AMEU/SAIEE joint virtual webinar

"THE DIGITAL MUNICIPAL Dx ELECTRICTY UTILITY OF THE FUTURE"

10 August 2022

Session 1 (Theory/Case Study)

"The future proofing of a digital SA municipal Dx electricity utility of the future"

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Association of Municipal Electricity Utilities (Southern Africa)
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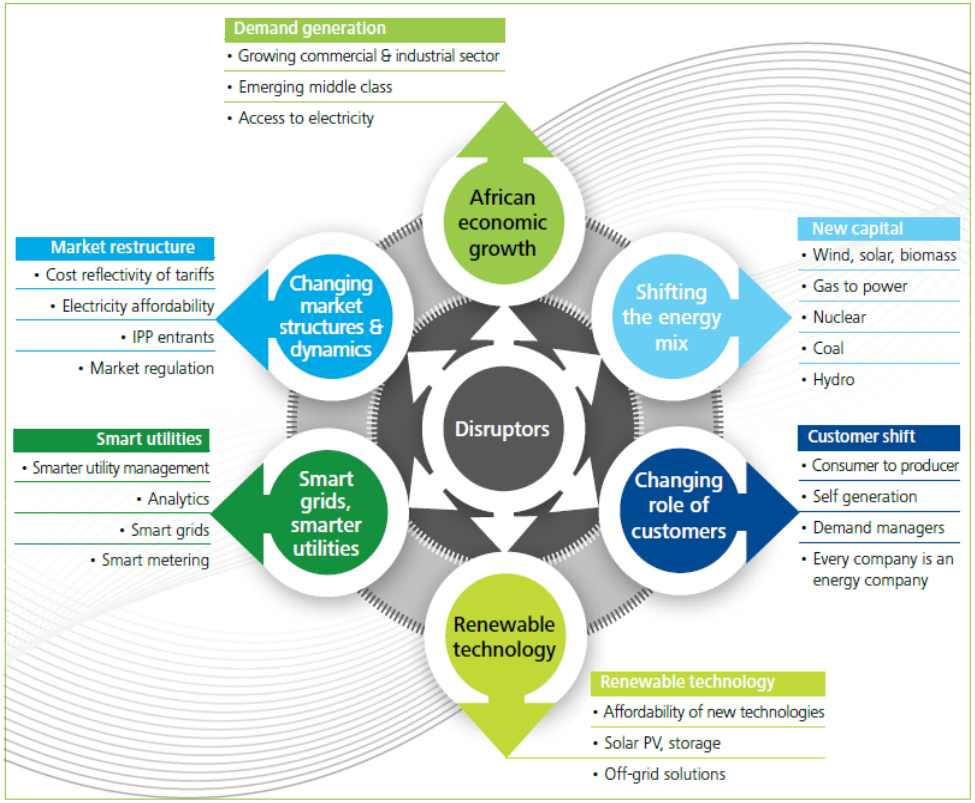
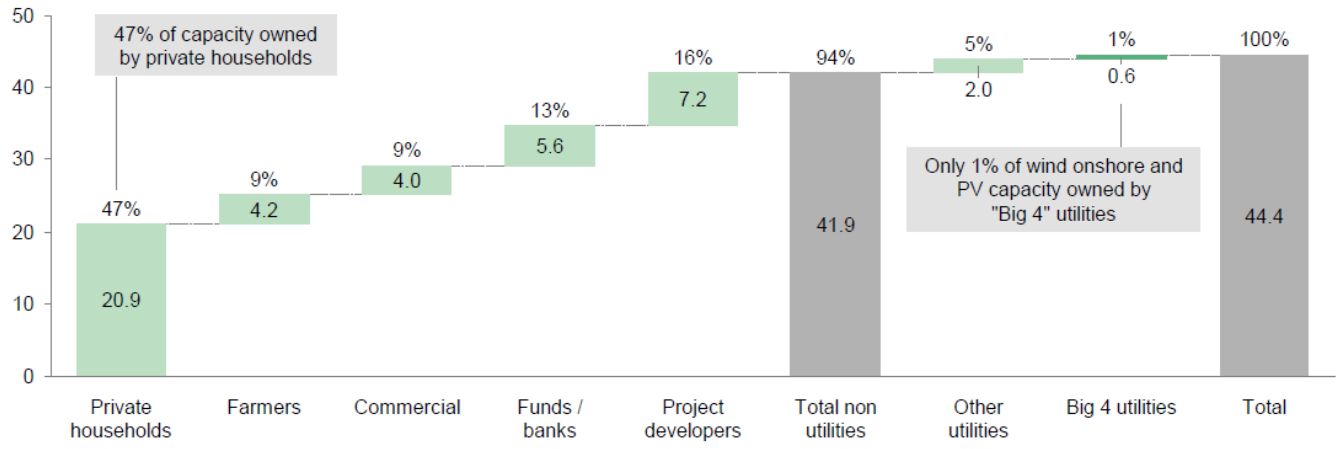


- Disruptor 1: African Economic Growth, transformation and rising demand
- Disruptor 2: A shifting energy mix gives rise to new capital and players
- Disruptor 3: Changing role and type of customers
- Disruptor 4: Renewable Technologies
- Disruptor 5: Changing market structures and dynamics
- Disruptor 6: Smarter grids and systems, smarter utilities

Ownership for wind onshore and solar photovoltaic generation capacities GW, year-end 2010



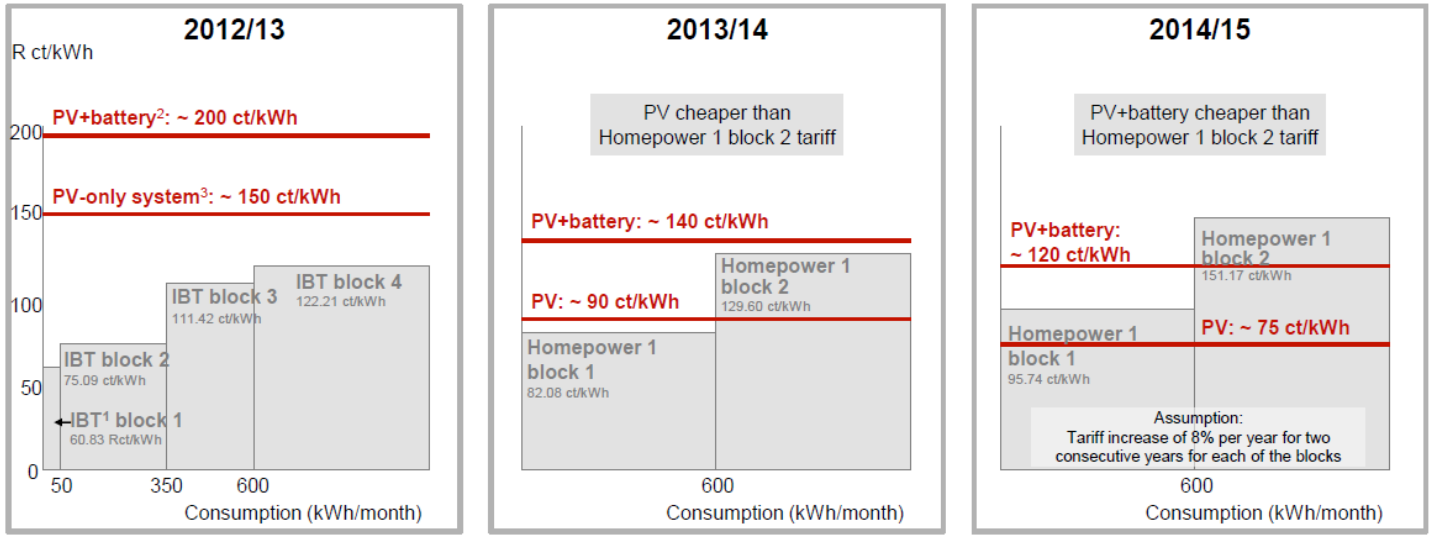
Business model disruption:
Incumbents are being crowded out by players with lower return expectations

1. Private persons using other income as collateral Assumptions: Average turnkey PV system price 3.1 €/Wp; average turnkey wind turbine price 1,500 €/kW Sources: KNI, Study "Marktakteure Erneuerbare-Energien-Anlagen in der Stromerzeugung"; Agentur für Erneuerbare Energien "Investitionen in Erneuerbare-Energien-Anlagen in Deutschland 2000-2010"; BCG analysis

Incumbents crowded out

LCOE of PV+battery systems compared to residential tariffs for Eskom customers

Incl. environmental levy, excl. VAT, ZAR ct/kWh



Risk of business model disruption (for both Eskom and Municipalities) from residential (and commercial) customers turning to partial autarky. Lacking Feed in Tariff last hurdle for broad PV penetration

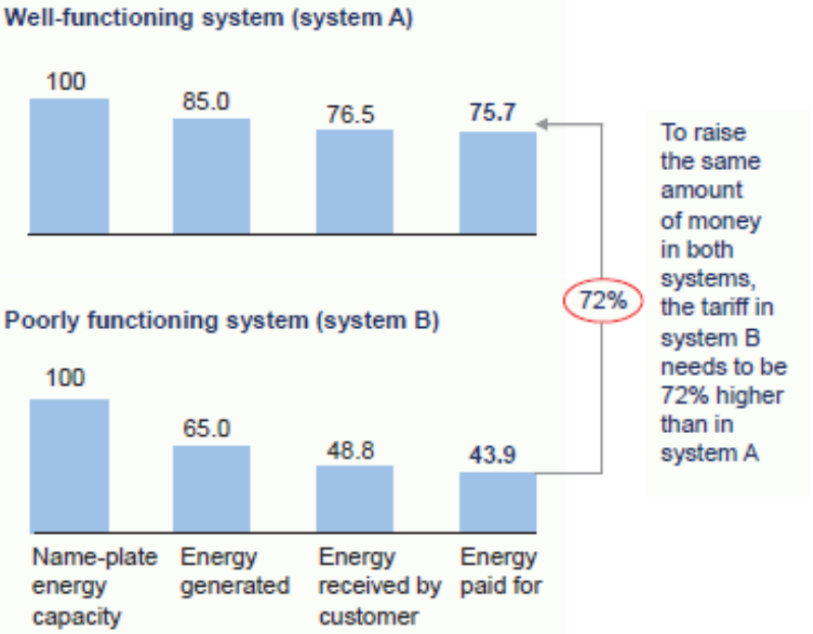
1. IBT = Inclining Block Tariff 2. PV+intraday storage: ~ 4 $ct/kWh for intraday storage; average of 45% of PV energy stored 3. For a large roof-mounted system
Notes: Today's regulation requires an independent, auxiliary power grid in order to utilize a PV system at home Assumptions: Performance ratio of PV system 85%; lifetime 20 years; interest rate 5%; annual OPEX 200 R/kW/a; storage price: ~100 $/kWh; PV generation 1600 kWh/kW/a
Source: IBT tariffs 2012/13 and Homepower tariffs 2013/14 from Eskom website; BCG analysis

Business model disruption

Exhibit 26 Poorly functioning systems require higher tariffs to achieve similar levels of financial sustainability.

Energy generated (indexed)

	Well-functioning system	Poorly functioning system
Load factor	85%	65%
Transmission and distribution losses	10%	25%
Revenue collection	99%	90%



Current State of municipal distributors?

- Municipalities on average account for 26% of their revenue from electricity;
- It has been reported that some municipalities make a margin as high as ~61%;
- It has also been reported that the municipalities as a collective have approximately 400 different tariff levels. There has to be significant rationalisation of this large number of tariff levels;
- In a typical example, a municipality buys electricity from Eskom at 120c/kWh and sells it at R3,00/kWh which seems like a margin of 150%. Why this discrepancy?
    - Revenue losses due to non-payment;
    - Technical losses;
    - The lack of implementing Time of Use tariffs ("TOU");
        - In peak times they sell massive amounts of electricity at a loss; and
        - In off-peak times they sell low volumes at massive margins;
- This leads to wrong consumer behaviour and results in massive inefficiencies in matching supply and demand which results in additional peak load capacity at excessive standby costs; as well as increased tariffs to ensure going concern status;

- Municipalities currently buy their electricity from Eskom;
- They should also buy from IPP's and optimise the energy mix (solar, wind, gas, storage);
- They should allow rooftop solar and storage facilities to sell back into the grid; and
- They should allow IPP's to wheel to customers and charge a use of system charge to the IPP and the customer which makes commercial sense to all parties;
- The customer / consumer should have the choice of energy supplier(s);
- The low cost of energy (kWh) from IPPs would positively impact on municipal expenses on energy;
- Time of Use tariffs would impact consumer behaviour and give the right price signals for prosumers to install battery storage behind the meter. This would improve grid stability and minimise the need to buy electricity at exorbitant rates during peak times;
- The principle of revenue neutrality should be killed and replaced with commercial sense;

TPDDL Turnaround Snapshot

Parameter	Unit	Jul 02	Mar 14	% change
Operational Performance				
AT&C Losses	%	53.1	10.5	80%
System Reliability – ASAI -Availability Index	%	70	99.5	42%
Transformer Failure Rate	%	11	0.55	95%
Peak Load	MW	930	1508	62%
Length of Network	Ckt. Km	6750	10979	63%
Street Light Functionality	%	40	99.57	149%
Consumer Related Performance				
New Connection Energization Time	Days	51.8	6	88%
Meter Replacement Time	Days	25	6	76%
Provisional Billing	%	15	2	87%
Defective Bills	%	6	0.2	97%
Bill Complaint Resolution	Days	45	6	87%
Mean Time to Repair Faults	Hours	11	1.34	88%
Call Center Performance - Service Level	%	-	91	
Payment Collection Avenues	Nos.	20	5377	26785%
Consumer Satisfaction Index	%	-	88	
Financial Performance				
Capex Incurred (Cumulative)				
Distribution	Rs. Cr.	1210	4843	300%
Generation (Rithala + Solar)	Rs. Cr.	-	332	
Revenue (Annualized for FY 03 and FY14)	Rs. Cr.	1156.3	5979.0	417%
Others				
Consumers	Lacs	7	13.9	98%
Employees	Nos.	5,600	3,527	37%

What should KPI's look like for Municipal distributors?

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- Municipal infrastructure should be mapped in detail using GIS systems;
- All information that forms part of an asset register should recorded in this system e.g.;
  - Laser scanned models of each OH line, transformers, switchgear etc.;
  - All details re make, model etc.;
  - Maintenance plans, history and next maintenance actions;
- Digitised asset register and data should improve maintenance effort, response time and cut cost;
- KPI's should be continuously updated and web-published on a monthly basis;
- Older parts of the infrastructure should be upgraded in a planned approach to modernise all aspects of the system and enable prosumers to become part of the solution;
- Electricity costs should be driven down to bring in new customers into the specific municipality which will enable growth;

Extracts from:

Sub-Saharan Africa Power Trends – Power Disruption in Africa: Deloitte, May 2015;

Brighter Africa, The growth potential of the sub-Saharan electricity sector: McKinsey and Company, February 2015;

US-India Smart Grid Workshop, March 2015, Bangalore: Tata Power Delhi Distribution;

Thank you