PROCEEDINGS

OF THE

Sixth Convention

OF THE

ASSOCIATION OF MUNICIPAL ELECTRICAL ENGINEERS

(UNION OF SOUTH AFRICA).

HELD AT DURBAN, NATAL.

From Monday, December 8th to December 12th.

1924

PRICE FIVE SHILLINGS.

UBA PRINT, DURBAN.

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ASSOCIATION OF MUNICIPAL ELECTRICAL ENGINEERS.

Founded 1915.

EXECUTIVE COUNCIL.

President:

JOHN ROBERTS (Durban).

Vice President:

B. SANKEY (Johannesburg).

Past Presidents:

G. H. SWINGLER (Cape Town),
T. C. WOLLEY DOD (Pretoria).

Other Members:

T. JAGGER (Ladysmith),
A. S. MUNRO Pietermaritzburg).
T. MILLAR (Harrismith),
L. F. BICKELL (Port Elizabeth).

Hon. Secretary and Treasurer:

E. POOLE, Box 147, Durban.

The Association of Municipal Electrical Engineers in Congress at Durban, December, 1924.

Top Row.—T. Sutcliffe (Benoni), Councillor Andrews (Ladysmith), T. Jagger (Ladysmith), Member of Council; Councillor Shearer (Ladysmith), R. A. Stoker (Kroon stad), Councillor Low (Cape Town), Dr. Hamlin (Stellenbosch), C. K. Turner (Kimberley), A. E. Harte (Elec. Comm.), B. H. Sargent (Vryheid), T. P. Ashley (Queenstown), L. B. Sparks (Pietersburg), J. T. Smith (Durban).

Second Row.—Councillor Paton (Kroonstad), Councillor Solomon (Kimberley), R. Macaulay (Bloemfontein), Councillor Barrett (Bloemfontein), Councillor Goble (Bethlehem), Councillor Prior (East London), J. Mordy Lambe (East London), Councillor Newmarch (Greytown), Councillor Ericson (Kimberley), A. S. Munro (Pietermaritzburg), Member of Council; Councillor Doull (Pietermaritzburg), W. H. Blatchford (Greytown).

Third Row.—Councillor Millar (Pretoria), T. C. Wolley-Dod (Pretoria), Past President; Councillor Clark, (Johannesburg; Councillor Shearer (Durban), B. Sankey (Johannesburg), Vice-President); John Roberts (Durban), President; G. H. Swingler (Cape Town), Past President; Councillor Hopper (Cape Town), L. F. Bickell (Port Elizabeth), Member of Council; Councillor Scott (Port Elizabeth), A. M. Jacobs, (Elec. Comm.).

Bottom Row.—F. D. Clothier (Visitor), L. Ralston (Dundee), Councillor Hosking (Dundee), E. Poole (Durban), Hon. Sec. and Tres.; T. Millar (Harrismith), Member of Council); F. C. D. Mann (Worcester), R. D. Coulthard (Oudtshoorn).

RULES AND CONSTITUTION

OF THE

ASSOCIATION OF MUNICIPAL ELECTRICAL ENGINEERS.

(UNION OF SOUTH AFRICA).

As submited and passed by the full Meeting of the Association held at the Town Hall, Johannesburg, on Friday, 19th November, 1915, with amendment as submitted and passed at the Durban, Port Elizabeth and Pretoria Conventions.

1. TITLE.—The Association shall be called the Association of Municipal Electrical Engineers (Union of South Africa).

2. OBJECTS.—The objects of the Association are to promote the interests of Municipal electric undertakings.

3. HONORARY MEMBERS shall be distinguished persons who are or who have been intimately connected with Municipal Electrical undertakings, and whom the Association especially desires to honour for exceptionally important services in connection therewith.

4. MEMBERS.—Members of the Association shall be Chief Electrical Engineers engaged on the permanent staff of an electric supply or tramway undertaking owned by a local authority in the Union of South Africa, and any duly qualified assistants whom they may recommend for election. Should any member cease to hold his qualification as above, his membership shall cease.

5. ASSOCIATE MEMBERS.—Any member resigning under Rule 4 shall be entitled to apply for election as an Associate member. Associate members shall not be entitled to vote on matters affecting the conduct and management of the Association, nor to hold office, but otherwise shall be accorded the privileges of ordinary membership.

6. CONTRIBUTIONS.—The subscription for members shall be £2 2s. for Chief Engineers and their Chief Assistants and £1 1s. for other members and associate members. Any member elected within six months after the Annual Congress shall pay the full subscription for the year and if elected six months after the Congress shall pay half subscription.

7. OFFICERS.—The Officers of the Association shall consist of: President, Vice-President, Hon. Secretary and the Hon. Treasurer.

8. COUNCIL.—The Council shall consist of the President, Vice-President, the two immediate Past-Presidents and four members to be elected at the Annual Congress.

9. ELECTION OF OFFICERS AND COUNCIL.—Officers and Members of Council shall be elected by nomination and ballot at the Annual Congress, and shall hold office until the next Congress. In the event of a vacancy occurring during the year the remaining members shall have power to appoint a member to fill the vacancy.

10. All those who attended the Congress in Johannesburg in November, 1915, shall ipso facto be members of the Association.

11. ELECTION OF FUTURE MEMBERS.—The election of future members of the Association shall be vested in the Council and applications for membership must be made on the prescribed form.

12. The affairs of the Association shall be managed by the Council, who shall have power to incur any expenditure necessary for the objects of the Association.

13. The voting at the Congress shall be restricted to the members present at such Congress.

14. The financial year of the Association shall terminate on the first day of the Annual Congress, at which date all subscriptions for the ensuing year become due, and no member will be allowed to vote whose subscription is in arrear.

15. PRESIDENT.—The President shall take the Chair at all meetings of the Association, the Council, and the Committees, at which he is present, and shall regulate and keep order in the proceedings.

16. In the absence of the President, it shall be the duty of the Vice-President to preside at the meeting of the Association, and to regulate and keep order in the proceedings. But in the case of the absence of the President and of the Vice-President, the Meeting may elect any Member of the Council, or in the case of their absence any member present to take the Chair at the Meeting.

17. The local Press of the town in which the Congress is held shall be notified of the time and date of the reading of all papers, but the Association shall reserve to itself the right to resolve itself into Committee at any time during its proceedings; moreover, it shall be competent for any Member to have his paper read and discussed in Committee if he so desires.

18. The Honorary Secretary and the Honorary Treasurer shall present a yearly report on the state of the Association, which shall be read at the Annual Congress.

19. The Honorary Treasurer shall be responsible for the funds of the Association, and shall present a Balance Sheet at the Annual Congress.

ASSOCIATION OF MUNICIPAL ELECTRICAL ENGINEERS.

(UNION OF SOUTH AFRICA).

DURBAN, DECEMBER 1924.

SIXTH CONVENTION.

Programme of Proceedings.

MONDAY, 8th DECEMBER, 1924.

9 a.m.—Council meeting.

10-30 a.m.—Opening of Convention by His Worship the Mayor of Durban, T. M. Wadley, Esq., J.P.
Valedictory Address.
Secretary's Report and Financial Statement.
Election of Officers.
Presidential Address.

2-30 p.m.—Visit to Durban Municipal Power Station, Alice Street, and Automatic Sub-Stations.

8 p.m.—Durban Male Voice Party "At Home." Municipal Art Gallery:—Swimming Gala, Beach Baths.

TUESDAY, 9th DECEMBER, 1924.

10 a.m.—Paper by B. Sankey, Esq., M.I.E.E., on his recent visit to England, including the World Power Conference and Wembley Exhibition.

Joint paper by Councillor T. C. Shearer (Chairman Electricity Committee, Durban Town Council), and Mr. John Roberts on "Control of Municipal Trading Undertakings."

12-45 p.m.—Official photograph.

2-30 p.m.—Trip round the Bay, including visit to the Coaling appliances and Graving Dock.

WEDNESDAY, 10th DECEMBER, 1924.

10 a.m.—Paper by Dr. Hamlin, Town Engineer, Stellenbosch on "Investigation design, operation and control of small Electric Power Stations.

2-30 p.m.—Visit to Sub-Stations and manufacturing works at South Coast Junction.

7-45 p.m.—Official opening of the Durban Municipal Broadcasting Station by His Worship the Mayor, followed by a private view of the Electrical and Wireless Exhibition.

THURSDAY, 11th DECEMBER, 1924.

10 a.m.—Paper by Mr. H. A. Eastman, Engineering Assistant Capetown, "Notes on the Commercial Development of Electricity Undertakings.

1 p.m.—Civic luncheon, Marine Hotel.

3 p.m.—Official opening of the Electrical and Wireless Exhibition by His Worship the Mayor.
Inspection of the Electric Locomotive.

8 p.m.—Joint meeting in Council Chamber of Natal Institute of Engineers and Members of the Convention at which M. Dawson of the Durban Power Station will read a paper on "Power Station Economy."

FRIDAY, 12th DECEMBER, 1924.

10 a.m.—Paper by Mr. F. C. D. Mann, Electrical Engineer, Worcester, "Notes on the Guiding Policy of the Municipal Electrical Department."

2-30 p.m.—Trip through suburbs to inspect lighting distribution and on to Sarnia for tea, returning to Durban via Pinetown and main road.

8 p.m.—Natal Institute of Engineers' Smoker, Model Dairy, Beach.

PROCEEDINGS

OF THE

Sixth Convention

OF THE

ASSOCIATION OF MUNICIPAL ELECTRICAL ENGINEERS.

(UNION OF SOUTH AFRICA).

MONDAY, DECEMBER 8th, 1924.

INTRODUCTORY.

The Sixth Annual Convention of the Association of Municipal Electrical Engineers of the Union of South Africa was opened in the Town Council Chamber, Durban, at 10-30 a.m. on Monday the 8th December, 1924.

The Retiring President Mr. G. H. SWINGLER (Cape Town) was in the Chair, and there were also present:—

MEMBERS—

J. Roberts (Durban), J. Mordy Lambe (East London), T. P. Ashley (Queenstown), A. S. Munro (P.M. Burg), T. Sutcliffe (Benoni), J. T. Smith (Durban), E. J. Hamlin (Stellenbosch), L. B. Sparks (Pietersburg), B. H. Sargent (Vryheid), L. Ralston (Dundee), T. Jagger (Ladysmith), R. D. Coulthard (Oudtshoorn), T. Millar (Harrismith), C. K. Turner (Kimberley), M. McDonough (Bethlehem), T. C. Wolley-Dod (Pretoria), R. A. Stoker (Kroonstad), W. H. Blatchford (Greytown), L. F. Bickell (Port Elizabeth), F. C. Mann (Worcester), B. Sankey (Johannesburg), R. Macauley (Bloemfontein), E. Poole (Durban).

DELEGATES—

Mayor of Durban, T. M. Wadley; Councillors G. W. Prior (East London), A. M. Doull (P.M. Burg), H. Hosking (Dundee), D. Shearer (Ladysmith), P. Andrews (Ladysmith), T. Ericsen (Kimberley), H. Solomon (Kimberley), P. Goble (Bethlehem), J. Paton (Kroonstad), W. J. Newmarch (Greytown), J. Scott (Port Elizabeth), W. Millar (Pretoria), W. H. Barrett (Bloemfontein), T. C. Shearer (Durban), J. D. Low (Cape Town), E. Hopper (Cape Town), J. A. Clark (J.H. Burg).

VISITORS—

A. E. Harte (Elec. Commission), A. M. Jacobs (Elec. Commission), A. E. Val Davies (J.H. Burg), Town Clerk (Bethlehem).

CIVIC WELCOME.

His Worship the Mayor of Durban, Mr. Councillor T. M. WADLEY, stated that it gave him great pleasure to welcome the members and delegates to Durban. He understood it was a feature of the Conventions that not only did Municipal Electrical Engineers attend but also Councillors and usually the Chairman of Electricity Committees were invited. By so doing those who were connected with the administrative side as distinct from the technical side could appreciate to some extent many of the problems of the engineers. The Councillor delegates were also encouraged by means of the papers that were read at the Conventions to join freely in the discussions. He thought that numerically speaking the Association could be considered a very strong one when the limited sources from which its members were obtained were considered. In welcoming them to Durban he thought he could justly say that he was welcoming them to a town which appreciated and recognised to the full the enormous value of electricity. The Durban Electrical Department endeavoured by all possible means to encourage the use by consumers of electricity in all its forms, both industrial and domestic. He regretted that the Chairman of the Electricity Supply Commission was unable to attend the Conference, but he was pleased to note that Mr. Jacobs and Mr. Hart were here to represent that Commission. He hoped the result of the deliberations at the conference would be of particular benefit to the Association and to the South African community in general, and he thought the Electrical Work which was being done in Durban would be of interest to them.

The PRESIDENT, on behalf of the Association, thanked His Worship the Mayor for his cordial welcome to Durban. Owing to unforseen circumstances they were not able to hold the convention at Johannesburg as originally intended and they were particularly indebted to the Durban Town Council and its Borough Electrical Engineer for stepping in to the breach and inviting them to Durban. Now that the Convention had been opened he hoped that the good which the Mayor had contemplated would be actually secured, and while the Convention itself might not be quite so spectatular as it might be so far as the speech were concerned, they did know that great benefit accrued to the individual Engineers and Councillors by coming into contact with each other at the Conventions.

BUSINESS MEETING.

On behalf of the Association the President extended a hearty welcome to the delegates from the various Municipalities and also to the representatives of the Electricity Supply Commission. He hoped that some good would come out of their meetings and he felt sure that good did accrue to electricity undertakings and to the Engineers and Council representatives by having informal chats among themselves. The whole success of the Association really depended on these informal talks.

Confirmation of Minutes.

The Minutes having been circulated were taken as read, and confirmed.

RETIRING PRESIDENT'S ADDRESS, by Mr. C. H. Swingler, City Electrical Engineer, Cape Town.

In most Institutions constituted in a similar manner to our Association it is the usual custom for the executive body to present a report referring to the work accomplished during the year and to comment on matters of particular interest to the Association since the previous annual general meeting, or in our case, the last Convention. On account of the distances separating the members of the Council—due in part to its constitution—it is often almost impossible for that body to meet more than once a year, namely, at the Conventions themselves. Hence it has become a recognised procedure for the retiring President to submit a brief review of the principal events affecting the Association and the objects for which the Association was founded, during his period of office.

At the time of my election I entered upon my duties sincerely appreciating the honour you had done me and with every intention that in emulating the efforts of my predecessors it might be possible to effect even still greater progress in the establishment of the Association as the representative body on all matters pertaining to Municipal Electricity Undertakings.

I feel, however, that the actual amount of work accomplished in this direction has fallen far short of the ideal I had set up.

You will no doubt remember that at the last Convention the Association was invited to hold its next Conference in Johannesburg in March of this year.

Unfortunately, however, certain unforeseen circumstances

arose making this impracticable and we owe our thanks to the Durban Borough Council for so kindly inviting us to hold our present Convention here instead.

One of the first acts undertaken towards the end of 1922 was to accept formally, in accordance with a resolution of the last Convention, the offer by the Incorporated Municipal Electorical Association of Great Britain for our Association to affiliate with themselves.

This Association was founded in 1895 and has a membership of 216 comprising 83 per cent. of the Authorities in Great Britain qualitying for membership, but which differs from our Association inasmuch as provision is included in the Constitution for Councillor Members also. Thus the great majority of Urban Local Authorities in the United Kingdom operating an Electricity Undertaking is represented in the Association and it is, therefore, recognised as an authority on all matters referring to the generation and distribution of electric energy.

By affiliation with them we are given the opportunity of obtaining most useful and interesting information (not readily available from any other sources) through the publication in their monthly reports of all matters of importance in connection with the trend of Municipal Enterprise and developments in Electricity Undertakings.

These reports are available to our members at cost price and contain information on matters of particular interest not only to the official in charge of the Undertaking but also to members of Electricity Committees and other Councillors.

As an example I would refer to the enquiry made early this year by the Association into the attitude of the various Electricity Committees on the very vexed question of the allocation of profits made by the Electricity Undertaking to the relief of the General Rates.

It was reported that the Electricity Department of the County Borough of Halifax had, during the course of its existence, contributed a nett amount of over £90,000 to the relief of the rates. Notwithstanding, or rather perhaps because of this, there was an overdraft on Revenue Account of £98,000 and the Department carried forward a deficit on Revenue Account of £36,000, against which there was a Reserve Fund amounting only to £1,800.

The Halifax Corporation had, therefore, not only relieved the rates from the profits made by the Undertaking, but had mortgaged future profits to the extent of the deficit.

In the last financial year the contribution to the rates was

£8,670, but the undertaking must also have paid a considerable sum in interest on the bank overdraft, which would not have been necessary but for the contributions to the rates in previous years.

It was clear that the case mentioned was possibly an extreme one, but it was thought that the views of other undertakings on the matter would be of interest.

A questionnaire on this subject was accordingly sent to a number of undertakings, when, out of 119 replies received it was found that only 46 had at one period or other made any contribution to the rates in excess of the amount (if any) received from the rates to make up deficiencies. Five of these state that the contributions were made prior to 1914 and others including Manchester, Southport, Glasgow and Hull have adopted the policy that no further contributions are to be made to the rates.

Out of the 119 replies eight were in favour, or only doubtful about the expediency, of relieving the rates from electricity profits, while every other reply was against such a policy.

Indeed it was very clear that Electricity Committees were against relieving the rates in this way but that their hands were forced by the Finance Committees or Councils.

In this connection it is of special interest also to note that under a section of the Stoke-on-Trent Act (1923) the Corporation must apply the whole of any surplus available to the undertaking, or to the reduction of the price charged.

We in South Africa have the same principles included in the Electricity Act (1922) whereby the Electricity Supply Commission as a vendor of Electricity is compelled to operate in such a way that profits made in one year by an undertaking shall be absorbed in the following year through a reduction in the price per unit.

To a similar effect Licensees under the Act are required to distribute among consumers 25 per cent. of the surplus profit of the undertaking for the previous year pro rata to their payments for electric energy received.

I think it would be to the benefit of the industry and the Towns generally if—assuming it is impossible for the Electricity Committee themselves to prevent profits from being relegated to the relief of the general rates—it were made compulsory by law for all undertakings to be operated in a similar manner in regard to profits as applies in the case of the Commission's Undertakings.

Opportunities of paying hurried visits to Europe do not come to us often and because of the lapse of time since the last visit one has lost touch to a great extent with friends who might at one time have been able to assist us to see for ourselves the principal engineering works in the Country.

One of our members who has recently returned from England, however, assures me that a very hearty welcome and every assistance possible in this respect is given by the I.M.E.A. members to S.A. Municipal Electrical Engineers and I need scarcely say that we ourselves would be pleased indeed to do everything we could to help to make as pleasant as possible the visit of any of their members to the Union of South Africa.

Early in the year our Association was invited by the Electricity Supply Commission to send a representative to the World Power Conference held at Wembley in July last.

This official recognition of the Association as a responsible body by the Commission is, I think, a matter upon which we have cause for congratulating ourselves.

In the letter of invitation a reference was made to copies of papers read being circulated to delegates of the various Associations attending the Conference and to the benefits accruing thereby to the Association.

The matter of the circulation of certain papers of particular interest is under consideration by your Council and a report will be made in the course of the Convention.

The Association was fortunate in that Mr. Sankey, who had made arrangements to be in England at the time in any case, was able to spare the time to act as our representative.

The report on Standard Forms of Accounts approved at the last Convention has been forwarded to the Electricity Supply Commission, The Electricity Control Board and the Controller and Auditor General.

By virtue of the fact that under the Electricity Act (1922) the Control Board is empowered to require various returns in regard to the Electricity Undertakings, a request has been made to them that the report be adopted as a standard method of rendering the accounts throughout the Union so as to obviate the additional work which would be caused to Municipalities by being compelled to furnish information in different forms to the Provincial Administrations and to themselves. No definite statement as to their policy in the matter has been made but I have recently been advised that the matter is under consideration.

The Electricity Supply Commission and the Control Board were established in conformity with the provisions of the Electricity Act early in 1924 and their duties commenced at once.

The Commission's report giving a review of its activities during the period March, 1923. to August, 1924, has recently been published and is a most interesting document.

Like ourselves, the Commission regards cheap power as an important factor in promoting industrial development and has had in view from the outset the possibility of assisting industries by the production and sale of electric energy at the lowest possible rate.

One of the first steps taken in this direction was the opening of negotiations with the V.F.P. Co., as a result of which a power station designed for a generating capacity of 60,000 K.W. continuous rating will be erected at Witbank by the Company for and on behalf of the Commission.

Through the Agreement between the Commission and the Company the Mines and other consumers within the Power Companies' areas of supply are guaranteed one half share in any savings to the Victoria Falls Power Co., and the Rand Mines Power Supply Co., resulting from the establishment of the Witbank Station.

This guarantee of certain definite benefits was of material assistance to the mining groups enabling them to conclude fresh contracts with V.F.P. under which a 15 per cent. discount on standard prices has been granted retrospectively from 1st January, 1923, and a 17½ per cent. discount from the date when the Witbank Generating station is in full commercial service, plus their pro rata share (according to the amount of energy consumed) of a rebate of 50 per cent. of any balance standing to the credit of the rebate account, in place of the 25 per cent rebate provided for in the Act.

The Colenso Power Station which in the first instance will have an installed capacity of 60,000 K.W., will be taken over by the Commission when the whole of the electrification works between Glencoe Junction and Pietermaritzburg are completed and ready for commercial service. In the meantime enquiries are being made into the electricity requirements for domestic and industrial purposes along the route in order that when they assume control they may be in a position to provide a supply of electric energy to municipalities and other consumers in the neighbourhood of the line.

The Commission is now erecting a generating station in the Cape Peninsula, primarily for the purpose of the electrification of the Capetown Suburban Lines and an agreement has been come to whereby this station and the existing Municipal Electricity Undertaking will be operated in conjunction with each other.

Negotiations are also proceeding in regard to the erection of a new generating station in Durban by the Commission for the supply of electricity to the Municipality.

A number of Regulations formulated under the Electricity Act describing the particulars required to be submitted to the Control Board by Licensees were promulgated towards the end of 1922 but call for no special comment.

The Licensing of Electricians Regulations suggested by the Association are being adopted by an increasing number of Municipalities which, since our last Convention have included Durban, Simonstown (by arrangement with Capetown in respect of the licensing of electricians only) and there are under consideration also Paarl, Stellenbosch, Wellington, Worcester, Ceres, Somerset West and Somerset Strand jointly.

As was to be expected after experience in the enforcement of the Regulations it has been found necessary to add to them to cope with unforeseen difficulties.

I referred at the last Convention to the introduction in Capetown of Provisional Licences, while recently it has been found necessary to formulate regulations specifically making licences non-transferable.

Further, in Capetown a number of convictions have been obtained in the cases of unlicensed men working as wiremen but it is found that the Regulations do not specifically make it an offence in law for the employer to employ such persons on work the performing of which is in contravention of the Regulations. A charge under the Common Law may of course be laid against the employer for aiding and abetting his employee to contravene the regulations but although steps have been taken with this object in view, it has not as yet been found possible to obtain sufficient evidence to secure a conviction. Even if the employee elects to give the necessary evidence, this, uncorroborated, is of little value since he himself is an accomplice in the act, while for obvious reasons other employees who would be in a position to act as witnesses for the Prosecution deny all knowledge of the matter.

The Regulations certainly provide for the cancellation of the registration of a Contractor who has allowed his employees to contravene the regulations, but this is a step which in my opinion should only be taken as the very last resort.

In other words, the Regulations appear to bear somewhat harshly on certain of the younger employees, for instance, those just completing their apprenticeship, who, if their own statements are to be believed, in certain instances have pressure brought to bear on them to do wiring work without being at the time under the continuous supervision of a licensed man—thereby acting in contravention of the regulations—while the employers who are the cause of any trouble which may ensure are practically immune from prosecution.

Another point which has arisen is that although the Municipal Council is empowered to cancel a Licence or a Registration as a Wiring Contractor the regulations do not provide for any minor punishment to act in the case of say the first offence as a warning and a deterrent.

This is of no great consequence in the Cape Province whereby, under Ordinance No. 6 of 1911 penalties are prescribed for the contravention of any Municipal Regulations referring to their Electricity Undertakings, but I understand that the Durban Council have found it necessary to deal with the matter by adding a regulation to this effect.

In conclusion I would like to express my appreciation of the ready assistance I have received from my colleagues on the Council and to testify to the unfailing courtesy I have experienced in my dealings with all members.

In handing over the reins of office to Mr. Roberts I do so knowing full well that the Association cannot fail to extend its sphere of usefulness, and I wish him every success in his work in that behalf.

December, 1924.

Mr. B. SANKEY (Johannesburg), on behalf of the members and delegates assembled at the Convention, thanked Mr. Swingler for his valedictory address and the interesting subjects dealt with therein. Their thanks were also due to Mr. Swingler for the good work he had put in during his term of office. From past experience he (the speaker) knew that the duties and responsibilities of a President were by no means completed when the Annual Convention concluded. In this case Mr. Swingler had carried on the duties of President for

about two years and as one of the members on the Council he had been in as close touch with the President during that time as any other member, and he could assure everybody that the President and his Secretary had done a lot of work to keep the Association together and carry on the various duties connected therewith. He wished to convey on behalf of the meeting their appreciation of the able manner in which the President had carried out his onerous duties.

Mr. SWINGLER (Cape Town), in expressing his appreciation of the complimentary remarks, stated that he owed most of his success, if there had been any, to the very able assistance of Mr. H. A. Eastman (Capetown) the Hon. Secretary.

Appointment of Hon. Secretary and Treasurer.

On the proposal of Mr. Swingler, seconded by Mr. T. C. WOLLEY DOD (Pretoria), Mr. E. POOLE (Durban) was unanimously appointed Hon. Secretary and Treasurer of the Association for the ensuing year.

REPORT OF SECRETARY AND TREASURER.

Mr. Poole read the following Report which had been prepared by Mr. Eastman:—

Mr. President and Gentlemen,

I have the honour to submit herewith my report and balance sheet for the period 24th November, 1922, to 15th November, 1924, during which I have held the office of Hon. Secretary and Treasurer of the Association.

The membership of the Association at present is 45, consisting of:—

Full Members	34
Members elected provisionally	4
Associate Members	7
Total	45

Those shown as Provisional members applied for membership during the period under review and because of the impossibility of holding a formal Council meeting since the last Convention these gentlemen have been provisionally elected through correspondence with the members of the Council individually pending confirmation of their election at a Council meeting to be held in the course of the present Convention.

Since the last Convention one member has resigned and one has left Municipal employ and his whereabouts are not at present known.

An application for transfer from Associate membership and one for re-transfer to membership will also be submitted to the Council for confirmation.

From the balance sheet submitted it will be seen that a substantial increase in the cash in hand amounting to £105 15s. 9d. is shown, as compared with that stated in the report submitted at the 5th Convention, but it should be noted that included in this sum is the amount of £24 3s. representing donations towards the expenses of the Association's delegate to the World Power Conference and from which no deductions in regard to expenses have as yet been made. This matter is also one which will be dealt with by the Council at an early date.

In regard to the amount of £11 8s. shown as due from sundry creditors, £7 7s. of this is represented by membership subscriptions and the remainder by subscriptions payable in advance for I.M.E.A. reports supplied to members. Of the amount due in respect of membership subscriptions £2 2s. has been carried forward from the last balance sheet, which, however, represents a subscription outstanding from a member now deceased, and £2 2s. is owing by the person referred to above, whose name was on the membership list at the last Convention, but whose whereabouts cannot now be traced. The further sum of £1 1s. is owing by a person who has tendered his resignation. It should be possible to recover the remainder of the amounts due.

It will be seen that an increase is shewn in the account for printing and stationery over that mentioned in the last report, but it should be noted in this connection that the proceedings themselves are more voluminous than have obtained previously due to verbatim accounts of all discussions having been included, and against the expenditure should be set the profits on advertisements which actually amounted to £19 15s. The donation to the general funds and towards the expenses of the delegate to the World Power Conference have been received from 11 Municipalities and our thanks are due to the members of the Electricity Committees responsible.

In conclusion I wish to tender my thanks to the President and members of the Council for their assistance and co-operation in connection with my duties during the period under review.

I am, Mr. President and Gentlemen,

Yours faithfully,

H. A. EASTMAN,
Hon. Secretary & Treasurer.

December, 1924.

REVENUE AND EXPENDITURE ACCOUNT.

Period 1st December, 1922, to 15th November, 1924.

EXPENDITURE.						REVENUE.					
Printing and Stationery				£96	17	9	By bal. brought forward			£42	17	5
Stamps, Telegrams and Postal Orders				11	6	7	Membership Subscriptions:					
Audit Fee, 1922				2	2	6	Received	£78	4 6			
Printing Byelaws and Regulations				2	10	0	Oustanding	7	7 0			
										85	11	6
Purchase of I.M.E.A. Reports	£3	9	3				Subscriptions for I.M.E.A. Reports:					
Reports on order	2	14	11				Received	7	7 0			
				6	4	2	Outstanding	4	1 0			
Bank Charges	1	11	9							11	8	0
Less Bankers Commission recovered		14	0				Donations to General Fund			36	15	0
					17	9	Donations in re Exp. of Delegates to World Power Conference			24	3	0
Sundries:							Advertisements in Proceedings	27	0 0			
Transport of Books	1	14	0				Sale of Proceedings		10 2			
Copy of Electricity Act		1	0							27	10	2
				1	15	0	Sale of Wiring Regulations			7	17	6
Balance				114	8	10						
				£236	2	7				£236	2	7

BALANCE SHEET.

LIABILITIES.				ASSETS.					
Revenue and Expenditure Account ..	£114	8	10	Cash in hand	£1	14	6		
Incorporated Municipal Electrical Association in respect of I.M.E.A. Reports on order	2	14	11	Cash in Bank	104	1	3		
								105	15	9
				Sundry debtors in respect of Subscriptions in arrear:						
				Membership	7	7	0			
				I.M.E.A. Reports	4	1	0			
								11	8	0
	£117	3	9					£117	3	9

I hereby certify the above to be a true and faithful account of all monies received and expended by me on behalf of the Association of Municipal Electrical Engineers (Union of South Africa).

(Sgd.) H. A. EASTMAN,
Hon. Secretary and Treasurer.

Dock Road Power Station,
Capetown.

I hereby certify that I have examined the Account Book and Vouchers of the Association of Municipal Electrical Engineers (Union of South Africa) and in my opinion the above Statement correctly represents the position of the Association as at 15th November, 1924.

c/o Accounting Office,
City Hall, Capetown.
20th November, 1924.

(Sgd.) AND. GILMOUR,
Auditor.

Mr. WOLLEY DOD moved the adoption of the Report and Balance Sheet. This was seconded by Mr. MACAULAY, and Agreed Unanimously.

Vote of Thanks.

On the proposal of Mr. McDonough (Bethlehem) seconded by Mr. Sutcliffe (Benoni), a hearty vote of thanks was passed to Mr. Eastman for his work as Hon. Secretary and Treasurer.

On the proposal of Mr. Sankey (Johannesburg), seconded by Dr. Hamlin (Stellenbosch), a vote of thanks was also passed to the Hon. Auditor.

Appointment of President.

On the proposal of Mr. Millar (Harrismith) seconded by Mr. W. H. Blatchford (Greytown), Mr. JOHN ROBERTS (Durban), was unanimously elected President.

Mr. Swingler then vacated the Chair, which was taken by Mr. Roberts.

Mr. ROBERTS in expressing his thanks for the honour conferred on him hoped that the Convention would be very successful. Preparations had been made in Durban to make it a success and to push the use of electricity. They had rather a busy time of it on account of the three events which were coming off at the same time. At first sight one might be inclined to think they were trying to do something theatrical but the three events: the Convention, the Electrical Exhibition and the opening of the Broadcasting Station, fitted in so well that they thought it best to bring them about together. By means of the Exhibition they would see something of the manner in which electrical cooking was developing in Durban and in particular the extent to which the actual utensils were being manufactured in Durban.

Venue of Next Meeting.

Mr. McDonough (Bethlehem) proposed that the next Convention should be held in Johannesburg if possible. This was seconded by Mr. Stoker (Kroonstad) and agreed to unanimously. Mr. Councillor Clark (Johannesburg) stated that he would be happy to communicate with the Mayor and endeavour to get the necessary authority. He had no doubt that within the next twenty four hours he would be able to report that the Johannesburg Town Council would be happy to place at their disposal whatever facilities were required for the holding of the Convention.

The President expressed appreciation for what had been said by Mr. Councillor Clark (Johannesburg), and stated that he looked forward with confidence to the receipt of a favourable reply.

Election of Vice-President.

On the prposeal of Mr. L. F. Bickell (P.E.) seconded by Mr. Swingler (Cape Town), Mr. SANKEY (Johannesburg), was unanimously elected as Vice-President.

Election of Council.

This was left over to the next day to enable members from the various Provinces to nominate their representatives.

New Members—

The following new members were reported as having been elected by the Council: P. D. Dadswell (Cradock), P. G. Kersten (Windhoek), A. Rodwell (Johannesburg), L. Ralston (Dundee), J. T. Smith (Durban). Also the following transfers: P. H. Newcombe (Indwe) from Associate Member; L. B. Proctor (Grahamstown) from Member to Associate.

Subscriptions Written Off.

On the proposal of Mr. Swingler (Cape Town), seconded by Dr. Hamlin (Stellenbosch) the following members were assumed as having resigned and their subscriptions written off which were in arrear: Messrs. H. Brittle (ex Cradock), Mercer (ex Bethel) and the late W. J. Proir (Bloemfontein).

Apologies for Absence.

Apologies for inability to attend the Convention were received from the following: Messrs L. L. Horrell (Pretoria), R. W. Fletcher (Krugersdorp), P. W. Dadswell (Cradock), W. McComb (Springs), E. T. Stokes (Johannesburg), G. A. Stewart (Johannesburg), A. Rodwell (Johannesburg), P. Finlayson (P.M. Burg), W. D. Ross (Potchefstroom), P. H. Newcombe (Indwe), L. B. Proctor (Grahamstown), F. Castle (Cape Town).

PRESIDENTIAL ADDRESS.

By Mr. John Roberts, M.I.E.E., Borough Elec. Eng., Durban.

I appreciate very much the honour you have done me in electing me your President for the forthcoming year, and in delivering my Presidential Address my mind naturally goes back to eight years ago, to our second Convention, when I first had the honour of being elected your President. We were then in the middle of the great war—with by far the worst half still to go—and a great deal of water has passed under the bridge since then. Many of us have gone through a period of great stress. Those of use who could do "our bit" on active service were sorely put to it to keep our systems working, which it was essential we should do on account of the many operations being performed in our towns, contributing directly or indirectly to the prosecution of the war. Of those things we were not allowed to refer in writing, but it is now a matter of history that Durban was more like a military camp than a commercial town in those days. It was the base for the German East African campaign. It was a half way house and remobilizing camp (or whatever the military term may be) for the Mesopotamia campaign. It was a place of call for stores and food for the Australian and New Zealand contingents, besides the base of huge military hospitals. I am glad to say that somehow or other we managed to meet practically all demands for electricity and the growth of the demand was phenomenal compared with what it had been in previous years. It was, of course, impossible to obtain machinery and supplies from abroad to meet requirements and we had to resort to all sort of devices to keep going. We had to erect overhead 6,000 volt lines in busy parts of the town, to use wooden poles for distribution, and old tram rails for poles for heavier lines. We bought second-hand boilers and reverted to hand firing and we built switchboards with old tram rails as a frame work. But I wont dwell on that period, for this generation is not likely to see a repetition of those experiences.

I suppose that, speaking generally, all Municipal undertakings have greatly advanced since our Convention met in Durban in 1917. It will be remembered that Mr. Poole, the Assistant Borough Electrical Engineer of the Durban undertaking, prepared the first complete summary of the various undertakings of South Africa, and we are to be congratulated that his splendid compilation has been kept up-to-date. It is interesting to compare the latest statistics contained in the

South African Year Book with Mr. Poole's first tables. A comparison is set down below showing gain in output of electricity, number of consumers and total revenue.

	1916.	S.A. Year Book for 1924/5.
Units sold	74,392,064	133,237,388
Number of consumers	52,556	90,742
Total revenue	£808,106	£1,655,883

It will be seen that:—

(1) The total demand has increased by 79 per cent.

(2) The total number of consumers has increased by 73 per cent.

(3) Revenue has increased by 105 per cent.

(4) Number of undertakings has increased by 46 per cent.

I should like now to refer particularly to the increase enjoyed by the Electrical undertaking of the Durban Town Council. I give below figures for the years ending July 31st, 1914, and July 31st, 1924, respectively, covering an interval of 10 years:—

	Year ending July 31st. 1914.	1924.
No. of consumers for lighting and heating	6,446	12,860
No. of consumers for power	329	852
Total units sold	15,426,678	41,871,922
Units sold, lighting and heating to private consumers	2,570,941	12,799,174
Units sold to private power consumers	3,583,717	13,035,901
Total revenue	£100,651	£259,960
Revenue, private lighting and heating	£43,260	£128,536
Revenue, private power	£15,201	£54,360
Average units per annum per consumer, private lighting	399	995
Average revenue per annum, private lighting	£6.71	£10

It will be agreed, I think, that the above figures reflect a very satisfactory increase all round, but the striking advance is in the consumption for lighting and heating purposes. Un-

fortunately, I am not in a position to separate the demands of purely domestic consumers—stores, hotels, etc.,—but it may be taken that the bulk of the increase occurs in the demands for private houses, and I am very gratified to be able to say that electric heating and cooking is advancing in favour amongst domestic consumers by leaps and bounds. I think our method of charging for current for domestic supplies is now well known. I will, however, recapitulate it briefly. The consumer pays a minimum sum per month depending on the rateable value of his house (not including the land), entitling him to the corresponding number of units at the rate of 5d. per unit, and for all current consumed in excess of this the charge is ½d. per unit. Places of business are charged for lighting during the daytime at 2d. or 3d. per unit, depending on the class of business, a time switch and two meters being employed. Hotels, boarding houses, etc., can obtain current for heating and cooking through a separate meter on separately wired circuits at ¾d. per unit.

The following table shows the advance in the demand for current for lighting and heating at the various rates during the past 10 years.

	No. of units per annum.	
Current sold at:	1914.	1924.
7½d. to 5½d. per unit	1,890,959	7½d. & 5d. 4,686,237
2d. per unit	131,768	3d. 606,350
1d. per unit	148,655	2d. 742,247
⅞d., ¾d., and ⅝d. per unit ..	399,559	6,754,340
Total	2,570,941	12,799,174

From the above the potential magnitude of the heating business can be appreciated, especially when it is stated that we have scarcely touched the fringe of it yet. It is, of course, quite true that to supply the amount of current demanded by private householders when electric cooking becomes general and not the exception entails considerable expense on distribution. Supply by means of alternating current is essential, with transforming points much closer together than is at present usual for purely lighting service. But there is no fear that expenditure on distribution will not be profitable as will be seen from the financial results of working during the years 1913/14 and 1923/24 given elsewhere in this address.

It seems to me from the foregoing that the heating and cooking business is worthy of the attention of all those undertakings where a cheap supply of current is available from a large and efficient generating station. Up till recently the cost of production in many of our plants was such as to preclude sale of current at figures low enough to make supply to domestic users commercially possible or profitable. But the next few years will see great changes in this respect, for the larger towns are either building new power stations or arranging for bulk supplies at low rates. Pretoria has its new station in operation, and we shall all be very much interested in knowing what their cost of production is per unit. Johannesburg will either be remodelling their plant or taking supply from the Supply Commission. By the time this address is delivered this vexed question may be settled. The Capetown Station is being greatly improved and a Commission station is to be erected there which, it is understood, will operate in parallel with the Municipal station. In Durban it is likely that an agreement will be arrived at with the Commission to take nearly 50 million units per annum from a new Commission station. In Bloemfontein a new station will be in operation in due course. In Natal, transmission lines will soon stretch from Durban to Glencoe, from which every town will be able to obtain far cheaper current than is possible under present conditions. If the charges for current are based on a standing or capital charge plus a charge per unit for current actually used the latter charge should not be more than one third of a penny per unit, so that it will be evident that it will be quite possible for all these undertakings to sell current at little, if any, more than one halfpenny per unit, provided of course that the consumer pays a standing monthly charge depending on his demand.

It is, I believe, well-known that it has been a consistent policy of the Durban Town Council to encourage the domestic use of electricity and the Electrical Department is more certain than ever that the policy is a wise one, both from the point of view of the consumer and from the Corporation's point of view as well. I know that our ability to go on selling at one halfpenny per unit without incurring loss was questioned chiefly because of the abnormal demand on the mains by electric stoves if these came into general use. I give below some financial statistics for the year 1913/14 and 1923/24:

ELECTRIC SUPPLY FUND.

Revenue Account.

EXPENDITURE.	1913-14	1923-24.
	£	£
Generation	30,759	76,888
Distribution	3,374	15,305
House Services	3,026	9,628
Public Lighting	1,675	4,328
Rents, Rates & Departmental Charges	3,887	16,673
Management and General Expenses	8,475	20,738
Total Working Expenses	£49,509	£143,562
INCOME.		
	£	£
Private Consumers	59,202	182,895
Government Contract Supply	11,318	24,556
Tramways Supply	16,426	27,754
Public Lighting	13,828	23,782
Total Current Sold	£100,777	£258,988
Sundry Revenue	57	1,005
Gross Income	£100,834	£259,993

NET REVENUE ACCOUNT.

	£	£
Interest on Loan and Overdraft	16,323	28,999
Renewals Fund	12,030	42,000
Sinking Fnud, etc.	3,720	5,362
	£32,073	£76,361
Surplus carried to Appropriation A/C	17,436	40,036
	£49,509	£116,397

It will be seen that the financial position of the undertaking is not worse now that a respectable amount of heating load has been built up than it was before. There is no doubt, of course, that the distribution problem for a general heating supply is quite different from one for purely lighting purposes, especially since the introduction of the half-watt lamp. The

acquisition of heating involves a large capital outlay on transformers and mains. But supposing a town equipped with a good electric light station and distribution system is faced with a demand for heating by either electricity or gas which has to be met, for after all no large community is being catered for properly if some public system of heating by gas or electricity is not available. In such a town the authorities must be prepared to spend a large capital sum either on a gas works or on reinforcement of the electric system. There is obviously a good prima facie case for electricity as it would seem to be cheaper to extend an existing system than to lay down a second involving a new central plant and a completely separate system of mains and services. Furthermore, electric heating is admitted to be safer, cleaner and more efficient than gas heating, and it has been proved in Durban that at one half-penny per unit the monthly bill of a household using electricity exclusively is within the means of all classes of householder, and I give below some particulars of a few typical electric lighting and heating accounts:

Municipal valuation of house	Number in family	Monthly consumption in units	Monthly account
£450	4	344	£1 4 6
£500	4	427	£1 8 9
"	3	320	£1 3 3
£580	5	389	£1 8 0
£720	6	462	£1 12 11
£800	2	184	18 4
"	7	319	£1 5 4
£900	3	360	£1 8 3
"	4	641	£2 2 11
"	4	424	£1 11 7
"	4	746	£2 8 5
"	4	360	£1 8 3
£950	?	1418	£4 4 2
£960	3	416	£1 12 11
"	3	580	£2 0 11
£1100	3	427	£2 2 11
£1150	7	980	£3 1 8
£1200	?	1091	£3 7 10
"	4	1020	£3 4 8
"	3	630	£2 3 10
£1400	3	414	£1 13 8
£1500	6	836	£2 16 5
£2300	3	1464	£4 10 11

There is another very important factor of this problem which should make every electric supply concern which is making no effort to cater for heating seriously to think. Many of us can look back to the days of the carbon filament lamp when 60 watts had to be supplied to produce 16 candle power, or nearly 4 watts per candle. This consumption has been reduced to half a watt or nearly one eighth of what it was 16 or 17 years ago. There is little doubt that further developments will be made, in fact an experimental lamp has already been mentioned in the technical press which, if successful, will put the half watt lamp right out of business and cause such a reduction in the lighting revenue of all electricity suppliers as will place many in a very embarrasing case. If the present consumption of ½ watt per candle were reduced to 1/10th watt suppliers of electricity would have to double or quadruple their rates unless they had a heating load to fall back on, and even at these increased prices it would not pay a householder to put in a small plant such as a petrol engine, but many would be able to run their lights off a small battery which could be charged up at a nearby garage. The statement of such a contingency may evoke a smile but I expect to see some startling developments in the electric lamp before many years are over.

One need never fear that improvements in heating apparatus will bring about a substantial reduction in current required for the purpose. A kilowatt hour at 100 per cent. efficiency represents a definite number of British thermal units, and the efficiency realized in the ordinary electric kettle is between 80 and 90 per cent., so that if we could conserve the heat available in a perfect manner the saving we should make in the amount of current used would be inconsiderable. In an electric lamp over 90 per cent. of the current is wasted as heat so that there is an enormous field open for improvement in electric lamps which will convert a larger proportion of electricity into light without so much heat as waste bye-product. The heating side of electricity supply, therefore, seems to offer a much greater chance of a secure, stable, and growing business than merely lighting. Such an address as this, brief as it is, would be incomplete without some reference to the Electricity Supply Commission which has come into being and commenced its duties since our last Convention was held. The first report of this body has now been issued, and it is now plainly to be seen that the policy of the Government which passed the Electricity Act, under which the Commission was brought in being, is to nationalize electricity generation by establishing State owned and operated stations throughout

the country where ever there is a demand for electricity an a sufficiently large scale. The present writer has advocated such a policy for years past, for the day of the small power station is gone where ever a community is within range of a large supply system. It is quite unnecessary for me to enlarge before this Convention upon the advantages in economy of one large power station over a number of small ones, and the day is not now far distant when all the urban communities in Natal will be able to draw current from the main transmission lines belonging to the Commission which will soon be parallel with the main railway routes. By the time this paper is read one section of this trnsmission line near Colenso ought to be actually in working from the new Colenso Power Station. By the end of the year arrangements will probably be completed for the building of a Power Station by the Commission at Durban. This station will operate in parallel with the Colenso Power Station through 80,000 volt transmission lines. The Commission have completed an agreement with the Victoria Falls Power Company for the building of a jointly owned station at Witbank, near Johannesburg, and a station at Capetown is now under construction. It will be admitted that the Commission have lost no time in getting to work and in a few years a great deal of the generation of current will have passed into their hands. Everyone will earnestly hope that the results will be to the good of the people of this country. There is just one thing I should like to say after a close connection with electrical development for the last 28 years in South Africa, and that is that the Commission will not adopt a too rigid control of new enterprises or insist on a uniformity of plant and method. Electrical machinery as well as systems of supply have been characterised by their great diversity of type. The best only has survived, and it is greatly due to the absence of central government control which has resulted in a practical trial having been given to so many different methods that the modern power station and distribution system to-day has evolved to rapidly to the high state of efficiency and reliability it has now reached. But great advances still have to be made. The next 20 years will see even greater progress than has the last, and we must remain as alert to introduce improvement as ever for electricity is still in its infancy and it is certain that the next generation will see tremendous changes in methods of production, transmission and distribution of current as well as in the applications of electricity, particularly in heating on a large scale.

DISCUSSION ON PRESIDENTIAL ADDRESS.

Mr. T. C. WOLLEY DOD (Pretoria) stated he would like to congratulate the President on the very interesting address he had given them. It raised very many interesting points. One in particular was the forecast of the extremely useful load which was to be obtained from heating and cooking and at the Exhibition he hoped they would see a good deal of the appartus and the organisation which had been brought about in Durban. With regard to the fear of the super-efficient lamp of the future, he did not think he was quite so afraid of that as they had had a similar scare when the improvements to the present lamy were in the air. He thought all lighting stations found their load increased thereby. The public finding they could get more for their money took more. The probability was that the same thing would happen as improvements in lamps went on. Although the heating and power load was the most important thing in large towns, the lighting load was the most important to the smaller municipalities. There were many interesting points raised in the address and most of them would like to have time to think it over before discussing it fully.

Mr. SPARKS (Pietersburg), in referring to the table of average monthly accounts of various consumers, stated that it would be useful to know what the average repair bill on the apparatus was. His experience with electrical coking in the past had been that it was rather expensive.

Mr. SWINGLER (Cape Town), stated they had to thank Mr. Roberts for a very interesting address which he thought would have the effect of stimulating those who had not been so enthusiastic over heating as Mr. Roberts. The climatic conditions differed considerably in the different towns. In Cape Town they were entirely different to Durban. Durban had an ideal climate for heating and cooking. An adequate supply of hot water in any scheme for cooking was most important and although in Capetown they sold energy for water heating at ½d. per unit, the cost of obtaining hot water was excessive, especially in the winter months. In Capetown they had spent £90 for every kilowatt demanded as compared with £60 at Durban. Their distribution system which extended from Camp's Bay to Kalk Bay, a distance of 30 miles, was much more costly to run and maintain than the compact Durban system. Nevertheless there was no doubt that they had to look to this load and he felt that they should encourage all classes of business.

In regard to the Tariff of charges for electric energy, he noticed that in Durban consumers paid a good round sum per month as a standing charge based upon the value of the property. In Johannesburg and in Capetown, however, they had the room basis in place of the valuation system. A family in a five-roomed house constructed in a cheap manner consumed just as much energy as a family in a well built villa valued at twice the amount of the former, so that a standing charge based on the valuation of the premises would cause an unjustifiable loss of revenue to the electricity undertaving in respect of the energy consumed in the poorer class of building. He considered that in every way the room basis for calculating the high rate units was fairer and better than the valuation system.

Mr. POOLE (Durban) informed the meeting that his account for current averaged £1 10s. a month for lighting and cooking.

Mr. RALSTON (Dundee) stated he was very interested in the subject of cooking. In the smaller towns the Engineers were constantly being asked why they could not give people the same rate of charges as was applicable in Durban. With regard to the elements for the various utensils a great deal depended upon who used them in practice. He had sold a few utensils but they frequently came back to him within a very short time without any elements left in them. He considered that if they had a more robust element in the utensils it would to a large extent eliminate the continual burning out. They should also have automatic devices for switching off the current. He would also like to know whether the open type element or the mica wound elements gave the best results.

Mr. SANKEY (Johannesburg), considered they would be in a very much better position to discuss the question of heating and cooking after they had visited the electrical exhibition and seen what Mr. Roberts had to show them. He humorously remarked that he thought the references in Mr. Roberts' address and the coincidence of the Electrical Exhibition not opening until Thursday were not altogether accidental. Mr. Roberts had thrown out a clever bait and wanted them to walk into the trap and make criticisms about the electrical apparatus and he would them come forward with his Exhibition and floor them completely. However, to come back to serious business, Mr. Sankey stated that there was no doubt that in Durban a tremendous amount had been done in the way of encouraging the use of electricity for every possible domestic purpose and at the present time this was a matter

which was exercising the minds of every Engineer in Great Britain. Very determined efforts were being made and very keen competition was being put up in England in this direction and the fight between the Electrical Undertakings and the Gas Companies was now particularly keen. In Durban Mr. Roberts was favoured with a particularly suitable climate for the use of electricity for domestic purposes. They did not have very long months of severe frost and cold and the requirements were very steady all the year round as indicated by the figures quoted. In Great Britain he thought the attempt to bring electric heating and cooking to the fore had arisen very largely from the Daylight Saving Bill which had practically cut out the lighting load from some stations for three to four months in the year. In this country they were handicapped owing to the cost of electrical apparatus and he was very pleased to see that the local manufacture had been taken up. In a modern cooker the replacement of elements was not a serious item; unless extraordinary carelessness was used they were to a very large extent foolproof. Mr. Sankey went on to refer to the cheapness of gas appliances in comparison with electric. An electric cooker for a family of five or six persons cost somewhere between £15 and £18 landed at Durban. A similar gas cooker could be landed at a cost of about £7 10s. Then with regard to power stations; whilst the larger stations with their large plants using about 2½ lbs. of coal per unit delivered at the switchboard could afford to sell current at a low rate the smaller stations were greatly handicapped. He referred to a small station which he visited some time ago. Whilst they could get down to about 10 lbs. of coal per unit for the evening load it was about 15 lbs. during the day. Unless the smaller stations could be improved to bring them more into line with the larger stations he did not see how the engineers there could make any serious attempt to cater for electric cooking and heating. He would like to hear the views of other engineers on the subject. He did not see why the smaller towns should not have the same field for electric cooking as in the larger towns, and it would be interesting to have discussion from the other members who were connected with small stations.

Mr. Councillor MILLAR (Pretoria), stated that it would be interesting if Mr. Sankey could give figures as to the comparative efficiency of electricity against gas and from the economical point of view. His experience in Great Britain was that there were far more gas heaters in use than electric because gas was more efficient and cheaper.

Mr. JAGGER (Ladysmith) stated at his station the coal

costs were .42d. per unit. Any small Municipality going in for a plant on up to date lines and with coal at a reasonable price ought to be able to produce current under a penny per unit at the Switch-board for heating and cooking purposes, provided the load had already been built up to meet working costs and that no loss was being made on the undertaking.

Until four years ago their boiler plant consisted of four loco type boilers. At that time their coal consumption was about 14 lbs. per unit. These boilers had since been replaced with more up-to-date plant and their consumption of coal had been materially reduced so that they were now able to sell current at 1d. per unit and still make a profit on it. Their annual output was close on three quarters of a million units and for a 450 K.W. plant he through it compared very favourably with other small municipalities throughout South Africa.

Mr. JACOBS (Electricity Supply Commission) stated that he would only speak on one point raised by Mr. Roberts in his address. Mr. Roberts had expressed the hope that the Commission would not interfere in any way with the free development of electricity in the country. He wished to say that if there was one thing the Commission was out to do it was to encourage electrical development in the country and they were going to do it in every possible way. No unreasonable limitation would be placed on the type of apparatus to be used. The engineers of the Commission recognised that the development of the electric generator and prime mover to its present day state of efficiency had been a slow process. They had not got to the end of that development and with regard to any new undertaking in connection with which the Commission may be consulted as to the economic possibilities of such an undertaking, in so far as it complied with their idea of their duty in such matters they would place no limitations on the development.

Dr. HAMLIN (Stellenbosch), stated that while he would much rather have spoken at a later stage there were certain things which he could say at present. On looking into the accounts of the various small municipalities he noticed that no matter what the charge for current was it did not seem to make much difference in the average amount paid per consumer during the year; it worked out at about £10 a year and he was surprised to see that even in Durban it was about £10 per private consumer. Having regard to that he did not think they had much to fear from the new extra efficient lamp. Personally he did not believe that the half watt lamp was of any real benefit to the consumer. It had a very short life and when account was taken of its useful life and the amount of renewals

he did not think there was any saving at all. On the subject of heating, in the country about the Western Province it was an entirely different problem when it came to the question of hot water. The ordinary household could have as many hot baths as they liked for about a shilling a month by buying an ordinary geyser costing about £7 and using fir cones for fuel. Three bags would carry any family through at a cost of 4d. a bag. He did not think therefore that they would be able to sell much energy for hot water in that district. At Stellenbosch they had about forty consumers using current for hot water which was charged for at 3d. a unit. If the station engineer was allowed to build up his plant under favourable conditions he ought to be able to make a little bit more money for his municipality. From a financial standpoint he would like some explanation from Mr. Roberts with regard to interest. The interest on overdraft and the interest on sinking fund did not seem to be in proportion.

The PRESIDENT in referring to the remarks made by members concerning the possibilities of the new lamp, stated that in view of the investigations which were being carried on in this direction they should pause a little before expressing no fear whatever at what may eventuate. Any large development of the electric lamp was bound to have a tremendous effect on the electric supply business and it was only natural that the experiments which were going on should be kept as quiet as possible until such time as it suited those concerned in the development to spring them on the market. They were all aware that certain apparatus had been kept back purposely not for months but for years in order that the industry should not be dislocated by the sudden introduction of new improvements. He was fairly confident that before very long they would see some very startling developments in the production of light without heat and at a very much less expenditure of electricity. Consequently he thought it was up to them to provide for some other load for their stations than lighting, and he suggested that electrical cooking was one that would repay any careful study.

Further discussion on Mr. Roberts' paper was adjourned to the first available opportunity and the Conference then adpourned until 10 a.m. the next day.

In the afternoon the Members and Delegates visited the Municipal Electric Power Station and Automatic Sub-Stations and in the evening special arrangements were made for them to witness a swimming gala at the Beach.

TUESDAY, 9th DECEMBER, 1924.

The Convention resumed its proceedings at 10 a.m.; the President (Mr. John Roberts) being in the chair and there were also present—

MEMBERS—

B. Sankey, E. Poole, J. Mordy Lambe, T. P. Ashley, A. S. Munro, T. Sutcliffe, J. T. Smith, L. B. Sparks, E. J. Hamlin, L. Ralston, T. Jagger, R. D. Coulthard, B. H. Sargent, T. Millar, T. C. Wolley-Dod, G. H. Swingler, L. F. Bickell, F. C. D. Mann, R. Macauley, R. A. Stoker, W. H. Blatchford, M. McDonough.

DELEGATES—

Councillors G. W. Prior, H. M. Doull, H. Hosking, D. Shearer, J. A. Clark, E. Hopper, J. D. Low, J. Scott, W. H. Barrett, W. Millar, J. Paton, W. J. Newmarch, H. Solomon, T. C. Sheaver.

VISITORS—

A. M. Jacobs, A. E. Harte, A. E. Val Davies, T. D. Clothier (Hill Crest).

GENERAL BUSINESS.

New Members.

The following new members were declared duly elected by the Council:—

W. M. MAIL (Kokstad).
R. ROYLE (Rustenburg).

Official Journal.

The President announced that the "South African Power Engineer" had been selected as the Official Journal for the Association.

Supply Pressures.

The President stated that there had been a good deal of communication between the South African Standards Committee and the Standards Committee of Great Britain who had written to the South African Committee on this important matter, particularly with regard to distribution pressures. The Commission were also anxious that some discussion should take place in regard to supply pressures and the suggetion had been made that this matter might be discussed the following morning after the reading of Dr. Hamlin's paper. He had also been requested to invite Mr. Jacobs to open the discussion on Supply Pressures.

Mr. JACOBS (Electricity Supply Commission) replied that he would be pleased to do so and it was agreed that the question be dealt with the next day.

Representative on S.A. Standards Committee.

On the proposal of Mr. Munro (Pietermaritsburg) seconded by Mr. Bickell (Port Elizabeth), it was unanimously agreed that Mr. SANKEY (Johannesburg) should continue to act as the Association's representative on the Committee.

Papers for Next Convention.

The President pointed out that the papers on various subjects necessitaterd a good deal of preliminary work on the part of the Secretary and requested members to come forward as early as possible in connection with papers for the next Convention.

Licensing of Electricians

The PRESIDENT stated that as a result of the draft Byelaws which were drawn up at the Pretoria Convention a small number of towns had now got same in actual operation. They were in operation in Johannesburg, Germiston, Durban, Cape Town and Port Elizabeth. Speaking for Durban he could say that the scheme was working very well indeed and he admitted that he had had to modify his own views on the matter. It had met with the approval of the local Trades Unions and there had been no complaints anywhere. It appeared, however, that a hitch had arisen in the Transvaal. Since the coming into force of the byelaws in Durban they had found it necessary to make certain small modifications therein and the suggestion had been made that the members from Pretoria and Johannesburg should be asked to draw up what would appear to be the most satisfactory form of bye-laws, which could be promulgated throughout the Union, for submission to the next Convention, and that the Convention should then take steps to bring about an Act of Parliament for the enforcement of such bye-laws.

Mr. WOLLEY DOD (Pretoria) stated that so far as Pretoria was concerned the bye-laws had not been promulgated or used because they foresaw that there might be some legal difficulty in connection with them, and it was decided that they should be gone into thoroughly and steps taken to have the legal position made unquestionable. Several other

towns in the Transvaal also thought there might be legal difficulty in the matter and they recommended that the question should be gone into thoroughly.

Mr. SWINGLER (Cape Town) stated that so far as Cape Town was concerned it had been in operation for some time and regulations had been promulgated making it compulsory for municipal authorities and other undertakings to carry them out. No difficulty had been experienced so far and he thought they should endeavour to get all the different Provinces into line. He proposed that Mr. Wolley Dod and Mr. Sankey be requested to go into the matter and frame a report and draft scheme for submission to the next meeting. This was seconded by Mr. Blatchford (Greytown).

Mr. RALSTON (Dundee) asked whether the licences would be transferable from one municipality to another.

The PRESIDENT in reply stated that they were transferable and that had brought about one of the difficulties because the standard required by one municipality varied slightly from that of another. A man from Johannesburg for instance with a licence was formally accepted as being qualified to take out a licence under the Durban bye-laws although they were not altogether identical, and he thought it was desirable that they should all be made uniform.

Mr. SWINGLER'S proposal was then unanimously agreed to.

Election of Council.

On the proposal of Mr. Macaulay (Bloemfontein) seconded by Mr. Stoker (Kroonstad), Mr. MILLAR (Harrismith) was elected as the representative of the O.F.S.

At this stage Mr. SWINGLER (Cape Town) asked if they were going to continue the practice of nominating members from each Province. In the past there had been difficulty in getting in touch with members of the Council and he thought the method adopted by the Engineers was a good one. Two members were appointed from the Province in which the President for the time being was situated, so that in case of emergency he could get in touch with them quickly and form more or less a working Council.

Dr. HAMLIN (Stellenbosch) supported Mr. Swingler in his remarks, and pointed out that it did not appear to be laid down in the Constitution of the Association that there should be one member from each of the four Provinces. It simply laid down that four members should be elected.

The PRESIDENT stated that the suggestion had been made by the Council that two members should be elected from Natal and one each from the Cape and Free State. On being put to the meeting this was agreed to unanimously and the President then asked that the Natal Members put forward next day the names of two members for the Council and that the Cape should likewise nominate one member.

The following paper was then read:—

"CONTROL OF MUNICIPAL TRADING UNDERTAKINGS."

By John Roberts, M.I.E.E., Borough Electrical Engineer, Durban, and T. C. Shearer, Esq., Chairman, Electricity Committee, Durban Town Council.

One of the greatest developments which has taken place during the past thirty years in Britain, as well as throughout its Dominions, has been in the activities of Municipal Corporations. We had at first intended to say throughout English-speaking countries, but in the United States of America the Municipalities have not founded public services nearly so extensively as have British peoples, and we refer particularly to electric supply and electric tramways. In that country these services are almost entirely in the hands of private companies, closely regulated of recent years by Public Service Commissions. Which of the two methods, viz., public ownership and operation or private ownership and operation under public control, are the best. We will not argue here, though it must be admitted that British undertakings are pygmies beside the huge concerns supplying Americans with electric power and transport. To find an explanation for this one must examine conditions in the respective countries which it is outside the scope of this paper to do, but at first sight it would appear that a prima facie case has been made out for private enterprise against public ownership as being the most progressive and successful in the operation of the electric supply business. There are, of course, well and badly managed companies as well as good and bad Corporations, but the most ardent advocate of municipalizing everything must admit that the private company has, speaking generally, an advantage over the Municipality in its more direct and simple organisation. The public company meets once a year to receive an account of the stewardship of its directors, generally a comparatively small body who, if the company is paying good

dividends, leave things greatly in the hands of a paid Managing Director, who is usually a large shareholder, frequently the largest shareholder, who, therefore, has a personal interest in the permanent wellbeing of the company. This latter consideration is in itself a guarantee to the shareholders that their investments are safe under his control. The Managing Director is left free to engage the paid staff of the company. He frequently acts as General Manager and is the head of an organisation completely free from any shackles of rules and regulations, so far as the internal working of the company is concerned, except those he and his staff make for themselves and those, of public authorities imposed by law on all similar undertakings. The management is thus carried on by experts not only in important questions of policy but in the merest trivialities. Moreover, decisions to meet day to day conditions can be quickly made. Personnel of staff, promotions, emoluments, dismissals, are all subservient to the one purpose, namely efficiency. Further, the permanent establishment of the company on a sound financial basis by forming ample reserves against unforseen setbacks or periods of bad trade is the object, rather than payment of large dividends, especially in the early stages of the company's career. At the same time a wise management may deliberately court a temporary loss to build up a turnover.

That, of course, is the bright side of a company management. The Managing Director may be a shortsighted money grubber who is no judge of men. His directors may plant on him their sons or proteges who want soft billets at high salaries. The capital of the company may be watered up to a figure far beyond its real value either intrinsically or as a genuine dividend earner, and the Directors may go out after profits from rigging the market in the company's shares rather than from honest trading.

But in the field of public utilities partly necessity and partly criticism has eliminated financial abuses and developed satisfactory administration, particularly in America, until it may be said that so far as electric supply and transport is concerned, the public is getting good service at a reasonable cost and without undue profits to the shareholders. The relative scale of operations of American and British electric supply may be gauged from the following figures taken from quite recent reliable statistics:

AMERICAN CITIES.

Name of Company.	Revenue. £.	Max. Load. K.W.	Capacity of Plant, K.W.
New York Ediston Coy.	13,600,000	555,000	698,000
Chicago Commonwealth Edison Coy.	10,800,000	624,000	663,000
Detroit Edison Coy.	6,900,000	303,000	359,000
Philadelphia Elec. Coy.	6,800,000	—	387,000

ENGLISH CITIES.

Liverpool Corporation	966,000	56,000	78,540
Birmingham Corporation	1,100,000	88,869	88,000
Glasgow	1,137,000	81,700	150,000
Manchester	1,460,000	108,000	181,000

The exponent of the Municipal doctrine that public necessities such as water, transport, power, light, etc., should be owned and operated by the people themselves must take thought in the light of the above facts, whether the customary methods of controlling their electric undertakings may be such as really tends towards the greatest progress and the most economical working of these utilities. Although, as we have said in our opening remarks, the expansion of Municipal activities has been so marked in the last thirty years, Municipal Government is a very old tradition. Long before the days of railways, before there were even good roads through the country the large British towns were greatly isolated from one another and were almost States within a State. They had to depend on themselves for protection as witness the walls round them which remain in some cases to the present day. They won charters and privileges exemplified in one instance by the fact that the King may not enter the City of

London in State without the permission of the Lord Mayor given in person at Temple Bar. The improvement of the main roads and finally the introduction of railways greatly reduced the importance of the towns as self-governing units and in the latter half of the nineteenth century the administration of a comparatively large town required the services of only one or two important officials such as the Town Clerk (who was in many cases not a whole-time officer, but a Solicitor with a private practice of his own), a Town Treasurer and a Borough Surveyor, whose duties were chiefly to attend to the roads and drainage of the Borough. If there were tramways they were horse-operated by a Company. Water and Gas were generally Company-owned or worked. Public health as a science had scarcely begun to come into being. It is a different story to-day. The pendulum has swung back again and the Municipalities in the Mother Country faithfully followed by their daughter cities throughout the Empire have again become centres of self-government exercising functions even more important to the citizens than those of the central Parliaments or Legislatures and often collectively controlling revenues and expenditure far in excess. The town of Durban, with whose Council we are connected has not been behindhand in this development and the extensiveness and diversity of its present functions is not realized by many of its citizens. Even the Town Councillors themselves may serve their term of two years without getting more than the most cursory knowledge of the scope and working of the numerous departments. The systems whereby these various departments are governed gives every Councillor the opportunity of making his voice heard on the most trivial detail of the administration and in this respect contrasts with the system adopted in the central and provincial Governments.

But before examining administrative methods let us merely enumerate the various undertakings, activities or duties falling on the shoulders of the Town Council in its task of caring for the welfare of the Durban citizens, which list does not include Native or Coloured employees.

Department		No. of European Employees.
Art Gallery		2
Audit Department		7
Borough Engineer's Dept.—		
Administration	19	
Survey	5	
Building Inspection	4	28
Parks and Gardens		11
Cemeteries		2
Estate Dept.		7
Fire Dept.		33
General Stores Dept.		29
Public Library		15
Licensing Dept.		7
Museum		5
Music		32
Beach		8
Police		142
Broadcasting (not completed)		5
Public Health		32
Sanitary Dept.		36
Sewerage Dept.		11
Town Clerk's Dept.		13
Town Treasurer's Dept.		49
Tailoring Dept.		9
Abattoir		11
European Market		45
Indian Market		4
Bathing Enclosure		17
Open Air Bath		8
Town Baths		3
Electrical Dept.		173
Telephone Dept.		140
Tramways Dept.		404
Water Dept.		62
Native Affairs Dept.		50
Public Works Dept. and Transport Dept.		254
Total Europeans		1,654

As regards the number of employees, scale of revenue and expenditure, to say nothing of the diversity of functions, there are few other organisations, excepting other public undertakings such as those Municipalities, the Railways and Post Office, which compare in scale or importance. The adminis-

tration of these Municipal activities, however, is carried out on entirely different lines to those belonging to the Legislative Government. Our object in this paper is to compare these two methods and make suggestions as to improvements which might be made, confining our attention to the departments which at present come under the particular care of the Chairman of the Electricity Committee, who controls the Electric Supply, Tramways and Telephone undertakings with, for some reason or other, the Fire Brigade tacked on.

One of the first duties of a new Town Council which takes up its duties every year in August, is to consider the Estimates of ways and means for the year beginning at the same time, and these Eestimates have usually been prepared in draft form ready for their consideration. The Borough estimates make a ponderous tome, and many sittings of the Finance Committee are necessary before they are passed, due greatly to the fact that there are always a certain number of new Councillors who, being filled with enthusiasm to master their duties, call for many explanations before the thousands of items are passed. By about November, or after three months of the the year have expired, the estimates finally pass the Town Council. After that, of course, the Committee are supposed to get ahead with the work, and we repeat that we are now considering the system as applied to the Electricity, Tramways and Telephone Committee. These Departments have their regular running expenses and have had, of course, to anticipate the approval of their estimates of expenditure which are thus more or less a farce. There is also provided in these estimates of capital expenditure new construction for extensions of their respective systems entailed by the growth of the demand by the public for their services. The carrying out of this work nearly always necessitates the purchase of plant and materials from overseas. Specifications have to be prepared on which tenders are invited, and as often these specifications have to be sent overseas to manufacturers, two or three months have frequently to be allowed for receipt of tenders. After tenders are received the head of the department makes his report to the Electricity Committee who, if they approve of his recommendations, send them on to the Council. They have, however, to pass the Finance Committee on the way. The tenders eventually come before the Council and are accepted, February might easily have come round by then and as frequently plant will require six months for delivery the Municipal Year is gone before the materials are to hand and the work remains unfinished. That is why estimates of capital expenditure are

always in excess of the actual amount spent during the year. In practice, to avoid as much delay as possible, the Departments ask for permission for some of their capital requirements as soon as the year opens and before the estimates are passed.

We have not commented in the above on the needless repetition entailed by the above system and this we now proceed to lay stress upon. One would think that when once the Council had thrashed out the estimates the necessity for again considering whether the work is required to be done or not would not arise. This is not so, however, and every item of capital expenditure approved by the Council has to come before the Committee and before the Finance Committee. On receipt of tenders the matter has again to come before both Committees. When the goods are delivered the Finance Committee has again to recommend payment before the Council authorises it to be made by the Treasurer. The consequence is that a vast amount of paper has to be circulated so tremendous in volume that no Councillor who has business of his own to attend to can hope to read it all

The method adopted by the Union and Provincial Governments is a great contrast to all this circumlocution. The Legislature and the Provincial Assemblies finally finish with matters of expenditure when they have given their approval by passing the Estimates. How the money is to be spent is left to the Departments concerned in consultation with the Minister or the Executive but in accordance with the standing financial regulations and always subject to the scrutiny and approval of the Public Auditor. In the case of the Railway Administration in order to relieve the Minister of Railways from the onerous duties which continual contact with the daily work of this vast organisation would entail, a special supervisory Railway Board has been appointed whose sanction the General Manager is required to obtain to all important actions. We cannot resist the belief that Town Councils will ultimately have to adopt some such scheme as this for the carrying out of their fast-growing duties. The present system entails such an enormous amount of work by Councillors, most of it concerning comparative trivialities that busy men grow impatient at the waste of time and give up in disgust.

We venture to make the following suggestion which has the advantage of the Provincial Government Executive system by which the Provincial Council delegates certain authority to its Executive, but has the further advantage that every Councillor can still take an interest in and if he likes can devote himself to one particular Municipal activity. There

are 18 Councillors and we would divide the work among 6 separate Executives with 3 upon each. Each of these Executives would be given full power to carry out the Council's instructions as conveyed through the Estimates of ways and means subject to the conditions referred to later.

(But before proceeding further, we would follow the practice of the Legislative and Provincial Assemblies by payment of these Executives say to the extent of £200 to £300 per annum per member. This would amount to payment of Councillors, but it has got to come in the train of payment of members of the Legislature).

In addition to the various Executives there would be two other boards, one the present Joint Advisory Board, so as to ensure uniformity of conditions of employment throughout the service, and this Board would be as at present, half Councillors chosen from the various Executives, and half chosen by the employees. There would also be a Tender Board chosen from the Executives who would have the power to accept tenders recommended to them by the Executives if such tenders were within the authorization of the Council under its Estimates of ways and means.

The Town Council would meet once a month:—

(1) To receive the reports from the various Executives of what had been done in pursuance of the Council's instructions and this would enable the Council and the public to keep in touch with the work of all the departments.

(2) To authorise excess votes recommended by any of the Executives to meet unforseen circumstances.

(3) To consider any questions of new policy recommended by any Executive.

(4) Before the end of each Financial Year to approve Estimates of revenue and expenditure for the guidance of the incoming Council.

Each Executive would meet at least once per month:—

(1) To prepare its report of work done to the Town Council.

(2) To consider reports by the Head of the Department and take the necessary action within their powers.

(3) To recommend approval of tenders to the Tender Board.

(4) To recommend engagements of new officials, dismissals, alteration of grades, etc. to the Joint Advisory Board.

(5) To make recommendations to the Town Council in regard to any departure from or extension of its policy in regard to the work of its department.

THE TENDER BOARD would meet twice a month to receive reports on tenders from the various Executives and to give instructions as to the most desirable tender for acceptance.

In regard to the personnel of these two Boards, the Joint Advisory Board members should be chosen from the Executives employing the largest number of men and the Tender Board should be composed of one member from each of the six Executives.

We think it is a scheme which is well worthy of the consideration of those who feel that present methods of Municipal administration have not kept pace with the increased demand on it by the great extension of Municipal service. A Town Council Executive would feel the satisfaction of having something to do instead of being confined merely to talking, and a healthier atmosphere of work rather than of talk would soon permeate the Municipal offices. The Tender Board and the Advisory Board would avoid too much responsibility being thrown on each Executive and would permit of co-ordination between the verious departments. The Executive system of the Provincial Council and the Cabinet system of the Legislative Assembly are scarcely applicable to a Municipality. A Town Councillor does not feel the need of delegating all his functions to three or four men as a permanent Executive. Living in the town he is serving and coming into daily contact with his constituents he feels he wants to be able to keep in touch and help to control a part at least of the Municipal machinery and would feel it unsatisfying to be able to do no more than meet for a short session a year and vote money he would have no say in the spending as would be the case if the usual form of Government by Executive, such as some people advocate, were adopted. One strong point of the scheme is that there is nothing in it novel to the present system of Town Council administration or beyond the powers already possessed by these bodies in South Africa except the power to receive payment for services. The Council does not give up any of its powers to its Executive who simply carry out its instructions and are subject to its supervision continually at its monthly meetings.

Here, at any rate, is a concrete proposal thrown into the arena of debate. If it produces serious consideration, either favourable or the reverse, no harm and perhaps some good will be the outsome.

DISCUSSION.

The PRESIDENT stated that he was not aware how the municipal problems had presented themselves in other parts of the country but he suspected that some of the complications which he and Mr. Shearer claimed existed in the present method were also shared at any rate by some of those who were connected with the larger towns, and they would be extremely disappointed if some more or less active criticism of their paper was not forthcoming.

Mr. Councillor HOPPER (Cape Town) stated that the authors of the paper had enumerated certain items as confined more particularly to Durban. He wished some of his fellow Councillors would conceive the idea of further municipal activities as prevailing in other parts. There were many instances of municipal trading in the Old Country but a decided objection seemed to be taken in this country to the adoption of such a course. While there may be reasonable objection in certain respects to a public body providing necessities they should consider the extension of further municipal activities. With regard to the electricity undertakings it was found that in many towns these were carried on by private enterprise. This was not in the interests of the community and they should be confined to municipalities and public bodies generally. The same remarks applied to water. Mr. Hopper then dealt with the question of municipalities establishing their own cement works. Cement was a large item in the expenditure of public bodies and there was no reason why they should not take up its manufacture. He was strongly in favour of municipalities providing the various essential services. He expressed the hope that in the near future the utility of electricity would become that of water and be general in every household. With regard to the articles mostly in use—kettles and irons—he would like to see some method of standardising the elements. The difficulty of obtaining a satisfactory article was enormous owing to the number of types sold. He thought it was the duty of a Corporation to provide some form of standardisation.

Mr. Councillor CLARK (Johannesburg) stated that the authors of the paper had given them food for much thought and reflection. He regretted that they had not had more opportunity of going closely into the paper, but the brief

perusal of the paper he had made prompted him to say that it was like the Curate's egg "good in parts." It contained much that was good and he proposed to refer to that. They could not all be expected to have the same opinion on municipal government. In the first part of the paper a doubt was expressed as to whether public management or private enterprise was the best for the people. Such an argument might reasonably have been raised fifty or a hundred years ago, but to-day the people in all lands were demanding ownership and the fundamental principle accepted by the people in various countries, and particularly in industrial countries, was "all things that are publicly used shall be publicly owned." To-day, where the large cities conducted their own water and electric supplies and transport services, etc., great improvements had been carried out by reason of the common ownership of these services, and anyone who attempted to suggest that such services should revert to private ownership would be considered a retrogade. The part that particularly interested him in the paper was the reference to the payment of Councillors. Johannesburg had brought that into being. The suggestion was also made that much improvement would be brought about by the establishment of Advisory Boards. He felt sure they would be interested to hear Mr. Sankey on Advisory Boards. In 1918 he (the speaker) was one of those largely responsible for the establishment of advisory boards in Johannesburg. He thought that if the employees were given an opportunity of collaborating with the managers much good and no possible harm would result. What was the result? Those associated with Johannesburg would know that the experiment was a lamentable failure. The men immediately believed they were appointed as a sort of superior management and began to interfere in all kinds of ways with the various departments. They clamoured at the Council for improvements, many of them unfair improvements, and every demand was accompanied by a threat of drastic action. The experience of Johannesburg had taught him that advisory boards were not advisable and would not work. He said this speaking as a Labour man and he had said so from Labour platforms. The experience of Johannesburg reflected no credit on the advisory boards. Then there was the question of Tender Boards. The authors of the paper considered that the creation of tender boards would be a good thing. Personally he did not think it would. He wished to say, however, that there was one thing in favour of Johannesburg. They controlled assets of ten and a half millions sterling and in the year 1934 they would be entirely free from debt. They were in a sounder financial position than any other local authority

throughout the British Empire and that had been due entirely to good municipal management. The people of Johannesburg had services equal to any other services throughout the world and that had been done at a minimum of cost.

Thme PRESIDENT stated that Mr. Clark's remarks were in the nature of a challenge to Durban. He thought one of the most successful Boards that had been in existence in Durban for the last three years was the Joint Advisory Board. It had put a finish to the disputes which continually arose between the Council and its employees. All matters concerning the staff were brought before the Board and were automatically dealt with and he considered it was one of the greatest instruments the Durban Town Council had for conducting its business in connection with its employees and it had been a glowing success. The experience in Johannesburg was apparently very different to Durban.

Mr. Councillor SHEARER (Durban) wished Mr. Coouncillor Hopper the best of luck in regard to his idea for the establishment of cement works. Durban was now contemplating the manufacture of ice so that the burgesses could obtain cheaper ice. With regard to Councillor Clark's remarks he thought it would be time well spent if he was to inquire into the working of the Durban Joint Advisory Board.

The following report was then presented, being illustrated by some very interesting lantern slides:—

SOME NOTES ON THE WORLD POWER CONFERENCE AT WEMBLEY AND THE CONVENTION OF THE INCORPORATED MUNICIPAL ASSOCIATION OF GREAT BRITAIN AT CHESTER.

By Mr. B. Sankey, M.I.Mech.E., General Manager Gas and Electricity Department, Johannesburg; Member and Official Delegate.

THE WORLD POWER CONFERENCE.

The first World Power Conference held in the Conference Hall at the Wembley Exhibition, London, from June 30th to July 12th, 1924, inclusive, was promoted by the British Electrical and Allied Manufacturers' Association in co-operation with Technical and Scientific Associations and Industrial Organisations in Great Britain and other countries, with the object of considering how the power resources of the world might

best be developed and utilised, both from a national and from an international standpoint.

This immense Conference included representatives gathered together from 42 various countries all over the world, representing practically every civilised country, many of their representatives being men of world-wide reputation.

The South African representatives consisted of the following:—

Dr. H. J. Van der BIJL (Chairman of the Delegation).

Mr. W. ELSDON DEW (Vice-Chairman), representing the Associated Scientific and Technical Societies.

Mr. BERNARD PRICE, representing the Associated Scientific and Technical Societies.

Mr. B| SANKEY, representing the South African Association of Municipal Electrical Engineers.

Mr. — ELLIOTT, representing the South African Railways.

Mr. W. Van DALSEN. Secretary to the Delegation.

Upwards of 400 papers were submitted and discussions proceeded simultaneously in three Conference Halls. The papers submitted were classified into 5 divisions, as follows:—

Division I.—Power Resources.
" II.—Power Production.
" III.—Power Distribution.
" IV.—Power Utilization.
" V.—General.

and these divisions were again sub-divided into various sections.

Time did not, even during the long period of the Conference, permit of more than a brief summary of the papers prepared for the occasion, being actually read and only 5 minutes were allowed to each speaker.

The complete transactions of the first World Power Conference, which will constitute a comprehensive review of Power Resources throughout the civilised world, and which will contain information of outstanding value on almost every important electrical subject connected with Power Supply, are to be published in 4 volumes, (about 5,500 pages), including the discussions. As stated in the publisher's announcement, "it is worthy of note that there are 320 papers written by

prominent men in nearly all the countries of the world, the four volumes representing a monumental work of supreme importance at this changing era in the world's history."

The 4 volumes are:—

Volume 1. (Approx. 1356 pages.)

The National Review of the Power Resources of the World, including an investigation of National Resources and Power Resources available and utilized.

Administration and Electrical Power Market.

Volume II. (Approx. 1360 pages.)

Water Power Production.

Preparation of Fuels.

Steam Power Production.

Volume III. (Approx. 1380 pages.)

Internal Combustion Engines.

Power from other Sources.

Power Transmission and Distribution.

Standardization and Research.

Illumination.

Volume IV. (Approx. 1,300 pages.)

Power in Industry and Domestic Use.

Power in Electro-Chemistry and Electro-Metallurgy.

Power for Transport. Education. Health. Publicity.

With the possible exception of Volume I, I strongly urge that every municipality however small, should purchase these transactions as representing the latest and most up-to-date Books of Reference for the use and guidance of their municipal electrical engineer.

The price of the 4 volumes as first announced, was £12, but this was subsequently withdrawn and it is expected that the price will be about £14 to £16. A prospectus of the contents will be available at the Conference for the information of members. As the demand is likely to be large, members are advised to order without delay. The publishers are Messrs. Percy Lund Humphries & Co., Ltd., 3 Amen Corner, London, E.C.4, and it is anticipated that copies will be available about December, 1924.

The proceedings commenced on Monday, June 30th at 3 p.m., by an official reception, the President the Rt. Hon. The Earl of Derby, K.G., in the chair, and the Conference was addressed and given an official welcome by the Prince of Wales, speeches in reply being made on behalf of a number of the principal participating countries.

At 7-30 p.m. an official banquet was held at the Queen's Hall, Langham Place, at which the Earl of Derby again presided.

The Conference proper commenced on Tuesday, July 1st., at Wembley, the hours being 10-15 a.m. to 12-45 p.m., and 2-30 p.m. to 5 p.m. daily, (except Sunday, July 6th) to Friday, July 11th.

The first week was almost entirely occupied with papers relating to the Power Resources of various countries as contained in Volume I, whilst the second week's proceedings dealt mostly with papers of a technical nature relating to Power Production. Transmission and Utilization.

At the conclusion of the Conference on Friday, 11th July, a meeting was held in the morning, of the International Executive Committee, consisting of the Chairman or other representative of each of the participating countries, South Africa being represented by Dr. H. J. van der Bijl and Mr. W. Elsdon Dew.

As a result of this Conference the following Memorandum and Resolutions were submitted to the full meeting, on Friday afternoon, July 11th, being moved by Mr. L. B. Atkinson (Great Britain) and seconded by Mr. H. J. Pierce (U.S.A.) and unanimously adopted.

"The First."

"WORLD POWER CONFERENCE."

"Memorandum and Resolutions approved by the International Executive Committee for submission to the Conference on Friday, 11th July, 1924."

MEMORANDUM.

Actuated by a common desire for the conservation and development of power resources throughout the world, the study of power problems, and generally for the carrying on of the work begun at the First World Power Conference, London, 1924, the foregoing have, for themselves and the respective national committees in the various countries signed their names hereto.

1. It is desirable that the work of the First World Power Conference shall be continued and that consideration shall be given to the advisability of forming a permanent Institution at a later stage under such title as may be found best to fit its activities; and to that end—

2. Each country participating in the First World Power Conference is invited to create and/or maintain a permanent National Committee, as far as possible representative of its interests in all aspects of Power.

3. The existing representatives of the International Executive Committee of the First World Power Conference shall continue for the time being to carry out the necessary work arising out of the Conference as set forth in this Memorandum.

4. Each National Committee shall be entitled to appoint one delegate to represent it on the International Committee and such appointments shall be made within six months from the date of this Memorandum.

5. In countries where it is not immediately convenient to appoint National Committees a correspondent may be appointed to keep in touch with the International Committee until such time as a National Committee can be appointed.

6. A meeting of the International Committee shall be convened within a reasonable time to decide upon the line on which it would seem advisable to them (after conferring with their National Committees) to further the objects of the First World Power Conference, and in considering their scheme to arrange that there be no interference or overlapping with the functions of any existing International Organization.

7. The present Organizing Director and his staff shall, for the time being, be the medium of communication between the Countries represented on the International Committee of the world Power Conference for all purposes of the Conference.

8. The next meeting of the World Power Conference shall be held at a time and place to be determined by the International Committee, subject to the approval of the respective National Committees. So far as practicable future Conferences should be held in different countries.

"RESOLVED."

1. That this Conference is of the opinion that the world's most crying need to-day is greater production and manufacturing activity among its peoples under conditions which will promote individual prosperity and happiness, and that this

can be largely achieved by the fuller development of national power resources and by the establishment of the most economical means for the general distribution and utilization of energy.

2. The International Executive Committee of the First World Power Conference desires to place on record its thanks to authors of all countries who contributed papers to the Conference.

3. The International Executive Committee of the First World Power Conference desires to express its thanks to the Chairman who presided at the various Sessions of the Conference.

4. That the visiting delegates to the First World Power Conference express their deep appreciation of the efficient manner in which the Conference has been organized and conducted by Mr. D. N. Dunlop and his associates, and their further appreciation of the gracious courtesies and generous hospitality so abundantly extended to them by their British Associates.

5. The British Executive Committee desires to tender its sincere thanks to the Officials and Secretaries of the National Committees and to Representatives of all countries participating in the First World Power Conference whose effective co-operation contributed so greatly to its ultimate success."

It is anticipated that the Second World Power Conference will be held in America in about three or four years' time. It will also be noted that it is proposed to form a South African National Committee and it is probable that our Association will be invited to nominate a representative to sit on that Committee.

GENERAL IMPRESSIONS.

As a representative of our Association whose members consist largely of engineers in charge of small undertakings, one could not fail to be impressed by the magnitude of the problems which were discussed. Central stations of less than 100,000 k.w. capacity seemed small. In California for instance. there are 5 million acres of land electrified, water pumping for irrigation provides a light load of 200,000 h.p., with a continuous power line 700 miles in length, served by numerous super power stations, whilst units of less than 15,000 k.w. were not considered.

Nevertheless, in spite of the magnitude of the Super-Power Stations and Super-High Tension Transmission systems of many European and American undertakings, it is noticeable that the main object in view is by no means neglected or overlooked, viz; cheap agricultural and industrial production by means of an abundant and widespread supply of cheap power, and great attention is being paid to-day to even the smallest uses of electricity for domestic and agricultural purposes. It is becoming more and more realized by the great producing countries of the world that electricity is one of, if not the key industry and that the country which possesses the cheapest and most universal supply of electricity available in its agricultural, mining and industrial areas, possesses an asset of international value.

Appended to this paper are summaries of 3 papers which were selected by the writer as being of most interest to the members of our Association generally and especially to those who may be unable to procure the full proceedings.

SUMMARY of PAPER.

No. 270.—Latest developments in the use of Electricity for Heating Purposes in General and especially for Domestic Purposes. By Dr. W. Lulofs, (Holland) 28 pages.

The author deals with the various uses of Electricity for Heating Purposes in Holland and mentions the following:—

Uses.

1. Preservation of green fodder by electric heat in place of hay making.

2. Pasteurization of milk.

3. Church heating, every seat being provided with electric hot plate.

4. Biscuit baking in electric ovens with endless transport bands, capacity 40 kw.

5. Confectioners' ovens generally consisting of two baking floors or ovens. 55 x 80 x 18 c.m. capacity, 4 kw. per oven.

Tariff.

The "Norwich" or rateable value system was adopted in Amsterdam in 1913-14 with great success, combined with free wiring, an extra charge of 2½ cents. per kw. hour being made. To-day 144,000 of the 165,000 houses are connected to the municipal networks.

The result of this tariff has been a much increased use of electricity by individual consumers, amounting in 1923 to 10.7 million units. The total demand for house lighting and domestic uses in 1923 for Amsterdam was as follows:

Private Installations	18,947,659	units.
Free Installations	16,543,322	„
Domestic Tariff	5,597,000	„
	41,087,981	„

Load curves are given showing loads produced at various hours of the day by domestic cookers and statistics on increased consumption due to their use.

From the station load curves it is shown that at first the current increases chiefly took place in the winter months, indicating that excess of electricity was chiefly used for heating. The opinion is given that the domestic loads obtained have a favourable effect on the load factor, and the use of current for domestic purposes in the summer is increasing.

Water Heating.

For water heating, the automatic storage system is mostly used, standardized in 3 sizes, i.e.:

1. 6 litres water kept at 85 C. element 500 watts.
2. 20 litres water kept at 85 C. element 100 to 200 watts, for bath rooms.
3. Size not given.

The electric Geyzer is not so popular on account of the cost of the wiring for the 15 kw. required.

General. .. ..

For room heating, radiant heat is generally used. Investigations have proved that per 300 consumers who have adopted the Domestic Tariff, the following apparatus is in use:—

1 laundry machine.
154 vacuum cleaners.
356 radiators.
9 hot water taps (recently introduced.)
117 kettles.
22 milk heaters.
52 toasters.
3 bed warmers.
1 100-litre reservoir.
7 20-litre reservoir.
6 6-litre reservoir.
37 hair dryers.
12 ventilators.
43 hot plates.
263 flat irons.
2 tea warmers.

At the end of 1923 roughly 20,000 consumers used the Domestic Tariff in Amsterdam and about 23,500 stoves are in use. At 1½ kw. per stove average this equals a connected capacity of 35,500 kw.

SUMMARY OF PAPER.

No. 161.—Pulverised Fuel for Boilers, by W. M. Selvey, Great Britain. (18 pages).

Pulverised Fuel plants generally are divided into two systems, the unit system having individual pulverizing and blowing units to each boiler, suitable mostly for small boiler plants, and the central system with centralised pulverizing and drying plant. with distribution mains to the boilers, adapted more especially to large power plants.

The technicalities of pulverizing and drying the various classes of fuel are dealt with in detail.

Systems.

The principal pulverized fuel systems referred to are the Lopulco, Simon Carves, Fuller, etc., employing various makes of pulverizers, such as the Attritor (Herbert), Unit Type (Simon Carves), Turbo (Stern & Atkinson), Gyro (Duffield), K.E.K. (Chemical Engineering Co.), and Raymond.

Power Required.

The power required in operation in units per ton of coal as received, is given as follows:—

System	Lopulco.	Turbo.	Attritor.	Gyro.	Unit.
Pulverizing Mills ..	12.5				
Conveyors	1.0				
Driers	2.7				
Fans	3.0				
Pulverised Coal Feeder	0.8				
	19.5	22	25	11	25

Combustion.

The chief difficulty lies in the intense heat of the flame and the high temperature produced. Special arrangements are required to prevent brickwork from being melted away. Water screens and various air cooling devices are described for the absorption of heat in a suitable manner.

Deposit on Tubes.

The experience in America as to deposit on the tubes seems to suggest that in the powdered form it presents no difficulties, and all that is necessary is a proper system of diamond soot blowers.

Ash from Chimney.

Whilst a considerable amount of ash undoubtedly leaves the stack—usually about 15 per cent. —this is such a fine impalpable powder that with a reasonably high stack it is impossible to trace any evidence of it locally.

Summary of Conclusions.

Pulverised fuel firing offers advantages in efficiency and economy of combustion of from 5 per cent. to 10 per cent. over best stoker plants, with easy and cheap removal of slag and fine dust. The cost of the equipment is greater but there are corresponding advantages in easy regulation, ease of closing down, banking boilers and starting up, which are worth consideration, especially for small plants operating intermittently on low load factors. Low grades of fuel can be used without difficulty.

SUMMARY.

No. 264.—Design of Low Tension lines and Installation for Rural Electrification by B. Faoborg Andersen. Denmark (7 pages).

The system most employed in Denmark for rural electrification is the three-phase 4 wire, having a pressure of 380 volts between phases and 220 volts to neutral and earth.

The voltage drop is normally from 10 per cent. to 15 per cent., and in a few cases up to 20 per cent., and it is therefore, possible to supply consumers within a radius of 1¾ to 2 miles from the transformer sub-stations.

The period of use averages 190 hours per annum per light installed, and 60 hours per annum per h.p. installed. One light is considered equal to 30 watts, and one h.p. equal to 900 watts.

The system of wiring found to be most satisfactory is the lead covered, taped, braided, vulcanized cable, provided with compound filled junction and terminal boxes.

High tension and low tension lines are run on the same poles,

with protection nets between the two sets of lines. Lines are run straight across country, the Danish Government having passed special legislation making it possible to carry lines across private fields. In this way it is now possible to build the H.T. and distribution lines in the most economical and reliable way, running almost in straight lines.

THE 29th ANNUAL CONVENTION OF THE INCORPORATED MUNICIPAL ELECTRICAL ASSOCIATION.

Held at Chester, 16th to 21st June, 1924.

As a member of this Association, of many years standing, and as a representative of our Association, I had the pleasure of attending this year's Convention and of meeting many former friends and colleagues. There was a record attendance of over 700.

The papers read and discussed at the Convention were as follows:—

1. "Power Plant Chemistry" by W. M. Miles (Sheffield Electricity Department).
2. "Public Undertakings"—Purpose, Policy and Management—by Councillor W. Hammer, Mayor of Hackney.
3. "Performance Guarantees for Power Plant, with reference to Official Acceptance Tests," by J. V. Waite, (Stoke-on-Trent).

As these papers have been both summarised and reported on in detail in the electrical papers, there is no need for me to refer to them, except to say that I was called upon to contribute to the discussion on Alderman Hammer's Paper. All three papers and discussions can be recommended for the careful perusal of members.

It is most noticeable to-day in England that Central Station Engineers are paying particular attention to 2 subjects; viz:

1. The economies of coal combustion and the overall efficiency of Power Stations.

2. The development of Domestic Load.

The necessity of attention arises from two very specific reasons which appear to have been brought about as an aftermath of the war.

The reason for the particular study of coal and steam economy is undoubtedly due to the high price of coal which

appears to be in most cases from 25/- to 30/- per ton, and surprising improvements in coal economy have been obtained even with old plants. In this connection the paper on "Power Plant Chemistry" is of particular interest and value.

It is also noticeable that the use of steam meters, both indicating and integrating, is becoming common practice, and I am informed that even on small boiler plants, indicating steam flow meters, which are not unduly expensive in first cost, are a great aid to economical firing and boiler operation.

The necessity for the development of the Domestic load arises very largely from the introduction of summer time, whereby the already long summer evenings are increased by one hour and consequently during the midsummer months the lighting load practically disappears causing a very heavy loss in revenue, which Central Station Engineers are striving to make up in other directions. Great progress has been made in most undertakings in the development of use of electricity for domestic uses in every possible manner and the competition with gas is extremely keen.

The annual dinner took place on Thursday evening, June 19th, at the Town Hall, Chester. In addition to the usual toast list, a special toast,"The Overseas Visitors" was proposed by the President in honour of Mr. Taylor, Electrical Engineer of Perth of Western Australia, Mr. Allbutt, Electrical Engineer to the Municipality of Newcastle, N.S.W., and myself, to which I was called upon to reply.

In doing so, I took the opportunity of conveying the greetings and good wishes of our Association, which were most enthusiastically received and I was charged to convey reciprocal greetings at our next Convention.

A full account of the Convention appears in the "Electrical Times" of June 26th, 1924.

THE PARSONS' 50,000 kw. TURBINE.

Whilst in England your delegate had the interesting experience of visiting the works of Messrs. C. A. Parsons & Co., Ltd., Newcastle-on-Tyne and inspecting what is described as the world's largest turbine, which had in July last, just been completed after 2 years labour, for the Crawford Avenue Power Station of the Commonwealth Edison Co. of Chicago. A description of some of the leading features of this turbine may be of interest to members.

In this plant there are three cylinders in series on the steam flow, each driving an alternator, the 3 alternators being electrically coupled in parallel.

Steam is generated at 600 lbs. pressure and supplied to the stop valve of the high pressure turbine at 500 lbs. pressure, superheated to 750 F. After expansion in the high pressure turbine to a pressure of 100 lbs. above atmosphere, it is led back through a well lagged pipe into a reheater in the boiler house from which it is returned to the I.P. turbine at a temperature of 700 F. The H.P. and I.P. turbines run at 1,800 r.p.m. and drive alternators of 15,000 kw. and 30,000 kw. capacity respectively.

Further expansion takes place in the I.P. turbine to a pressure of about 2.0 lbs. absolute, at which pressure the steam enters the L.P. cylinder, to be expanded to the condenser vacuum of 29¾" mercury, (barometer 30"), which is attainable when the temperature of the condensing water, (Lake Michigan), is 30 F.

The low pressure turbine drives a 5,000 kw. alternator at 720 r.p.m. Owing to the lower revolutions of this turbine, the area provided in the final stage is so large that blades of normal profile, but set at a slightly greater discharge angle, can be employed. The steam is condensed in twin surface condensers with the tubes vertical and having a total surface of 56,000 square feet.

About 22 per cent. of the total steam entering the turbine is used for feed water heating; it is extracted from the turbines at three points, the feed water being heated up from 65 F. to 315 F. in three stages before entering the economisers.

A heat consumption of 10,265 B.Th.U. per Kw.Hr. is anticipated, or a thermal efficiency (from steam to electricity) of 33.2 per cent.

For recovery of the heat in the flue gases, economisers are used for the final stage of feed water heating, and air preheaters, a regenerative process being employed in the latter to heat up the incoming furnace air.

The boiler plant is expected to have an efficiency of 86.5 per cent. After allowing about 3 per cent. for the total power absorbed by the auxiliaries, an overall thermal efficiency (from coal to electricity) of 27.80 per cent. is anticipated. This is on the basis of a boiler pressure of 600 lbs. per square inch.

Some details of the turbines and alternators will be of interest. The three cylinders contain 64 simple turbines arranged in series, the first having blades 2½ in. long and ¾

in. wide on a mean diameter of 30½ in. and the last having blades 40 in. long and 3⅜ in. wide on a mean diameter of 160 inches.

In view of the low density of the steam, the passages from the I.P. turbine onward have been specially designed to have the minimum of resistance to avoid any sudden enlargements which would produce eddies or shocks. The I.P. turbine discharges its steam directly into the L.P. turbine through a concial annular space surrounding the intermediate bearings, and the energy of the leaving velocity of the I.P. exhaust is thus conserved.

The maximum blade tip velocity is reached at the last ring of the I.P. turbine, where it is 760 feet per second; in the L.P. turbine, which runs at 720 r.p.m. the maximum tip speed is 626 feet per second.

Some idea of the huge size of this set may be gathered from the description of its shipment. The turbine parts, mainly huge masses of machinery, were packed by sections in wagons and conveyed by railway from Heaton to the North Eastern Marine Engineering Company's wharf at Wallsend, where they were loaded by a mammoth crane into the Cairn liner "Cairntoor," there being 187 pieces of machinery, weighing over 1,000 tons altogether. No fewer than 13 pieces weigh between 20 and 50 tons each, and another turned the scale at 78 tons 9 cwts. Still another package, weighing 67 tons gross is of peculiarly awkward dimensions—namely 19 ft. 11 in. by 17 ft. 6 in. by 18 ft. 4 in. It consists of a L.P. turbine, and had to be transported in parts and put together on the wharf.

It is hoped to show lantern slides and diagrams of this machine at the Convention.

THE TRANSVERTER.

Another new and interesting piece of electrical machinery exhibited for the first time at the Wembley Exhibition, was a machine called a Transverter. This machine is the invention of Messrs. J. E. Calverley and W. E. Highfield, and is being developed by the English Electric Co. at their Preston works. Two machines each of 2.000 kw. capacity have been built. Unfortunately, at the time of the writer's visit to Preston, the machine was undergoing some adjustment and therefore could not be run.

This machine is essentially designed for the purpose of transforming alternating current at voltages such as are used for the generation of current, say from 3,000 to 11,000 v. into direct current at pressures of the order of 100,000 volts.

A full description of this machine is given in the "Electrican" of May 9th, 1924. The efficiency from ½ to full load approximates 96 per cent. The production of H.P. direct current by this machine at such a high efficiency opens up large possibilities hitherto impossible with H.P. alternating current, and this should be of particular interest to Engineers in South Africa. In this connection it is of interest to recall the early history of the Victoria Falls Power Supply Scheme. It was originally proposed to erect a Power Station with an output of 250,000 H.P. at the Victoria Falls. The necessity for carrying out searching investigations to determine the most satisfactory transmission system over the great distance of 700 miles led to the formation of a Committee of experts, which included Blondel of Paris: Gisbert Kapp, Birmingham: Lord Kelvin, London: and Tissant of Basle.

This Committee recommended that the transmission should be by means of High Tension Direct Current, and it was proposed to adopt a series transmission system in which the current is constant and the pressure variable. The maximum pressure proposed was 100,000 volts.

Later. Ralph Mershon of America and Dr. Klingenberg of Germany, were consulted, both proposed high tension, three phase power transmission independently of each other, the frequency in Mershon's scheme being 12½ and in that of Dr. Klingenberg 10 periods per second. Calculations made at higher frequencies showed such an unusual distribution of pressure at fluctuations of the load, that the idea of adopting higher frequencies had to be abandoned altogether.

Both engineers, however, preferred three phase transmission even at such low frequencies owing to the difficulties of high pressure D.C. generation as then existing.

The successful development of the Transverter would presumably overcome these difficulties and open up again the possibilities of transmission over distances of hundreds of miles. Lantern slides illustrating the Transverter will be shown.

The PRESIDENT thanked Mr. Sankey for his very interesting paper which contained a lot of valuable information. With regard to the huge machine made by Parsons which Mr. Sankey had described and illustrated he (the speaker) had seen it in the form of a model when in England and it was the talk of the Engineering World.

The Conference then adpourned until the next day, after an official Photograph of the Convention party had been taken.

In the afternoon through the courtesy of the Port Captain, the party were taken for a trip on the Durban Bay to view the coaling appliances and other Harbour Works.

WEDNESDAY, DECEMBER 10th, 1924.

The Conference continued its proceedings at 10 a.m., the President (Mr. John Roberts) being in the chair and there were present:—

MEMBERS—

B. Sankey, J. Mordy Lambe, T. P. Ashley, T. Sutcliffe, L. B. Sparks, L. Ralston, T. Jagger, R. D. Coulthard, B. H. Sargent, T. Miller, T. C. Wolley-Dod, G. H. Swingler, R. Macauley, F. C. D. Mann, L. F. Bickell, W. H. Blatchford, R. A. Stoker, M. McDonough, E. J. Hamilin, E. Poole, C. K. Turner.

DELEGATES—

Councillors G. W. Prior, H. M. Doull, D. Shearer, P. Andrews, J. A. Clark, E. Hopper, J. D. Low, W. Miller, W. H. Barrett, J. Scott, J. Paton, W. J. Newmarch, P. Goble, H. Solomon, T. C. Shearer.

VISITORS—

W. D. McAlister (Kokstad), A. M. Jacobs, A. E. Harte, T. D. Clothier, A. E. Val Davies, Town Clerk (Bethlehem).

BUSINESS MATTERS.

Next Convention.

Mr. Councillor CLARK (Johannesburg), announced that he had been authorised to extend to the Association an invitation to hold their next Convention at Johannesburg and that the Town Council placed at their disposal whatever accommodation was required and he felt sure they would extend to them the facilities which go to add pleasure to the Conference.

A hearty vote of thanks was then passed to Mr. Clark and the Johannesburg Town Council.

On the proposal of Mr. SWINGLER (Cape Town) seconded by Mr. MACAULAY (Bloemfontein) it was unanimiously agreed that the next Convention be held in Johannesburg during the month of September, 1925.

Election of Council—

The following members were elected to the Council:—

NATAL—Messrs A. S. Munro (P.M. Burg), T. Jagger (Ladysmith).

CAPE—Mr. L. F. Bickell (Port Elizabeth).

The following paper was then read:—

INVESTIGATION, DESIGN, OPERATION AND CONTROL OF SMALL ELECTRIC POWER STATIONS.

By E. J. Hamlin, D.Ss., M.I.E.E., Town Engineer (Stellenbosch).

Introduction.

The author promised to read a paper to this Congress with a great amount of misgiving. He realises that there are others far more able to deal with the subject, and trusts that he will be forgiven his presumption. If a useful discussion results then the author's labour will not have been in vain.

Investigation.

To be entrusted with the investigation of a small Electric Lighting Scheme is not a small responsibility. Many small towns have no debt except for the production of an essential service such as Water Supply. One has to consider that for a small town it is a "leap into the dark," or one may say a "leap into the light."

In many of the smaller towns there is a danger of the progressive element going too quickly for the more conservative. The latter class do not really mean to be drags on the wheels of progress but feel their responsibility as custodians of the ratepayers' purse, and want to be assured that the introduction of an Electric Light Scheme will not mean increasing the rates of their town unduly. They have, of course, some ground for their point of view for in recent years one can point to several Municipal Electric Lighting Schemes that were doomed to failure from their inception.

The Engineer who is entrusted with the task of reporting on a new scheme must therefore present his Report in the clearest possible language; and, without thinking of the resulting consulting fee. If in his opinion an Electric Light Scheme is not an economic proposition he should not be carried away by the ultra-progressive elements in the town, but state his facts and leave the Council and the Ratepayers to judge. In two instances which have come to the author's own personal observation he has definitely advised the Municipalities against embarking on the undertaking. One Council took the advice given, and the author believes it is still pleased, whilst another did not, and it is to-day financially embarrassed on account of the same.

The Consulting Engineer should not make up his mind

definitely regarding any class of Prime Mover before a thorough investigation. In the author's opinion, although he is a very keen believer in the internal combustion engine, it is not always advisable to put in this class of Prime Mover. The author maintains that it is a suicidal policy to think that every small Electric Lighting Scheme must have either a Diesel or a semi-Diesel, although he knows there are some who will disagree with him entirely.

Further many Councils run away with the idea that their Prime Mover must be a Water Turbine because they seem to think that fuel costs nothing. They will definitely oppose a scheme which is not an hydraulic one, and there are one or two towns in Africa where it has been a hopeless failure. The Consulting Engineer, again, should not pander to the views of a Council if they are not economic ones.

When the author is entrusted with the responsibility of preparing a Report, he takes as a basis of his Report the questionaire issued by the Electricity Commission and as far as possible tries to deal with the points raised by that body in his Report, and as an appendix to his Report he makes a copy of this questionarie, and as a further appendix gives the answers to the questionaire or refers the Commission to the pages of his Report dealing with the subject.

(A copy of a Report will be laid on the table for inspection.)

The author having so made up his mind deals in the Report with the following matters.

(1) Prime Movers.

Here the relative advantages and disadvantages are discussed of the following four methods:

(a) Hydraulic.

(b) Crude Oil Engine.

(c) Gas Engine.

(d) Steam Engine.

A choice is then made and reasons stated definitely for the same and usually an alternative choice is given.

Of course, the question of Bulk Supply must also be considered.

(2) Distribution Systems.

This is an exceedingly vexed question, and so the author discusses fully the relative advantages and disadvantages of:—

(a) Overhead system.

(b) Underground system.

(c) The question of Underground Feeders and Overhead Distribution.

Again a choice is made and reasons given.

(3) Street Lighting.

This is also discussed fully and the relative advantages and disadvantages of station control and time switches discussed.

(4) Buildings.

(5) Financial.

A surprising fact has come to the author's notice when analysing the various Municipal accounts. that it does not appear to make very much difference how much per unit is charged for electricity. the average, per consumer, for small towns works out at between £9 and £10 per annum, per consumer.

Before passing on to the next point, namely, the design, it is necessary to refer to the question of batteries. It is a very vexed question. The useful life of a battery in South Africa is very short for it rarely exceeds 8 years. The author knows there are "pros" and "cons" but it is his firm belief that a battery should be placed in all small stations using direct current. The author is a great believer in the 24 hours continual service—in fact he believes that without a battery it will take a much longer time to give absolute satisfaction to the ratepayers of any town.

Design—Preliminaries.

After the presentation of the Report it is usual to have an interview with the Council, and the author cannot give it in too strong terms of recommendation that Consulting Engineers should endeavour to remember that they are dealing usually with non-technical people when explaining electrical matters. It is necessary to cultivate the art of being able to explain things by analogy for if the Consulting Engineer cannot convince the Council and Town Clerk of the underlying principles of the scheme he is proposing so as to give them the necessary "powder and shot" to explain it to their ratepayers, there is sure to be trouble.

Once the Council are persuaded that it is necessary to go in for the scheme there are all the legal formalities to be gone

through in terms of the various Ordinances and Laws of South Africa, and it is usual that the Consulting Engineer should be able to attend the meeting of Ratepayers to help the Council to answer any questions that may be put.

The appointment of the Electricity Supply Commission has been a great boon to Consulting Engineers, and the author thinks to Municipal Councils as well. The author would like before proceeding further with his paper to pay his little tribute to the way in which the Engineers to the Commission have helped him in his consulting practice.

General.

The design of an Electric Light Schme for a small town requires just as much thought as the design of a larger scheme. This contention, the author thinks, will be conceded because a 50 or a 500 H.P. Diesel Engine is just the same to instal. The same applies to the transmission lines.

The designing of an Electric Light Scheme is entirely different from the designing of a Water Supply Scheme. In the latter it is necessary to put in a supply pipe to meet the needs of the town for a period of approximately 30 years, whilst with an Electric Light Scheme the author does not think it is sound practice to put in a Generating Station larger than what will meet the needs of the town for the first 10 years.

To the author it seems hopeless for an Engineer to advise his clients to put machinery into a station which is sufficiently large to meet the needs of the town for 20 or 30 years to come and so burden the scheme with Capital Expenditure that it is impossible to make it a paying proposition.

In only one detail should the exception be made, and that is the design of the building. This should be so designed that expansion is an easy matter, without having resource to knocking down portion of the old building in order to add to the same. After a great deal of thought the author has standardised what he considers to be an ideal station and for the information of members, he will exhibit designs for a small town using (a) Suction Gas and (b) Diesel Engines. These plans are practically self-explanatory, and the author trusts will be of help to his brother Engineers.

Preparation of Specification and Drawings.

In the author's early days as a consultant he got together a set of General Conditions to the Specifications and learned from experience to add to, or modify them, until at last he has

been able to get a set which meets with the approval of most of the tenderers in South Africa.

However, as a body of Engineers the author thinks it would be wise to stick, as far as possible, to the standards published by the Institution of Electrical Engineers of England, only modifying them to meet our special conditions in South Africa.

The author however maintains that Standard Regulations mentioned above need revision—at least the following clauses should be inserted.

1a. Assistant Engineer.

9a. Some Alternative clause.

13a. A Discrepancies clause.

19a. An Ommissions clause.

36a. A Clause about date of commencement of work.

37a. A Clause giving Engineer Power to suspend or delay work.

The author would like to offer the suggestion that this matter should receive the attention of the Executive of this Institution.

Incidentally by having a standard set of General Conditions it would greatly reduce the cost of printing the Specification, and the tenderers would not have to wade through a lot of printed matter.

Prime Movers.

It is an easy enough matter, after the Consulting Engineer has made up his mind, and convinced his clients, that either of two Prime Movers will meet the conditions of the town, to frame his specifications to meet these conditions.

It is remarkable that engine manufacturers do not come together and standardise the sizes of their engines, the same as electrical manufacturers have standardised the sizes of their motors and generators. It is next door to impossible for a Consulting Engineer to analyse tenders when he gets a choice of Prime Movers to drive a 40 kilowatt machine which range from 60 H.P. to 82 H.P., and also with one or two cylinders.

There is one point, however, which gives rise to trouble and that is the quantity of spares to be supplied with each machine. This is another matter the engine manufacturers should standardise. In these days business is cut so fine that

the number and class of spares to be supplied with the engine is often a determining factor, and when account is taken of the value of the spares supplied, the lowest tenderer on paper, is not the one in fact.

Switchboard.

In the author's opinion this is the "heart" of the whole electric supply, and it is surprising how little attention is given to the matter of an efficient switchboard. After examining some 100 tenders for various kinds of switchboard the author was amazed at the way some firms string together apparatus in the hope of getting the order for the switchboard. Tenderers in his opinion should give more attention to this matter and engineers should be very definite in their specification, and not under any circumstances accept anything delivered from that specified unless good reasons can be given.

Battery.

As stated above the author is a great believer in a 24 hours supply—hence in a D.C. system a battery is necessary.

Unless there are very definite reasons the author advances the following suggestion as to the essentials:—

(1) The battery should be of the "ready-burnt" type.

(2) The battery should be of such a size as to replace one unit for a period of 3 hours.

Transmission Lines.

This is a very difficult matter. Take Stellenbosch for instance. The author knows the Consulting Engineer, originally would have liked to put down underground feeders, and in many instances underground distributors, but it was financially impossible in those days. The result, however, has meant the destruction or disfiguration of many of the most beautiful oaks in South Africa, and to-day the author's Council is putting all its main feeders underground, and in the future most of the extensions will be underground as well. It is very hard for the consumer to have to pay anything from £10 to £15 for an underground cable connection, whereas for an overhead connection it can be done for £1 5s. Every town presents different problems, and there is no golden rule which is the better method. It is purely a question of economics, but the author has now come to a very definite conclusion that it would be the best method to, at least, have all the feeders underground, even if the distributors have to be put overhead.

Examination of Tenders.

Many Engineers think that when their report has been adopted, the Ratepayers have been convinced that the scheme is an economic one, and permission to call for tenders has been given by the Electricity Commission and the Provincial Council concerned, that matters are then plain sailing. The author's experience is that then the trouble begins. It is amazing to find the inconsistencies of tendering. The author would like to give one or two instances.

(1) Planting of Poles.—The price for the planting of poles varies with different tenderers between 10/- and £3 5s. In one case the analysis shewed a difference in this one item alone of £1,075.

(2) Excavation for Cable.—Tenders varying between £250 and £1,170 for exactly the same piece of work were received.

(3) Meters.—Tenders were received from the makers of meters which vary between 50 and 100 per cent. more than the price quoted by the principal agents in South Africa.

(4) Engine Generator Sets.—The difference between a 60 Kilowatt Mirrless Full Diesel Engine Set and a 60 Kilowatt Ruston-Hornsby Solid Injection Engine Set was £600. Within a couple of months a 100 kilowat set, using the same prime movers as above, the difference in price was only £80.

There must be an explanation of all these wonderful methods of tendering. Surely if the principals making the meters have an agreement with the agents in South Africa not to sell meters except at a much greater price than the agents it would be better for the principals not to quote at all. It places the Consulting Engineer into a most awful hole. For the benefit of all concerned, the following is a translation of an Afrikaans conversation which took place in my presence.

Councillor: Are not Messrs.... makers of .... meters?

Consulting Engineer: Yes.

Councillor: How can Messrs.....supply the same meter in one instance at 2/3rds of the makers price, and in another at one-half the makers price?

Consulting Engineer: The agents have a special agreement with the makers.

Councillor: Then I suppose the agents are giving an inferior article.

Consulting Engineer: No, certainly not.

Councillor: I propose, Mr. Mayor, that we do not use these meters because there is something "fishy" about it.

The Consulting Engineer knows there is nothing "fishy" in it. He knows the firm will supply the real article but how can he convince Councillors who do not know the intricacies of these trade agreements to the contrary? The author maintains that the time has come when principals having trade agreements with agents in South Africa are ruining their business and are interfering with the course of trade if they do not stop tendering against their agents. Competition is keen enough to stop the agents from getting excessive profit, and if the meters are made by the principals that should be sufficient.

Analysis of Tenders.

The author is of the opinion that a very thorough and complete analysis of Tenders is the duty of the Consulting Engineer. If this be done properly all the "pitfalls" opened by some tenderers are discovered. It has the added advantage of making the position clear to his clients, the Provincial Administration and the Electricity Commission. It obviates a great deal of annoying correspondence, and incidentally, as the Electricity Commission charge on the basis of the time taken by its officers, it saves the Municipal Council concerned a great deal of money.

Operation and Control.

The operation and control of a small Power Station is an exceedingly difficult matter, unless definite principles are fixed in the minds of the Municipal Council.

An Electrical Supply Undertaking is entirely different from any other undertaking under municipal control. It must be considered as a business. The Electricity Supply Undertaking is therefore for the benefit of all ratepayers, and no effort should be spared to make it economically sound. In some towns the Electricity Supply Undertaking is used to get a cheap and efficient street lighting, even to the detriment of the consumers of light and power.

In the author's opinion a policy should be laid down by the Municipal Council concerned, and the Engineer left to work it on business lines. Of course the great difficulty is to get an efficient manager with sufficient engineering knowledge to run the business, or vice versa, to get an Engineer with sufficient

business knowledge to do it. The author maintains that the time has now arrived in South Africa when by using one Engineer for all municipal undertakings that it would be a benefit to the Ratepayers and to the Electricity Supply.

It is useless for the Engineer to lock himself up in a water-tight compartment, for in towns where there is only a small undertaking he has to deal with many consumers who are ignorant of the many advantages which can be gained by the application of electricity to their homes. After he has got them interested in the use of electricity it is then purely a question of tariffs. In the past there have been many papers read before this association on the subject of tariffs, and the author does not wish to labour the point.

On the other hand it is essential that the Engineer should endeavour to work his station as economically as possible. During a recent visit to England the author came across a new type of oil filter. He persuaded his Council to buy one of them, and the lubricating oil charges have been reduced by one-half, and the generating price per unit by one penny. He recommended a brother Engineer to adopt the same system, and this meant a saving of £1000 a year.

Again, it is not generally realized that sunlight has a tremendous effect on the efficiency and useful life of a battery. From experiments which the author carried out over a period of 4 years he has come to the conclusion that the efficiency of a battery can be increased by 4 per cent., and its useful life by 25 per cent, by the application of scientific principles to combat the "evil" influence of sunlight. In South Africa alone, in sinking fund charges, this would mean an annual saving of £4,000.

Again further the Engineer should endeavour to combat the loss of efficiency in secondary batteries by the prevention of evaporation. By a series of experiments the author found out that by using a good insulating oil that the battery efficiency was increased by 1½ per cent. and that there was a saving of nearly 800 gallons of distilled water in one year. This is no small item to a small undertaking.

By getting a system of work in the Power Station where things are done in a regular and organised method supervision can be reduced considerably, and on the other side fuel charges can be materially reduced.

There are many small towns where the overhead transmission lines are far too small, and it would be infinitely better to pay a little more in interest and sinking fund than to have a

line loss of 20 per cent which is quite common in South Africa.

The author is a great believer in the Engineer controlling the records of the Electricity Supply, and not the Town Clerk's or the Town Treasurer's department. As far as the author's Municipality is concerned he supplies the office with full details of the charges, and in this way he is able to get out his monthly returns, and put his hand on any inefficient point in the whole system.

The author is a great believer, as far as the Electricity Supply Undertaking is concerned for small towns, in municipal trading. The work is done cheaper, and just as efficiently, and as far as the author's Municipality is concerned it has, for the last four years, paid the portion of his salary which is debited to the Electric Light account.

Conclusion.

The author realises that this paper is rather sketchy, and he apologises for the same. He trusts that it will be realised that this paper was written in a spirit of wishing to help, and not in a spirit of criticism. The Engineers of the small Municipalities have a particularly difficult life, and everything should be done to make that life more pleasant.

With the advent of the Super-stations which are appearing on the horizon, it is the small Power Stations which will be of great assistance to these Super-Stations.

The Engineers to smaller Municipalities are doing the propaganda or missionary work, and like most missionaries are only appreciated on the day of their burial, and sometimes not even then.

In the author's opinion the knowledge and advice of the Engineers to the smaller Municipalities should be more used on the Executive of this Association.

DISCUSSION.

The PRESIDENT thanked Dr. Hamlin for his useful paper.

Mr. RALSTON (Dundee) stated he would like to know how Dr. Hamlin arrived at the charge of 25s. for a house connection. Did that include the meter board, meter and fuses. Then with regard to putting oil on the top of batteries to prevent evaporation: no doubt evaporation would be an item in a plant which had no steam system, but where they had steam and a small condensor he did not think it counted for much. The cleanliness of the battery counted a good deal in his

opinion. Then with regard to the effect of light on batteries; the makers of the new batteries which he had recently installed at his station distinctly state that the battery room should be as light as possible and well ventilated. With regard to the point made by Dr. Hamlin in connection with the Engineers of small municipalities, he wished to know whether the Engineer should control the whole of the workings of small municipalities.

Dr. HAMLIN (Stellenbosch) in reply stated that the 25s. was the amount to be paid by the consumer. For putting in 150 connections recently a quotation had been received which worked out at £1-15-0 including meter board, fuses, and connecting up the meter supply from the line. If the consumer paid 25s. it would pay the municipality. He could not agree with Mr. Ralston that even with a steam station the production of 800 gallons of distilled weater in a year was not to be considered. With regard to the insulating oil on batteries that had now been adopted throughout the whole of the British Post Offices and they had effected a saving up to 40,000 gallons of distilled water a year. He agreed that some manufacturers did say that the batteries should be given plenty of light and ventilation, but they did not say that the batteries had been ruined by direct sunlight. On the question of Engineers, what he meant was that the amount of work in a small town could be done by one engineer. The Engineer's brains could be better utilised by the municipality instead of leaving it to the foreman.

Mr. McDONOUGH (Bethlehem) stated that it appeared to him that most of the points raised in the paper left out of account the formation of the Electricity Supply Commission. Whatever the Consulting Engineer may do or whatever plant he may propose to instal, it had first of all to be approved by the Commission, and one had to presume that the Commission's Engineers were qualified to give the best advice as well as the Consulting Engineer. The Engineer in putting forward a scheme had to give sound reasons for it, sufficient to convince not only laymen but the Engineers of the Commission. The consumers or ratepayers were therefore doubly safeguarded.

Mr. BLATCHFORD (Greytown) stated that, speaking from his experience with a small plant, if any engineer was considering laying down a small plant for a town of say a thousand white population there was no fear of the undertaking not being a success. He gave the following figures concerning his station. The Capital expenditure was £13,000. Depreciation set aside amounted to £4,300 and Loan redemption

amounted to £2,200. The number of units sold in 1923-24 was 165,000 odd and the cost of production was 2.94d. per unit. The charge for current for power was 3d., 2d. and 1½d. per unit, and for lighting 1s. for first 5 uits, 10d. for next 25 units, 9d. for all above less 10 per cent. The total income for the year amounted to £3,833 and the expenditure was £3,645.

Mr. JAGGER (Ladysmith) stated that if Dr. Hamlin had mentioned periodical testing of mains and meters as one of the most important operations in connection with any electrical undertaking he would find that a great deal of the losses in connection with small power stations occurred under those headings. He had found on several occasions when testing mains that bad joints were found and in several cases the mains were not heavy enough for the required load. Through periodically testing mains and keeping them in thorough repair a considerable saving had been made in line losses. He drew attention to the tremendous loss that took place annually through meters running slow, in many cases from 15 to 20 per cent.

Mr. SPARKS (Pietersburg) thanked Dr. Hamlin for the useful information in regard to small power stations. He was not altogether in agreement with him, however, on the question of batteries. He thought seven years life was far too high for a battery in South Africa. With regard to the saving of distilled water, it was not so much the saving in water but every time water was added the distribution of acid was upset with the result that in some places the acid was stronger than others and he thought this introduced a great deal of stress on the plates. In the smaller towns he thought it was a good plan to restrict the hours for light and thus eliminate excessive spare, more time being available for maintenance. On the question of poles he thought the use of wooden poles in South Africa should be prohibited. Eventually the maintenance became very high and wooden poles were very unsatisfactory.

Mr. STOKER (Kroonstad) stated he had listened to the paper with very great interest and he very much appreciated the points raised. There was one point on page 62 which he thought might have been made a little clearer. Dr. Hamlin did not think it sound practice to put in a larger station than would meet the demand for ten years. He thought a little more might have been said about distributions lines. On page 67 of the paper a rather significant remark appeared "There are many small towns where the transmission lines are far too small, etc." Did Dr. Hamlin think that the distribution system also should be put down only large enough for the needs for ten

years. It was easier to enlarge a power station than the distribution mains. He would also like a little more information regarding the reduction in cost of generating due to the use of oil filters.

Dr. HAMLIN (Stellenbosch) in reply stated that if necessary he could give chapter and verse in support of some of the statements contained in his paper. Consulting engineers were often told all sorts of things by municipalities desirous of going in for an electrical scheme, but the quantity of current to be sold puts a different complexion on any proposition. It was very difficult for the Commission to honestly criticise any scheme unless full particulars and figures were given. There had been schemes within the last five years where thousands of pounds had been lost to small municipalities. There were stations not far from Cape Town using 40 lbs. coal per unit and losing £300 a month. With regard to Mr. Jagger's point as to the testing of meters, the golden rule was a meter a week taken out, tested and repaired. The general practice with his station was that when new meters were put in the cover was taken off and the brushes cleaned. In that way they only had about 2 or 3 per cent which were really slow. In regard to mains he could not agree that it was a difficult thing to increase the mains in any particular area. So far as the feeders were concerned he would put them down big enough to supply for 20 years and if the load was not too much he would re-distribute and put down another feeding point. On the question of batteries, the first patteries put in at Stellenbosch lasted over eight years and would have lasted longer if they had not had rough usage during the epidemic when they were left practically to the care of coloured employees. From an economic standpoint he did not agree that there should be restricted hours. With regard to wooden poles he agreed that these should not be allowed unless specially treated. As to the lubricating oil he hound that by using filters the cost had come down to 1d. and in the coming year he hoped to reduce it further.

Mr. BLATCHFORD (Greytown) stated that he had installed both Ferranti and Chamberlain and Hookham meters. With the Ferranti meters he found a lot of flaking takes place but not with the other. The meter seemed to oxidise and this had a braking effect on the disc. He would like to have some assistance in getting over the difficulty. On the question of batteries, he mentioned that a battery was laid down fifteen years ago and had given very good service indeed.

Mr. McDONOUGH (Bethlehem) stated he had also

experienced the flaking in the Ferranti meters. He had got over the difficulty by scraping the enamel off the disc and amalgamating it with mercury and recovering the disc.

Mr. SWINGLER (Cape Town) stated they had the same difficulty in Cape Town and overcame it in the same manner as Mr. McDonough. They were now using a new rustproof type.

Dr. HAMLIN (Stellenbosch) stated he had found the same experience and got over the difficulty in the same manner. Economics had to be studied in any station and the filter in use at his station had been brought to his notice in a paper and whilst in England he had learnt that at a certain station by the adoption of the filter the amount of oil had been reduced by 75 per cent. and on the recommendation of the engineers there he had introduced it at his station.

Mr. McDONOUGH (Bethlehem) stated that he did not think the filter would apply in the case of high speed superheated steam engines, but applied more particularly to internal combustion engines.

Dr. HAMLIN (Stellenbosch) replied that he thought the engineers of big towns used something of a similar nature. This oil filter could be used for transformer oils. A great saving had been effected in many places by their use.

Mr. SWINGLER (Cape Town) stated that they used a filter on every machine. To-day it was possible to buy a motor car which re-filtered the oil every 20 miles. If that could be done on a motor car it could be done with any machinery.

Mr. VAL. DAVIES (Visitor) stated that he differed with Dr. Hamlin on many points, but they both aimed at service for municipalities. He thought the paper was something of a medley of the principles governing the ethics of consulting work and the inauguration of small plants and it would have been advisable to keep them more separate. Consulting work was so entirely different from operating a plant that it really did not permit of being treated in a paper. A consulting engineer needed unbounded patience in dealing with people who for instance raised objections to the installation of electric light because it was bad for the eyes. That was a personal experience of his recently where a section of the Council would not agree to the installation of electric light for fear of injury to the eyesight of the inhabitants. There was one thing he would like to emphasise and that was the real need of clarity in specifications. To load a specification with irritating general conditions was often a confession of lack of clarity in the

subject matter of the specification itself or alternatively of a want of pluck on the part of the person drawing up the specification. He thought the revised conditions issued by the Institute of Electrical Engineers could not be improved upon.

The PRESIDENT stated that on page 62 Dr. Hamlin mentioned that the design of an electric lighting scheme for a small town required just as much thought as for a large town. His experience was that they gave a great deal more thought and required a great deal more judgment and consideration. In a large town there was no question as to whether the thing was going to be made to pay, whereas in a small town the trouble was not to know what kind of plant to put in but to be able to put in a plant at such a low price as to justify the undertaking. He was very much struck with the statement on page that the price of current in small towns had very little bearing on the revenue obtained. That was a very significant fact indeed and he thought that they did not take sufficient notice of it. One could readily understand it because the average individual with a certain income can afford to pay a certain amount for light, and whether the charge was 3d. or 2s. his expenditure was not going to be governed by the amount of light he required but by the amount he could spend. It would seem to indicate that if a minimum charge of say 15s. a month was fixed for small towns there would not be any need for such charges as 5d., 6d. or 1s. a unit. If such a charge was made, and after that, charge at the cost of production it would simplify tariffs in the small towns and put the thing on a basis whereby they could start to cater for electric heating straight away because the minimum charge would take care of all the standing charges. If one would only break away from the idea of the high price per unit it would not be such a hopeless outlook to expect that electric cooking would be made available in the small towns. He thought that the small towns should seriously look into the question as to whether a small condensing plant would not be a useful addition to their plants. It was necessary in catering for electric cooking to bring down the working cost as much as possible and while coal was anything like 8 to 10 lbs. per unit it made it very difficult to sell current at a low price as would make cooking posible. The objection from some people was that they had not the water, but in fact less water was required with the condensing plant than without it.

Mr. McDONOUGH (Bethlehem) stated that having had some experience of the small towns he was wondering what sort of a commotion it would cause if they proposed to make a minimum charge of 15s. a month throughout the year.

He was afraid it would never do with some of the towns he had been in. If they proposed to supply current at 1d. a unit most of them would find it necessary to double their plant almost immediately. Many people did not pay more than 5s. or 6s. a month.

DISCUSSION ON STANDARD SUPPLY PRESSURE.

Mr. JACOBS (Electricity Supply Commission) before opening the discussion on this subject, took the opportunity of expressing the thanks of his Commission to the Association for the invitation to send delegates to the Convention. He also adds his personal thanks for the invitation. He had been looking forward to the opportunity of meeting them; he had come in contact with a good many of them already through correspondence but every man with business experience knew how unsatisfactory that was. A great many obstacles were removed when one could shake hands with a man and size him up. During the comparatively short time that the Commission had been in existence they had done a consilerable amount of work both for small and large municipalities. Their one object was to serve to the best of their ability and to put forth their best efforts for the common good. When they disagreed with a man their methods were not those of the primitive Red Indian who took his tomahawk and went out on the warpath. (Laughter). They preferred to meet men around the table and discuss matters and arrive at an understanding.

Standard Voltages—

In this matter what they had in mind was the standard pressure for high tension transmission. They were occupied exclusively with the voltages to be used for lighting purposes. He did not know exactly what the reason was but for some reason it was considered very desirable to work in multiples of 100 at first and to allow 10 per cent. voltage drop. As far as lamp voltages were concerned, until the British Standards Association was instituted voltages of 110 were common in America and 220 on the Continent. The comparatively low voltage in use in America was really due to the very extensive high tension distribution carried throughout the towns. It was not uncommon to see 6,000 volt lines carried through towns on wooden poles. By having the high tension mains running through the town it was easy to put up transformers and use a low voltage for distribution. 220 was used on the Continent for other reasons. His acquaintance with the subject so far as South Africa was concerned only dated from last year. When

the subject was first brought to his notice it came in the form of a proposal to use 220 for direct current and 240 for alternating current. If they were going to standardise voltages he did not see why they should not have a real standard, that is, one voltage for A.C. and D.C. He could not agree to having two different voltages and he had tried to find reasons for the proposal. He had communicated with the Johannesburg branch of the British Standards Association who had in turn communicated with London and the reply received was to the effect that these voltages were put forward as the result of an agreement.

He had pressed the matter further but was sorry to say that so far he had not had a logical explanation as to why it should be necessary to use two voltages, one for direct and the other for alternating current. He had discovered, however, that there was no objection to them having a South African standard voltage if they so desired. The subject was slightly difficult. The voltages in use in this country ranged from 200 to 250, but if they were tabulated he thought it would be found that there were very few at the extreme ends, 200 and 250. He did not know whether it would be possible to agree on some common voltage to take in the whole range, but he did think it might be possible to agree on some standard voltage which would meet the majority of the installations in the country. He threw that out merely as a suggestion.

Mr. SANKEY (Johannesburg) stated that as the representative of the Association on the Standards Committee (S.A. Branch) he had had something to do with this question. It had come before the Electrical Branch during the current year in consequence of a communication from the Head Office in London bringing up the question of a standard voltage for South Africa, the idea being, he thought, that the main committee would like to standardise some definite lamp voltage throughout the British Empire. They had been given some particulars of the percentage of undertakings in the United Kingdom, Australia, India and South Africa at the different voltages of 220, 230 and 240. As time was short he had taken the opportunity of circulating most of the members and obtaining from them their opinions and also particulars of the voltages in use at the different undertakings. After a great deal of difficulty he had succeeded in drawing up a list of supply voltages common in the Union which he thought was correct.

MUNICIPAL ELECTRICAL UNDERTAKINGS.

UNION OF SOUTH AFRICA

SUPPLY VOLTAGES FOR LIGHTING AND DOMESTIC USES.

Corrected Copy (November, 1924.)

Compiled by B. SANKEY, M.I.Mech.E., Johannesburg

200		220		230		240		250	
A.C.	D.C.	A.C.	D.C.	A.C.	D.C.	A.C.	D.C.	A.C.	D.C.
Durban Harrismith Johannesburg Pietermaritsburg Benoni Springs Bloemfontein	Nil	Cape Town East London King Williamstown Paarl Kimberley Strand	Alice Burghersdorp (Cape) Cape Town Cradock Dundee Estcourt Cathcart Greytown Buterworth Ladysmith Oudtshoorn Queenstown Somerset East Stellenbosch Uitenhage Wellington Worcester Beaufort West Mafeking Middelburg, C.P. Malmesbury Kokstad Riversdale Umtata	Mossel Bay Boksburg Randfontein Roodepoort	Aliwal North Caledon Heidelberg Heilbron Johannesburg Klerksdorp Kroonstad Lindley Newcastle Parys Senekal Winburg Reitz Volksrust Graaff Reinet	Barberton Middelblrg, (Transvaal.) Queenstown Standerton Vrede Krugersdorp Rustenburg Brandfort Pietersburg Molteno Humansdorp Ficksburg Vereeniging	Potchefstroom Beaufort West Bethlehem Utrecht	P. Elizabeth Pretoria Waterkloof	Bethal Ermelo. Indwe P. Eliz. Pretoria Vryheid
7	—	6	24	4	15	13	4	3	6
Totals	7	30		19		17		6	

Other Voltages: Ceres 110 D.C. Durban 100 A.C. (in small business area). Germiston 120 A.C.

He would be glad if members would have a look at it and see if their respective stations were put down at their correct voltages as it was very important that they should have a correct list of this description published in their proceedings. At a special meeting called to consider the question the matter was discussed very fully and it was found that the largest number of undertakings A.C. or D.C. came under the 220 portion, there being 24 D.C. and 6 A.C. Next to that there were 19 at 230, 15 of which were D.C. and 4 A.C. Then there were those at 240 and they consisted very largely of new undertakings. The new standard of 240 which they had recommended some time ago had been adopted and there were 13 A.C. and 4 D.C. It would therefore be seen that if they were to take 220 230 and 240 they comprise practically the whole of the undertakings in the Union with the exception of 9 which were shown as supplying 200. With regard to extremes, some consist of portions of towns which were supplying at one voltage on the outskirts and another in the centre of the town. Consequently the extreme ends of curve were not important as regards the number of towns, but as regards the number of consumers they probably comprised as many as the rest of the towns put together. In Johannesburg alone they had 18 000 consumers at 200 volts. At the meeting which was held the suggestion was put forward from London which had originated with the Lamp Manufacturers Association that South Africa should adopt the happy mean of 230, but the feeling of the meeting was that it was a very weak argument. All those who were below that voltage would be required to raise their voltages and those above to lower, and 230 seemed to be the figure which fitted the least number of undertakings. After a considerable discussion it was agreed that there was no reason why they should not adopt the higher voltage as being more suitable for the maintenance of an adequate pressure and supply. It was also argued that cooking and heating at 240 was quite as reliable as at 220 was six or seven years ago. Therefore from the point of view of reliability there was nothing to choose between 220 and 240. It was very much easier to increase the pressure than to lower it. In many of the towns the great trouble was to maintain an adequate pressure of supply at the far end of the system, and if they were called upon to lower their standard they would be faced with large outlay for the stiffening up of the distribution mains, where as if they had to raise it 10 volts it would serve to ease the problem. The consensus of opinion was very strong in favour of the adoption of 240 as a uniform standard voltage for A.C. and D.C. systems. As a result of that meeting a cable had been sent to London

recommending one voltage for South Africa and that 240 was preferred. Up to the time of his leaving Johannesburg he had not received a reply from London. It was the desire of the Standards Committee that the Convention should take the matter up and discuss it as being the one Association most intimately concerned with regard to the standard voltage in this country, and the Committee were looking for a lead from the meeting and a definite expression of opinion. In case the engineers should be alarmed at the prospect of altering their meters he stated that he had had some tests carried out with some ten different makes of meters and it was a simple matter to carry out. He would be pleased to give details to anyone who required them.

The PRESIDENT asked whether, in the event of any of them who were not using either of the pressures mentioned expressed an opinion in favour of 230 or 240, it would carry with it an obligation to bind themselves to take immediate steps to alter their pressures. In Durban the pressure was 200. They would not stand in the way of something better if they were not called upon to alter their pressure immediately among the 13,000 or 14,000 consumers in Durban.

Mr. SANKEY (Johannesburg) in reply stated that in all the various standardisation questions such as wiring rules, licences, etc., this body could do an immense amount towards voluntary standardisation. In his opinion they were the one Association who had done the most practical work in the electrical world in South Africa in the last four or five years, and they had succeeded in bringing about to a large extent standardisation of wiring rules and regulations. They had also initiated the licensing of electricians and registration of contractors, and as time went on that standardisation would become complete. They had now the suggestion to standardise pressures and he did not see how it could be carried out on a compulsory basis. They could lead the world in the standardisation of supply pressures because electrically speaking they were one of the youngest and most vigorous countries in the world and were not tied down to obsolete plant and distribution systems. He would look to Johannesburg and Durban to give a lead in that direction once a definite pressure was decided on. They should take all the steps they could to fix the standard pressure; and if between now and the next Convention that was decided upon and agreed to by the Electrical Standards Committee and the Electricity Commission of South Africa they could then discuss the best means of bringing standardisation of pressures into effect on a voluntary basis.

Mr. SWINGLER, Cape Town, stated that as one who was partly responsible for the minority report at the time the previous standard was decided upon, he wished to put the other point of view. As was well known when the matter was discussed in 1916, it was decided by a small majority of those present to recommend the adoption of 240 volts as a standard pressure for both alternating and direct current systems of supply.

Mr. Robberts and he thought that a great mistake had been made at the time in this respect, so much so that they circularised the members and obtained eighteen members who supported their point of view, viz: that 220 volts was the best standard pressure to adopt in the Union of South Africa. This minority report which really was a majority report inasmuch as the majority of the members of the Association of Municipal Electrical Engineers had signed it. (although the majority of those attending the Conference voted against it) was forwarded to the local branch of the British Engineering Standards Association Committee. They all knew the advantage of standardising pressures, a matter almost as important as that of standardising frequency. With a standardised pressure consumers would have no difficulty in regard to being saddled with unsuitable apparatus should they move from one town to another or to an extra-urban area of supply. The local Engineering Standards Committee. however, decided that 240 volts should be put forward as the standard pressure, although it was known then that on the Continent of Europe, including Germany, Austria, Holland and all other countries, with the exception of France, 220 volts was the pressure of supply. He, himself, had always advocated 220 volts as the most suitable pressure to adopt in this country. In 1921, the Standards Committee in Great Britain apparently found they had made a mistake in standardising a pressure of 240 volts as they reduced the D.C. standard from 480/240 to 440/220 volts. This was done principally in order to meet the Lamp manufacturers so that they could make lamps for 230 volts and sort them out for use on 240 or 220 volt systems as required. The latter have now improved the manufacture of lamps to such an extent that a uniform lamp can easily be made and, therefore, desire the standard to be again changed to 230 volts for both A.C. and D.C.

In this country there were undoubtedly a larger number of undertakings that could get down or up to a 220 volt standard than would be the case if 240 volts were adopted as a standard. A few undertakings which have recently been

started up have adopted the 240 volt standard but they were very small concerns. If the British Engineering Standards Committee wished to alter the presure, they should revert to their old standard of 220 volts. The lower the pressure, the less the danger from shock and the longer was the life of lamps and other apparatus. The higher the voltage the more danger to life and the more delicate were the appliances. A 220 volt A.C. shock was sufficient for most people and too much for a large number. At the present time he did not think the standardisation of World voltages was sufficiently advanced to say if a higher voltage than 220 will be adopted, but in his opinion if they adopted exactly what the British Standards Committee wanted, they would be left with only the British sources of supply for lamps, elements, etc., to draw upon.

The PRESIDENT concurred with what Mr. Swingler had said regarding the 240 voltage as they could see no reason why that should be the pressure for South Africa. The reason in England was that many towns changed over from A.C. to D.C. Where there was the Electric tramway load with a pressure of 500-550 and it was thought desirable that the same generators should be used for lighting and power. These conditions did not obtain in South Africa and they could not see why they should support the proposition and they decided to recommend a pressure which was much more in line with that in use, namely 220. It fitted in very well with an alternating current supply four wires three phase, which was a very useful system and becoming more and more popular. Makers of appliances made them suitable for 200 or 220 and if the pressure was 230 there would be the temptation to make the the same applicances applicable for 230 which would cause overloading and trouble. There were at least 50 per cent. more stations now working at 220 than any other pressure in use, and there were many other arguments in favour of remaining at 220 which however, he did not think he need go into at the moment.

Mr. WOLLEY DOD (Pretoria) stated that they should consider that whatever happens South Africa will not be able to lead the world in standardising pressures. There was no question that so far as the British Empire was concerned there would be an attempt to standardise pressures. It had been obvious from time to time that manufacturers did not realise what was the best pressure. They had at all times produced what the consumer wanted. There was no practical difficulty in making lamps and heating apparatus for the higher voltages but they could not lessen the distribution losses which must

occur at lower voltages and though lamps apparatus and insulating material will improve, the distribution losses will remain for ever. They should recommend that they take the highest practical voltage for the benefit of distribution.

Mr. SUTCLIFFE (Benoni) pointed out that if the voltage was altered it would mean a tremendous amount of work in alteration to meters, etc.

Mr. SANKEY (Johannesburg) stated that so far as he knew there was no proposal to make any scheme compulsory, but he need hardly point out how one uniform pressure would assist the use of domestic electricity about which they had been talking. Their crying need was one of universal pressure for every kind of domestic apparatus. The trouble of supply firms having to supply apparatus for every voltage increased the cost and kept back their universal use.

The PRESIDENT stated that members should not worry about the financial aspect of the scheme at present. He was going to support 220 without the least idea of having to recommend to the Town Council for a good many years that they should make a change. But it would be open to argument as to whether they should not make further extensions at the new pressure. He thought they should lay down some standard for all new undertakings. They should consider the question from the general point of view; the question of cost of change over did not enter into it.

Dr. HAMLIN (Stellenbosch) stated that he thought the answer to the question had been given, namely that they had to have standardisation in order to get a cooking load to help them along. By having a standard pressure manufacturers could turn out apparatus cheaper than if they had to do it at special voltages. He supported the pressure of 220 and 440.

Mr. BICKELL (Port Elizabeth) stated that there seemed to be no reason why South Africa should not adopt the same pressure as in Great Britain. All the heating apparatus practically was made there and if they were going to adopt the standard of 220 why did they in South Africa wish to have 240.

Mr. LAMBE (East London) stated he thought it was greatly to be regretted that the British Standards Committee appeared to have wobbled a good deal. He was strongly in favour of the 220 voltage as against 240. He regretted that all supply authorities had not adhered to the 110 volt standard. He was experiencing the effects of a change from 110 to 220 after hanging on for a very long tine and he could say that the change was not in the best interests of the consumer. He

knew from experience that apparatus above 220 was not as satisfactory or as efficient. He thought it was similar to the case of the high speed ship, the coal consumption and wear and tear went up out of all proportion for the last few knots. Mr. Sankey had said that although the largest number of towns operated at 220 they did not represent the largest number of consumers; he would say that those towns which would have to change to 220 were better able to afford the change financially. He had no hesitation in saying that it would be financially impossible for many of the small towns to face such a change.

At 12-45 p.m. the Conference adjourned until the following day at 9-30, when further discussion of Supply Pressure would take place. In the afternoon visits were made to the Graving Dock, the party being conducted over the works by Mr. W. R. Crabtree the Engineer-in-charge, also to the South Coast Junction Refinery of Sir J. L. Hulett & Sons, Ltd, through the courtesy of Mr. J. L. Malcolm the General Manager. In the evening the party were present at the official opening by His Worship the Mayor of the Durban Municipal Broadcasting Station and also to a private view of the Electrical and Wireless Exhibition in the Town Hall.

THURSDAY, DECEMBER 11th, 1924.

The Conference continued its proceedings at 9-30 a.m. the President (Mr. John Roberts) being in the chair and there were present:—

MEMBERS—

J. Mordy Lambe, T. P. Ashley, A. S. Munro, T. Sutcliffe, L. B. Sparks, E. J. Hamlin, T. Jagger, R. D. Coulthard, B. H. Sargent, T. Millar, G. H. Swingler, R. Macauley, F. C. D. Mann, L. F. Bickell, W. H. Blatchford, R. A. Stoker, E. Poole, T. C. Wolley-Dod, B. Sankey, C. K. Turner.

DELEGATES—

Councillors C. W. Prior, H. M. Doull, D. Shearer, E. Hopper, J. D. Low, W. Millar, W. H. Barrett, J. Scott, J. Paton, P. Goble.

VISITORS—

A. M. Jacobs, A. E. Harte, T. D. Clothier, W. D. McAlister.

Continuation of Discussion on Supply Pressures.

Mr. SWINGLER (Cape Town) made the following proposal—

"That this Convention of Municipal Electrical Engineers (Union of S.A.) approve of 220 volts as being the uniform Standard Pressure at Consumers terminals for lighting supply. (In the case of 3 phase this pressure of 220 volts being supplied between each phase and the neutral wire.)"

This was seconded by Mr. LAMBE (East London).

Mr. SANKEY (Johannesburg), proposed as an amendment that the pressure be 240 volts. In support of his amendment Mr. Sankey stated that he thought most speakers had considered far too much the present year 1924, and not what they had to consider say for the next ten years. He did not think it mattered very much what American or Continental pressures might be; they had their own standards and peculiar conditions of supply, and he did not think that South Africa should be too anxious to adapt themselves to America or any other place. They would do better to adapt themselves to what best suited the British manufacturer. The most important point to be considered was the question of distribution. The distribution problem in the next ten years was going to be a most difficult one and they had to look at it from that point of view for more than one reason. He referred the members to the chart of the various voltages he had prepared and stated that if they wished to reach any degree of standardisation, say 80 per cent. in South Africa, and were going to take 220 volts as the standard, by drawing a line between 220 and 230 they would see how many existing undertakings would have to drop their pressure in order to get down to the standard. That was going to be a practical difficulty which would cost a tremendous amount of money to get over, especially in the case of underground mains. How were they going to drop their pressure by 10 volts and still keep their supply within the proper limits of the declared pressure. If, however, they dropped the line between 220 and 240 the problem was considerably simplified, and if they took it up to 240 they could bring practically the whole of the undertakings with a few prominent exceptions into line for a minimum of expense and in the minimum of time. Then there was the question of domestic electricity which was very prominently before them at the moment. The exhibition of electrical apparatus should be an eyeopener to many of them and he hoped that in the next ten years the domestic use of electricity would be such as to provide them with big loads and big revenues, but there again the distribution question was going to be the crux of the problem. His experience with electrical cooking had

been that if they wanted to get proper results they had to have uniform pressure. He had seen disastrous results in the cooking of bread due to falling away in pressure. From that point of view he considered 240 was better than 220, and if the 240 and 230 undertakings had to adopt 220 it would mean the re-building of the whole of their distribution network or a large section of it and they would have to give up the idea of entering the domestic field. Then again they had to remember that the home committee were apparently favouring 230 which in his opinion was at least better than 220. Looking ahead for the next ten years he thought 240 was going to be the most suitable pressure. With regard to the reliability of electrical cooking apparatus he thought they might at least take it as probable that in the next five or ten years they would get apparatus suitable for 240 or 230 volts. He did not see why there should not be as much improvement in cooking apparatus in the next five years as there had been in the last five years.

Mr. WOLLEY DOD (Pretoria) seconded the amendment.

Mr. SWINGLER (Cape Town) in referring to Mr. Sankey's remark that they should look ten years ahead stated that it was nearly ten years since they adopted by a majority of the members at the Conference, but not of the Association, that 240 be the standard. Since then experience had taught the British Standards Committee that they were wrong and the D.C. pressure had been reduced to 220 volts. Their first consideration as suppliers of electricity should be to give satisfactory service to their consumers and in his opinion the best service for many years to come would be with apparatus wound for pressures of 220 volts and under. In America, which had developed the supply of electric energy at a much more rapid rate than Great Britain (they had developed a heating and cooking load larger than any other part of the World) their pressure of supply was only 110 volts.

The PRESIDENT stated that he could not understand the attitude of mind of those who wished to impose such a pressure as 240 which had been rejected by England for very good reasons and which so far as he was aware was not used in any other country in the world. He felt sure that the question of distribution mains for heating and cooking was not going to solved by any such difference of pressure as 200, 220, or 240. The whole thing had to be re-organised from its base up. He had often expressed the opinion that he was afraid a D.C. station running at 200 or 240 would find itself terribly handicapped with its D.C. supply if it took on heating loads

and would find no appreciable benefit by having its pressure increased to 220. He would like to emphasise that they must not assume that because any standard pressure was adopted by them anybody not conforming to that standard pressure would immediately be confronted with the problem of changing over. The Durban Town Council could not for a moment face the idea of altering their pressure within the next five years. They scarcely had the staff to cope with ordinary extensions let alone starting a revolution of the whole system which would disorganise the supply for years to come. It would not be a commercial proposition and they would not get any sympathy for doing such a stupid thing. Nevertheless now was the time to fix for all future undertakings what was the best pressure to use.

Mr. JAGGER (Ladysmith) stated that there was much to be said in favour of both pressures 220 and 240. On looking over the chart it seemed to him that if they took the intermediate 230 pressure it would meet the requirements of a great number of municipalities. So far as Ladysmith was concerned 220 was certainly the most adaptable, but in taking a broad view of the matter he though 230 would meet the case in a more satisfactory manner than 220 or 240. Another point in favour of 230 Volts for the Standard Pressure was that a 400 Volts supply between phases would be obtainable and this pressure would be more suitable for motors than the 380 volts which would be the pressure between phases if the standard were 220 volts.

Mr. STOKER (Kroonstad) seconded Mr. Jagger's proposition in order to stimulate discussion.

Mr. SPARKS (Pietersburg) stated that Mr. Swingler had emphasised the benefit to the consumer. The less they spent on their mains the more the consumer benefitted. It was a question whether lamps and heating apparatus could be made more satisfactory at 220 or 240. It was stated that 220 to 240 was only about 10 per cent. increase. If they would work it out they would find that there was a difference of 18 per cent. in the expenditure on mains. That meant a good deal in putting down a new plant and it should bear in their minds very strongly.

Mr. SWINGLER (Cape Town) stated he would like to know how Mr. Sparks arrived at his 18 per cent. It was only the extra cost of the weight in copper. He hoped they would not compromise on 230 just because there were two points of view among members of the association.

Mr. LAMBE (East London) stated that Mr. Jacobs had

remarked that he could never understand why the British Standards Committee had adopted one standard pressure for direct current and a different one for alternating current, and that he had never been able to get any good reasons for it. He (the speaker) thought that was because there was no real reason. It would appear that they were perhaps attaching too much importance to the manufacturer. He agreed most strongly that the consumer was the one to be mainly considered in the interests of the progress of electric supply. He agreed with Mr. Wolley Dod that the manufacturers would give what the consumers wanted. Mr. Swingler had made a strong point in mentioning America with a standard pressure of 110 where the sale of electricity was far beyond any other country in the world. It was because they had tackled the transmission and distribution question in a different manner to us that they had made that successful. In this country they had attempted to do too much transmission at low pressures instead of transmitting at high pressures and distributing at local points at a pressure best suited for use on the consumers premises.

The PRESIDENT stated that Mr. Lambe had put the matter concisely when he said that in distributing current required for heating purposes they must use more high pressure transmission and decrease the length of the distribution mains. In Durban they had no difficulty with 200 because they put in transformers wherever the load was and the feeders were 2,500 volts and the distribution was in small sections. That was the only way to deal with the requirements. Whether it was 220 or 240 it made no difference in practice but it was very important to the users of the utensils.

Mr. SANKEY (Johannesburg) stated that the chief argument put forward for the 220 appeared to be the very argument for the 240 namely: the benefit to the consumer. The greatest benefit that they could confer on consumers was to have a standard supply pressure throughout South Africa. He thought they would admit that if 240 was the pressure they would in the quickest, easiest and most economical way be able to bring all the undertakings into line. The whole point was the argument as to variation of pressure. It would appear to be no worse at 220 than 240 so that did not apply. The better the distribution the better the supply and the more benefit to the consumer. Incidentally the higher the pressure the cheaper the installation.

On Mr. JAGGER'S (Ladysmith) proposal being put to the meeting it was declared not carried, only one vote being recorded in its favour.

Mr. SANKEY'S (Johannesburg) amendment was then put to the meeting and declared lost, the voting being six in favour, fifteen against.

On Mr. SWINGLER'S (Cape Town) proposal being put to the meeting it was declared carried, the voting being sixteen in favour, six against.

The Secretary was instructed to communicate the decision to the S.A. Standards Committee, the Control Board, and the Electricity Supply Commission.

In the absence of Mr. Eastman the following paper was read by Mr. Wolley Dod (Pretoria).

NOTES ON THE COMMERCIAL DEVELOPMENT OF ELECTRICITY UNDERTAKINGS.

By H. A. EASTMAN, Engineering Assistant, Cape Town.

Any business established for the purpose of selling commodities of daily need to persons who cannot purchase from any other source has from its very commencement inherently every probability not to say certainty of being a successful enterprise. If by any chance the anticipated success does not materialise the fault does not lie in the business itself but in the method of conducting its operations.

This condition obtains in the case of every Municipality owned Electricity Supply Undertaking the customers being termed consumers, and the business the selling of a service which is indispensable in the light of modern circumstances.

Moreover the Electricity Supply business has the important advantage over other commercial enterprises that it is protected to a very great extent from serious loss during periods of trade depression by the great diversity not only of the applications of electric energy but also of the times of the day at which the consumption takes place.

Due to these conditions the supply of electricity in the course of the last 20 years has grown to such an extent that the industrial development of every country is dependent upon, and indeed may be judged by, the extent of the electric energy used and there is more than a modicum of truth in the statement that a Nation cannot advance more rapidly than its Electricity Undertakings.

As with other enterprises without serious competition, so also with Electricity Undertakings, natural expansion may take place spontaneously and without effort, but the proportion

of the actual to the possible amount of business will be far less than it might and should be. However satisfactory the results may be at any time in any one Undertaking, the possibility of increasing its scope is always present. Besides being unfair to the business itself, it is also detrimental to the interests of those corresponding to shareholders, viz: the Ratepayers, if constant activity in obtaining new business is not a definite part of its organisation.

The attitude taken up in certain instances by Undertakings towards investing money in commercial expansion as compared with increasing their engineering and plant investment as described in the Electrical World, October 1923, affords a striking example of incorrect perspective in the matter of increasing the business.

In order to find an outlet for 3,000 K.W. surplus plant capacity in a residential community of 50,000 persons it was proposed to connect up to a number of small towns in the neighbourhood at a cost of approximately £250,000. A commercial survey showed that little more than one half of the population so served would be likely to become consumers and that there was scarcely sufficient business in sight to pay only the capital charges on the transmission lines.

An alternative proposition was made that by spending £10,000 in fitting up modern offices and showrooms in a central portion of the town and by advertisement and propoganda assisted by canvassers, the load would be fully taken up within two years. The authorities, however, inclined towards spending the larger sum on something which was tangible even though it may not earn its salt. The idea of putting a comparatively small sum into new business equipment so as to earn a greater return on their existing investment was unattractive.

This is perhaps an extreme case, but is nevertheless an illustration of the distance to which the lack of faith will go in regard to the intensive cultivation of existing fields of development.

That considerable extensions in the use of electric energy are being made in South Africa is a matter of common knowledge, but the degree to which this service can and should be extended can only be understood fully by those actually engaged in the business. While to a great extent the growths of the mining and manufacturing industries and of the larger electricity supply undertakings are mutually interdependent, it would appear that the development of the lighting and

domestic loads throughout most of the Undertakings is allowed to be dependent principally upon the extent of building operations.

It can be assumed, however, that some steps are actually taken by all Municipalities to add to their number of consumers and to increase the consumptions by existing consumers, but apart from noting the tariffs quoted for certain services little information, if any, is available as to the methods adopted for popularising the use of electric energy. This lack of information as to the active steps taken to "push the business" in our undertakings is to a great extent due perhaps to the relative isolation of each from the other and to the few opportunities those in charge thereby have of comparing notes. It is hoped, therefore, that these notes which under the circumstances necessarily refer largely to the methods adopted in other countries and Capetown may, even if no new view points on the subject generally are introduced, serve as a basis for a discussion from which some benefit will result.

In attempting an analysis of the present position of the Electricial Industry in the Union as regards latest possibilities of expansion and the growth of the industry in its various activities within recent years, a very real need has been found for the regular publication of statistics from which the desired information may readily be obtained.

The advantage accruing by the collection of such statistics as will enable one to see at a glance how any individual undertaking compares in details of its development with others, and the industry as a whole with that in other countries is obvious and it is to be assumed that this will form one of the activities of the Electricity Supply Commission.

In compiling the figures in Tables Nos. 1 and 2, it has been assumed that the consumers comprise only the white population and supplies which are clearly disproportionate to the population, e.g. to the Mines have been excluded while energy used for traction purposes has been mentioned separately but excluded from the curves given in Figure 1:

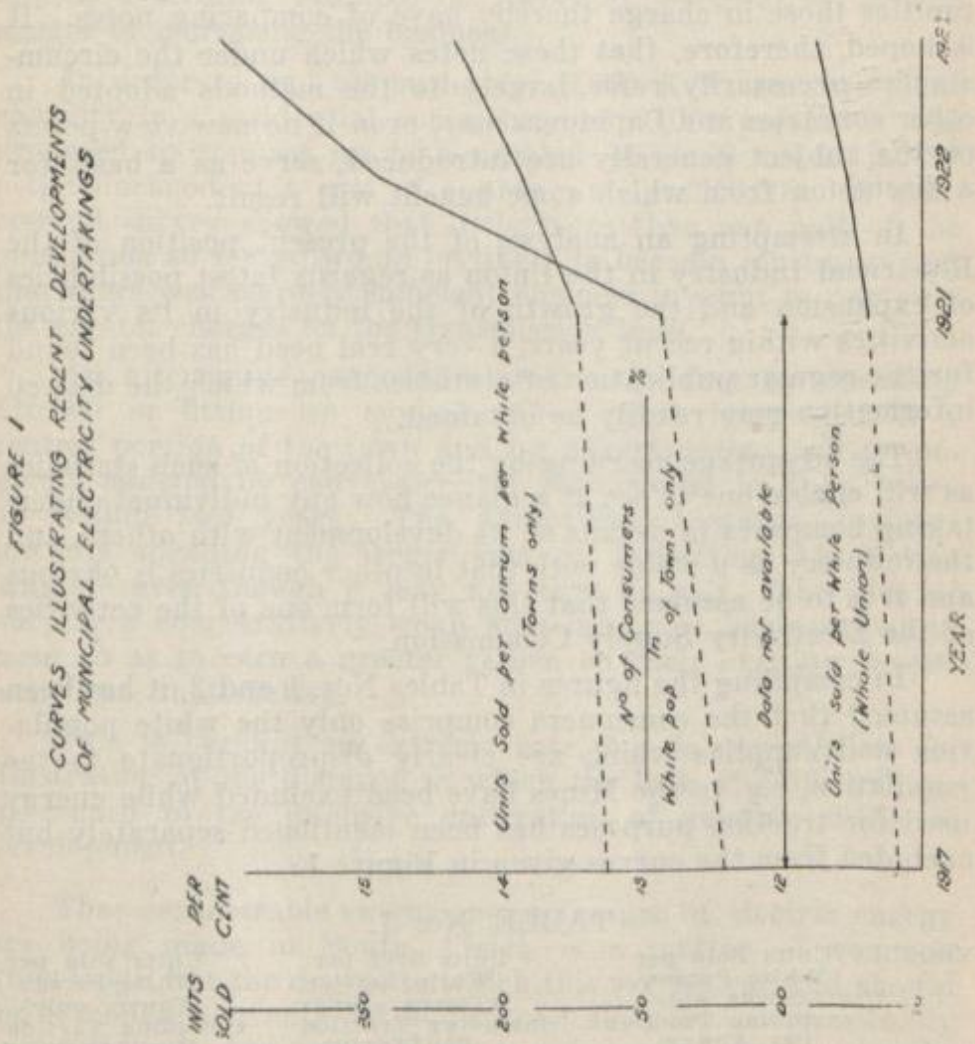
TABLE No. 1.

Year	Units Sold per White Person (Towns only) excluding Traction Per Annum.	Units Sold per White Person (Towns only) including Traction Per Annum	Units sold per White Person Towns only) excluding Taction Per Annum.
1917.	161.	204.	60.
1921.	175.	218.	71.
1922.	197.	243.	78.
1923.	220.	270.	89.

TABLE No. 2.

Year	Per Cent. No. of Consumers to White Population (Towns only)	Units Sold per Consumer, excluding Traction	Approx. per cent of Total Possible Consumers to Actual Consumers. (Towns only).
1917.	12.4	1,302.	60 per cent.
1921.	12.9	1,356.	61.5 „
1922.	14.9	1,356.	71 „
1923.	16.0	1,371.	76 „

The figures given above are based upon statistics published in the Official Municipal Year Book and in the Year Book of



the Union of South Africa, and although in the absence of complete data published directly on the subjects given, the deductions made may under the circumstances be accurate to

within, say 10 per cent. the error from year to year will remain practically constant. The figures referring to Towns only take into account those towns operating electricity undertakings for which complete data are available. It will be seen that the consumption per white person (towns only) has increased from 161 to 220 per annum, viz: 35 per cent., although during the same period the stated population has increased only by 20.6 per cent.

The actual number of consumers has increased correspondingly by 57 per cent. while the number of units sold per white person for the whole Union. excluding traction. during 1923 is 89 and including traction is 101. This corresponds very favourably with statistics recently published by the Electricity Commissioners (Great Britain) which show that the consumption per head of population was at the end of 1923 approximately 100 units per annum, excluding traction, and approximately 200 units per annum including traction and all other supplies. The corresponding figure to the latter for America is 800 units per annum.

South Africa is thus maintaining a good position as compared with an industrial country such as England, but for the same reason as makes it necessary there and in other countries to extend by intensive efforts the further employment of electric energy in domestic, industrial and agricultural uses. so also should active steps be taken still further to develop the electric supply industry in the Union.

The following Table No. 3 is of interest in showing what has been done in this direction already without apparent organised effort:

TABLE No. 3.

Use of Electrical Energy in Factories.

Census Year	No. of Establishments using: Motive Power.	Electric Energy.	Electrical H.P. Installed.	Per cent. No. using Electric Drive.	Per cent. Increase in Elec. H.P. installed.
1915-16.	2,619.	1,618.	50,493.	45.0	
1916-17.	2,970.	1,414.	58,291.	47.8.	13.4
1917-18.	3,286.	1,555.	64,249.	47.3	9.27
1918-19.	3,343.	1,632.	68.295.	49.0	5.78
1919-20.	3,802.	1,697.	75,654.	45.0	.73
1920.21.	3,935,	1,919.	78,650.	50.0	3.81

It will be seen from this that in five years the number of

establishments using motive power have increased by 50 per cent., the number using electric energy have increased only by 18.5 per cent. and that only roughly 50 per cent. of the factories in the Union are operated by electric energy. It is significant, however, in this connection that the total horse-power installed in the electrically operated factories has increased by 56 per cent. in the same period.

No records appear to exist of any survey having been made with a view to obtaining an approximate estimate of the total number of possible consumers. Surveys of this nature are a matter almost of routine in America and have recently been instituted in England in the course of development campaigns. The results if not strictly accurate at any rate serve a useful purpose in indicating the degree to which expansion might be expected and as an experiment, adopting the same principles as were applied recently in a typical territorial survey in a typical territorial survey in America, column No. 3 of Table No. 2 has been calculated. The figures have been arrived at by taking an average of 5 Europeans per dwelling (as stated in Census Statistics) and an estimated number of commercial establishments, shops, offices. etc. of 5 per 100 of the population in the Towns.

On this basis it appears as though taking into account only the town white populations now served that the proportion of actual to total possible number of consumers attained the satisfactory figure during 1923 of 76 per cent.

The successful development of any business, however, is not dependent principally on the number of customers but on the average revenue from all customers. Similarly unless at the same time as new consumers are connected up steps are taken by an Electricity Undertaking to educate all consumers in the use of the service rendered, the results obtained are more than likely to be disappointing.

In this connection, I would refer to that portion of a Paper on Multi-Part Tariffs read before the Institution of Electrical Engineers (Proc. Vol. 59 No. 303) in which it is stated "In many places (in England) a consumer who pays less than £5 per annum is a source of loss to the Undertaking."

A recent analysis of the consumptions by consumers in two typical residential districts (a) and (b) in the Capetown area of supply gave the following results:

Lighting Tariff only (6d. per unit.)

	Accounts with Consumption of 10 Units and under per month per cent. of Total Accounts.	Accounts with Consumption over 10 Units and under 20 units	Accounts with Consumption over 20 Units per month. per month.
(a)	24.3 per cent.	32.3 per cent.	43.3 per cent.
(b)	18.3 per cent.	34.5 per cent.	47.2 per cent.

	Domestic Rate Heating, etc., under minimum per cent. of Total.	**Domestic Combined Rate.** Lighting and Heating. Under minimum of 10/- per month per cent. of Total.
(b)	67.9 per cent.	7.3 per cent.

From this it will be seen that in the cases of the 24 per cent in (a) and 18 per cent of the consumers in (b), the iron losses in the transformers and distribution system which may be considered as allocated to their supplies are considerably greater than their consumption and when, in addition the capital charges on that portion of the equipment required to provide their supplies, together with the cost of the clerical work involved in rendering their accounts are taken into account, it is obvious that that at their present consumption they are an actual source of considerable loss to the undertaking.

All progress eventually must pass through commercial highways and unfortunately although the manufacturer has developed and supplied satisfactory appliances. the engineer has built generating stations, the efficiency of which cannot well be increased to a revolutionary extent by any methods at present known, the consumer finds the "going" somewhat rough. Apart from being to the advantage of the Undertaking, it is its duty to make his path smoother.

The average person is by nature conservative and although as a rule willing without question to consider the use of electric energy for, say lighting purposes, he is usually diffident about extending its use in his home or works for anything more than occasional use until once its advantages have been experienced. This attitude is due partly also to his entire ignorance of electrical matters generally which causes him to a great extent to treat with suspicion local electrical firms who approach him with a view to the sale of appliances or machinery when that which he has are satisfactory for his purposes.

In connection with industrial appliances, his views in regard to the supply authorities also are liable even nowadays to be somewhat similar for he argues that not only do they

make a profit in supplying the means for operating his business after his existing plant has been scrapped but they have also within their power and misfortune summarily to hinder his business by reason of faults causing cessation of the supply.

The fact that his operating costs will be reduced as a result of the electrification of his works and that his own prime movers are more liable to breakdown than the supply of electric energy are points which it is difficult to bring him to believe and as a general rule unless the Electricity Undertaking itself takes the lead in the matter, the probability is that he will remain for all time only as a potential consumer.

At first sight it may appear that the extension of the industrial load can be effected only when trade is good. While undoubtedly the consumption by established electrified industries is directly dependent upon the state of trade, the fact is liable to be lost sight of that a depression in trade is the very time when isolated plant operators are the more likely to give the fullest consideration to any possibility of reducing their working costs.

The prospective consumer then dare not in self defence against competition refuse to discard his existing plant in favour of electrification. The submission of estimates of his costs under electrification are, however, often a simple matter compared with that of convincing him that these are correct.

The author has in mind an interesting example of one method attaining this object in connection with a proposal to electrify a certain Works at the time operated by steam whose annual consumption was estimated at 1,500,000 units with an annual load factor of 65 per cent.

Estimates of Capital and running costs under electrification showed a considerable reduction on their present-day costs and moreover the adoption of electric drive provided space for further extensions in the existing buildings which was impossible by the retention of the steam plant, but despite all arguments no further headway could be made in the negotiations. Finally, however, at the suggestion of the Undertaking, independent Consulting Engineers were called in to report on the proposals on the understanding between the Company and the Supply Authority that in the event of the Consultants reporting in favour of electrification the Company would pay their fees and alternately, if their report were adverse to electrification, the fees would be paid by the Supply Authorities.

It is satisfactory to be able to record that the electrical equipment is already ordered and the estimated consumption

is now 2,000,000 units per annum through the purchase of larger plant.

No Electricity Undertaking can prosper unless it has the entire confidence of not only the consumers themselves, but also of the General Public for it is from them that additional consumers will be drawn.

Much has been written on this subject which, however, can all be condensed simply into the fundamental principals of courtesy and co-operation among fellow workers and between these and the Public, combined with good service at the lowest and fairest possible tariffs. Success is bound up in open-handled policies, in readiness and willingness immediately to remedy unfavourable conditions, in scrupulous fairness to all consumers and in constant appreciation of the consumers' points of view. It is of the utmost importance that this spirit of mutual service and desire to do everything possible to satisfy the actual and the prospective consumer should imbue every-one of the Undertaking's employees from the humblest to the Chief Officials. Only one failure in this respect among any of the employees may do an incalculable amount of harm.

The great majority of actual and prospective consumers instinctively look to the Undertaking's Officials for advice on every possible detail and it goes without saying that such advice will be freely given. The attitude is a natural one based on the fact that it is to the interest of the Supply Authority that the installations proposed are suitable for the consumer's purposes. In the larger Undertakings, however, this may mean that one or more members of the staff are required to devote a considerable portion of their time in acting more or less as Consulting Engineers. While action of this nature is quite defensible in the cases of consumers of small amounts of electric energy, it requires the exercise of a considerable amount of tact to avoid trespassing upon the legitimate preserves of the professional consultant in the cases of the larger consumers and still to obtain the prospective or additional load.

The possibilities of expansion of the Undertaking can be divided broadly into three distinct services, viz: Domestic, Industrial and Agricultural. Of these, as far as South Africa is concerned, the two first mentioned divisions are of the more immediate importance, but in certain districts no doubt in the course of time facilities will be given whereby a considerable agricultural load may also be obtained. This has been developed to a large extent recently in America, for instance, in

the use of electrically driven pumps run for irrigation purposes during "off peak" hours.

The domestic service requirements vary from place to place in only a slight degree, but the possibility of an Industrial Load will depend largely upon conditions inherent to its locality such as facilities for transport and for the operation of industries having regard to the type of community served and the products of the district.

For the development of these services it is, of course, essential that:—

1. The Undertaking's Generating Plant and Network is ready immediately to supply the maximum possible load likely to be demanded.

2. Eletric energy is supplied at such tariffs that it is to the advantage of the consumer to adopt the use of electricity to the exclusion of any other source of energy.

3. To all intents and purposes absolute continuity of supply is assured.

The vexed question of "tariffs" per se do not fall within the scope of this paper, but I would like in passing to refer to the importance of these being made as simple as possible. This point as a rule does not arise in the cases of the smaller consumers, but unfortunately in the case of large industrial supplies it seems to be almost impracticable to devise a tariff equitable in every respect to the Undertaking and to the Consumer which does not involve the use of technical terms which to the latter are frequently not only meaningless, but which he looks upon very much with suspicion.

In order to determine what possible adverse influences there may be working against the maintenance of cordial relations with consumers, no better means exists than to try to put onself in the position of the ordinary applicant for a supply.

Since perfection is impossible, disabilities will always be found in every Undertaking which although taken separately may be so trivial as scarcely to be noticed may in their sum actually be of importance.

Among those which appeal to consumers and which it is within the powers of the Undertaking to rectify are:—

(a) Laborious procedure required in obtaining a supply;

(b) Cost of obtaining service apart from installation costs;

(c) Difficulty of checking accounts;

while those only partly within the powers of the Undertaking are:—

(d) Cost of Installation;

(e) Cost of Apparatus and Equipment.

In coping with the additional administrative and technical work caused by the growth of the Undertaking and in order to cater for new conditions as they arise, rules and regulations to be complied with by actual and prospective consumers in regard to extending and obtaining supplies are added to which although desirable and satisfactory for the purposes of organisation and standardisation may constitute a real hindrance to the furthering of the business by reason of the complicated procedure required.

In short, the consumer having in mind the all important fact that the Undertaking wishes to supply electric energy to him, cannot understand why the matter should be hedged round by what to him is unnecessary "red tape." The simpler the procedure in vogue, the earlier he can obtain a supply and the better he is pleased.

It goes without saying that the cost of the service connections must be low. Nothing is more irksome to a prospective consumer who, having made all necessary arrangements with the contractor for the installational work is suddenly confronted with the fact that he will be required to pay an additional amount to the supply authority in order to be provided with a supply at all, and that this sum may involve wiring both inside and outside of his premises but of which the Undertaking may retain the ownership.

Particular attention has been paid to this point in Capetown and a scheme has now been evolved which it is thought overcomes all difficulties of the kind indicated and is submitted as a matter of interest.

Prior to the War, the whole of the first 100 feet of service connection between the installation and the supply mains was borne by the Council. This included, of course, the necessary wiring work inside the premises from the meter to the leading-in point and thence to the overhead supply mains. The increased cost of materials and labour brought about by the war made it necessary to make a charge for this work, the whole of which was paid by the consumer and which at the beginning of 1922 averaged £6 to £7 per connection. Later in 1922 new consumers were required to pay only one half the cost of the connection, but the Council's employees actually fixed the service and the material remained the property of the Council.

Now, however, the service wiring inside the premises is made part and parcel of the installation itself and is fixed by the Contractor for the work generally while the outside portion of the Service Connections up to a distance of 100 feet is fixed by the Council free of charge. Where the cost of the outside portion of the service exceeds 100 feet, the consumer is required to pay one half of the cost of the excess quantity.

Quite apart from the simplification of the procedure so introduced, it avoids inconvenience being caused to the Consumer through the employment on the premises of the Council's workmen in addition to those of the contractor at the same time, and more frequently after the contractor has completed his work. Moreover, since even in the cases of new premises, the plastering, etc., of the walls is frequently completed before notification of a supply being required is received, although the installation wiring is chased into the plaster, the service portion of the wiring when carried out by the Council was almost always necessarily run on the surface and formed a just cause for complaint.

In fairness to the consumers also it should be possible for everyone easily to check their consumptions and their accounts for energy supplied. The fact remains that a great deal of mistrust of the accounts rendered exists in the minds of consumers by the use of meters involving constants and the registration of which cannot be read without the possibility of confusion arising.

This disability is overcome by the improved cyclometer dial types of instruments, but clock dial types are still in use to a very great extent and as is well-known it is not unusual for meter readers themselves to misread a dial to the extent of one division which may represent anything from 1 to 1,000 or more units. Although the error would be discovered when next reading the meter in, say, a month's time, either the consumer or the Undertaking would suffer financially by reason of the error if this were not discovered before the account is sent out and if discovered later a reflection on either the competence or the good faith, or both, of the staff of the Undertaking is engendered in the Consumer's mind. As a rule he himself, however, is quite unable to tell what is the correct reading. It is of interest to note that one of the largest supply authorities in America using clock dial types of meters has considered the matter of so much importance as to print on the meter card itself instructions for reading the meters, thereby providing the consumer with information by which he can not only check the meter readers' work but also their own consumption costs from day to day.

Too great stress cannot be laid upon the necessity of consistent meter accuracy, for failure in this respect is of the greatest possible harm to the good relationship between the Undertaking and its consumers.

This matter has been made the subject of close attention in Capetown where meters registering high daily consumptions are examined at frequent intervals by a special staff for the purpose and tested as a matter of routine once every twelve months and those used on smaller consumptions once every three years. It is intended, however, to reduce these intervals as soon as the necessary arrangements can be made.

In addition an organised system of anticipating and dealing with complaints in regard to excessive consumption and of investigating immediately the cause of unusually low registrations has been introduced.

All meters, totalling approximately 18,500, are read in rotation once a month by five meter readers whose duty it is, as well as that of the clerical staff, to see that the deduction made from the previous reading is entered correctly on the meter card and the consumptions recorded are forwarded daily to the City Treasurer for the rendering of the accounts. The staff mentioned are also responsible for querying any reading which taking all known circumstances into account appears abnormal. In every case where anything unusual is suspected, what is known as a "complaint order" is made out requesting the Installation Department to examine, and if necessary, test the meter, and the City Treasurer is advised of the position so that he may delay sending out the account.

If the meter is found to be registering incorrectly to the extent of more than 3 per cent, the account is amended accordingly and the meter replaced by one of known accuracy.

The amount of work involved is shown by the fact that during 1923, 1,952 "complaint orders" were made out, of which 51 per cent were found to be justified. These were issued for such reasons as observed excessive consumption, erratic consumption, low consumption, meters stuck or reversing and the hundred and one troubles which arise in the ordinary course. Of the 414 complaint orders made out for excessive consumption, 90 per cent of these orginated from consumers but only 28 per cent of the total number were found to warrant adjustments to the meter readings.

Due to the natural tendency of human nature practically the whole of the "complaint orders" made out in respect of

abnormally low consumption, viz:—485, originated in the Department itself. Of these 37 per cent required adjustment to the readings.

Assuming then that the tariffs offered are sufficiently attractive, the problem arises as to what means are available whereby the number of profitable consumers and the consumption by the unprofitable ones can be increased.

As referred to previously, this question and the success of any campaign will be determined largely by the state of trade and under certain circumstances in the Industrial Services this may be independent of any direct action on the part of the supply authority.

As regards extensions in the Domestic Field as great a variety of methods are at hand as would be used by any progressive business and the use of either must necessarily be determined by the local conditions, but behind all effort of that description little headway will be made unless actual personal interest in the matter is taken by the staff in every proposal and enquiry.

Supplementing the personal element the usual methods would thus include:—

(a) Advertising;

(b) Propaganda;

(c) Canvassing;

(d) Showrooms and Exhibitions;

(e) Hire and Hire-Purchase Systems for electrical appliances.

(f) Facilities for reducing the initial installation costs.

The scale upon which operations would be carried out is limited only by the money and staff available, and, on the principal that anything worth doing is worth doing well, the cost will not be inconsiderable, but this will in any case, if the work is carried out properly, be amply repaid.

The most highly organised system of advertising and propaganda generally, undoubtedly is that used in America. In the United States, however, while 2,122 out of the 5,794 central stations (viz: 36.7 per cent.) now in operation are run by Municipalities, these produce only about 3 per cent of the central station energy consumed in the country. Thus practically the whole of the electric energy is supplied by Public Companies and these being constituted in the first place essen-

tially as business concerns consistently adopt the most approved business methods of extending their operations. Although these may not be applicable in every case to Municipal Service, the results obtained are truly remarkable and the methods used as described in the American Technical Press are worth careful consideration for modified application to Municipal Undertakings.

One cannot help coming to the conclusion that many businesses must have been built up and maintain their supremacy by the extent and quality of their advertisements. The more attractive (in a literal sense) the advertisement the more one is influenced to purchase the advertiser's wares in preference to another's of the same quality and price. How much more, therefore, is the success of advertising assured in connection with electricity supply when the price is less and convenience greater than can be obtained from any other service?

The most effective advertisements will be found to be "snappy," clear in its meaning and yet worded in such a manner as to cause the reader to want to know more about the subject.

Lengthy advertisements are liable to defeat their own object in that the average person cannot or will not spend the time necessary to find its purport. Lengthy descriptive matter is better dealt with in the form of pamphlets, circular letters "inspired" Press Articles, etc.

The Advertisements issued by the Electrical Development Association, England(some of which are laid upon the table for information) are excellent examples of the type referred to.

In contradistinction to newspaper advertising as indicated the "direct by-mail" method may be used for describing in plain and popular style the various uses for electric energy in house and factory. Under this heading are included circular letters (written as far as possible in the personal strain) folders, pamphlets, etc., on the subject likely to be of particular interest in each case posted direct to a member of a firm or family whose name appears on a "mailing-list" kept specially for the purpose.

Typical pamphlets of the type mentioned issued by the Electrical Development Association are also submitted as illustrations of the pleasing and effective style which can be obtained even in matters technical.

Besides these, however, pamphlets explaining subjects not readily understood, for example, the method of going about obtaining a supply or extending an existing installation,

approximate costs of service and installations, what can be done by one unit, how to read the meter and check the accounts and the hundred and one other matters which are so easily taken for granted by the technical man, but are quite incomprehensive to the lay mind, cannot fail more firmly to establish the good will of the public even if additional business does not accrue immediately thereby.

The advertising campaign in progress in Capetown includes display advertisements in the local papers and bioscopes the use of "stickers" attached to consumers' accounts, letters, etc., illustrating the use of electric energy in directions likely to be of special interest to the addressee and in circulating information on special applications of electrical power to persons and firms known at the time to be using other sources of energy—principally coal.

In addition, with a view to interesting consumers in the Electricity Undertaking as a whole, a lecture illustrated by lantern slides was given to a meeting of ratepayers and printed "in extenso" in the Press, the results of which in the publicity accomplished far exceeded expectations.

No difficulty is experienced in Capetown, and it is unlikely that any should be found in other places, in obtaining the assistance of the Press in the publication occasionally of matters descriptive of the Undertaking generally.

Indeed, one of the preliminary steps in any publicity campaign should be to interest the public in the subject generally by suitable descriptive articles appearing at intervals in the public press. In the case of electricity supplies the subject of the articles should be the present position of the Undertaking and the willingness and ability to supply electric energy to all and sundry to the utmost limit for existing local conditions.

The journalistic licence of the editorial staff of the lay press is frequently the cause of grossly exaggerated statements which fortunately, however, as a general rule, does more good than harm in attaining the object required.

In Capetown propaganda of this nature has been followed by the publication of signed articles describing in popular language the most economical method of use of various electrical appliances in the home, e.g. ovens, toasters, thermal storage systems, etc., and showing the method of computing the consumption per hour and costs of running based on the alternative tariffs in vogue. Immediately following upon publication of these articles a distinct increase in the number of enquiries

have been received in connection with domestic appliances and it is only natural to assume that the one was caused to a great extent by the other.

Opinions differ considerably in regard to the permanent employment of a canvasser, the principal objections being usually the difficulty of obtaining the right type of man.

This method of obtaining new business has been brought to a fine art in America and is a regular part of some of the supply Undertakings' activities. In some cases commissions are granted to each employee directly obtaining a consumer and in others this is paid only to meter readers whose duties comprise canvassing also.

This arrangement is rendered the more practicable where besides holding powers to carry out Wiring Work, the supply undertaking actually exercises them. For obvious reasons Municipal Authorities, however, do not carry out such work except under special circumstances and it appears that the desired result may be accomplished more satisfactorily to all concerned through the Council making it worth the while of the Contractors themselves to act as canvassers by the inauguration of special financial facilities both for Contractors and Consumers in connection with wiring installation costs.

In Capetown a canvasser was actually employeed in the Electricity Department but the post became vacant shortly after the introduction of the Free Wiring scheme referred to later, and no immediate necessity has since been felt for its re-establishment.

As stated previously, the Public invariably look to the Supply Undertaking for the lead in the use of electrical appliances and a real need is felt in a large number of Undertakings for facilities for actually demonstrating the use of and varieties of apparatus obtainable. Unless some means are at hand of doing this the enquirer must necessarily be referred to one or more dealers concerning whose stock one has only a very rough idea and the prospective consumer's intention of obtaining impartial assistance by the Undertaking is frustrated. The possibly moreover exists that he is induced to purchase an article which is not as satisfactory for his purpose as he might have obtained elsewhere and he is ultimately added to the list of disgruntled consumers.

The most obvious method of catering for this need is the establishment of an up-to-date showroom in which are

effectively displayed and convincingly demonstrated typical varieties of appliances in daily use. Such showrooms indeed form part of the organisation of most of the larger and many of the smaller Municipal Undertakings in Great Britain.

Descriptions of typical showrooms are frequently given in the technical press from which it will be seen that they are invariably operated on the lines of the most modern type of sales organisations and equally invariably with success financially to the Undertaking generally.

Opposition to the establishment of showrooms is frequently shown by local electrical wiring contractors, their chief argument being that the ratepayers' money is being used to allow the Municipality to compete against them.

All too frequently the opposition comes from Contractors who not only have poorly equipped showrooms themselves, if any, but who also cannot possibly obtain the same selection of equipment as the Corporation, and moreover "wait for" rather than "go for" the business for which the Undertaking's showroom is established. Successful opposition by such persons applies permanently a brake on the development of the Undertaking the effects of which are felt adversely by all consumers present and future

The only methods of combating this opposition are, of course, by tact, common sense and willingness of mutual co-operation between the Supply Authority and the Contractors and it appears from records available that benefits are derived by both parties in every instance as compared with the preliminary fear that the Contractors will lose the trade they had.

As compared with statutory powers enjoyed by Municipalities in the Union to sell, hire, etc., apparatus, carry out wiring work, etc., many Municipalities in England for example are restricted in their operations merely to supplying a serivce of electric energy.

Nevertheless ways and means have been found by some Municipalities even with such restrictions as the entire prohibition of the sale of any appliances or materials to operate showrooms at a profit.

A most interesting description of overcoming the difficulty, mentioned is described in the Proceedings of the I.M.E.A., 1923 Convention, referring to the operation of a Showroom and Sales Department in Burton-on-Trent. In this Town with a population of 50,000 and annual consumption (1922) for all

purposes excluding Traction of 7,500,000 units, the showroom was established upon the following principal points of agreement with the Local Electrical Wiring Contractors:—

(a) All goods sold at the Showroom must go through an approved contractor who is responsible for invoicing and collecting all monies;

(b) The client is asked which of the contractors (approved list displayed in the Showroom) it is desired the account should be rendered by;

(c) No preference is to be given to any one contractor when effecting a sale;

(d) Gross profit on all sales to be equally divided between the Corporation and the Contractor who is selected to invoice the goods.

The equal sharing of the profit with a firm having no knowledge of the transaction appears at first sight to be unfair, but the contractors themselves bring their clients to the showrooms to select fittings and appliances and the arrangement works both ways.

The nett profit to the Corporation for the showroom with sales totalling £2,400 was actually £441 for 1920.

It should be borne in mind, however, that the first consideration of the showroom is to provide service to the public and profit on sales should be a secondary consideration. The Undertaking will in any case benefit by the increased demand to an extent far outweighing the greatest loss (on paper) with properly run showrooms.

In Halifax where the Municipality has similar powers to those in the Union of South Africa, when an article is sold to a Contractor he is charged at the list price less 15 per cent. and when sold to a consumer who names his Contractor the 15 per cent discount also holds good. If an article is sold to a consumer who has no Contractor it is sold at list price and the whole of the discount is retained by the Corporation.

The Showroom besides being used simply for the use of appliances is often made the venue of public lectures, demonstrations and exhibitions where the architectural features admit.

Particularly in the domestic field the lectures and demonstrations imply as a general rule the employment specially for the occasion of a specialist in the particular use forming the subject of the lecture.

While fully realising the different conditions obtaining

in different countries the latent possibilities of demonstrations of this nature are indicated by the fact that recently in the course of a week's lectures in Boston, U.S.A. on kitchen devices, having special reference to cooking, the attendance at six afternoon and evening sessions and one extra morning session was approximately 10,000 persons.

The average householder especially in the larger towns recognises and appreciates the application of the slogan "do it electrically," indeed, possibly his daily routine has been lightened somewhat in this direction and the extensive use of electric energy—by other people—is a usual topic of conversation with him.

As far as he himself is concerned, the initial cost and the maintenance costs (in domestic use) make his extensive adoption of the use of electric energy out of the question.

Evidently every progressive undertaking must include in its development plan, methods of overcoming these final difficulties and as a rule, the adoption of hire or hire-purchase or deferred payment arrangements in connection with installations themselves, appliances, motors, etc. is the simplest and most obvious solution.

In Capetown, the installational costs difficulty has been overcome to a large extent by the introduction of what is known as the "Assisted" and "Free Wiring" Schemes. Hire and Hire-Purchase arrangements in regard to Motors are also in use, but these do not apply to domestic appliances at the present time, previous experience in the inclusion of these under the same system as motors having proved unfortunate due to excessive maintenance costs.

Under the "Free Wiring" Scheme, the Council employs an approved Electrical Wiring Contractor to carry out the installation wiring, including the internal service connections, but excluding the Meter and Service Cut-outs at a schedule price per point, and obtains repayment of the amount of the contract from the consumer by instalments over twelve successive months.

Only those Contractors who are clearly well established in business as such are included on the approved list for this work. The arrangement is such that if a contractor secures an application for an installation under the Free Wiring scheme, the contract for the work is given to him, but if a prospective consumer applying direct does not specify any particular contractor, the work is given out in order of rotation on the list. 90 per cent of the Contract Price is paid upon com-

pletion of the work and the remainder 12 months thereafter. The Contractor is required to maintain the works during this period.

To ensure payment of the costs incurred by the Council, an agreement is entered into between the Council and the Consumer, the fulfilment of the consumer's obligations under which is required to be guaranteed by the landlord of the premises.

The following shows the price paid per point installed and the repayment price per month for twelve months payable by the occupier:—

No. of Points	Price per Point Installed.	Repayment Price per months for 12 months.
3.	£1 18 0	3/9d.
4.	1 18 0	3/9d.
5.	1 17 0	3/8d.
6.	1 16 0	3/7d.
7.	1 15 0	3/6d.
8.	1 14 0	3/5d.
9.	1 13 0	3/4d.
10 and over	1 12 0	3/3d.

The installational work is carried out under a specification issued by the Council and the total contract price at the price per point stated is increased by a fixed charge of £3 to cover the cost of the internal service connections irrespective of the number of points installed.

NUMBER OF NEW CONNECTIONS PER MONTH.

The repayment price in each case covers the consumption of electric energy at the Flat Rate for Lighting so that, for instance, in the case of a seven point installation with a repayment price per month of 24/6, provided that the consumption does not exceed 49 units per month (6d. per unit for lighting), no charge is made for the energy consumed. If the consumption exceeds 49 units in this case and is say 69 units, his monthly bill will amount to 34/6 and his wiring installation is installed literally Free of Cost to him.

The specification for the work refers to closed seam simplex conduit run on the surface and covers plain pendants only, but one wall plug is allowed for every five other lighting outlets.

Consumers are allowed to instal in their premises points at their own cost in addition to those included under the Free Wiring Scheme, and an additional charge of 1/- per month is made in respect of each point so installed.

The popularity of this arrangement is clearly shown in the accompanying curve relating to the total number of con-

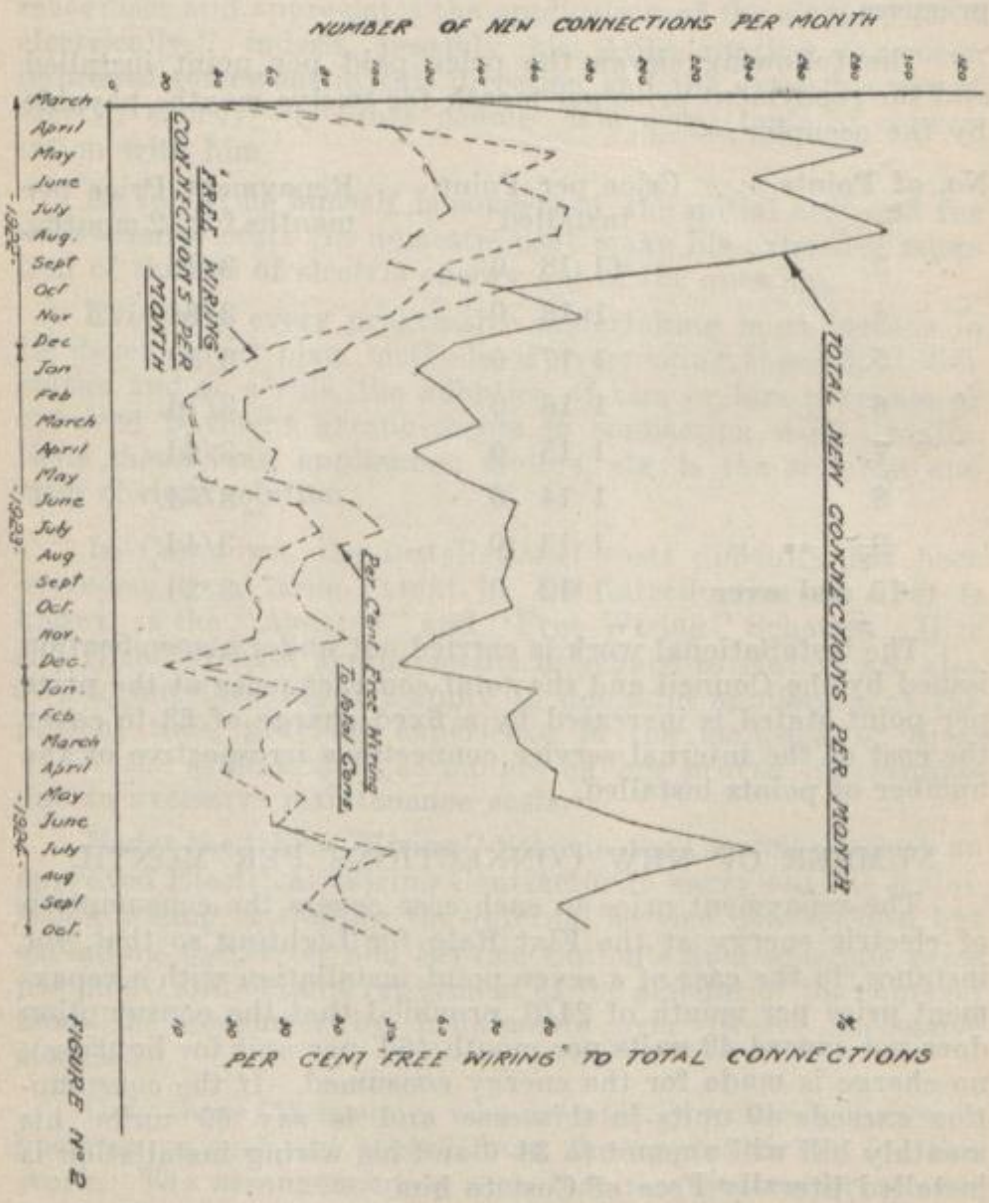


FIGURE No 2

sumers connected per month. It will be seen from this that the "Free Wiring" consumers form on the average 44 per cent. of the total and that this figure has even attained 75 per cent. The rise in the curve from May, 1924, is explained by the

reduction in the charges to those given above from the flat rates of 40/- per point installed plus one half the cost of service connections and a repayment price of 4/6 per point installed.

What is known as the "Assisted" Wiring Scheme has been introduced in order to afford intending consumers requiring more elaborate installations than those covered by the specifications for "Free Wiring" (including also the wiring for motor installations) facilities for the repayment of the Contract Price by instalments and the benefit of the Council's supervision of the installation work while in progress.

Under this system a specification is drawn up by the Council in accordance with the consumer's requirements and tenders for the work are called for by the City Electrical Engineer.

The applicant is entitled to accept the lowest or any tender and can arrange for the repayment of the total cost plus 10 per cent. for Interest, Supervision, Maintenance, etc., in twelve monthly instalments.

If, however, the consumer does not desire to take advantage of the instalment system of repayment, he may settle the account upon completion of the work, in which case the Council makes a charge of 5 per cent on the contract price to cover the cost of preparing the specification and supervising the work.

Under the Hire-Purchase schemes for motors, the prospective Consumer can nominate from whom and at which price he desires to purchase a motor, and, provided the price is considered reasonable and the motor is suitable for the use intended, the Council will purchase the equipment out of hand and recover the amount from the consumer by instalments spread over 30, 40 or 60 monthly payments at the rate of 10d. 8d. and 6d. per £. invested respectively. These charges include Fire Insurance and all maintenance other than brushes, etc., or damage occurring through misuse.

In addition, motors are hired out at a rate per horsepower per week varying from 2/- for very small motors to 15/- for a 40 B.H.P. machine, but as a general rule the hire-purchase system is the more popular.

DISCUSSION.

Mr. WOLLEY DOD (Pretoria) stated that he had tried cyclometer dials in meters and was very dissatisfied with them. He had found no difficulty with the clock dials, and at each

reading a slip was left with a copy of the meter dial showing what the reading was.

Mr.SWINGLER (CapeTown) stated that he had also experienced trouble with cyclometer dials and preferred clock dials but that certain makes were found to give no trouble, for instance those fitted to Siemens-Schuckert meters.

The PRESIDENT concurred with what the previous speakers had said regarding the difficulty with cylometer dials.

Mr. SANKEY (Johannesburg) said he would be interested to know what the average cost was for connections including the meter and what proportion if any the consumer paid. In Johannesburg they were connecting at the rate of roughly 2,000 a year and they had to charge the whole cost to the consumer except for the meter. Where the length of service exceeds 100 feet they required the consumer to put in a small meter chamber in which the meter, etc., were fixed. He would also like to know what was done in connection with high tension connections.

Mr. SWINGLER (Cape Town stated that that portion of the overhead servire connertion between the supply mains and those outside of the premises at the leading-in point was carried out by the Council and the whole of the service connections from the leading-in point, with the exception of the meter and Council's cutouts, was a portion of the installation proper and was carried out by the electrical contractor to a special specification as part of his contract for the installation wiring generally. Also, in the case of overhead service connections, where the distance from the supply mains to the point from which the service conductors are led to the inside of the premises was 100 ft. or less, the Council supplied and fixed the outside portion of the service, together with the meters and service cutouts, free of charge.

The actual cost to the Council for the usual 2-wire service connection up to 100 ft. from the supply mains was about £3. The corresponding cost to the consumer for the service connection from the leading-in point to the meter was also on the average about £3, so that the whole cost of the connection from the supply mains to the meter board was borne roughly equally between the Council and the consumer.

In those installations where the distance referred to exceeds 100 ft. the cost of the outside portion of the overhead service connection in excess of 100 ft. was ahead equally between the consumer and the Council. Where the service connections consisted of cables laid underground, the whole

of the work was carried out, both outside and inside the premises, by the Council and one half of the whole cost of the work was borne by the consumer.

Mr. BLATCHFORD (Greytown) asked what was done in the event of a meter reading 3 per cent slow; did the Department charge the consumer for the work in testing and adjusting.

Mr. SWINGLER (Cape Town- stated that they did not make any charge for the first test of the meter which was made on the consumer's premises. If, however, the consumer wanted further evidence as to the accuracy of the meter, he was required to deposit the sum of £1-1-0 and the meter was tested by the Cape Town University Authorities, and the deposit refunded if the meter was found more than 3 per cent. fast. Their policy (and their duty) was to serve the consumers and not irritate them unduly. They treated their consumers as customers.

The PRESIDENT stated that he thought something should be done in regard to making the service connections more simple. He had noticed in American Journals advertisements of apparatus that were put together in a more workmanlike manner than the present system of slinging the meter, main switch and fuses all on a board with connecting wires in between which could be got at. He did not see why they should not have some combined form of connection without any connecting wires between.

Mr. Councillor MILLAR (Pretoria) asked if something could not be done to provide some form of indicator when the fuses blew out. Another point was that the present arrangement of meter, switch and fuses, etc., was most unsightly and something should be done to hide them more from sight.

The PRESIDENT agreed with Mr. Millar as to the unsightliness of the meter boards, and stated that in Durban they no longer placed the meters inside the buildings where verandahs were available. He thought a little more thought should be given when building to the housing of the meter equipment.

Mr. Councillor BARRETT (Bloemfontein) stated he thought the Corporations should insist upon proper provision being made for the meter equipment in all new buildings so as to do away with the unsightliness.

Mr. SWINGLER (Cape Town- stated that they insisted upon proper provision being made for the metering equipment in Cape Town in blocks and offices and large buildings, and

he did not see why proper provision should not be made in all buildings in this respect.

On the suggestion of the President Mr. Swingler undertook to go into the matter and endeavour to bring forward some scheme before the next Convention.

Dr. HAMLIN (Stellenbosch) referred to the system of free wiring in use at Stellenbosch, also to the establishment of municipal showrooms in the smaller municipalities on a profit sharing basis.

Mr. SPARKS (Pietersburg) asked what method was adopted for extensions in the smaller towns, whether the consumer had to pay for them or guarantee a certain consumption per annum.

Mr. SWINGLER (Cape Town) stated that in Cape Town the mains were extended in order to give the consumer a supply without calling upon him to meet the cost of the extension, provided that the consumer guaranteed a gross revenue of 33-1/3 per cent of the cost involved for five years. This, however, did not refer to the cost of the service connection from the nearest supply point to which the mains may be extended, the treatment of which he had referred to earlier in the discussion.

The consumer had, of course, the right to pay the cost of the mains in a lump sum if he so desired and under that arrangement the guarantee of revenue referred to was not required. As other consumers were supplied from the same extension of the mains, the first consumer's liabilities were reduced pro rata.

Mr. Councillor GOBLE (Bethlehem) asked if it was customary in most municipalities to charge rentals on meters.

Mr. SWINGLER (Cape Town) stated that he was totally opposed to charging rental on meters. A meter was a measuring device and they had no right to charge rental on it.

The PRESIDENT stated that in Durban they had given up charging rents many years ago.

Mr. LAMBE (East London) stated that what had retarded the use of electricity was the mulitiplicity of charges and conditions which an applicant had to face. He thought it should be possible to consolidate them and merge them into the price of units.

Mr. SANKEY (Johannesburg) stated he would like to have the opinion of members on the question of minimum charges. It was a vexed question with many undertakings.

There was quite a large number of consumers in various parts who use only about 2/6 worth of electricity per month. Unless there was a minimum charge these people were a drag on the undertaking.

Mr. SWINGLER (Cape Town) stated that the point had been dealt with by Mr. Eastman in his paper by referring to the view held by engineers in Great Britain. He (the speaker) felt convinced that most consumers who did not contribute at least £5 a year to the undertaking were a loss. It was wrong to have energy "on tap" ready to serve the consumer year in and year out without his having to pay his fair share to the standing or establishment charges. Every consumer should pay a fair "ready to serve charge" in the shape of a minimum charge.

Mr. BLATCHFORD (Greytown) agreed that it would be fatal for the smaller powe stations if they did not have a minimum charge. At his station the minimum charge was 5/-.

Dr. HAMLIN (Stellenbosch) was also in favour of a minimum charge stating that he thought 5/- was little enough.

The PRESIDENT referred to the steady increase in the use of electricity for domestic cooking in Durban. He felt sure that in the near future electricity would be used as universally as gas.

On the motion of Mr. Councillor HOPPER (Cape Town) seconded by Mr. Councillor BARRETT (Bloemfontein) the following resolution was carried unanimously:—

> "That the attention of the various Municipal Councils owning Electricity Undertakings be directed to the advisability of calling the attention of the Architects Associations in their district to the necessity of embodying in their specifications the provision of suitable and adequate accommodation in all buildings for the installing of the Electricity Supply Authorities' service equipment."

The Conference then adjourned to the next day.

Civic Luncheon.

The party were then entertained to luncheon by His Worship the Mayor, after which they were present at the official opening of the Electrical and Wireless Exhibition at the Town Hall by His Worship the Mayor. Through the

courtesy of the S.A. Railways and Harbours Administration an Electric locomotive was on view during the afternoon.

In the evening the party attended a meeting held in the Council Chamber by the Natal Institute of Engineers when Mr. M. Dawson of the Municipal Power Station, read a paper on "Power Station Economy."

FRIDAY, DECEMBER 12th, 1924.

The Conference resumed its proceedings at 9-30 a.m., the President (Mr. John Roberts) being in the chair and there were present:—

MEMBERS—

B. Sankey, J. Mordy Lambe, T. P. Ashley, A. S. Munro, T. Sutcliffe, L. B. Sparks, L. Ralston, T. Jagger, E. J. Hamlin, R. D. Coulthard, B. H. Sargent, T. Millar, T. C. Wolley Dod, G. H. Swingler, R. Macauley, F. C. D. Mann, L. F. Bickell, R. A. Stoker, W. H. Blatchford, J. T. Smith, E. Poole.

ASSOCIATE MEMBERS—

J. H. Dobson (Johannesburg).

DELEGATES—

Councillors G. W. Prior, H. M. Doull, D. Shearer, E. Hopper, W. Millar, J. D. Low, W. H. Barrett, J. Scott, T. C. Shearer, A. Eaton (Durban).

VISITORS—

T. D. Clothier, W. D. McAlister.

GENERAL BUSINESS.

Banking Account.

On the proposal of Mr. BICKELL (Port Elizabeth) seconded by Mr. MACAULAY (Bloemfontein) it was agreed that the Banking Account be transferred from Cape Town to Durban and that the Hon. Secretary and Treasurer (Mr. E. Poole) and any member of the Council be authorised to sign cheques and operate on the account.

Thanks and Appreciation.

It was unanimously resolved that the Hon. Secretary and Treasurer should write and thank the following for their courtesy to the Association—

The Mayor and Town Council of Durban, for use of Council Chamber, etc

South African Railway Administration, for arranging for an inspection of one of the Electric Locomotives.

Port Captain, for use of tug and inspection of Harbour Works.

Mr. W. R. Grabtree (Resident Engineer) for inspection of Graving Dock.

Mr. W. H. Milne (Divisional Electrician, S.A.R.) for inspection of coaling appliances.

Mr. John Roberts (Borough Electrical Engineer) and Staff for inspection of Power Station and Sub-Stations, etc.

Mr. H. N. Thomas, for special Tramway facilities.

Mr. E. C. Chubb (Curator of Museum) for use of optical lantern.

Natal Institute of Engineers, for invitation to meeting and concert.

Durban Male Voice Party for invitation to "At Home."

Queens Park Amateur Swiming Club for invitation to Swimming Gala.

Mr. J. L. Malcolm (Manager, Sir J. L. Hulett & Son, Ltd.) for inspection of S.C. Refinery.

Messrs. Vincent and Pullar, British General Elec. Co., Metropolitan Vickers, Hubert Davies & Co., Collingwood & Beckwith, T. Barlow & Co., T. C. Shearer, Town Clerk (Durban), F. T. Bradley, J. H. Gyles, J. H. Woods, C. W. Brokensha, for use of motor cars on visits of inspection.

On the proposal of Mr. LAMBE (East London) seconded by Mr. SWINGLER (Cape Town) a hearty vote of thanks was passed to the Municipalities who had contributed funds for the Convention.

Mr. McALISTER (Town Clerk, Kokstad) put in a lettre of appreciation from his Municipality.

Mr. Councillor BARRETT (Bloemfontein) on behalf of his Municipality expressed appreciation for the opportunity of attending the Convention.

Mr. Councillor PRIOR (East London) and Mr. Councillor HOPPER (Cape Town) also expressed appreciative remarks in connection with their attendance at the Convention.

Broadcasting.

Mr. MILLER (Harrismith) mentioned the subject of Wireless and stated that as they were well aware there were numbers of people at distances from the various Broadcasting centres who were unable to afford expensive valve sets. He thought it should be possible for the Broadcasting Authorities at the three centres to make arrangements with the various towns in their areas so as to have relay stations established which would enable people to have their Crystal sets.

The PRESIDENT stated that although no actual move had yet been made in the direction indicated such a scheme had been in his mind since the inception of the Durban Station and he thought it would be a natural extension of that station to put down Relay Stations. He hoped that in the near future the Durban Town Council would be in a position to consider the matter and give further information on the subject, and at the same time he recommended the matter to the attention of the engineers connected with the smaller municipalities.

Status of Councillor Delegates.

The PRESIDENT stated that there had been a feeling that it would be of advantage to the association if Councillors were attached to it in some closer manner than the present arrangement whereby they attended only as delegates. The constitution of the English parent body to which the Association was attached admitted of some such closer membership and the suggestion had been made that further information be obtained on the subject.

On the proposal of Mr. JAGGER (Ladysmith) seconded by Mr. MILLER (Harrismith) it was agreed that the Hon. Secretary should make all necessary inquiries and that the Council should draft a proposition or scheme for the amendment of the constitution and that such proposition should be circularised amng the members at least one month before the commencement of the next Convention, and be discussed at that Convention.

The following paper was then read:—

"NOTES ON THE GUIDING POLICY OF THE MUNICIPAL ELECTRICAL DEPARTMENT."

By F. C. D. Mann, Borough Electrical Engineer, Worcester, C.P.

When first entrusted with the management of a Municipal Electrical Department the writer soon discovered that it was highly important to determine broad principles on which the

relations between the Department and Consumers could be based, and in the hope that some of the aspects of the problems as they appeared when seeking these principles may be of interest, and even of value, to other small undertakings, these notes are submitted.

From a previous slight experience of Electricity supply, the impression had been gained, from the Consumers point of view that the general attitude of the Authority was of the "take it or leave it" type and with a strong mixture of the "what you don't know, find out, but don't bother us" order. It would appear from articles in the Technical Press recently that this attitude has been carried on, with a few brilliant exceptions, until the present day but that at last its correctness and commercial value is being questioned.

The following are among the more important questions which arise and require a clear understanding before any solution of the problem can be attempted:

(1) Who are the Consumers and what is the Electricity Department?

(2) What does it, or should it, supply, and how does this supply compare with other Municipal supplies?

(3) What are the technical and commercial aspects of of the case?

Considering these questions in order—Who are the Consumers and what is the Electricity Department? Many persons appear to hold the view that Municipal Councils are composed of members endowed with authority "by law," with no interest or sympathy for the individual or town, and over whose actions the ratepayer has no control, often losing sight of the fact that each member is freely elected by the people from among themselves and that the prime object of electing such representatives is that the few may, in the name of the whole community, carry on such works and provide such necessities as cannot be provided by the individual for himself. While individuals may be able to provide some or all of the essential services for themselves in some form, yet experience indicates that a Municipal service for the whole community offers the greatest good for the greatest number.

The members of a Municipal Council therefore are elected with the main object of providing for the individual better services than he can supply for himself—that is, the interests of the ordinary citizen should have consideration before the organisation through which the services are supplied; it fre-

quently appears that the ratepayers have to put up with indifferent services through the apathy or inefficiency of the Department or Committee concerned. The Electricity Department should comprise a Committee and Staff whose one chief aim should be the comfort, convenience and interests of the individual and community to the utmost limit of possibility of the service. Secondly—What does, or should, the Electrical Department supply and how does this supply differ from other Municipal supplies? Taking the latter part of the question first, the general municipal services are Water, Roads, Sanitation and others depending on the size of the community. These services are similar in that the individual knows and understands the full limit of service to be expected and obtained from the several services; thus, when an ample and pure supply of water has been provided, everyone knows all there is to know about its use, but with the Electricity supply this is not so, and it is only the trained and experienced man who can fully realise the possibilities of the service. The obvious results of an electricity supply are manifest in lighting for the home and streets and power for the workshops and here the matter has been left in many cases. While the Electricity Committee are content to supply light and power only, it must be admitted that the utmost advantage to be derived from the supply is not being offered to the people; they are therefore failing in their duty.

Electricity, and the service it can render is, generally speaking, new and unknown; the housewife has no experience to draw upon, the average man is equally ignorant and the Press are silent, but from the moment an electricity supply is started there is service for all, in Home, Office, Workshop and Store, waiting to be called upon. Service: that is what the Electricity undertaking should really supply, in the fullest sense of the word. It is the obvious duty of the Electrical Committee to have on its staff at least one trained engineer who is conversant with all phases of electricity supply and usage and able to keep up with the latest developments of Electricity in service. The next step is to show the public what can be done for them if they care to avail themselves of the opportunity; this means that the undertaking must make provision for the information of, demonstration to, and assistance of the public, as well as the supply and maintenance of appliances, in every possible way. This is work which cannot be left to others and although it raises the vexed question of municipal trading, yet from its nature it is essentially part of the whole business of electrical supply, just as the marketting of its products is the legitimate business of any factory,

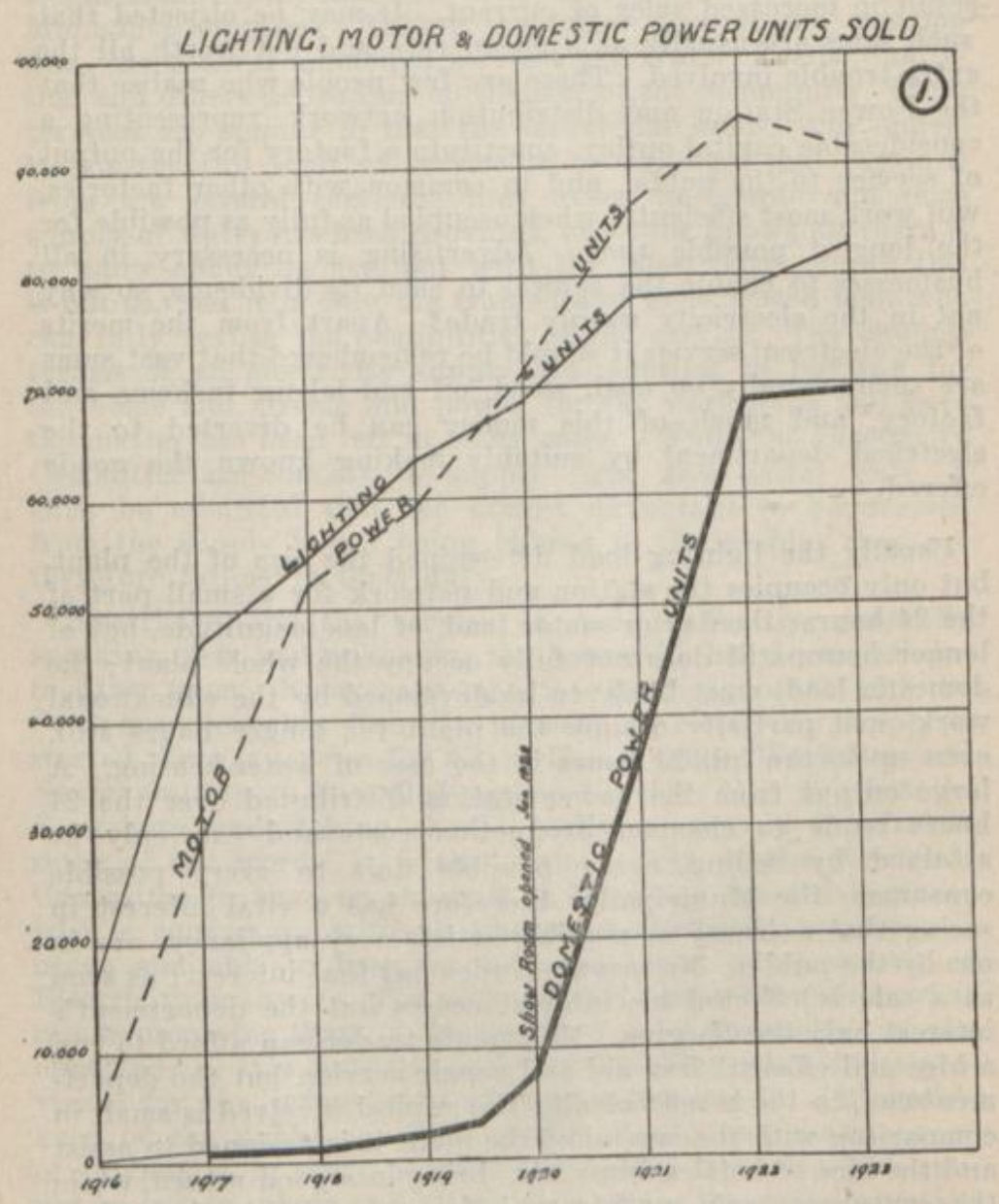
only in this case both the articles and its methods of use have to be made known. The whole community is concerned and from the baby to the oldest inhabitant, all are possible consumers. Turning now to the commercial side of the question —What is to be gained by endeavouring to educate the public while others in the past have done well enough by leaving them severely alone? Experience shows that such efforts result in increased sales of current. It may be objected that such sales are usually at a cheap rate and not worth all the extra trouble involved. There are few people who realise that the Power Station and distribution network, representing a considerable capital outlay, constitute a factory for the output of service to the public, and in common with other factories, will work most efficiently when occupied as fully as possible for the longest possible time. Advertising is necessary in all businesses to enable the capital to earn its dividends, so why not in the electricity supply trade? Apart from the merits of the electrical service it should be remembered that vast sums are spent anually on coal, wood, oil and labour in home and factory, and much of this money can be diverted to the electrical department by suitably making known the goods offered.

Usually the lighting load determined the size of the plant, but only occupies the station and network for a small part of the 24 hours; the day or motor load, of less magnitude, but of longer hours still does not fully occupy the whole plant; the domestic load, most likely to be developed by the educational work, will partially occupy the plant for longer hours still, even up to the full 24 hours in the case of water-heating. A large output from the power station distributed over the 24 hours tends to cheapen production costs and can only be attained by selling every possible unit to every possible consumer; the Municipality therefore has a vital interest in seeing that as many as possible satisfactory appliances are in use by the public. No private trader has that interest; as soon as a sale is effected his interest ceases but the department's interest only then begins. No private trader can afford to run a hire and efficient first aid and repair service, but the department can, to the benefit of all. The capital involved is small in comparison with the capital of the plant it is designed to assist and the hire of kettles, irons, etc., bring in a good return, while the consumers gain confidence before committing themselves to heavy initial expense.

The attached Curves have been prepared from actual experience to show what can be done with a little effort in the way

of loadbuilding and the general effect on the plant; much more should be done, but the beginning has been encouraging.

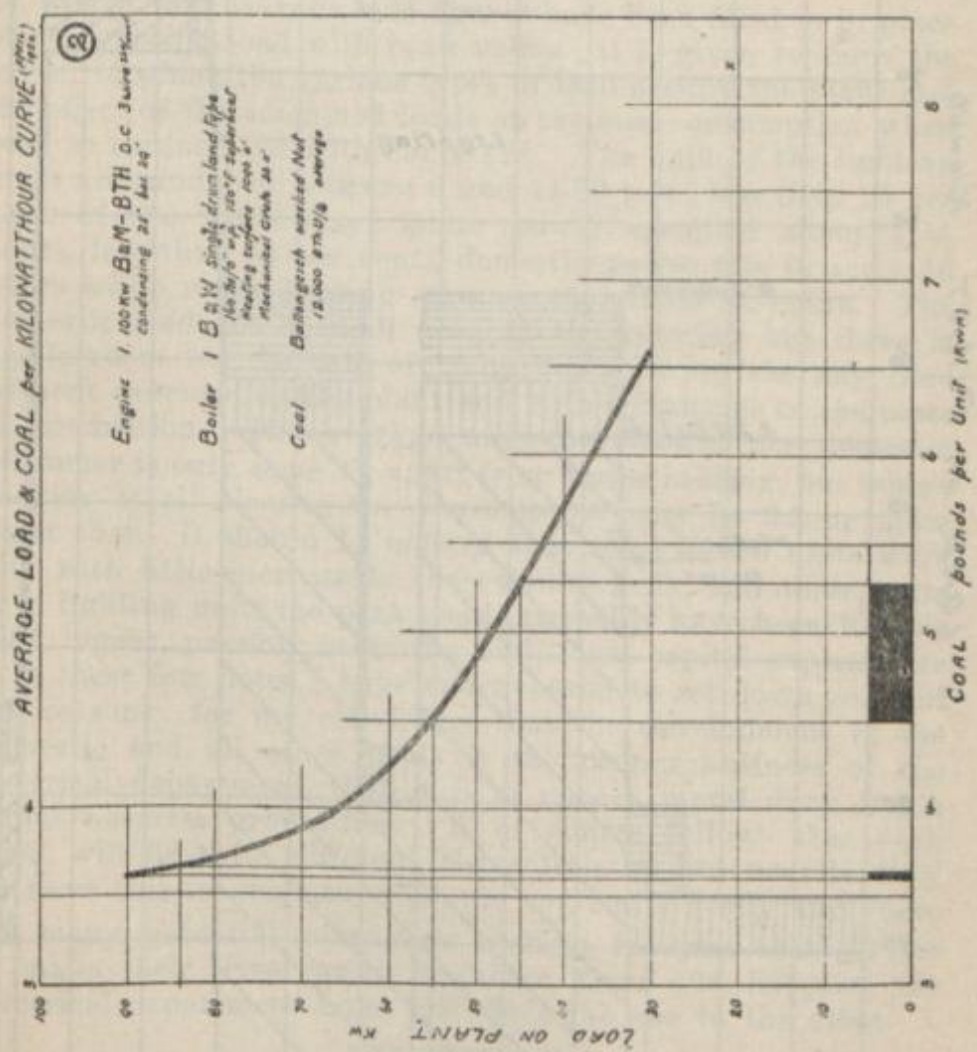
Curve (1) shows the growth of the output (sales) under the 3 headings of Lighting units, not including Street lighting, Motor power units and Domestic power units, from the commencement of the supply in 1916. It will be observed that



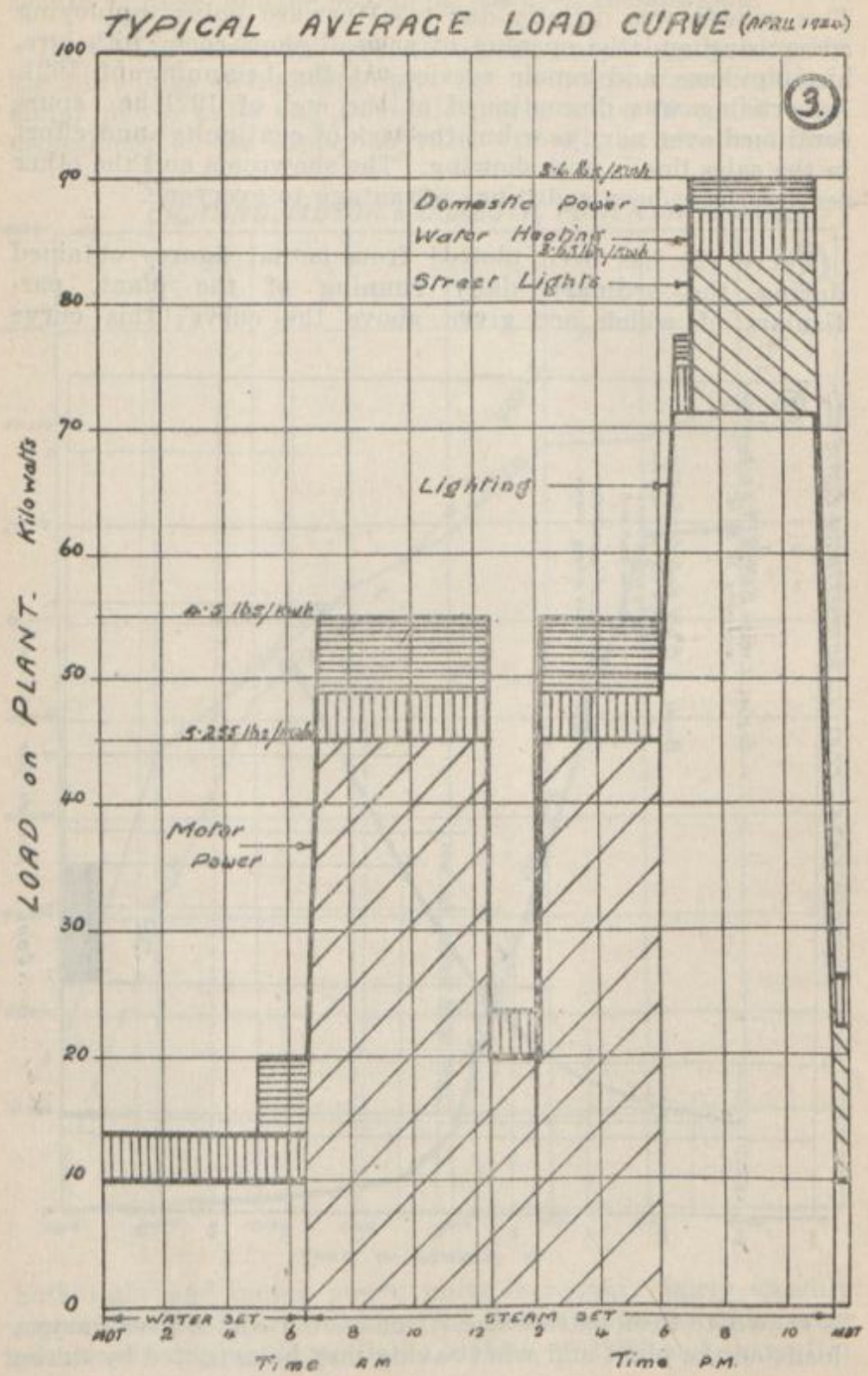
both light and motor power units increased fairly steadily right from the start but that the domestic power units were practically negligible until the middle of 1920 and thereafter

assumed proportions comparable with the other two heads. This growth was directly due to a forward policy employing advertising and the opening of a small show room with hire, hire-purchase and repair service, at the beginning of 1921. Advertising was discontinued at the end of 1921 the spurt continued over next year but the lack of continuity and effort in the sales line is now showing. The showroom and the other services have been a distinct advantage to everyone.

Curve (2) has been plotted from actual figures obtained during the ordinary daily running of the plant, particulars of which are given above the curve; this curve



is shown to demonstrate the effect on the coal bill of varying loads on the plant and what saving may be expected by taking


TYPICAL AVERAGE LOAD CURVE (APRIL 1924)
3.
Domestic Power
Water Heating
Street Lights
Lighting
Motor Power
LOAD on PLANT. Kilowatts
100
90
80
70
60
50
40
30
20
10
0
WATER SET
STEAM SET
MDT
MDT
Time A.M.
Time P.M.

on additional load at any time. Thus at an average load of 45 kw. the average coal used per unit is 5.25 lbs./kwh or a total of 236 lbs./hr. By increasing the average load to 55 kw. the coal per unit fell to 4.5 lbs./kwh. or a total of 247 lbs., that is, 10 additional units have been produced for an expenditure of only 11 additional pounds of coal. Further up, by increasing the load from 84 kw. to 90 kw., 6 units are produced for 18 additional pounds of coal. The advantage of loading the half loaded plant is obvious and a careful study of such plant curves will indicate what rates can be offered to any particular service.

Curve (3) is typical of the week day load curve in April 24, except that average load figures have been filled in in place of the varying load with peak values; it is given to show the extent to which the various types of load occupy the plant and the effect of the combined loads on the coal consumption when read in conjunction with curve (2). The bulk of the lighting units are produced between 6 and 11-30 p.m., less than 25 per cent. of the whole day; motor power occupied about 11½ hours, less than 50 per cent., domestic power fills in some 16 hours while water heating runs on the whole 24 hours. The domestic load has a small peak in the morning but there is ample room for the sale of many units during the day time without overloading the plant and with advantage to the costs of production. The average units per month per domestic consumer is only some 35, apart from water heating, but where cooking is all electric the consumption may be 3.5 or more times that. It should be noticed that some 68,000 units were sold with little increase to the evening peak, had these units been lighting units the peak would probably have been 100 per cent. bigger, possibly requiring additional capital expenditure

In these few notes I have endeavoured to set down some of the reasons for my conviction that the development of the domestic and all other loads is the proper business of the electrical department, that it is at once a moral duty and a sound business proposition. It of course follows that each plant will have its different characteristics but usually they all have this in common, that the service is ready and there are many potential consumers waiting for just that service to make their lives easier, healthier, freer and happier; the electrical department must introduce the one to the other.

DISCUSSION.

The PRESIDENT congratulated Mr. Mann on his paper and stated that he thought Mr. Mann had done a great deal towards the increase of the domestic load.

The President then took the opportunity of welcoming Professor DOBSON who had been unable to attend the previous sittings of the Convention.

Professor DOBSON (Johannesburg) in thanking the President for his welcome expressed his pleasure at being able to attend. With regard to Mr. Mann's paper he stated that generally speaking it was a survey of what an electrical department should be. He agreed with most of the contentions of Mr. Mann about developing municipal loads in every possible direction and that such undertakings should have a properly qualified engineer. To deal with Mr. Mann's paper seriatim would take considerable time. He would like, however, to say a few words. Mr. Mann had traced the evolution of municipal undertakings very carefully and had brought out problems which had given very great food for thought in the past and he felt sure they would give the younger municipal engineers food for thought and definite lines of policy in the future to go on. There was no doubt whatever that the municipal electrical supply undertaking was a business of great importance and involved not only technical and engineering experience but there was a vast amount of business and financial experience which the engineer in any other ordinary business was very seldom up against. In his opinion the municipal engineer, if he did his business thoroughly, in the course of years was a much better man than the mere technical engineer. He thought Mr. Mann's paper would give encouragement to the other municipal electrical engineers how to build up their loads and run the business in the most efficient manner and more than anything else to make the department come out from the point of view that the revenue will exceed the expenditure.

Mr. RALSTON (Dundee) congratulated Mr. Mann on his paper. Being in charge of a small station the points raised by Mr. Mann were very interesting to him.

The PRESIDENT stated that the paper was a most instructive one and it showed that one had not much to fear of the domestic load increasing the peak as some thought. Their experience in Durban corroborated this. The amount of cooking at night was nothing to be afraid of and it had not made the evening peak worse than ever it was.

Mr. BLATCHFORD (Greytown) stated that the paper would be of even greater value to the small station engineer if they had statistics showing the cost of generating, distribution, etc., and the probable cost and the amount of revenue received per annum. He was very interested to see the various

curves and he congratulated Mr. Mann on the labour he had put into them.

Mr. MANN stated that he regretted he was not able to give full details at the moment, but he proceeded to give Mr. Blatchford certain figures which were available.

Mr. SANKEY (Johannesburg) stated he was interested to see that Mr. Mann had emphasised the points made by Mr. Eastman in his paper and in the President's address with regard to pushing the use of electricity for domestic heating and cooking. It showed that quite a lot could be done in the smaller towns in this direction. Personally he had thought that in some of the small towns the idea of pushing the domestic load was rather a hopeless propostion but from what they had heard during the week he thought many engineers would go home with fresh hopes of building up a day load. He congratulated Mr. Mann on the excellent results obtained from his enterprise which would be an encouragement to many of his fellow engineers. The paper was essentially one for those in charge of small stations.

On the proposal of the President a very hearty vote of thanks was passed to Mr. Mann, and the President expressed the hope that Mr. Mann would be able to elaborate on his paper at the next Convention.

DISCUSSION.

(On previous paper, by Mr. Councillor SHEARER and Mr. JOHN ROBERTS).

(Durban).

Mr. Councillor SCOTT (Port Elizabeth) stated he had derived a great deal of education by having come to the Convention and he would go back to his Council and strongly recommend that they become directly associated with the Association. In particular it had given him great pleasure to hear the paper by Mr. Councillor Shearer and Mr. John Roberts. Several points had been raised which were worthy of discussion by the Councillor delegates; they were all questions of very great importance to City Councillors as they were the problems that were met with in their everyday civic life. In one part of the paper reference was made to the question of the new Councillor and the amount of time taken by his asking for information when he first sat on the Council. He (the speaker) did not quite agree with the remarks made on that point; he thought it was from the new Councillor that

some of the older Councillors were raised out of the apathy they had fallen into. Some of the older Councillors seemed to think that a new man should not open his mouth but agree to everything they had to say. There was a very burning question in his Council and that was the question of the contribution to rates from the profits of the electricity undertaking. He considered that it was a wrong principle to allocate a portion of the profits of an electrical undertaking towards the relief of rates in any town. A municipal electrical undertaking should provide due capital charges interest and sinking fund, make due provision for depreciation and renewals and build up a substantial reserve fund. After having done so, any profits that may be left should be devoted entirely to further reduction of the cost to the consumer. He thought it would be a good thing if the Convention would pass a resolution to be put forward to the Councils in South Africa that in the opinion of the Convention it was detrimental to the best interests of the workings of electricity undertakings for any portion of profits to be contributed to the relief of rates. There was also the question of the payment of Councillors. He was totally opposed to that. If the principle was adopted there was the danger that they might develop a type of professional Civic Councillor whose activities might not all be in the best interests of the town. He felt that if a person was prompted by the true civic spirit he would derive sufficient reward for any trouble or effort he may give to civic work from the pleasure of giving service to the town. In referring to the methods in connection with finance in the Durban Town Council as mentioned in the paper, he considered that once the Finance Committee and Council had passed the estimates they should have sufficient confidence in the members of the respective committees to give them the power to expend the money they have passed during their period of office.

Mr. Scott then proposed the following:—

Contribution to Relief of Rates.

"That this Convention of Municipal Electrical Engineers reaffirm the following Resolution adopted at the 1917 Convention in regard to Electrical Contributions to the Relief of Rates and that the various Municipal Councils in the Union of S.A. owing Electricity Undertakings be advised accordingly."

1. That all charges arising between different departments of a Municipality should be based on Standard Tariff Charges where such exist, and in the absence of such

Standard Charges should be based on the net cost of services given or received.

2. That we are of opinion that it is unsound policy as militating against the successful financial operation of Municipally-owned electrical undertakings to allocate net surplus profits for the relief of rates or for Municipal Funds, or to make indirect charges so as to unfairly reduce net surplus profits.

3. That the rapid introduction of new and improved machinery for the production of electricity renders it imperative that every electricity undertaking shall set aside out of its net surplus profits an adequate amount to write off obsolete plant.

4. That the only legitimate outlets for net surplus profits are the building up of an ample obsolescence fund, and the reduction of charges to the consumer in order to encourage the use of electricity.

This was seconded by Mr. Councillor LOW (Cape Town)

Mr. SWINGLER (Cape Town) stated they should do all they could to convert Councillors to the point of view that it was far more beneficial to a town to have low electricity charges than a fraction of a penny reduction in the general rate.

Mr. Swingler continued to give certain figures in connection with the contributions to the relief of rates at Cape Town and illustrated the unfairness of such a system.

Mr. Councillor SHEARER (Ladysmith) stated that it had given him great pleasure to attend the Convention. On the question of contributions to the relief of rates, he stated that he thought his town was in as good a financial position probably as any other electrical undertaking in the Union. They had in hand in sinking funds, maintenance and depreciation funds, etc., moneys amounting to approximately 66 per cent. of their capital expenditure and he looked forward to the near future when they would have their entire capital expenditure wiped off. They were in the fortunate position of being practically the first town to undergo the experiment of taking their current from the Electricity Commission. They had had various interviews with the members of the Commission and he had formed a very high opinion of the manner in which they had treated them. So far as he could see they were out to assist municipalities in every possible way. When they

received their full supply from the Commission they would be in a position to go in for heating and cooking so as to build up their day load. In regard to the costs, he thought they could compare very favourable not only with any of the smaller municipalities but with most of the larger ones; their costs worked out at 1.3d. per unit. That had been brought about to a very great extent in the first place by having a competent and efficient engineer and secondly by the Councillors placing every confidence in their engineer and adopting the recommendations which he brought forward from time to time. It was his intention to give his municipality a brief outline of what had taken place at this Convention so that they would not run away with the idea that they had been away on a pleasure trip altogether.

Mr. Councillor DOULL (Maritzburg) stated that so far as his town was concerned the question did not arise, as under the Ordinance no profits could be placed to the reduction of rates but to reduction in the price of current. Councils had taken advantage of the position by undervaluing the services rendered by the department and in that way had penalised the electrical department. He held the view that all profits by electric light undertakings should be utilised towards cheapening the price of the current. With regard to payment of Councillors he thought that was a question for muicipalities and not for the Convention. He agreed, however, that there was an unnecessary amount of work in the Councils.

Mr. SWINGLER (Cape Town) pointed out that in Glasgow and Manchester they had adopted the policy that no more money should be taken to the relief of rates. If that was a good policy for those towns to adopt he thought it was good enough for the principal towns in South Africa to do likewise

Mr. Councillor LOW (Cape Town) stated that as one of the lay delegates to the Convention he was going away with an entirely changed opinion. He was convinced that the annual Convention was of real value not only to the engineers but to the laymen as well. With regard to the contribution to the relief of rates he had always been strongly against this and he was pleased to say that the electrical committee of his town had put forward a proposition to reduce the contribution to rates this year. He felt that if the Convention would re-affirm the resolution which was carried some years ago it would considerably strengthen their hands.

Mr. SANKEY (Johannesburg) supported the resolution which was passed at the last Durban Convention. Johannes-

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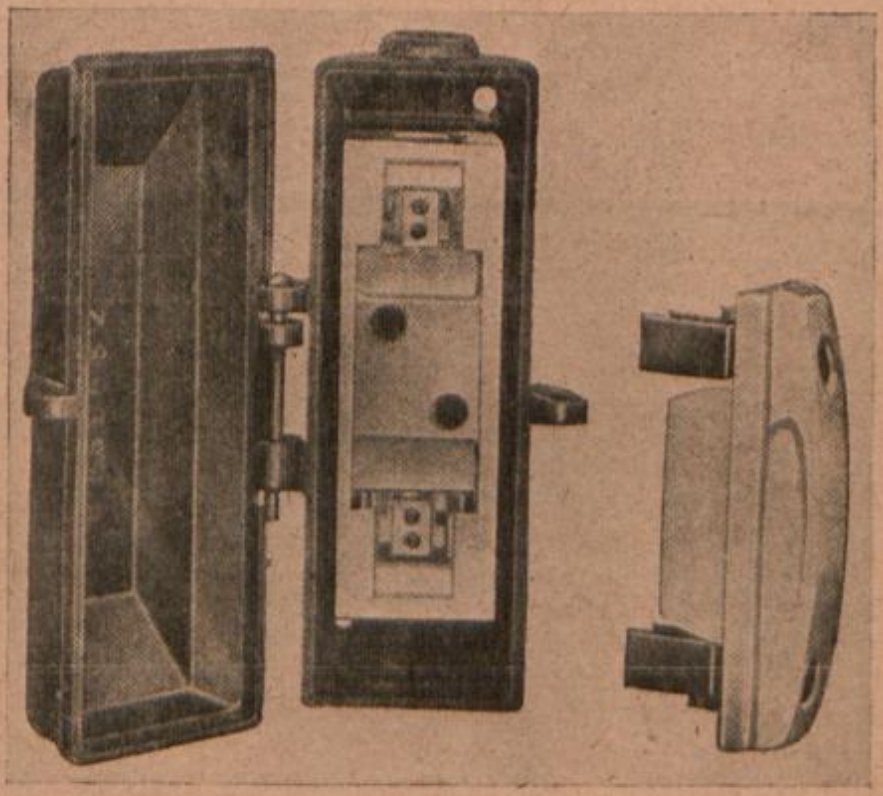

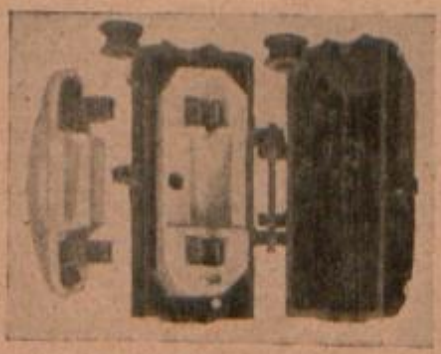

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burg was one of the worst offenders in respect of the relief of rates. Mr. Sankey proceeded to quote figures showing the amount which his department had contributed and stated he would like to impress on the Councillor delegates the effect which that had on municipal officials. In a private Company it yas usually the aim and object to encourage the staff to view the Company and its organisation and efficiency from a patriotic point of view and to do their best for the undertaking. But this constant handing over of profits from municipal undertakings had the most soul deadening effect not only on the manager or engineer but on the whole of the staff. At times it was most difficult to maintain the efficiency and spirit of one's staff. He put it to the Councillor delegates that this calm appropriation year after year of everything that was left over practically was not the way to encourage the efficiency which municipal men like to think should exist and did exist in municipal undertakings.

Mr. Councillor SHEARER (Durban) stated that there had been a lot of controversy on the question of contribution to rates. A lot could be said for and against it. One way in which the man in the street viewed the position was that if the departments did not make their contributions the alternative would be an increase in the rates. The assessment rate was based on the estimated expenditure. They had to meet the liabilities and certain sums were obtained from the trading departments. If the ratepayers were going to get cheaper trams and light it followed that they would have to increase the rates. It was a very difficult question and he felt that after this Confereene when the matter was brought up before the Durban Council they would have something to go on with. He regretted that more members of the Durban Town Council had not attended the Conference. He considered it was an education to a Councillor to come and sit at the Conference. Although they may not be able to follow all the technical points there was always something which they could pick up.

The PRESIDENT stated that with regard to the relief of rates no one could be more impressed than himself with the evil effects on an electrical undertaking caused by large contributions to the relief of rates. The position in regard to his department was that if they had been able to keep within the department the funds which had been contributed to rates since they started they would be in a far more stable and satisfactory position than they were in to-day. There was no doubt that the prices of current would be still more favourable than they were at present. The layman did not understand

what that may mean to the prosperity of a town. A halfpenny a unit was a very low rate to the town and was of great advantage, but a rate such as .35d. would be still more favourable, and it might mean all the difference as to whether some large and important industry could be established in Durban or not. There were many industries dependent on large supplies of electricity, and it might have a very deep influence upon the industrial future of a town if such industries could be established there. He heartily supported the resolution.

On being put to the meeting the resolution was carried unanimously.

Professor DOBSON (Johannesburg) stated he would like to make a few remarks on the paper submitted by Mr. Councillor Shearer and Mr. John Roberts. He had been associated with the Johannesburg Gas, Electrical and Tramways Supply and other municipal undertakings for a period of nearly twelve years, and it was only natural that the control of municipal undertakings was of special interest to him from the point of view that he was quite convinced that so far as the larger municipalities were concerned, the municipal administrative machine as applied to the great industrial undertakings undoubtedly had broken down. He had no remarks to pass concerning the small municipalities but one heard a great deal about the payment of Councillors in the larger Municipalities and the inefficiency of municipal trading concerns and it could be traced to the fact that the municipal administrative machine was unwieldy, cumbersome and unworkable as at present applied to large trading concerns. They may be interested to know that before he left municipal service he took a survey as to how he had been spending his life, and the result was that about a third of his time was occupied in doing really good and effective work on the undertakings under his control, another third (owing to the cumbersomeness of the municipal machine) was spent in making what he considered were unnecessary reports, and the other third was spent in trying to elucidate those reports to Councillors, who undoubtedly had his sympathy in that they were loaded up with unnecessary work which made the successful business man revolt when precious time is wasted to no good purpose. There is no doubt whatever that the Councillor who is called upon to serve on the Councils of the larger municipalities which run large trading departments is in an almost impossible position. The cumbersomeness of committees and the circumlocution and circumnavigation of business is clearly pointed out in the paper and the subject should be seriously tackled from the

point of view of complete overhaul and reorganisation so that councillors and officials may feel that their labours are efficiently applied. It is very discouraging to heads of municipal departments to find that they are associated with a machine which, from a business point of view is perfectly ludicrous, and he admired the courage of Mr. Shearer and the President in placing before the Conference one of the most important matters which had been brought before the Conference for many years. It would be a pity if this Conference did not take some tangible step to see that something is done and representations made to the proper quarter. He thought this Conference was an excellent nucleus for discussion on this matter so as to have the municipal machinery put on a better footing. Reverting back to the paper under discussion he stated it was clear that the authors felt, as he had felt for many years, that the number of committees and the number of men on the committees, should be considerably cut down. On the present basis he had no hesitation in saying that the amount of work associated with a large trading concern in the larger municipalities if the Chairman of the Committee carried out his duties thoroughly it was a whole time job. He agreed with the authors that if they could cut down the number of men dealing with each particular section of a Council's work they would get more efficient dealings. With regard to the proposed Tender Board he looked upon that as one of the most important functions of a municipal machine. The Railway Tender Board had been mentioned; he did not think the S.A. Railways Administration could proceed with its work efficiently unless the question of tenders had been delegated to a proper authority like the Tender Board. Speaking of the larger municipalities he was strongly of opinion that a Municipal Tender Board should comprise a number of the municipal heads of departments, but the number should be cut down to a minimum. He had also observed from his many years of municipal experience that the municipal administrative machine would be considerably improved if the number of municipal departments was reduced. He hoped that as a result of the paper by Messrs. Shearer and Roberts the Conference would take some tangible steps and make recommendations to improve the municipal machine, and make it more like a business concern and this would be acting in the best interests of the public, the Councillors as well as the Municipal Officials.

Mr. Councillor DOULL (Pietermaritzburg) stated he was strongly opposed to discussion of this kind being introduced. He considered it was "in fra dig" for a body such

as the Conference to discuss what a Council ought to do or ought not to do. He realised, of course, that Professor Dobson was a free lance.

Mr. Councillor EATON (Durban) on being requested to join in the discussion by the President, stated that he had been greatly interested in the discussion on municipal procedure as affecting trading undertakings. The Councillor who had not the technical knowledge of a subject may be a stumbling block. He had noticed in committees when discussing matters which he did understand, that other Councillors have often expressed views that were not altogether in keeping with sound judgment. He could quite understand the feelings of an engineer who has specific knowledge when listening to a Councillor, who may be well up as an accountant say, expressing a view on the engineer's work. His own sympathies were always with the engineer. He thought that the procedure in the Council was cumbersome. He did not think they could get to the crux of the matter in a limited time. He thought the Conference should agree to form a committee and see if they could not put forward a proposition to improve the procedure. He believed that trading by municipalities was going to be extended more and more. It was to the engineers that they were going to look for guidance and it was for the engineers to show them in what way they could make trading undertakings beneficial to the whole of the community.

The PRESIDENT expressed appreciation of the spirit in which Mr. Eaton had spoken of the paper written by Mr. Councillor Shearer and himself. He was sorry however, to think that any delegate should consider it was out of the province of the men who have to use the municipal machine to make suggestions of its improvement if they considered they were in the interests of the departments. After all they probably knew better than anybody else where its weakness were and if they had their work at heart and were anxious to make their work a success it was only natural that they should feel it keenly and that it was so urgently necessary to have it put on a good basis. He was a great believer in municipal enterprise. He did not believe that fundamentally a private enterprise was more efficient than a municipally owned organisation. He thought there was no reason why a municipality should not make a concern pay as well as a private company. In fact he believed it was the other way about and that it was essentially better and more efficient. They had magnificent examples all round. They had the South African Railways conducting an enormous service in the public interest. They had

the British Post Office. Those of them who have their hearts in their work naturally felt that if they could suggest anything in the way of improvement it was their duty to do so. If a committee could be formed to go into the matter it would be a most desirable thing. A great argument of those who advocated private enterprise was that private enterprise could frequently command the services of men by munificent salaries and glittering prizes and in that way get better management and efficiency. He was one of those, however, who thought the best work was not always done by men who earn the biggest salaries. The best work was often done by men for the sheer love of it, and many examples of that could be found. The Assistant General Manager of Railways was paid a miserable salary compared with what private enterprise would offer for such a position, and there were many similar examples.

Mr. CLOTHIER (Visitor) stated he had listened to the proceedings with the greatest interest. Although he was no longer actively engaged in the work his interest was no less keen in it, now that he was merely an onlooker, than when he was actually wrestling with the difficulties of the members. He congratulated the President on the excellent exhibition put up during the Conference period. In his opinion it touched one of the parts of electricity supply which was even more important or very nearly so, as that of the engineering problems, and that was the getting into touch with the public at large with the services that electricity could render to them. References had been made to the inadequate supply used by the public to what might be used. Mr. Clotheir proceeded to quote figures as to the number of units used per head in England and America which showed a substantial difference between the two countries. He stated there must be some very good explanation why that should be so and suggested that if the engineers would make a critical examination of the reasons for that it would bring out something very useful. It was not so much the price at which electricity was sold as from the information he had been able to obtain there did not appear to be any cases where electricity was sold cheaper than it could be obtained for in many parts of Great Britain.

Conclusion.

Mr. Concillor SHEARER (Durban) expressed pleasure at the presence of the members of the Conference among them at Durban. It was an education to all of them to come to most conferences. Certain suggestions had been thrown out. It had been suggested that a small committee should be formed from the Conference but he thought that was not practicable. But

they could go to their various municipalities and take the suggestions with them and he had no doubt it would bear good fruit. There had been many items of considerable interest to Councillors. On behalf of the Electricity Committee of Durban he wished to thank them all for their presence and he hoped they would all meet again at the next Conference in Johannesburg and that they will have benefitted as the result of the present Conference.

Mr. Councillor DOULL (Pietermaritzburg) expressed his appreciation of the manner in which they had been treated. This was his second conference and he was pleased to say it was a marked improvement on the previous one he had attended.

Mr. SARGENT (Vryheid) stated he would go away from the Conference having learnt a good deal as a result of being among them. He felt sure it would be of benefit to his Council.

The PRESIDENT stated he had greatly enjoyed acting as President of the Convention. If Durban had shown them anything of interest that had been their main object and he was pleased it had been achieved. He felt sure they would all benefit by the exchange of ideas that had taken place, and thanked them all for the efforts which had been made to make the Convention a success.

In the afternoon the party were motored through the suburbs to Sarnia, to view the distribution system for the supply of current, and in the evening were the guests of the Natal Institute of Engineers to a Smoking Concert.

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