

(Convention Announcements followed.)

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FOURTH DAY

On Resuming:

THE PRESIDENT: Good morning, ladies and gentlemen. Ladies and gentlemen, we have a very old member of the Association with us today, Mr. Sparks. I don't know whether it is your name or electricity, Mr. Sparks, but we are very pleased to have you here today. (Applause.)

I will now open the discussion on Mr. Clarke's paper as requested by Mr. Dunstan.

Mr. F. STEVENS (Ladysmith): Mr. Chairman through you I would like to associate myself with the compliments paid Mr. Clarke. I gather the point he wished to stress is the need for all consumers, Domestic as well as Commercial, to keep their maximum demand as low as possible with a view to improving their load-factors and as a result the Supply Authority's in the hope of reducing capital costs and thereby the tariffs.

I am sure the majority of the Delegates agree with this, the only ones that may not are those connected with Kariba who, I understand are looking for load whatever the load-factor.

For the consumer to concern himself in such matters, which often involves some expenditure or inconvenience on his part, he has to be assured there will be a financial saving as a result. Unfortunately in giving him this assurance the Supply Authority has to point out the snags that go with it and this is where the Authority is up against it for whatever it does to improve its own load-factor there are reasons for avoiding the step if possible.

To introduce ampere demand meters which have to be watched by the consumer and re-set by the Supply Authority or circuit breakers which may interrupt the Consumer's supply thereby causing some annoyance, alternatively Load Control equipment such as Ripple or D.C. Bias Relays that put restrictions on the supplies of hot water, destroys goodwill.

For the past 11 years in Ladysmith we have controlled the water heating loads automatically and to-day the system after

diversity maximum demand per domestic consumer is in the vicinity of 2.25 kw. which compares favourably with some of Mr. Clarke's figures. It is not known how much of the credit for this should go to the habits of our community as Ladysmith is a big railway centre where some employees have breakfast when others are having sundowners.

The load-factor has, during the time mentioned, increased from 40 to approximately 55%, some months it reaches 63%.

To further improve the load-factor consideration is being given to introducing ampere demand meters and circuit breakers for determining the minimum charges.

This step will be applied to all consumers other than domestic and those on maximum K.V.A. demand which means to say to Commercial Consumers only such as shops, boarding houses, churches and the like.

These consumers will be given the option of going on to one or the other so as to cater for those prepared to watch their ammeters and others who prefer for their lights to go out by way of a warning knowing full well they have only to switch off some of their load to enable them to restore the supply.

Although we have had approximately 100 maximum demand meters installed in shops and various institutions for some months we have not yet charged on an ampere demand basis so I am unable to comment on their use.

The present ammeters are being read and re-set monthly to enable us to acquire the necessary information to enable us to frame a suitable tariff.

I and no doubt others present will be interested to hear from those engineers who have already used ampere demand meters or circuit breakers for assessing fixed and minimum charges.

I would like to apologise for some of the figures mentioned being approximate, this is due to our office being in an upheaval through building alterations when I left for East

London. We have amongst our statistics the A.D.M.D. for domestic loads supplied from a number of individual substations, some are in areas where business people reside while others are where railway staff live. I am sorry this information is not available now.

Having myself managed a small Undertaking such as Mr. Clarke is in charge of I feel confident he will attain his object in taking the steps he proposes, so wish him all success in his efforts.

THE PRESIDENT: Thank you Mr. Stevens. Any further discussion?

Mr. G. C. THERON (Vanderbijlpark): Mnr. die President, Die referate op vanjaar se kongres gelewer, soos ook die by baie ander geleentehede, is deurspek met die term „belastingsfaktor“.

Die belangrikheid van 'n goeie belastingsfaktor en die nou verband met die gesonde ekonomie van 'n elektrisiteitsonderneming kan dus nie oorbeklemtoon word nie en ons is mnr. Clarke baie dank verskuldig dat hy die soekling daarop laat val het.

Die skrywer haal as volg aan uit 'n verslag:

The electrical engineers are anxious to use the most efficient stations . . . but to search for ways and means to "maximise" the use of the vast plant under their care does not seem to concern them. To do so would require some unorthodox thinking and a departure from tradition. There would have to be some drastic modifications in tariffs.

Dit wil voorkom asof aanvaar word dat verskrywings die enigste oplossing bied terwyl die syfers in die tabel No. 2 van die referaat bewys dat die verbetering van die belastingsfaktor deur die aanwending van hierdie middel beperk is.

In die vier gevalle aangehaal was daar in elke onderneming wel 'n verbetering aan die begin maar ook agteruitgang op 'n later stadium vernameklik in die geval van Windhoek.

So iets soos vraagbeheer kan nie met sukses en blywende resultate in die hande van verbruikers gelaat word nie. Met die aanvang is die resultate daar maar die verbruikers wil 'n diens gelewer hê en spoedig word die hoër tarief betaal liewer as om vraagbeheer vrywillig toe te pas, of daar word oorgeskakel na ander metodes van kook en verhitting.

Daar moet sterk gewaarsku word teen die heffing van 'n tarief waar die meter-lesers meer as een register moet lees want dit jaag dadelik die rekenkundige uitgawes op en dikwels heeltemal uit verband met die voordele wat bereik word.

Die gebruik van stroomverbrekers om die vraag te beheer of dit van een apparaat na 'n ander oor te skakel kan ook nie ondersteun word nie.

Die resultate wat bereik word is dieselfde as met 'n sentrale beheersfêmel behalwe dat die verbruiker die werk moet doen of die ongerief moet verduur. Verwag ons nie te veel van die verbruiker in die opsig nie.

Na alles die verbruiker betaal vir die lewering van 'n diens en nou word verwag dat die werk deur hom gedoen moet word.

Bediendes is vinnig besig om te verdwyn uit ons huishoudings en dit is die plig van elke plaaslike owerheid wat belas is met die versprei van elektrisiteit om dit aan te vul met die

verskaffing van elektrisiteit wanneer die verbruiker dit nodig het en teen die laagste moontlike prys.

Sentrale vraagbeheer van die warmwaterstelsels verseker die hoogste belastingsfaktor moontlik, die laagste tariewe en dit sonder dat die verbruiker ongerief aangedoen word of daarvan bewus is.

Ons is oortuig dat as Raadslede en ingenieurs die verskaffing van elektrisiteit as 'n diens aan die verbruikers, en ek bedoel 'n noodsaaklike diens in die wydste sin, beskou, sal daar nie argumente wees omtrent sogenaamde surplusse en wat daarmee gedoen moet word nie. (Applause.)

Mr. W. H. MILTON (Escom): Mr. President, and gentlemen, I do feel that it might illustrate a point of view if I indicate a difficulty which I myself am facing. I am building a little cottage in Swaziland where the limited availability system is practised, and have to decide just what limit we require for the cottage which we will occupy, infrequently, during the year.

My daughter is also taking supply and is under that same restriction. On the basis of the prices charged she has elected 10 amps as the maximum which she requires, and she manages to fit everything in by using a Rayburn stove, coal water heating, and so on, because, although she might like to use 20 amps on occasions during the year, to pay for that 20 amps throughout the year makes it rather expensive.

I am, of course, in a most difficult position. I can't accept hers as the right solution, so in the case of our cottage I have decided to endeavour to work on the 10 amps maximum. In order to achieve that, I have got to restrict the size of my stove, the water heater, which I insist must be electric. I am satisfied we can achieve my object by using load relays. These are quite simple gadgets. Those load relays will then disconnect the water heater when the stove load is on, up to a limit of 5 amperes, which is the figures I have fixed in my mind at the moment; and then, as radiators and so on will outlets, another load relay, connected in the total supply circuit will disconnect all plugs except the stove plug, in the event of the load approaching the limit to which we are "tied" by the 10 ampere miniature circuit breaker.

Then, of course, if my wife has things on which still bring the load up above 10 amps, we go into total darkness. That experience of darkness during a party when a guest comes along and switches on a kettle with a 1,500 watt element before first turning off the heater in the lounge (which is what the normal housewife does) is something to be experienced. In the middle of a party, when everybody is really gay, somebody slips out and puts the kettle on and a few minutes later everyone is in darkness and wondering where the matches are.

My reason for giving you information is that, if you had ampere maximum demand metering in a case of that description, we would be free on the rare occasions when required, to really put a load on the system — 20 or 30 amps wouldn't matter. Although in all normal circumstances, in view of the ampere charge, those same relays would be very useful. They could restrict your load and all you'd need to do would be to short out those relays so that they became inoperative when you wanted to throw a party.

With infrequent parties, and rare heavy loads, you get a maximum of diversity. Once you work on a limited demand

system and choose, say 10 amps, you are paying for something whether you use it or not, and the tendency is "Well, I don't care, let's use it, the energy is cheap enough". And you'll see that in quite a number of cases where people leave load on because they have a fixed demand charge; they say "Why bother to switch it off?" although, if switched off, we could make far better use of our distribution networks, our distribution transformers and our generating plants.

THE PRESIDENT: Thank you Mr. Milton; are there any further contributions to the discussion?

Mr. J. DOWNEY (Springs): I would just like to correct probably be used with kettles, etc. supplied from socket Mr. Milton on one point — he forgot to tell you that amperé demand does not jump up immediately you put the kettle on, so there is sufficient time to boil the water in the kettle without pushing up your amperé demand an appreciable amount, although you still have 10 amps on the system, you can finish up with 13 or 14 amps as a maximum.

Mr. P. J. BOTES (Roodepoort): Mnr. die President, in Roodepoort is ons ook nou van plan om binnekort 'n sisteem daar te stel om die spitsaanvraag in die aand te beheer.

Mnr. Clarke, volgens sy referaat maak gebruik van miniatuur skakelaars om die spits aanvraag te beheer gedurende die kook periode. Volgens my mening sal daar ind'en hierdie skema in Roodepoort, waar daar ongeveer 6,000 verbruikers is wat oor waterverwarmers beskik toegepas word, 'n spitsaanvraag ontstaan aangesien die waterverwarmers een vir een terug geskakel sal word wanneer die volle spits periode nog nie verby is nie. Die waterverwarmers is teen daardie tyd koud en gevolglik sal volgens my mening 'n groter spitsaanvraag ontstaan.

Dit sal waardeer word om ander lede se opinie in die verband te vernem.

Dankie, mnr. die President.

Mr. M. H. L. BOSHOFF (Graaff-Reinet): Having come from a "fighting dorp" to a "fighting port" — I thought, I am now told by my councillor member that I come from the "gem" of the Karroo. That may be so, Mr. President, lad'es and gentlemen, but I think I must be attached to the wrong embassy — apologies to Concordia.

I had two years experience as a contractor working in a municipality which uses, as a tariff basis, the MCB. I also worked as an assistant electrical engineer in a town which used the "red peril" as it was known, the maximum demand meter. This period was also two years.

Two years, that was the maximum I could take! I learnt a lot about maximum demand meters — a great deal indeed. The people, also the master, who incidentally was my tutor, was the consumer. The consumer is the man who puts you and me in our jobs and in business, the same way as the public puts the politician in government. It is no good having all sorts of theories, be it a government theory or be it an electricity undertaking theory; if the public don't like it they will "take you out".

Their main opposition to a M.D. tariff is (as I have already stated previously) "We must pay a double charge".

The theme throughout these talks has been "Decrease your peak loads". I therefore refer you to the table given on Page 47 by Mr. Clark.

It is significant that, in the case of Oudtshoorn, there was roughly a 20% increase in load factor when the MCB was installed; in the case of Somerset East it was 19%; in the case of Walmer it was 0%; and in Windhoek it was 14% but, as has already been stated, except for the case of Somerset East, there has been a retrospective step in Load Factor, or a stagnant aspect attached to it.

The only reason why Somerset East is capable of keeping it up is because, by a charge of 30 cents per amp, they are throttling the use of electricity. At Cradock we used the maximum demand meter and charged 22½ cents per amp, in so doing we were throttling the load (which will be shown below).

So much so, that four years after installing M.D. Meters some form of compromise was made to the public i.e. an additional tariff was provided which was based on a fixed charge. The consumer having the opportunity of selecting whether he wanted to pay a fixed charge or an amperé demand charge.

In the case of Cradock, in the middle fifties, they attained a peak load of 2300 kw + or —. In 1959, that maximum demand peak load, as it's called, was reduced by them to 1800 kw, but what had happened in the case of Cradock? Cradock built a new power station, having 6 MW installed capacity, as against their original power station having roughly 3000 kw as their total capacity.

Now Cradock, which is just across the hill from Graaff-Reinet, shows a very negligible increase in the sale of electricity of the order of 1% for last year. Graaff-Reinet has shown an increase in electricity sales of 9% and an increase in maximum demand peak load of 3%.

Further-more it is very favourably composed with Cradock because the community within a total of 100 is exactly the same. The loads are the same, the few industrial consumers, if you could call them that, are identical to both, so a very fair comparison could be made there.

In Graaff-Reinet we have 5000 KW installed. We have a peak load of 1700 KW at the moment. It is my opinion that, at this stage, we must treat maximum demand meters, or MCB's, the same as we should treat hydrogen bombs and atom bombs, with care, and tenderly. They could be, I am sure, be of great assistance to mankind, but I think we need much more research in their application.

Thank you.

THE PRESIDENT: Thank you Mr. Boshoff.

Mr. J. E. MITCHELL (Hon. Member): Mr. President, I would like to thank Mr. Clarke for giving us his paper today and while I am on my feet I would like to thank Mr. Barratt also.

I have been on the Executive many years, and we have been struggling during that period to get engineers of the smaller municipalities to give us papers. We knew we had some talent there but it was very difficult to extract it. I think you should be congratulated, Percy, on being able to get two of your past Branch Chairmen (I think I'm right there) to give papers to this Convention. They bring out some of the difficulties of the smaller municipalities, which is what 75% of the people here are representing, and to whom we always endeavour to give assistance, and when the engineers

of the smaller municipalities do give papers of this nature it does help us to appreciate their problems.

I am a bit worried, however, in regard to some of the things that are happening. You have to be very careful in trying something new. I have always been one who has advocated trying something new, but I was rather horrified when I heard what Mr. Milton is having to put up with in Swaziland, for instance. I thought he would know how to put a magnet on the side to adjust the setting . . . (laughter) . . . but perhaps I am giving secrets away!

And that leads me to the next point: it may be a thermal type of limiter, and it can have anything from 0% to 100% inaccuracy, and it is here also that I turn to the feature of the maximum demand ammeter metering. Because there, again, unless you are going in for the expensive Merz integrating type, it means you have a thermal one there too. Mr. Downey, our Vice-President, illustrated immediately the inaccuracy of that type when he mentioned to Mr. Milton that although he put 20 amps on it would not register it, unless he left it on for a long period. And that is one of the things you have got to watch because surely what you are interested in is the load on the system, the diversified load on the system and the diversified load on the transformer, and what we have not to forget, is the term "diversity". The load factor of a vacuum cleaner is possibly less than 1%, but the load factor of 1,000 vacuum cleaners is considerably more than 1%, because it is very rarely you get 1,000 housewives using their vacuum cleaners all at the same time. They use their vacuum cleaners over a long period. You have one fan, but when you have 100 fans diversity gives you a reasonable load factor.

What I am worried about is that you are going to stop people buying electrical appliances, which, after all said and done, is our life blood, and not using them because of the difficulty you get in having the load limiter trip out on you, or going above your maximum demand, which you think you can pay for the day, and you are not going to get the improvement in load factor that you will get by using more electricity.

The system which seems to be advocated is this: that you get a better load factor by using less electricity. And it is correct too. But surely that is not our job in life. Our job in life, in my opinion, is to give a service. You give the service in the best possible manner, and if it costs more, all right, we come back to the problem we were talking about before — the reason why everybody is cutting down today is lack of capital. If you inject more capital back into the system you can provide the service that everybody wants, and I am very worried about the aspect of saying, "Well, we haven't got the money, therefore, we must do something to reduce the service we are giving to the public". Because it is a reduction in service. Your lights go out because somebody switches on the kettle — that is a reduction in service, and I would much sooner see the problem tackled from the other side, because it means business, it means that your industries are going to produce more plant, produce more work. This other way I am very worried that you might get a reducing spiral, where you have less appliances because you are selling less electricity, so you have less load and you need to put in less plant.

You must be very careful that it doesn't do that, instead of what we want, and that is the expanding spiral, when you

use more, you create more work, you create more plant, and everybody has a much more booming economy.

THE PRESIDENT: Thank you Mr. Mitchell.

Mr. J. D. N. VAN WYK (Pretoria): Mr. President, firstly allow me to thank you and the organisation for the privilege of being able to attend this Convention as a visitor. I have found it most interesting and stimulating.

One of the previous contributors to this paper mentioned the fact that there seems to be the necessity for much research on certain problems. As an engineer who earns his daily bread (and I should emphasise "bread" here) as a research engineer, I would like to make a few remarks, in particular, sir, since one of the contributors to Prof. Smith's paper said that research should not be vested in a centralised authority, but should be competitive and vested in the individual industry. I don't quite agree with this view, because even a country like the United States with its vast resources finds the competition in research rather expensive; we have only to follow the history of the missile development to be aware of this.

The reason is of course that research is a very specialised subject, and is very costly in facilities as well as in manpower. The manpower requirement is, I think, the more difficult one to satisfy, because the research engineer is a rather special creature — in South Africa he often has to work for a low salary, even although he is required to have certain special characteristics for which there is at the present moment an international demand. Further, one has to bring to bear on research problems, the effects of teams of people from the various disciplines involved. I therefore think that there are not many organisations in South Africa, who can afford to do research on their own.

In the heavy current field, of course, it is often argued that we don't need research in this country, because it is mostly carried out by parent companies overseas. Here again, I think that we have many problems unique to South Africa, as we have learnt also at this Convention. Furthermore I have yet to come across a case where one can directly apply research carried out in other countries to our local problems.

There is also the "bugbear" of secrecy or trade secrets which is often quoted as the reason why joint research is impossible. My own organisation, the C.S.I.R., does quite a lot of research on contract for industry, and it is up to the sponsor to make sure that in any contract his interests are protected.

It seems then, that there is a strong case for joint sponsoring of research by a group, such as your own.

Mr. A. C. SIMPSON (Durban): In reply to Mr. Dunstan and Mr. Boshoff:

In 1953 Walmer had the option of introducing a demand type tariff or a tariff with the number of living rooms as a basis. We chose the demand type in preference to the room basis, and we chose circuit breakers in preference to demand meters for the following reasons:—

- (a) Lower initial cost.
- (b) No extra monthly readings would be necessary.
- (c) No difficulty would be experienced with having to re-set and re-seal demand meters every month.

I understand that in towns where demand meters are installed consumers have had circuit breakers installed to limit

the demand; if the circuit breaker ampere charge is reasonable circuit breakers do not restrict the use of electricity. In Walmer the alternative was 40 cents per living room or 10 cents per ampere. Our unit sales have continued to increase at 7% per annum, and the maximum demand continues to increase.

Many consumers complain about having to pay an increased demand charge when they install a stove or water heater. For some unaccountable reason they would prefer somebody else to pay their demand charge.

Circuit breakers also have a number of other practical advantages. They give increased protection against faults in the house, and they operate quite well against lightning surges. There is another major practical advantage in Walmer. The majority of houses have 2 Wire No. 10 overhead connections with 7,044 mains. Over the years these mains have been expected to carry increasing loads, and we have now reached the stage where houses have 40 amp stoves, 12 amp water heaters, 8 amp kettles etc.; by limiting a single phase connection to 35 amps we have prevented a lot of trouble with services and we have given the consumer the option of staying within the limits of his service or installing another phase.

Other complaints about circuit breakers are from consumers who have spent a considerable amount of money on electrical equipment and cannot see why they should spend money on increasing the size of his service. I cannot appreciate the reasoning.

There is also the consumer who is trying to manage a 40 amp load on a 15 amp circuit breaker and there is the consumer who wished to be incorporated with Port Elizabeth. Since 1953 we have installed 2500 circuit breakers and have less than 3 dozen failures, and circuit breakers are very accurate to-day. The makers can supply accurate and reliable circuit breakers.

Finally I would ask that engineers who have had experience of circuit breakers and circuit breaker tariffs be asked to submit their findings to the A.M.E.U. who could make it available to members.

Thank you.

THE PRESIDENT: Thank you Mr. Simpson, I'll pass that on to the Executive.

Mr. J. K. VAN AHLFTEN (Sasolburg): Mr. President, gentlemen, the author is to be complimented on a very fine paper which is especially interesting to the smaller town electrical engineers like myself and has been of great interest. I have, however, a few comments to make, and these primarily concern the question of load factor improvement, by the application of the demand type of tariff. Both the author, and the author of the earlier paper dealing with power station development for an isolated community, have apparently succeeded in achieving an overall improvement in the system load factor since the introduction of the demand type of tariff.

While it is conceded that an improvement has taken place, it was, however, clearly shown in the paper on electricity costs and tariffs that two-part tariffs, including the demand type of tariff, and also part of day type tariffs, cannot be considered very reliable for an efficient or substantial improvement of the load factor.

The other problem of course is that maximum demand type meters are expensive and can hardly be justified unless the load is relatively large, whereas the introduction of the circuit breaker loading as a means of maximum demand metering, can lead to trouble in an all-electric township, where there are heavily loaded electric stoves, water heaters, and other domestic appliances, apart from the fact that control over the free use of electricity is now not only restricted to the peak periods, but also to the off-peak periods.

It would therefore appear that the only method of reducing capital costs and ensuring maximum utilisation of plant is to have some means of control of the peak loads on the system, and furthermore that any means of doing so by way of different tariff structures does not have the desired effect, as the fixed costs are related to the annual peak load.

This brings us back again to where we left off in Livingstone last year, with the discussions on my paper dealing with a remote control system, for shedding any undesirable load during the peak periods with a subsequent improvement in load factor and therefore also in a lowering of electricity costs.

It may therefore be concluded that the problem of the allocation of costs in direct proportion to the energy handled is the one factor for which, as yet, no reliable tariff structure has been devised. On the other hand, an efficient means of controlling the peak load on a distribution system can lead to maximum plant utilisation and therefore also to a more equitable means of allocating the costs in supply involved. Thank you Mr. President.

Mr. L. LEWIS (Mossel Bay): Mr. President, I did not intend speaking on the subject of demand metering to small consumers, because I have learnt over the years that if you want to be at peace with your neighbour you never discuss maximum demand meters or anything of that nature.

Anyway, I feel I do have something to contribute and on which I'd like Mr. Clarke to give us his comments.

Before I start, I might just mention that my own view is rather similar to that of Mr. Jimmy Mitchell. I believe that an ammeter does tend to suppress the use of electricity. Whether it is good or bad I wouldn't like to say.

We found that when we introduced the maximum demand meters, people didn't understand what we were trying to get at. They were told that they could save money, so they set about saving money. That involved discarding a lot of appliances. They didn't know what to do in order to save one or two amps. It turned a lot of honest people into petty criminals because they would try and "chop and bang" the ammeters to see whether the pointer would go down. We knew all about this, and of course, we didn't want to take a lot of people to court, but it became a bit embarrassing when people started phoning up and saying, "Look, the servant girl has banged the broom against the wall and the amps have jumped up". We could still take that. But what really made me do a bit of thinking was when a very prominent lady in the town phoned up one evening and said, "I've been knocking this ammeter with my heel and the glass has broken; what shall I do now?"

After that I thought that the time had come for us to explain to people that if they want to use electricity they must use some amps, and we tried to explain that, but you can't

get these things across to the average housewife. You just cannot. You might try for a year, or ten years, but you will just not get it across.

What we had to do was to introduce a minimum ampere charge, and we set the ampere charge at 12 amps, for two reasons really; one was that you cannot manage on less than 12 amps and the second was that the ammeter was not marked below about 10 anyway, and when the meter-reader used to come and judge it at 9, then the housewife would say, "Nonsense, it's 7", and we had no end of trouble. This minimum had quite a good result. People started using the 12 amps, not because they understood the position really, but because they said, "Well, since the municipality are charging us for 12 amps we'll jolly well use 12 amps" and they used it after that.

Anyway, we found after a while that the ammeter is a real bone of contention, and we gave them an alternative to use the MCB. Since the MCB isn't rated at 12 amps unless specially ordered we offered to install an MCB free of charge, and we told the consumer that they could put in 15 amps minimum, and nothing less.

What happens now? People don't know what 15 amps are—they don't know what 100 amps are. We put in a 15 amps MCB and on a few occasions they come back and say, "It's too small. What do we do now?" And we say, "Well, we'll put in something bigger", and then of course we get the reply, "Now you are going to charge us again". They always say that. So we say, "No, that service will give you free of charge, and if you want to change it 100 times we'll change it 100 times free of charge", and it almost never occurs that we have to change MCB's. Most people settle in on 15 amps. They seem to adjust their loading that way, and on the few occasions that we do have to go and change it, well, it is no great expense to the department, and it does create a bit of good-will.

I thought I might just mention about this minimum 12 amps, and I would like to hear some comments on it. At our next tariff change, I should like to bring this up to 15 amps, because I feel one should not try and sell electricity and at the same time be an inconvenience to the consumer. If you must limit him, limit him to something reasonable. Don't try or encourage him to try to come down to zero.

Before I sit down, I should like to warn Mr. Milton that he is in for a lot of trouble with his wife. He had better change his MCB to at least 15 rating.

THE PRESIDENT: Thank you Mr. Lewis. I think we will close the discussion now. Time is running short, and I think Mr. Clarke will have a long reply, so he will put that in as a written contribution to the proceedings.

Mr. M. CLARKE (East London): I would like to thank all those delegates who have spoken, particularly to the proposer of the vote of thanks, Mr. Muller, and Mr. Dunstan for their kind words, and perhaps the not so kind words that Mr. Dunstan has said in a quiet way, but in any case, for the good things they have said about me and about the paper in particular.

Reply to discussion on paper "Load Factor and Consumer Maximum Demand."

Mr. Muller has raised the point concerning the use of maximum demand tariffs in conjunction with load shedding

devices and I agree that such a possibility justifies full consideration, more particularly where large numbers of consumers are involved. At the same time I do feel that the fundamental requirement is to encourage each individual consumer to improve load factor, this being advantageous to the utilization of each item of equipment on the supply system. The use of load shedding devices — or more correctly load shifting devices—will not necessarily result in similar improvement of utilization on distribution or reticulation plant as the improvement which that equipment gives to the load factor at the generating or bulk supply point.

Mr. Dunstan warns against loss of goodwill and the development of consumer resistance and I would be the first to say that we must be cautious in this respect. At the same time there is no surer way of antagonising consumers than encouraging load with tariffs that later prove to be uneconomic for the supplier, and then having to adjust upwards, as so often happens. The reference to the use or development of an electric thermal storage cooker and the changed cooking methods implied, is answered by the fact that large numbers of the anthracite-fuelled stoves of this type are in use and have been in use for many years.

The question of accuracy of miniature circuit breakers is also raised and I can only say that in my opinion an inaccurate measurement either by circuit breaker or demand ammeter is far better than no measurement at all, and that the majority of present day circuit breakers are really quite accurate and reliable enough for all practical purposes.

I was pleased to hear Mr. Steven's comments on conditions in Ladysmith and I note that he has found the D.C. bias system of load shedding both successful and economically suited to the smaller undertaking.

THE PRESIDENT: Thank you Mr. Clarke.

There is 10 minutes before tea break, and I think we can have a discussion on Mr. Middlecote's paper. Will you come up to the platform, Mr. Middlecote, please?

As far as the application of multiple tariff metering is concerned Mr. Milton has asked for comments on the reaction of Treasury staff; my paper made it clear that we use M.C.B.'s as the tariff base and our experience is that this combination is a Treasury Clerk's delight in as much as the evaluation of accounts is reduced to a very simple form indeed. Furthermore in Somerset East we have not found there to be much foundation to the fear that changes in breaker ratings make the system unwieldy or unworkable. In actual fact we average about two changes per month out of a total of some 400 domestic consumers using this tariff, which figure includes variations due to movement of tenants between houses and such increases or decreases as are occasionally called for between summer and winter load conditions.

Our experience has been that domestic consumers select a rating just large enough to cater for their day to day needs—and you will note that averages of from 12.9 to 17.2 amps per consumer are given in the paper—and not as Mr. Milton has found, for their highest possible requirements, and, that they seldom change from that rating. A possible reason for the obvious difference in experience of consumer selection of rating lies in the fact that in Somerset East the demand charges are a fairly substantial part of the consumer's total

costs, thereby inducing them to reduce peak loads to more reasonable levels.

Mr. Theron mentions the disadvantage of maximum demand ammeters creating a second reading each month, and with this I wholeheartedly agree. I think that Mr. Lewis put the case against ammeters very clearly in this and other regards when they are applied to the domestic class of consumer. His experiences in Mossel Bay and the further comments from Mr. Simpson were of great interest to me.

On the other hand both Mr. Theron and Mr. von Alften express the view that load shedding is more effective than tariff inducement for the improvement in load factor but I feel that while this may be correct in some instances it does not go to the root of the matter. In my opinion load shedding—or load shifting—is a modified form of off-peak rating whereby load is encouraged at times where, under present day conditions, plant utilization can be improved. But this implies that sooner or later the “valley” in the load curve is filled up and its place is taken by a new peak. If we must run generating plant for twenty-four hours or each day why not induce consumers to use electricity over as many of those hours as possible? This has the added advantage that manufacturers will be drawn in to develop appliances or combinations of appliances which assist each individual consumer to improve their load factor and that of the system, right down to the humblest item of distribution equipment.

Both Mr. Mitchell and Mr. Boshoff have echoed the warning against throttling the use of electricity and the latter in particular has painted a gloomy picture of consumer reaction based on his experiences. He refers to the need for more research into the problem and in this I agree with him, but at the same time if we, the Engineers of the Supply Industry, do not initiate the research who else is likely to? After all, as I mentioned in the second paragraph of the paper, the evidence points to the fact that for too long most of us have been standing to one side and discussing the problem instead of doing something about it.

In conclusion I can only endorse Mr. Simpson's appeal for all those towns who are operating under one or other of the maximum demand type tariffs for their smaller consumers, to come forward with as much statistic information as possible in order that the advantages and disadvantages of the system can clearly be understood by all those contemplating changes in tariff structure along these lines.

Mr. V. H. WOODS (Vereeniging): Mr. President, I think that Mr. Middlecote's paper is timely in bringing to our notice the necessity for standardisation. I think he would however, be ready to agree that standardisation should not be extended to the regimentation of ideas.

I am in agreement with Mr. Middlecote's reference to cable manufacturers, being an example of benefits that can stem from standardisation, and the reference in his paper to the recommendations by the Bureau of Standards in regard to the construction of 11 KV cables, have, I am sure, proved of benefit both to the manufacturer and the consumer.

The S.A.B.S. mark scheme is fundamentally concerned with quality, and I think it must be accepted that since the advent of the mark scheme, the quality of many articles produced in the Republic have complied much more consistently with the

prescribed specifications. The mark scheme in my view, has also, to a great extent, resulted in the elimination of unfair competition from manufacturers whose goods have not always measured up to specification requirements.

Whilst the Standards Act authorises the Bureau of Standards to supervise processes in the factories of a manufacturer, it is not unknown for inspecting authorities to include similar clauses in their tender conditions. I can, however, state from my own experience, without reserve, Mr. President, that this facility has never been abused, and I do not consider that manufacturers need have concern regarding this clause in the Act if their genuine desire is to produce to the requirements of the S.A.B.S. specification.

As far as the point made by Mr. Kane is concerned, regarding the uprating of cables, there would seem to be some confusion here. I am aware that the point of uprating of P.V.C. cables is under discussion by the cable manufacturers with the S.A. Institute of Electrical Engineers to whose regulations the wiring of buildings is required to conform, and it can readily be arranged for the Association to be provided with all the available information on this subject.

Thank you Mr. President.

Mr. J. E. MITCHELL (Hon. Member): Mr. President, I am not going to discuss the paper, but as I have many time and oft got up and spoken when Mr. Middlecote has been putting forward points with which I have not agreed, I thought this time that now he has had his head chopped off with a hatchet, I would like to say a few words of praise on his behalf.

I would like to give thanks to Mr. Middlecote for, what I consider, is one of the best papers we have ever had presented. Not only that, but also one of the best methods of presentation. I think he did a wonderful job.

I felt I had to do this because Pat was once my commanding officer when we first met on the degousing range of Robben Island just 29 years ago this month, and I notice that his naval training hasn't quite deserted him, because in speaking about transformer losses, he didn't say they were raised, he said they were “shoved up”.

Also he didn't mention one special standard and that is the standard of engineer they now have in the S.A.B.S. Mr. Middlecote himself. When I listened to Mr. Sutherland speaking I thought here was Mr. Sutherland trying to sell something and here is Mr. Middlecote trying to sell his wares (obviously if there is no Bureau of Standards he is out of a job), and as I see it, he makes such a good job of his selling of standards, that if you don't like the standards, you should give him a job, on the commercial side.

Mr. G. McL. YUILL (Port Elizabeth): Mr. President, gentlemen, I would like to take this opportunity of congratulating Mr. Middlecote on his interesting paper. I have known Pat for a long time now and he is fully aware that I have always been, and always will be, a pro Bureau of Standards man, and that applies also to the organization that I represent.

As I have indicated in my opening remarks my job takes me around, and quite frankly I have found that Engineers are becoming more and more conscious of the S.A. Mark and that applies to the public over all.

Papers such as the one that Mr. Middlecote presented yesterday brings home to us and the public the advantages of quality control.

Already we read from this morning's newspaper's extracts from Pat's paper. I must say at this function that his photograph would pass no standard at all!

Mr. Middlecote certainly spoke with his tongue in his cheeks when he states on page 34 of his paper under the sub-heading "Cables".

And I quote: . . . A faithful field for standardization exists in the cable industry. Indeed it could probably be stated without fear of contradiction.

Pat was fully aware what those remarks would stir up. Well done Pat and thank you again for your most interesting address.

Mr. A. A. MIDDLECOTE (Pretoria): Mr. President, ladies and gentlemen: I won't be very long but I would like to thank contributors for all their neck chopping, and also the many unofficial contributors who gave me a lot of encouragement and displayed their interest in standardization over a glass of what has not yet been standardized. Some of them even discussed standardization at the dance. I had a couple of queries about standardization, but I must say that it was that phase which Mr. Woods referred to (and I wholeheartedly agree with him. We must never regiment.) when one of the ladies said, "Ah, why don't you standardize on sizes of dresses?" Gentlemen, if we had to try and standardize that magnificent form, wouldn't it be sad!

Actually, I have tried to point out that standardization attempts to bring order from chaos, and I would like to tell you a little story which I think is rather apt for a gathering such as this. One day in a municipal office there were gathered three municipal people — the medical officer of health, the engineer, and one of the councillors, and they were arguing whose was the oldest profession. The medical officer of health said, "Mine is, obviously. If you know your Bible you'll know that Eve was created from one of Adam's ribs. That was a surgical operation. Obviously medicine is the oldest."

The engineer said, "Oh, no, no. If you know your Bible really well, you'll read a little before that that God created the world from chaos. That was an engineering accomplishment." The Town Councillor said, "Who the blazes do you think created the chaos?"

At this stage I would just like to answer one point and reserve a full answer for a later stage. This is the question of capitalisation since in actual fact, this was the only point on which I might have stuck my neck out, I quite agree it is a contentious point. It was put there to inspire a little consideration of the problem. I selected the capitalisation clause used in the paper as a typical but simple example, because there are so many capitalisation clauses in practice. As a matter of fact the proposer and seconder by their very discussion on this point show that we could spend endless hours arguing which is the best capitalisation clause. That in itself is a waste of a great deal of time and money and I think clearly indicates that a capitalisation clause might well be a very dubious benefit. In addition when belittling the value of accepting standard losses they failed to stress the fact that if your standards are dynamic, your losses will always be near

the optimum available for the particular time in relation to the technological advances available. In other words these standard losses would probably be within a few per cent of what the ideal capitalisation clause (if there were such a thing) would make them.

Mr. Sutherland brought an issue which I had hoped would not be discussed here. He discussed at length one aspect of the application of a standardization mark scheme in South Africa. In my paper I had discussed a standardization scheme generally and its value to the community. I hope that its value has indeed been demonstrated to you all. I would like to say that none of Mr. Sutherland's remarks had any bearing on the points I raised but were solely restricted to claims that the standardization mark scheme in South Africa is compulsory and therefore unethical.

I can assure you that the few complaints we do hear include more complaints that insufficient value is attached to the mark than the sort of complaint made by Mr. Sutherland. This is adequate proof that the mark is not compulsory. In fact Mr. Sutherland's second point regarding the lack of value attached to the mark on shoes is also a contradiction of his first claim that the mark is compulsory. If it were compulsory he would not have the shoe example to air in public.

In any case our figures show an increase in standardization mark activity of 20% per annum, which would seem to indicate it is a healthy activity. Mr. Sutherland's "shoe question" is possibly answered by this. Time is required for the mark on any commodity to develop naturally (and not please compulsorily as Mr. Sutherland would have it is) and one waits for interest to be established in our democratic community.

The other point which bears out the value of our standardization mark scheme in South Africa is the interest displayed in it by similar overseas laboratories. Even the BSS is increasing its activity as regards standardization and certification marks.

In closing I would like to thank you Mr. President and all the members here for their patience in once more listening to me. (Applause.)

THE PRESIDENT: We will adjourn for tea now, ladies and gentlemen.

CONVENTION ADJOURNED.

THE PRESIDENT: Ladies and gentlemen, I would like to thank His Worship the Mayor for the welcome he extended to us at the opening of the Convention, and we would like him to know how much we appreciated that, and the various functions that have been held during the course of the Convention. (Applause.)

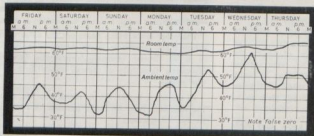
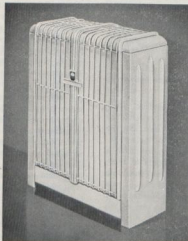
HIS WORSHIP THE MAYOR OF EAST LONDON: Mr. President, ladies and gentlemen, I didn't realise when I came along here this morning, that I would have to address you again. I am totally unprepared so it will come "off the cuff". In the short term that I have been mayor of the city, something like eight months, this is one of the happiest and most enjoyable Conventions that I have had the pleasure of attending. I know that votes of thanks are going to be passed to all those who have assisted in the success of this Convention, but

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in advance, I want to endorse everything that will be said by Mr. Giles later on.

You, who have come from all over the country, have had experience of what East London has to offer, and bearing that in mind, I hope it won't be another 14 years before you come back to us again!

Mr. President, I have to depart for a couple of hours to attend a civic function in King Williams Town, — the opening of the Dale College Centenary celebrations — and I must be away by half past eleven, but I must say that some of the friendships that I have made during this Convention will I know last for a long, long time. It has been wonderful and a very happy experience for me; as mayor of the town it has been a delight to entertain you all. As I said earlier on, I hope it won't be too long before you come back.

What I did appreciate about your Convention was this: that lots of you had the courage to bring your wives with you, and what a galaxy of beauty we experienced. You know we chaps living in East London see the same old faces, day after day, and to see some really attractive ladies from other parts of the country does one's heart a lot of good. Your mind can work, but that's about as far as it can go!

Anyway, I won't be able to say goodbye to you all personally — I have taken the opportunity of shaking the hands of a few of you — but "Best wishes for the future, and a safe return home to you all" and I am going to shake hands with our mutual friend Jack Downey, as my farewell to you, and I hope that Jack will take the opportunity of shaking as many of your hands as he can before you go.

I might tell you that I knew Jack in Port Elizabeth some 30 odd years ago, and we only realised this old association the other night chatting at the Alexander Country Club. But at this point, I want to say a special word of thanks to Percy and Eve for the delightful little party they gave us on Sunday night when I should have been in church, to get us off on the right footing, and then to the Ewing family for the lovely little informal evening they gave us out at their farm, and it was those two little informal evenings which drew a lot of us together, and as I said, helped to cement some friendships which will not easily break down. Thank you, the Ewing family, and thank you the Giles family, and thank you ladies and gentlemen. (Applause.)

THE PRESIDENT: Thank you Mr. Mayor.

May I call on Clr. Deyssel of Springs to reply to our Mayor?

Clr. F. F. DEYSEL (Springs): Mnr. die President, mnr. die Burgemeester, dames en here, — en so het ons nou aan die einde van ons 36ste Konvensie gekom . . . 'n Konvensie wat ons seker nie maklik sal vergeet nie, omdat so baie mense dit vir ons so baie aangenaam gemaak het. Dit is nou my aangename taak om namens al die afgevaardigdes hier „Dankie” te sê, en wanneer 'n mens „Dankie” sê, beteken dit gewoonlik dat u iets ontvang het. Ons het baie ontvang, en daarom wil ek nou ook 'n baie groot „Dankie” sê aan sy Edele die Burgemeester en die Burgemeester se vrou van Oos-Londen, . . . „Baie dankie” vir u wonderlike gasvryheid en u vriendelikhed. Ook aan u Raad vir die gebruik van die stadsaal, die binnesaal en die Raadsaal; selfs u reëniger, koue nogal voordelig wees as dit binne die saal aangenaam is as en wonderiger weer was die Kongres tot voordeel. Ja, dit kan buite op die straat.

Nog 'n rede waarom die lede so trou op hulle pos was, is waarskynlik die feit dat hulle motorkarre so ver van die stadsaal af parkeer was.

Gedurende die besprekings het iemand die vraag gestel of ekonomie 'n wetenskap is al daar nie. Ek wil nie hierop probeer antwoord nie, maar ek wonder net wanneer die elektrotegniese wetenskaplikes, daarin gaan slaag om die onverbruikte elektrisiteit tussen spits tye wat nou verlore gaan omdat dit nie opgegaan kan word nie, maar wat eintlik ook nie bestaan nie, omdat dit nie ontwikkel is nie, omdat dit nie gebruik is nie, wel te gebruik of op te gaar, of te bespaar gesien dat energie nie geskep of vernietig kan word nie.

Dit het my getref mnr. die President dat so min raadslede aan die besprekings deelgeneem het. Waarskynlik omdat 'n paar van u deskundige amptenare na hulle lede raadslede verwys het as gasvriende wat nie altyd weet waarvan hulle praat nie.

Ek het so 'n baaietjie navrae gedoen, en ek het gevind dat 'n deskundige 'n persoon is wat meer en meer leer van minder en minder totdat hy uiteindelik alles weet van niks! Verder het ek gevind dat niemand hier my kon sê wat elektrisiteit werklikbaar is nie, en dit is waaroor die hele Kongres gegaan het. Dit wil my dus voorkom, asof niemand van ons weet waarvan ons hier gedurende die Kongres gepraat het nie.

Namens die V.M.E.O. wil ek u, mnr. die Burgemeester, en u Eggenote, en u Raad, u amptenare, en al die inwoners van Oos-Londen hartlik bedank vir u gasvryheid en vir u vriendelikhed, en ek wil u sien en sterkte toewens vir die toekoms.

Dankie, mnr. die President.

THE PRESIDENT: Dankie, Raadslid Deyssel.

I will call on Mr. Paddy O'Dowd to propose a vote of thanks to the ladies.

Mr. A. E. O'DOWD (Salisbury): Mr. President, Your Worship, ladies and gentlemen: we have during this Convention had the lesson, the sermon, last night, I believe, even-song, and now we come to grace after meals. But first, I must put a suggestion which has come from the ladies. I am to ask the councillor members if they will give to the wives of the municipal electrical engineers a mike and a speaker. They see two benefits from this. When a municipal electrical engineer arrives home, his consciousness drowned by the slings and arrows of outrageous council, she will not have to raise her voice in the attempt to penetrate this barrier, and they believe that the strangeness of the feminine voice might arouse the awareness that they are looking for.

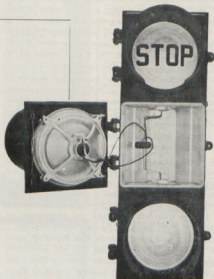
I would suggest, too, to you Mr. President, that your ladies, who have so generously graced these Conventions for years, should be known by some affectionate title. Rotarians have Rotarianes so why shouldn't the A.M.E.U. have something similar? When one thinks of all the charm, sincerity, and good humour, that they pack into such delightful containers, one word comes to mind immediately. They might be called the "Megatownes". Anyhow you can make your choice.

His Worship spoke of the grace of our ladies, and one incident occurred while I was down here which rather illustrates the point. I was in a car with an East London friend of mine and a padre. We were pulled up at the robot, and one of our ladies crossed the road. The padre's eyes followed her. So my East London friend said to the padre,

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"You shouldn't do that, should you?" "Oh," said the padre, "Why not? I can read the menu can't I? I don't have to eat it."

And so, Your Worship, it is on behalf of these charming people, that I say this grace of thanks to you, to your colleagues, and to those good manufacturers in East London who extended their hospitality to the ladies. Wednesday, for example, was a day the ladies, I am sure, will remember. You showed them something of the beauties of this city, you showed them the history of the city, as displayed in your museum, you gave them tea to a delightful musical accompaniment, and a lot of them (I don't know how many, but most I suppose) visited a hosiery manufacturer. Well, verily you have given them to drink, to eat, and you have even clothed them! How easy it is therefore for me to be able to say to you and your colleagues, and the manufacturers, their sincere thanks, for so generous a hospitality, which they could and have so readily enjoyed.

They count amongst them, one, Mrs. Mitchell, who commits her thoughts to verse, and, with your permission, sir, I would like to ask her to read what she has written for this occasion. (Applause).

Mrs. MITCHELL: Well, it's a change this year, "Honorary Member Mitchell's Honourable wife"!

Mr. President, Mr. Mayor, ladies and gentlemen, a few more thoughts and thanks from the ladies for this Convention.

These Conventions held each year
Let our men do what they hold dear,
Filled with questions, varied the choices,
For four days 'men only' air their voices.
We ladies are so pleased to be
Able to prove for all to see
That on occasions, without a word,
Wives can be seen and yet not heard.
We sometimes wonder — bless their hearts —
If men's lives have too many parts.
One of low as well as high tension,
Of 'keeping on' just for their pension.
Working up steam for power, light, and heating,
Then letting some off at this annual meeting,
To their hearts' content, with grumbles and grouses,
And no answers back from their dear little spouses!
They may appear to have got us fixed
But really our feelings are not at all mixed,
Once in a year, what's good for the gander
The goose may agree with, and so we will pander.
Engineers, Commercial, Consultants so merry,
We might even think of including Jack Berry!
Where else would you find such efficient resistance
When wives ask them just for a bit more subsistence?
Still, we would not forego the chance and the pleasure
Our husband give us to enjoy this leisure.
So we say "Thank you" and hope it will last
May Conventions never be things of the past,
Though engineers come and engineers go,
Some still conducting, and some going slow,
Some break council's shackles and learn how to live,
This latter I speak for — most decisive.
An electrical life is full of potentials
Of tariffs and slide rules and differentials.

How about it, just for a lark,
Shed your load and become a town clerk!!
We look forward each year to meeting again
To see the same faces and hear the refrain,
"It is nice to see you," and so once more
Renew our friendships the same as before.
Our President is Percy whose surname is Giles,
His face always wreathed in cigar smoke and smiles,
Always a model of unruffled calm,
Never been known to do anyone harm.
That he would succeed in office high
Was known by the ladies, and this is just why:
Being already two thirds like Yul Brynner
Made him a cert for being a winner!
The outings and meetings so carefully planned
Have given us delight, and memories in hand.
The stockings and chocolates, morning tea with sweet music,
And bus rides with driver whose repartee was so slick!
To husbands, and Paddy O'Dowd, bejagers!
To Percy and Eve, Joy and Dick and their helpers,
To the Mayor and the Mayoress for friendship so genuine,
East London is lucky to have such a pair in.
To East London's Council for every item
Our thanks go to all of them, ad infinitum!
(Applause.)

THE PRESIDENT: I think the job of thanks for that, just goes to the Mayor.

HIS WORSHIP THE MAYOR: Mr. President, Mr. O'Dowd, ladies and gentlemen, what finer tribute could we pay to the ladies?

On behalf of the Mayoress I want to thank you for what you said, and also want to thank her for the loyal support she has given me during the course of this Convention.

Once again (Mrs. Mitchell would you please let me have a copy of that some time for my records) thank you very much indeed.

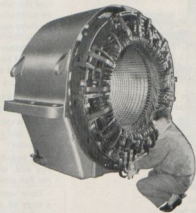
THE PRESIDENT: It seems as though the sea air does Peggy good! That is one of the most inspired poems I have heard from her. Thank you Peggy.

On behalf of the affiliates, would Mr. Lawson say a few words.

Mr. T. G. LAWSON (British G.E.C. South Africa): Mr. President, Mr. Mayor, Ladies and gentlemen: I say "South Africa" specifically because in proposing a vote of thanks, which I regard as a signal honour, I do so on behalf of affiliate members to your Convention, and I see colleagues here from most centres of the Republic, and also from Rhodesia.

Although we individually have gathered from various centres, it is true to say that the companies and the organisations in which we serve cater for the needs and requirements for the municipal electricity undertakings throughout the Republic, and the Federation, in one or several fields, from the humble terminal or lamp to the turbo-generator, and also for emergency supply, a very rare event in a power shut down. Your Convention Mr. President, provides us with that opportunity of obtaining a closer and certainly a clearer realisation of your problems, and it behoves my colleague members and I, to endeavour, in co-operation with your colleagues, to assist in solving some of these problems to the benefit of all users of electricity.

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In this regard I believe, and support, the view that competitive conditions should prevail in research. I believe it would not be incorrect in saying that opinion; regards the papers presented as being of a very, very high order. They certainly have been thought-provoking and stimulating, and presented with a lucid clarity which is clearly evident that much research went into their preparation, and thought into the discussion. They were more than academic, they were realistic.

I would like to think that when the relief and strain has taken its full effect, your Executive Council will be able to persuade Mr. Middlecot to be one of your speakers at future Conventions, perhaps also you may be able to find some "peace and quiet" for Mr. West!

This Convention, Mr. President, I am sure has been a complete success — certainly it has for the affiliates, who have enjoyed it very much, and it seems to me that some super-tension oil filled cable must have played some important part, because as you know oil does grease the wheels.

It is said, Mr. Mayor, that East London is a conference city, and as a venue I wholeheartedly agree. I suggest that you endeavour to persuade our President to hold more conferences of A.M.E.U. here, even at the cost, perhaps, of having to alter the Constitution.

When I was resident some 200 miles west of here, I found many excuses and reasons for coming to East London. Your climate with its cooling sea breeze, in spite of some remarks which have been made, I suggest is attractive to us from inland parts. Your bowling greens and golf courses are delightful respites from the kilovolts and megawatts of our everyday life, and I do suggest that on the East course particularly you have some of the best caddies that golfers can find.

The hospitality of you, sir, and the citizens of East London in hotels, stores, and garages, have been almost electrifyingly embarrassing; and your traffic department has been extremely kind.

For this hospitality we are most appreciative. We thank you, Mayor, for your extreme kindness, for the many things which we have been privileged to enjoy during our short stay here.

And also to you, Mr. President, we wish you a successful year of office. There is also the Executive Committee and the tireless secretary Mr. Ewing, and the many, many helpers too numerous to mention individually who have played their most important part in providing for we affiliates to enjoy the hospitality showered upon us.

It certainly has been a happy Convention. On behalf of myself and the affiliates, thank you very much. (Applause.)

Clr. W. ROSSOUW (Brakpan): Geagte mnr. die President, mnr.-die Burgemeester, ons as raadslede sê vir u baie dankie vir die gasvryheid wat ons geniet het, maar laat my toe, mnr. die President, om u en u komitee alle voorspoed en sukses vir die jaar 1962 toe te wens.

Ons het hier bymekaar gekom in Oos-Londen om sake te bespreek wat van belang is vir elke gemeenskap, hoe groot of hoe klein, en vir ons Republiek. Ook was ons mos hier bymekaar om te verneem hoe gaan dit daar oorkant die Limpopo. Ons se vir ons vriende daar in Rhodesië: „Baie

geluk; baie voorspoed" met die ondernemings wat hulle in gedagte het.

Mnr. die President, as 'n jong man, maar wat baie male al op die raad diens gedoen het, wil ek vir u geluk wens. As ons oor die skare kyk of oor die gehoor kyk, is daar niks om te vrees nie. Manne wat ons die toekoms aan kan vertrou; manne wat vir ons net die beste sal gee. Ons leef in die atoom eeu. Wat gaan die end van hierdie eeu vir ons oplever? En daarvoor kan ons „Dankie" sê aan hierdie suid punt van Afrika dat ons manne en vroue het wat bereid is om die beste te lewer. 'n Klein volkie maar met groot ideale. Ideale wat nie maklik ondergedruk of ondergeploeg kan word nie, en ek glo net dat ons met sukses na elke dag wat voorlê kan uitkyk.

Ek wil net nou beroep doen op ons ingenieurs hierso, en ek wil vir hulle vandag sê — as ek so deurkyk dan sien ek grys koppe. Nou, ja, ons neem aan dat dit die manne is wat vir die jonger manne soos ek, en vir manne wat in hierdie profesie belangstel, leiding moet gee. Van julle gaan offer vir die jong manne wat in julle spore moet volg. Trap diep spore. Ek luister graag na u. U sal die beste gee.

Maar, mnr. die President, ek wil u bedank, en u organisasie sal hierdie Konvensie waargeneem het — elke ene — u, daar in die stoel; die een daar agter die band opname — die klerke wat hier agter werk — almal die klein ratte, in daardie groot masjien, en elke rat in daardie masjien is net so verantwoordelik as die grootste „U" wat daar sit.

Mnr. die President, die masjien is ge-olie — die toekoms sal ons tegemoet gaan, vertrou. „Excelsior"!

DIE PRESIDENT: Baie dankie, Raadslid Rossouw.

THE PRESIDENT: The Mayor will now leave, gentlemen.

HIS WORSHIP THE MAYOR: Totsiens, almal. (Applause.)

THE PRESIDENT: Thank you, ladies and gentlemen.

Well, now I must give an opportunity to Mr. Milton before we get on to the closing session — he specially asked for it, and he is making his own terms!

Mr. W. H. MILTON (Escom): Mr. President, ladies and gentlemen: I would like to convey my thanks to you as an Honorary Member for all that I have learned at this Convention, and also for all that I have learned of your wishes, and I trust I shall bear those requirements in mind in future, if I am allowed to visit another Convention!

On behalf of the Electricity Supply Commission, I would like to convey my thanks to you for the invitation extended to us to not only attend, but to take part in your deliberations. I trust that future invitations will also be extended, which I will be able to accept. I rather fancy that our incoming chairman will take a very great interest in your activities, and it is quite probable that he will attend your functions. I am speaking personally as I have had no actual directive from him, at this present stage, which you will understand.

I would, therefore, like to wish you a very successful year of office from Escom Head Office, and congratulate you and your committee of the arrangement of a Convention which, for once, has more or less concentrated its activities, on the financial and economic problems related to our technical activities. (Applause.)

Mr. I. H. M. DREWETT (Johannesburg): I was deputed to represent the Institution of Certificated Mechanical and

Electrical Engineers, South Africa, at this Convention, but unfortunately was unable to reach the microphone before the closure was applied. I would like, however, to convey to you in writing the thanks of the President of the Institution for the invitation extended, and his apologies for his inability to attend. I was asked by the President and Council of the Institution to convey to you congratulations on your election, and to extend best wishes for a successful and enjoyable Convention.

I feel that the success and enjoyment of the Convention was attained in full measure, and would like to thank you for the hospitality extended to me in East London.

THE PRESIDENT: If there are no other speakers who are bursting to say something, I must now pass into the final phase of this Convention, and read out the list of people whom I think we should thank for contributing to the success of this Convention.

The first is the Mayor's Secretary, and the second the Town Clerk and the City Hall staff. As you can see they work remarkably well. Electricity Department staff, both the clerical and the technical sections, who had a great deal to do with the organisation, long-range, medium-range, and short-range. The Parks and Transport Department, the bus drivers, the East London Hotel Association who really went to town last night, ladies who provided the tea for us in the Quadrangle, the Shell information service, and the numerous back-room workers, associated with the Officials of this Convention. They have all worked to make it a success.

I wish to conclude now with an expression of thanks to the members of the Executive who are going to serve us so willingly, to our industrious secretary, and Joy, who has co-operated in so many ways, with the Executive, and to our Vice-President.

I wish to thank the City Council for being so tolerant as to allow me to go off from time to time on the Association's business, and to my wife for her forbearance and understanding, when I have been engaged at home on the Association's work.

Lastly, I thank you all for your attention, and wish you a safe return to the places from which you have come. Totsiens. Goodbye.

Mr. J. E. MITCHELL (Hon. Member): Ladies and gentlemen, if nobody on the Executive will do it, I will do it.

If you will sit down I will ask you to accept what I am going to do, and that is propose a vote of thanks to our President.

Our President, Percy, has handled this Convention in true Giles fashion — I am not talking about the cartoonist — and I think we owe a debt of gratitude to him for the wonderful way in which he has done his work and kept us all amused. I hope you will show your appreciation of Percy's work in the usual way! (Applause.)

CONVENTION ENDS.

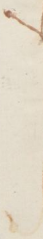
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.....

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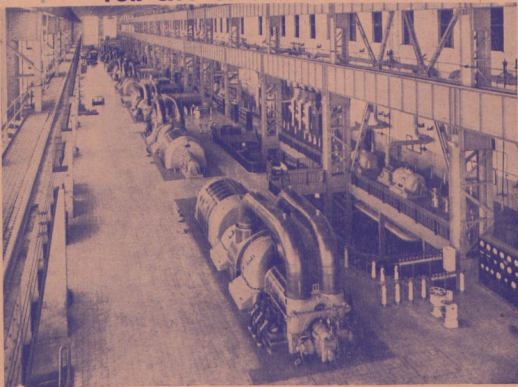
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