Global electricity disruption and the South African parallels

Presented by: Paul Vermeulen  
Manager, DSM and SSM  
City Power Johannesburg  
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What’s wrong with the cash cow?

By 2014, it was apparent that electricity’s core business was unable to generate a surplus without grants and subsidies.....

Sustained economic downturn from 2008

Spiralling tariff increases

Projected demand growth

Consultants were engaged to review and change the business model.
Electricity to Energy company.......
Global change in Power and Utilities is being driven by numerous disruptive factors.

- Significant investment is being made to refurbish and expand grid assets.
- Generation mix is shifting to cleaner sources that include gas and renewables with storage. Sources are becoming more decentralized.
- Customers are being offered choices to manage their energy use and costs, through energy efficiency measures, distributed generation and energy management solutions.
- Smart meters, “big data” and analytics can be used to optimize energy delivery, improve energy efficiency and enhance customer experiences.

Aging workforce and challenges of the new digital economy require effective knowledge transfer and fresh thinking.

- New viable energy mixes, mini and micro grid options to meet the energy needs of communities, both rural and urban.
- Regulatory compact is under pressure to accommodate changing customer demands e.g. trading and wheeling, block-chain technology.
- Federal and State mandates are driving restructuring, creating incentives and imposing new rules.

Source: EON Business Model Review presentation
Understanding the implications of technology driven disruption

The Integrated Energy Plan (IEP) and Integrated Resource Plan (IRP) remain based on centralized generation and distribution models. To include distributed options, an IRP at City level is necessary to arrive at the true least cost option.

Rapidly increasing awareness of unsustainability of current business models. Cross-subsidization issues are taxing the inputs to the Economy instead of the outputs.

Decentralization + Democratization + Digitization + Decarbonisation = RE Emerging as least cost option

The ‘DDDD’ concept from ‘Wise Minds’ report:

Add an element of:
- Runaway prices
- Human dislike of monopolies
- Industry graft and corruption
- Billing crisis
- Unjustified cut-offs

Perfect recipe for grid defection!
Infrastructure Investment

As at 2014, the EDI maintenance backlog stood at R 68 billion.

NRS 048, SAIDI and CAIDI figures continue to deteriorate

- In the years prior to the establishment of the REDs, municipalities did not want to create debt and slowed refurbishment spend
- Spend really resumed only two years after the REDs were abandoned in 2010
- The backlog is still growing
- MFMA procurement needs review—
  - At odds with strategic sourcing principles, resulting in a diverse range of equipment in each asset class, complicating maintenance
  - ‘Single year’ financing syndrome favours spend on big ticket items (e.g. Transformers) that do not fix the problems that require engineering relationships

Contributes to ever increasing disruption of service delivery
Unsustainable SA Electricity Industry Structure

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**Eskom Generation**
- Large coal fleet, one nuclear, some hydro

**Eskom Transmission**
- Incorporates the System Operator and Single Buyer Office

**Eskom Distribution**
- Retail Sales

**Eskom Residential Customers**

**Eskom C&I Customers**

**REIPPP**
- Green Energy

**NERSA**
- Regulates this part of the industry using Eskom Retail Tariff and Structural Adjustment Methodology

**COGTA**
- Department of Cooperative Governance and Traditional Affairs

**SALGA**
- South African Local Government Association

**National Treasury**

**PFMA**
- Compact with Eskom

**National Nuclear Regulator**

**DPE**
- Department of Public Enterprises
- Control over SoEs such as Eskom

**DoE**
- Department of Energy has oversight over the whole industry

**City of Johannesburg**
- Not required to generate a surplus for the City
- Municipal Residential Customers
- Municipal C&I Customers

***City Power Metro (SoC) Distributor**
- *8 other Metros
- *170 Smaller Munics

**NERSA**
- Regulates this part of the industry using a municipal benchmarking methodology

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*Required to generate a surplus for municipalities.

*8 other Metros

*170 Smaller Munics
Changing energy mix and distributed generation

- **Eskom Generation** - Large coal fleet, one nuclear, some hydro
- **Eskom Transmission** (Incorporates the System Operator and Single Buyer Office)
- **Eskom Distribution Retail Sales**
- **REIPPP – Green Energy**
- **TREASURY** Provides tax incentives for EE and RE
- **SALGA and CITIES** Recognize climate change issues
- **NERSA** Approved SSEG tariffs for several municipalities

**City of Johannesburg**

- Eskom C&I Customers
- Municipal Residential Customers
- Municipal C&I Customers
- *City Power Metro (SoC) Distributor
- *170 Smaller Munics
- *8 other Metro s

**Double Disruption for Munics!**

- **SSEG tariffs allow City Power to procure surplus residential PV energy at 42 cents per kWh**
- **Eskom energy now costs 87 cents per kWh (2018/19 may be R1,14)**
- The margin of selling surplus PV energy is 45 c/kWh better than selling Eskom power
- Without storage, 100 000 affluent residential PV customers could contribute 700 MWh of cheap energy towards the 29 000 MWh the city requires each day.
- This would be a fair contribution to the cross-subsidy needed to support the poorer residential sector
- *Is this such a bad thing?*
Empowered Customers
Load shedding certainly taught customers a thing or two about new options....

But now also:
- Energy Efficiency
- Solar PV
- Solar Water Heating
- Changing Habits
- Wind
- Heat Pumps
- Fuel switching (gas)
- Energy storage (UPS)

The disruptive effects of load shedding continue today – Continued increasing tariffs - RCA clawbacks (3 to go)
Switching stresses have reduced network reliability

* To date City Power has commissioned 8,4 MW
Digitization

**First disruption** –
How do we get it to work with our existing stuff?

**Second disruption** –
Requires ongoing upgrade and replacement

**Third disruption** –
Requires capital budgets to support the continuous upgrade cycles

**Fourth disruption** –
Requires systems integration expertise (preferably in-house) to preserve functionality of whatever it gets connected to

**Fifth disruption** –
Moore’s law may have brought the equipment costs down. It has not brought down the cost of engineering resources to support continuous replacing and upgrading

IEDs –
Great functionality but lifespan is limited, 15 years tops

Electro-mechanical protection –
Single purpose but had a lifespan of up to 60 years
Market and Policy Reforms

The inaction on policy reforms, despite the Energy White Paper of 1998, is really what is causing disruption to the South African industry

Has led to:
- Severe underinvestment in maintenance backlogs
- Unviable distribution entities
- Business evacuating municipal supply areas

Resulting in:
- Deteriorating service delivery in smaller municipalities
- Municipalities unable to pay Eskom bills
- Forced assimilation into Eskom

• REDs Abandoned in 2010

• ISMO Bill
  Parliament Portfolio Committee had passed the bill, however the ruling party blocked to Parliament in 2014

• No competitive IPPs in the country, perpetuation of monopoly
  • Coupled with a ‘revenue requirement’ regulatory mentality:
    ➢ No real pressure to control primary energy costs
    ➢ No real pressure to contain new build cost overruns

• Scuttling of the REIPPP program, artificially keeping renewable energy cost high
  • Coal and transport industry opportunists, with inside help, have made fortunes out of the SA electricity consumer
  • A real increased risk of a forced, chaotic unbundling of Eskom
City Power’s preliminary cost of supply study determined that each residential service connection costs R893 per month, or over R10 000 per annum to maintain.

(Quick sanity check: Total operating cost / number of customers - R3,9 Bn / 420 000 customers = R9 285 per annum per customer).

The monthly amount for FBE in the DORA is R70 per month per household.

The shortfall is covered by a cross-subsidy from commercial and industrial tariffs. Eskom does the same

We are effectively taxing the inputs to the economy, rather than the outputs to the economy

If municipal distributors were truly considered to be distribution system operators, able to purchase at wholesale rates, the pricing to them should be the lowest in the table above…….
Regulatory Frameworks

Delay in the promulgation of new regulations is causing problems –

Delayed by:

- Energy source not properly considered in the IRP
- Uncertainty at the DoE and NERSA of possible impacts

Resulting in:

- Under the radar connection to the grid
- Potential grid safety issues
- The stifling of a valuable new industry

Regulatory rules on small scale embedded generation. First issued in September 2011

Regulatory Rules on third party transportation of energy. First published 2012

- Municipalities not in agreement with key principles
  - MV connections exempt from use of system charges
  - Any customer and any generator can enter bi-lateral agreements
  - Compensation must be paid to generators where network is down or vandalized

- Trading cannot be supported
- Revenues from transport of energy cannot be realized
- If implemented as is, the regulations would further aggravate revenue losses
Grid provides the Green Energy investor a place to sell or trade their surplus energy and optimize investment.

From a national systems point of view, the most efficient green energy solution includes the existing grid.

New value proposition from grid operators is to provide backup supply and seamless load balancing services.

Grid enables Green Energy trading and new revenues from ‘transport’ of energy.

While storage is expensive, the EDI has a small window of opportunity to convince customers of the value of the grid.

Regulatory uncertainty may lead to a lost opportunity.
New Options – the New Energy Mix

Low Income Suburb / Informal Settlement

- Renewable Energy - hedge
- Load Management to control non-essential electric loads

Utility Scale Storage

Limited Grid Supply

Local Storage

Gas provided for cooking energy needs
New Competitors – Leasing through a PPA

- An IPP supplies part of your electricity
- The tariff offered is better than the utility
- The tariff and its increases are defined in the PPA

**PPA**
- Zero capital outlay. The signatories of PPAs usually want cheaper power without having to make a financial outlay
- Variable payments linked only to the power provided. No power, no payment
- Cost of electricity is tax deductible, but over the life of the PPA
- Owner does have to take responsibility for operating and maintaining the system, it is all done by the IPP
- Outsources a non-core function
- PPAs tend to match the tenor of the EUL and so they are long-term in nature too

Source – Next Renewable Generation business breakfast presentation

Can a Municipality be the Client?
Skills and Diversity

Today’s secondary plant technicians and engineers must be competent in electrical engineering as well as ICT.

Engineers are scarce, ICT staff are more abundant.

Design bridging courses for ICT resources to come into the EDI.
Controlled unbundling of Eskom

Oversight by a minimum of government entities

Centralized Baseload Generation Entities

REIPPP – Green Energy

Independent National Transmission and Market Operator

EIUG Customers

Viable Distribution System Operators

Distributed IPPs

C&I Customers

Residential Customers

Prosumers, C&I or Residential

Behind the meter generation

Behind the meter storage

Consolidated Eskom and Municipal distribution regions

Conclusion

- There are presently many disruptive factors affecting the EDI
- The most severe is our tarnished image and loss of credibility as a result of graft and corruption
- The slow pace of transformation is leading to an increasingly unsustainable industry
- This is heading towards a mega-disruption
- Eskom and Municipalities are both state owned enterprises, which will government have to bale out first?
- One positive note – we may have a chance to leap-frog some of the transition pains that other parts of the world have already been through