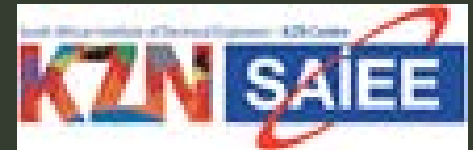


# The New Energy Landscape

Emerging technologies & disruptors

At van der Merwe  
Aurecon



2019

*We need to talk about the future  
because this is where we will  
be the rest of our lives.....*

**aurecon**

*Bringing ideas  
to life*



# Summary of international trends in the energy sector

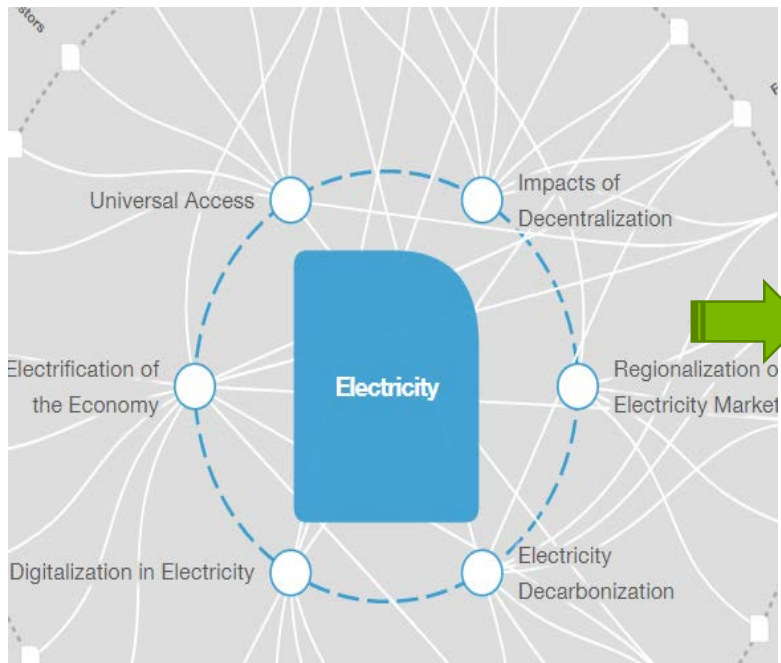


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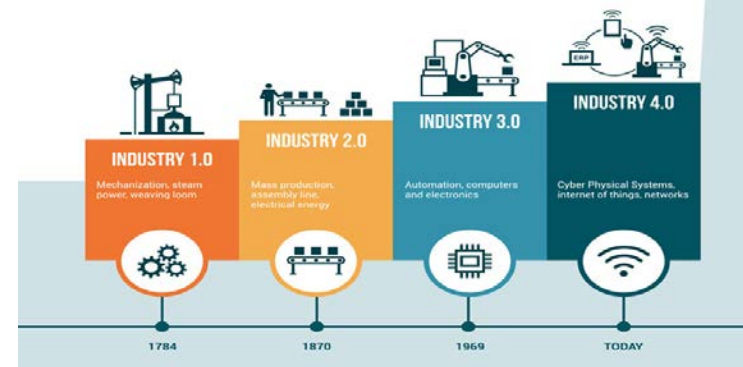
# The Utility Operating Landscape: Current Challenges

## International Trends



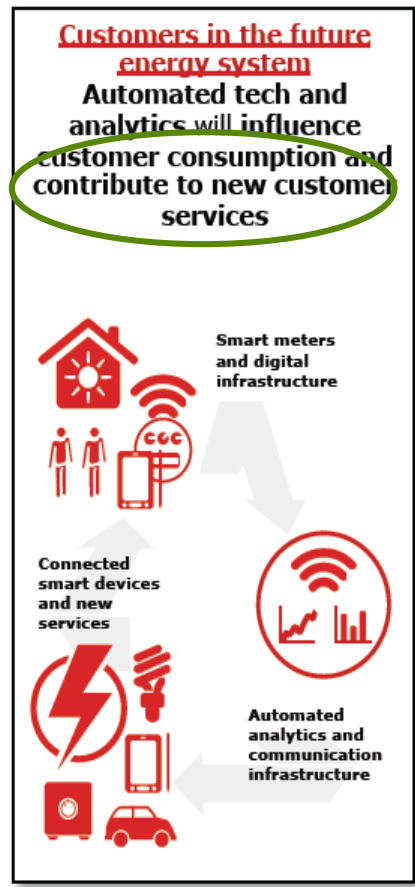
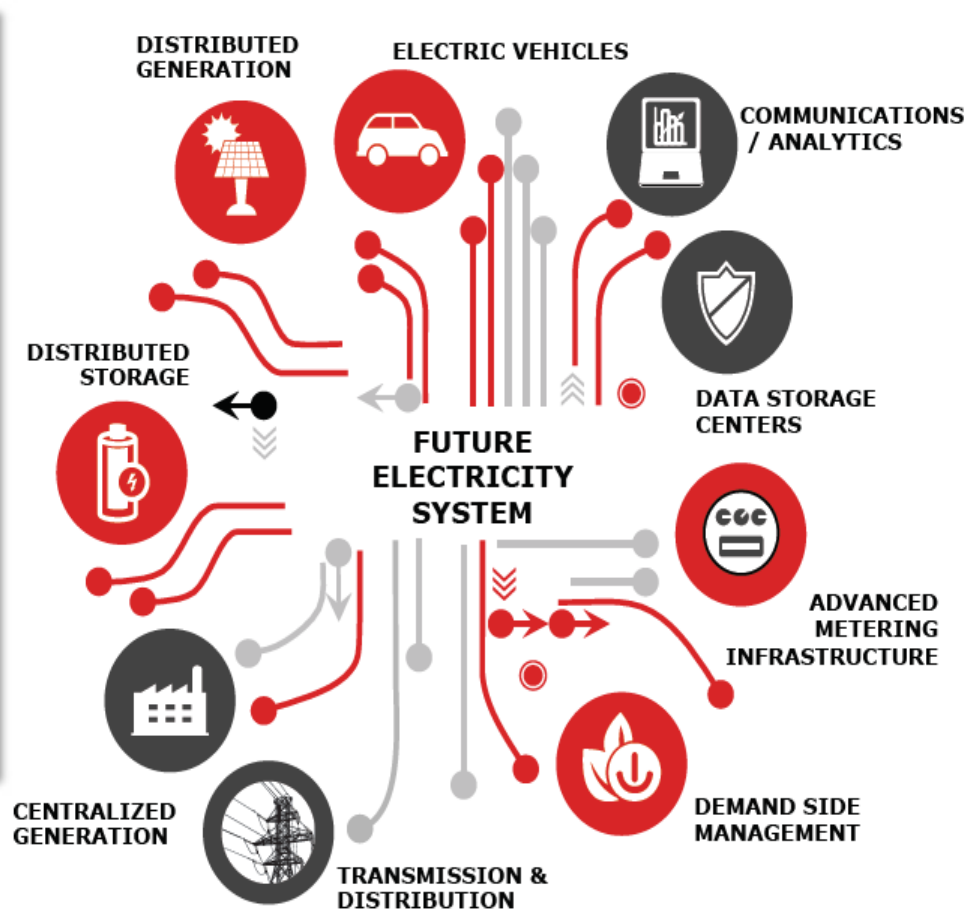
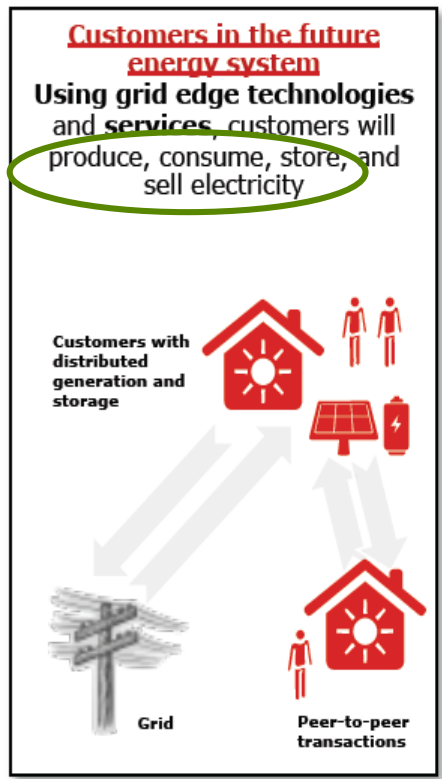
DEMAND PROFILE CHANGES

## 4<sup>th</sup> Industrial Revolution



Acknowledgement: De Beer, Van der Merwe and van der Merwe AMEU 2018 :The Dawn of the New Municipal Business Model and the Legal Imperatives to realise same

# World Economic Forum – future energy system



# Trends from our Aurecon's Australian office

## Selected Key Drivers of the 4 identified Uncertainties

5m

1

### Decentralisation

- Consumer preferences and choices
- Decreasing cost distributed renewables and storage
- Lack of policy framework and system architecture
- Cost and risk of network investments
- Emerging IoT to manage distributed system

2

### Lower carbon future

- Consumer and business desire for emissions reduction
- Decreasing costs and risks of large-scale low carbon and storage technologies
- International, national (currently a vacuum) and state GHG policies
- Uptake of Distributed Energy Resources (DER)

4

### Electrification

- Electric Vehicles
- Electrification of industry 4.0
- Switching of gas and diesel consumption to electricity

3

### Energy consumption

- Structure and growth of economic activity and population
- Lower future energy prices
- New commercial and industrial loads, eg data centres
- Emerging hydrogen (or other energy carrier) export industry

# *Summary of local trends in the energy sector*

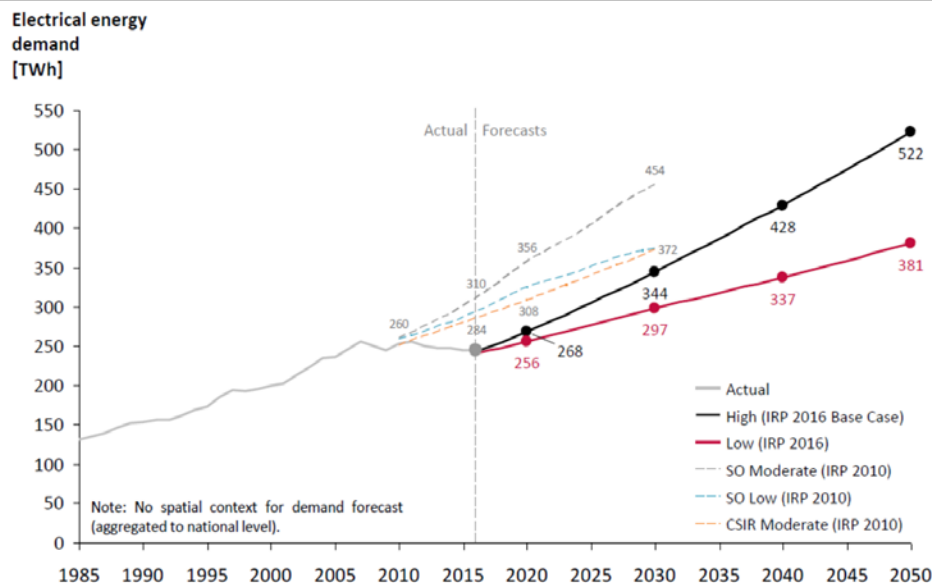


- 1. Slower Economy but Growing Population*
- 2. Market Disruptors- Emerging technologies*
- 3. Death Spiral*
- 4. The changing/emerging business model*

# 1. A Slower Economy but Growing population

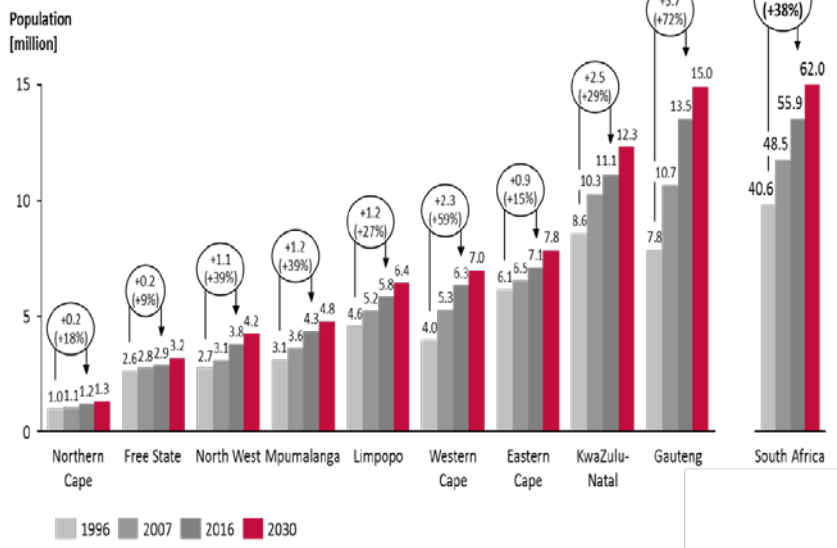
Increasing population but decline sales growth...

Forecasting load: IRP 2016 (draft)



Sources: StatsSA; DOE; CSIR analysis

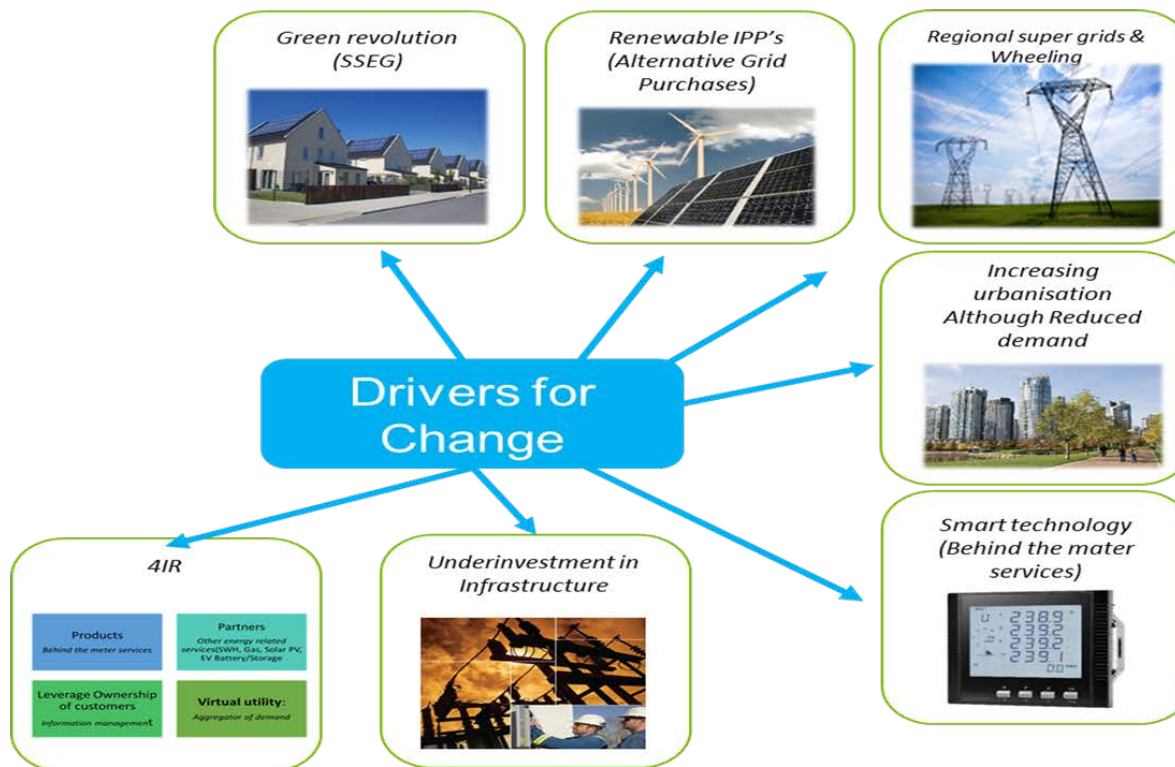
National/provincial



Sources: StatsSA

## 2. Market Disruptors that drives change

### Change Drivers



Acknowledgement: De Beer, Van der Merwe and van der Merwe AMEU 2018 :The Dawn of the New Municipal Business Model and the Legal Imperatives to realise same

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## Plug-in Electric Vehicles & RE



## Energy Efficiency



## Energy Controls



## Heat Pumps



Source: EPRI 2014, CSIR

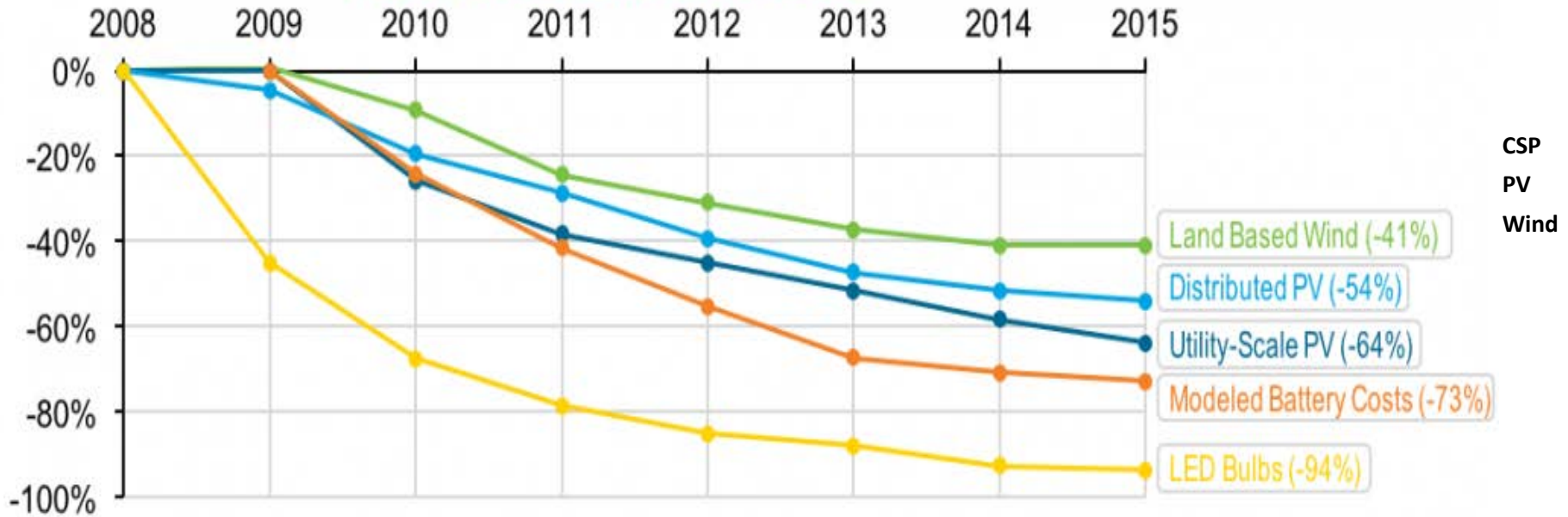
## Consumer Electronics



SONY

# Local renewable energy cost reductions

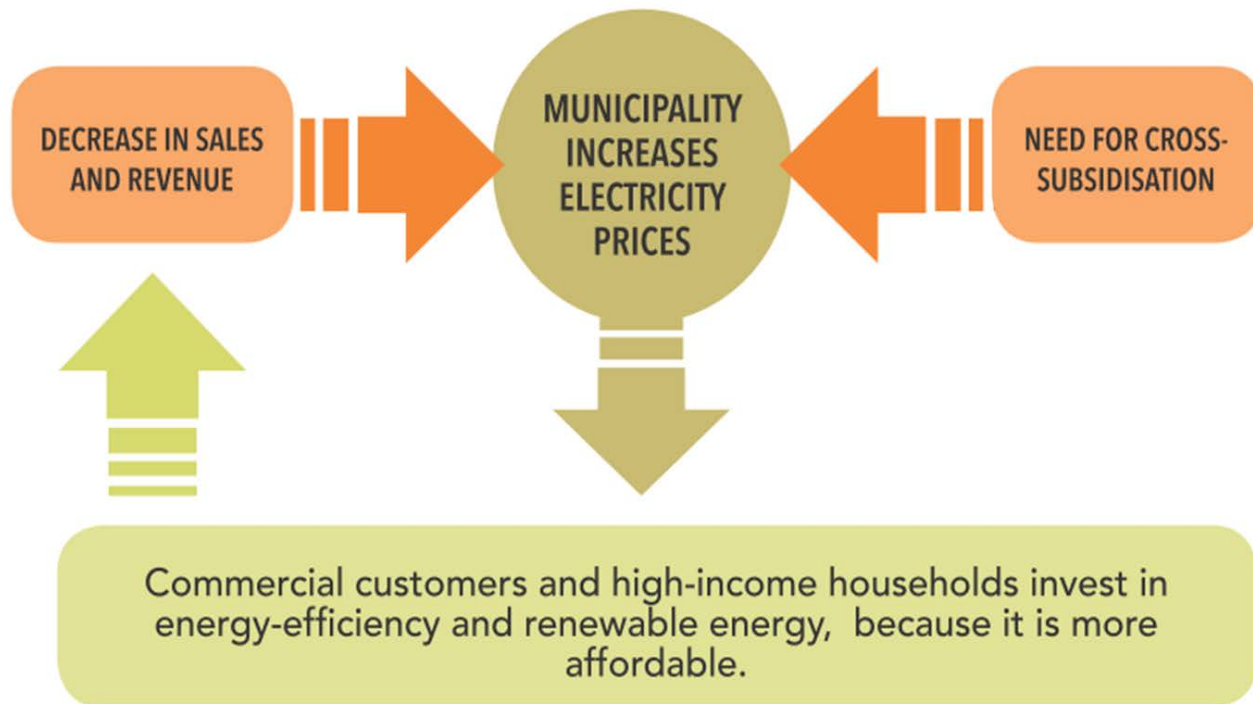
## Cost Reductions Since 2008



Source: Energy.gov



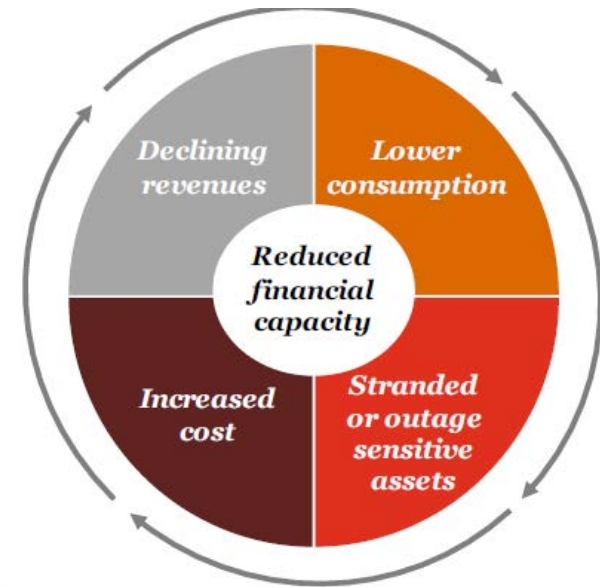
### 3. Death Spiral



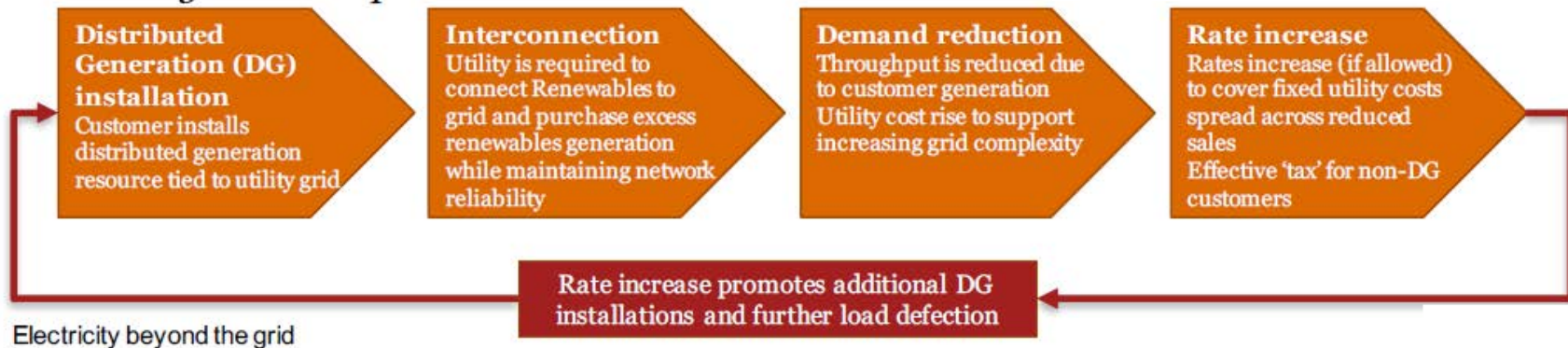
# Death Spiral

Utilities across the world are also under pressure caused by the large scale introduction of renewable generation, leading to the so called “utility death spiral”.

- “Utility death spiral” refers to the feedback loop where grid-wide fixed costs divided by a shrinking pool of customers drives up rates, causing more customers to go off-grid. As customers reduce their use of grid electricity using solar (or other off grid technologies), the customer base needed to cover the utilities’ fixed costs reduces, thereby increasing rates. |



## The utility “death spiral”

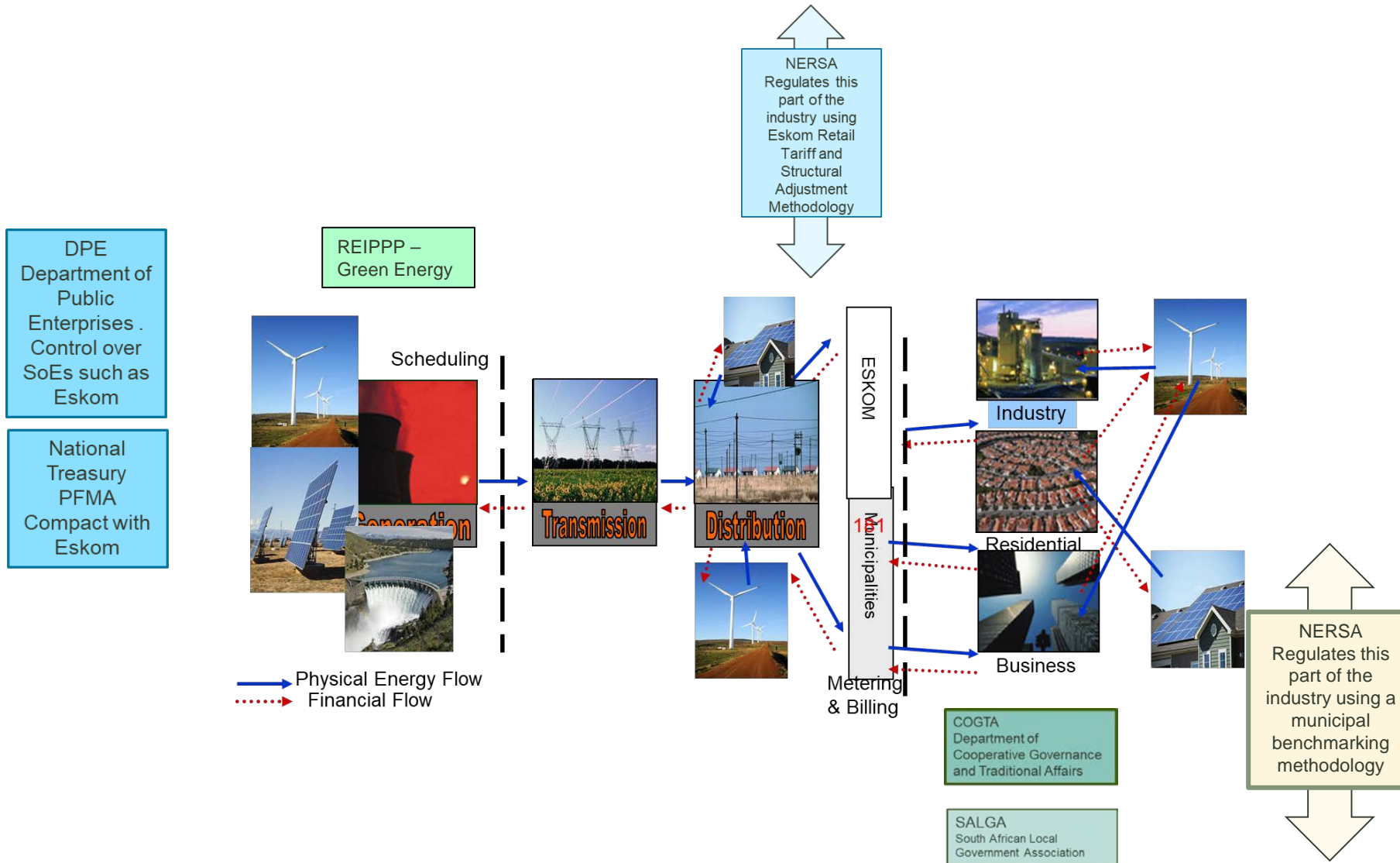


\*REFERENCE PwC

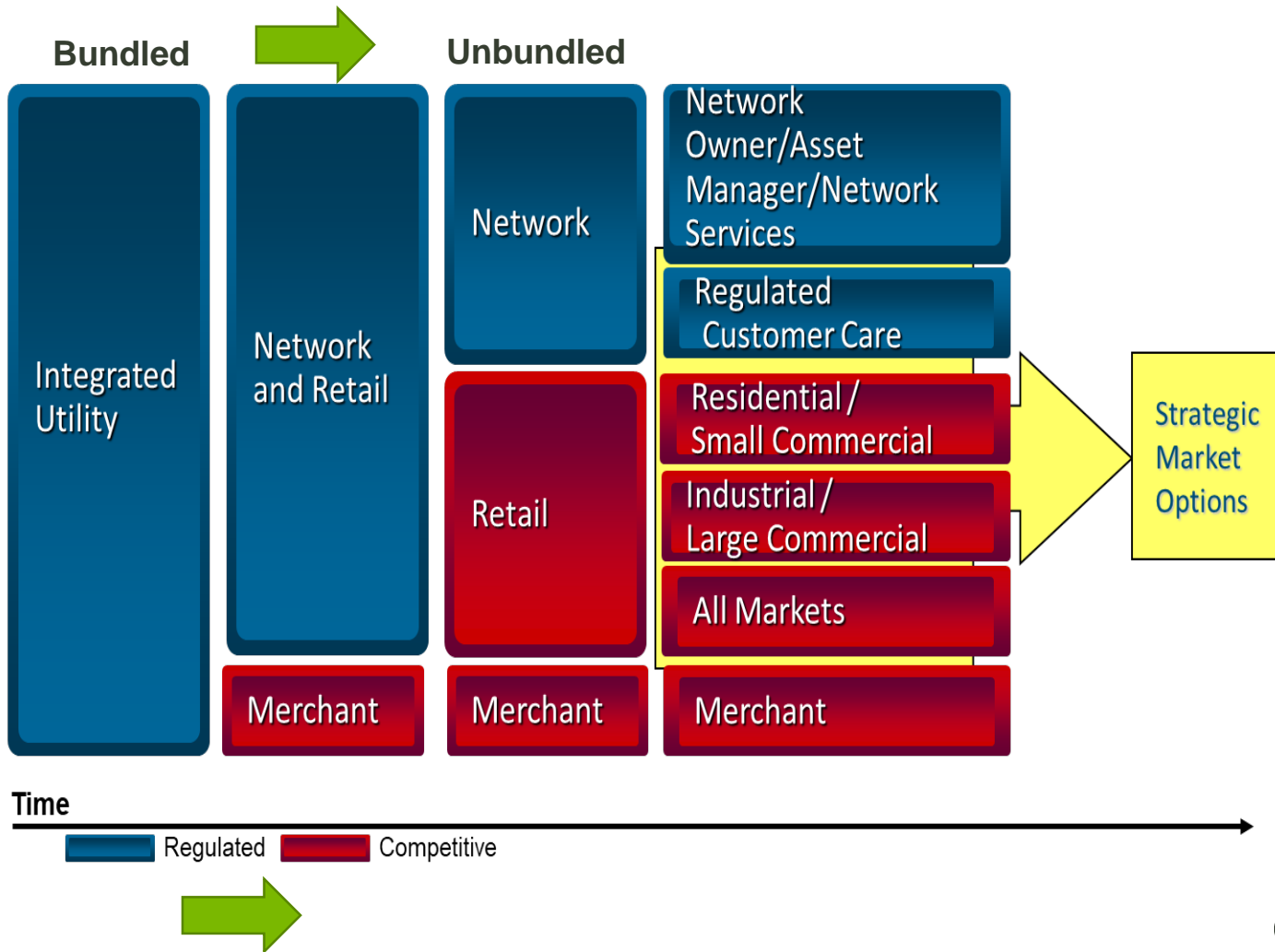
## 4. The Changing/Emerging business model

*From the current to the new...*

# ESI "transition" Supply Value Chain



# Distribution Business Evolution



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# Recent transitions in the SA ESI

- Eskom coal stock challenges
- Decline in EAF ~ 73%
- NERSA allow Eskom R32,7bn clawback

	Current	Emerging
<b>GX</b>	Purchase energy from Grid Own Generation	Purchase from IPP's Distributed Generation (e.g. PV rooftops)
	<b>Value Driver</b> Satisfy demand / Security of services / Diversify GX mix / Environmental considerations	
<b>TX</b>	ESKOM National Grid	<ul style="list-style-type: none"> <li>• Bi-laterals</li> <li>• Specific Imports (super grids)</li> <li>• Wheeling of Power via municipality grid /own use</li> <li>• Self build options</li> </ul>
<b>DX</b>	<b>WIRES</b> <ul style="list-style-type: none"> <li>• Create and maintain infrastructure</li> <li>• Reduce losses</li> </ul>	<ul style="list-style-type: none"> <li>• Network enablement</li> <li>• Smart grids</li> </ul>
	<b>Value Driver</b> Network enablement / Network access / Quality of supply / Reliability	
	<b>RETAIL</b> <ul style="list-style-type: none"> <li>• Billing</li> <li>• Metering</li> <li>• Collection</li> </ul>	<ul style="list-style-type: none"> <li>• Behind the meter services DSM, EE, (distributed storage)</li> <li>• Net metering</li> </ul>
	<b>Value Driver</b> Network enablement / Network access / Quality of supply / Reliability	
<b>CUSTOMER SERVICES</b>	Reactive customer services	<ul style="list-style-type: none"> <li>• Enhanced customer participation</li> </ul>

- Ekurhuleni & Cape Town metro
- ~XX GW of PV Solar
- ...ing



PowerX wheel to NMBM  
Various X border in place and under investigation

Various munics are investigating and have introduced "behind the meter" services

**Products**  
Behind the meter services

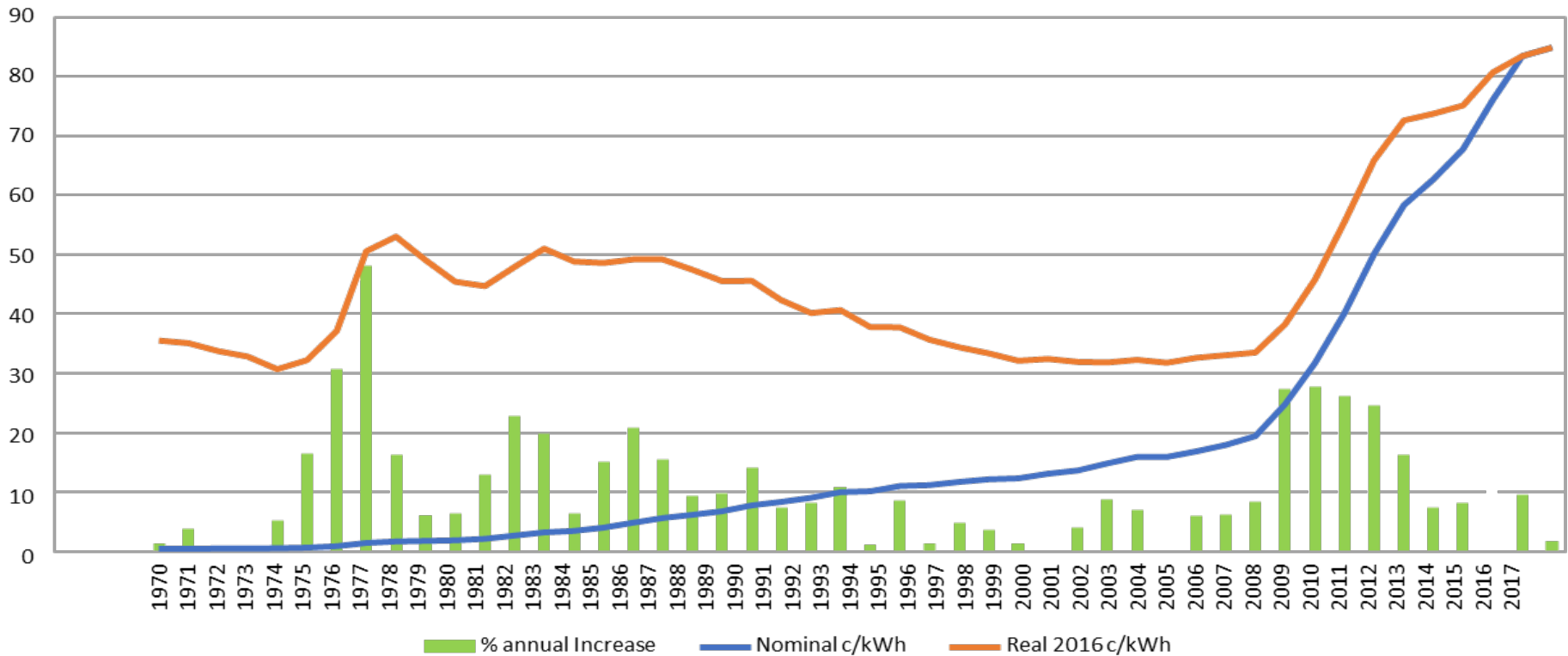
**Partners**  
Other energy related services (SWH, Gas, Solar PV, EV Battery/Storage)

Leverage Ownership of customers  
Information management

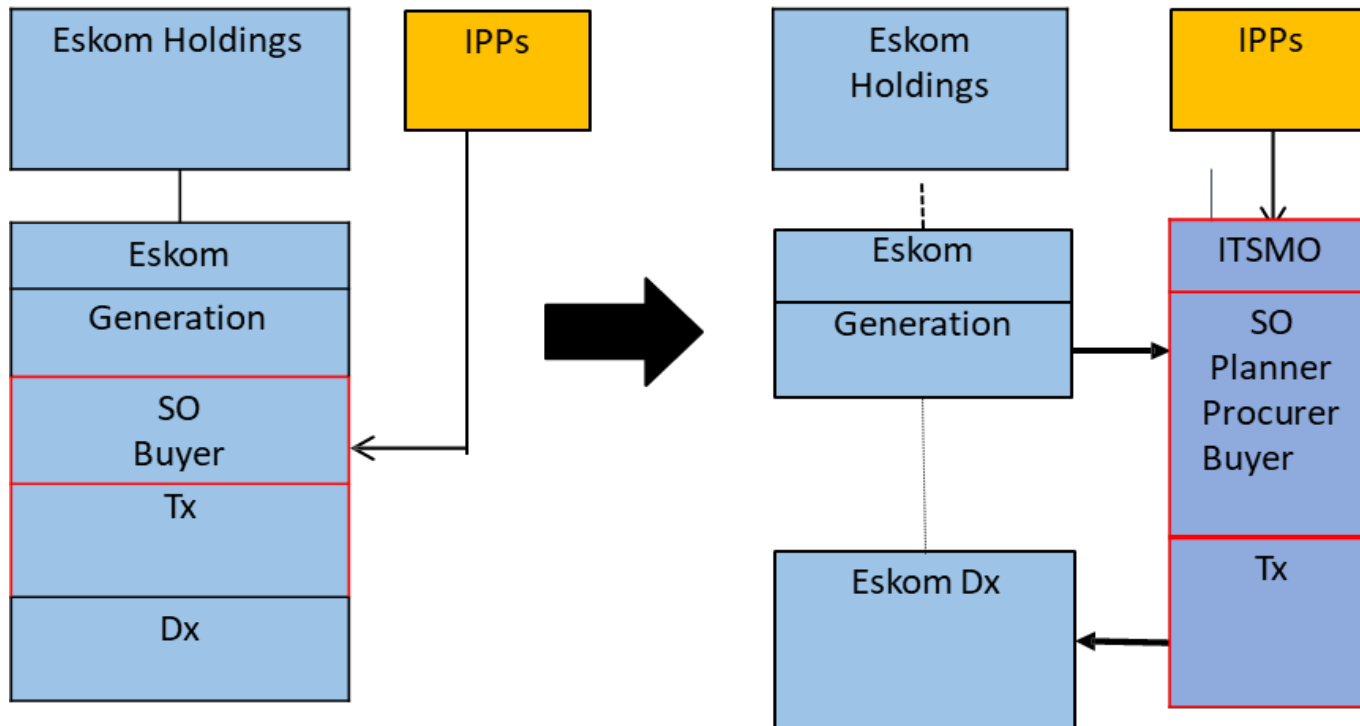
**Virtual utility:**  
Aggregator of demand

PPLV movement..

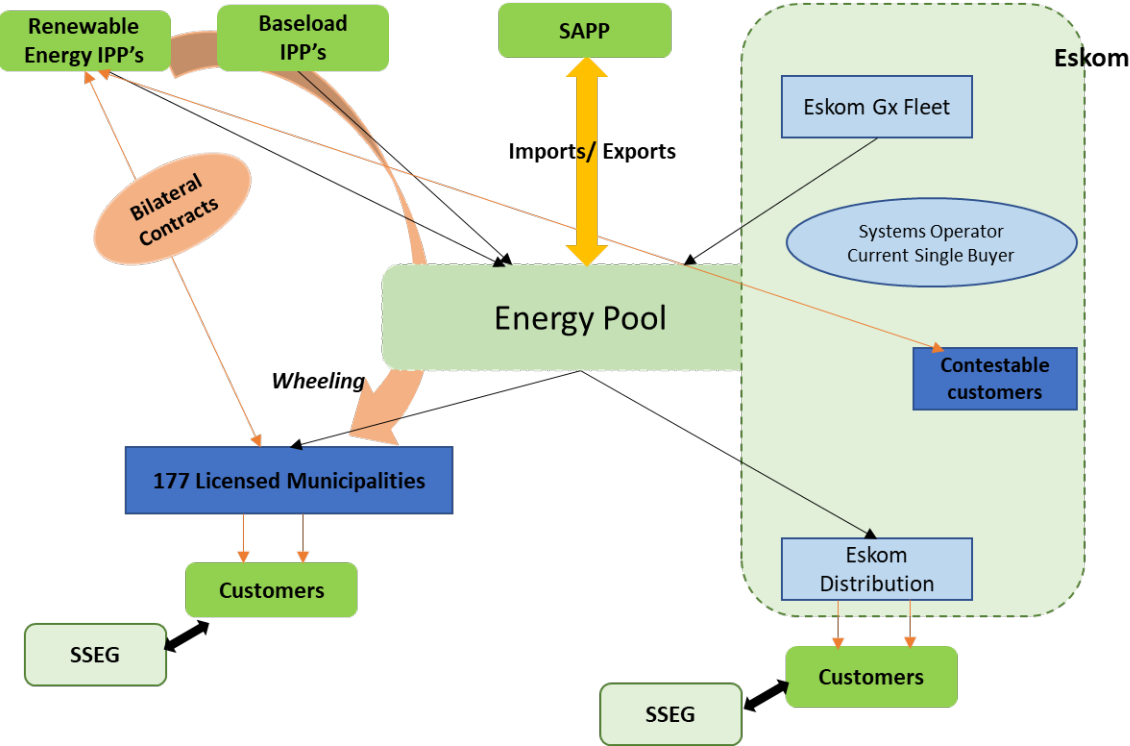
## Eskom Tariff Increase – 10 Year View (increase 4x nominal & about 3x real)



## Proposed Eskom structure (SONA interpretation)

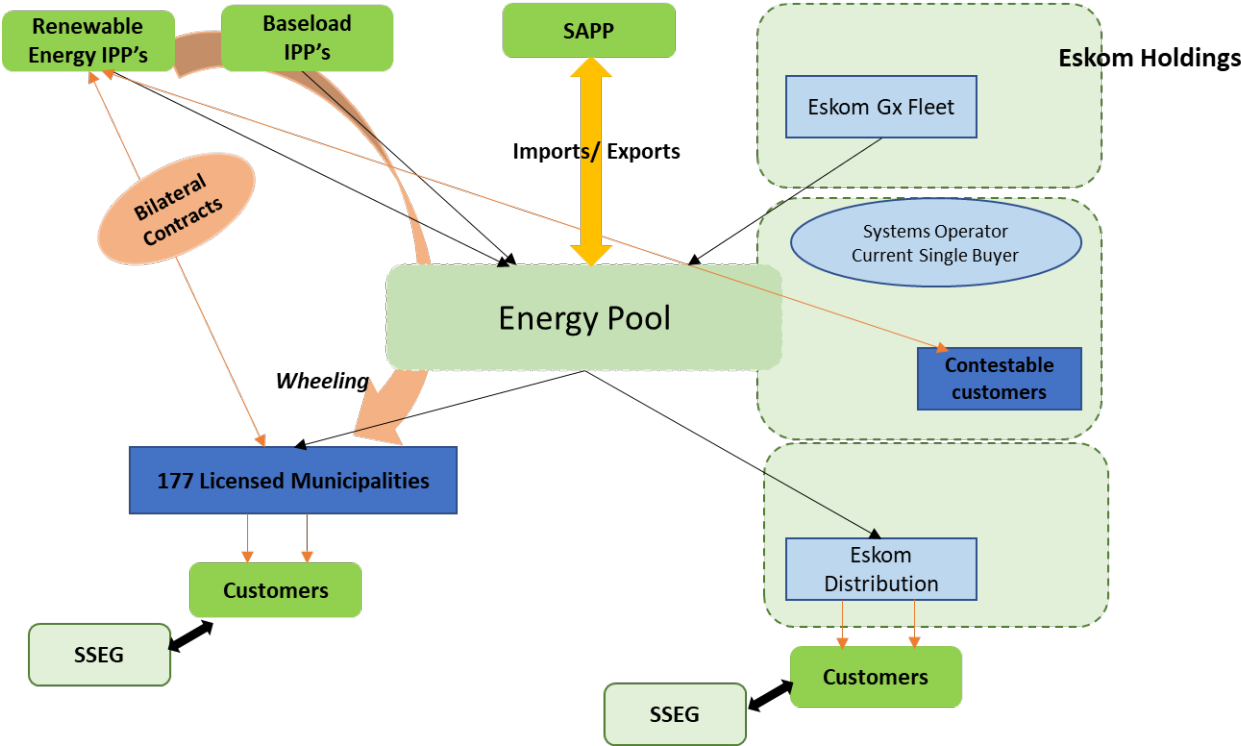


# Emerging Structures



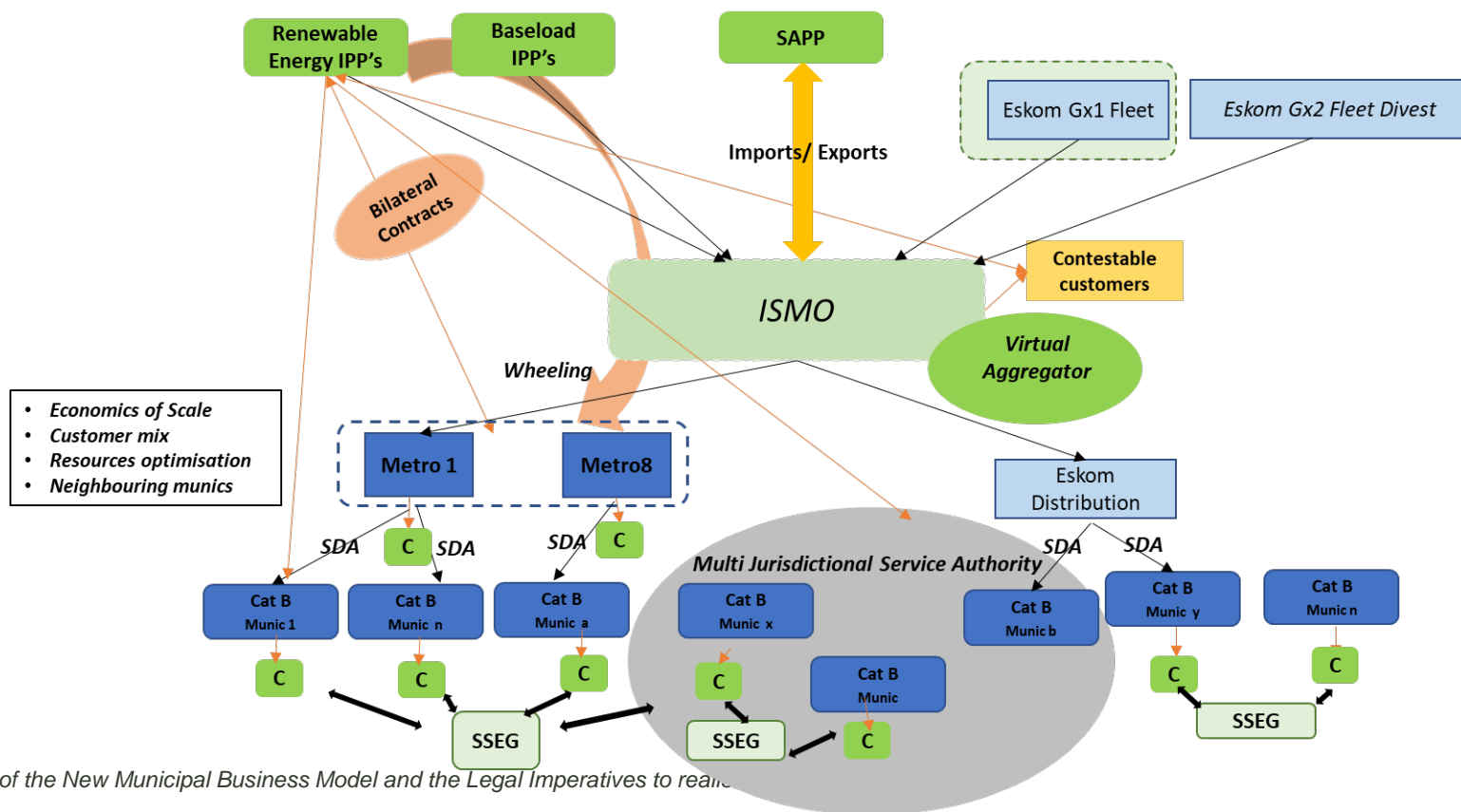
*The Dawn of the New Municipal Business Model and the Legal Imperatives to realise same*

# Emerging Structures



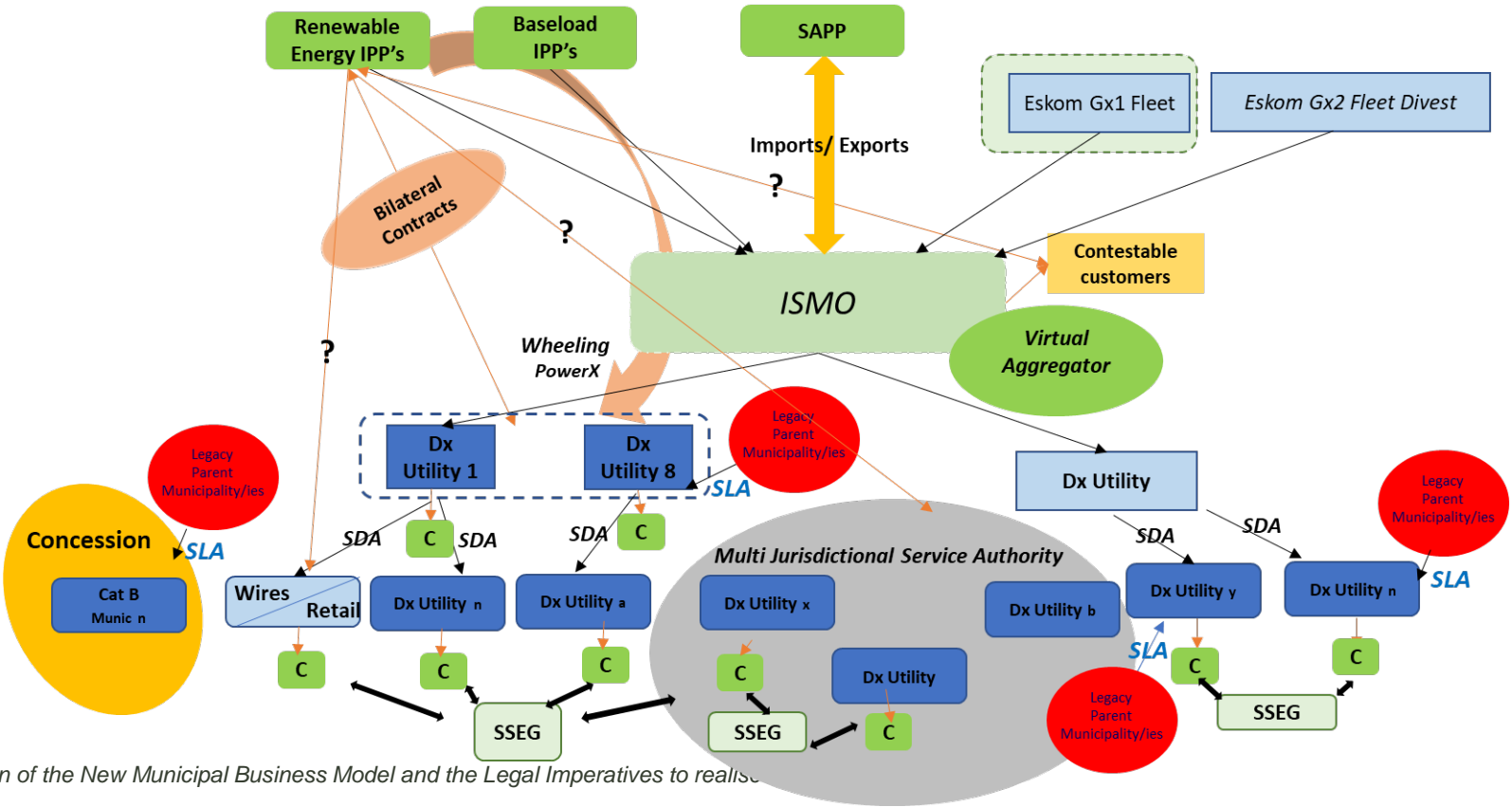
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# Emerging Structures



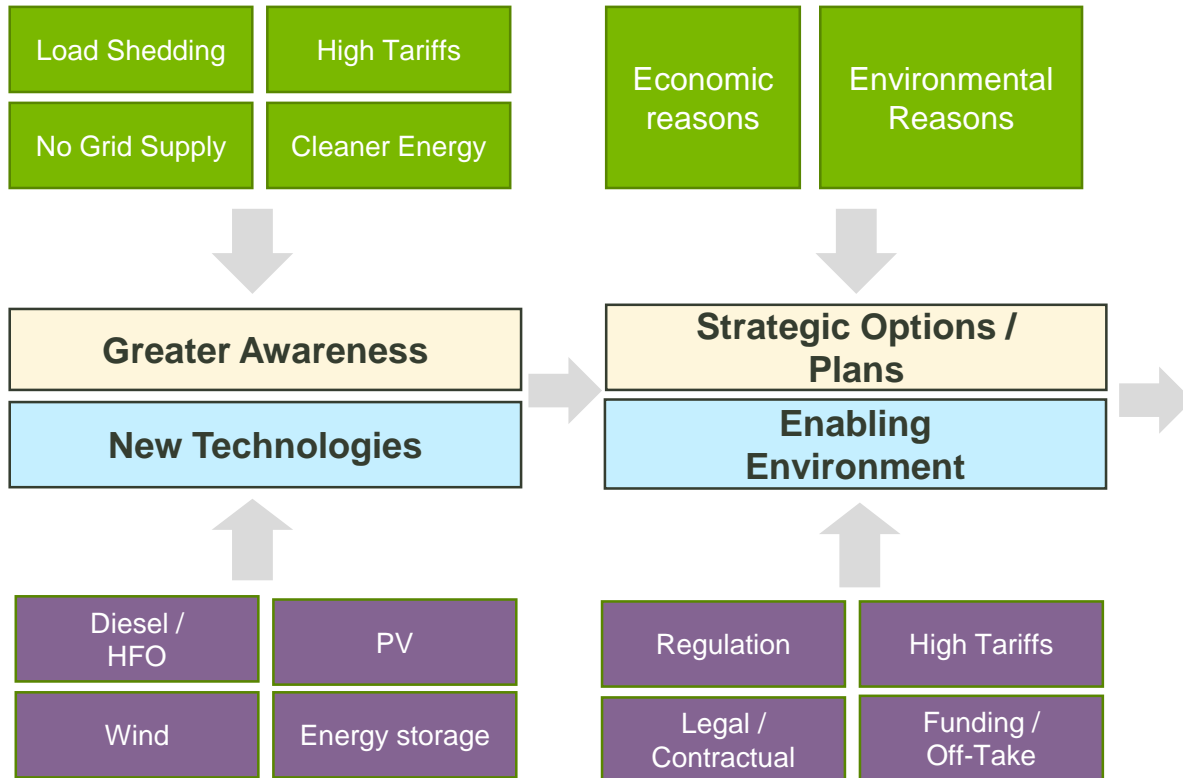
The Dawn of the New Municipal Business Model and the Legal Imperatives to reairc

# Emerging Structures



The Dawn of the New Municipal Business Model and the Legal Imperatives to realise...

## In summary



- Is becoming more **distributed**
- Increasingly **digitalized**
- Resource **mix** is becoming more **renewable & intermittent**
- Are decarbonizing
- Becoming increasingly **integrated** with other key sector & infrastructure

## At van der Merwe

### Energy and transaction advisor – Aurecon Tshwane



- *At specialises in utility management, restructuring/transformation of utilities, and legal & regulatory support to sector state entities. During his career he has served on various Governmental Commissions, Workgroups and Task teams for the ESI/ EDI restructuring, Utility Supply Regulations, Electricity and Regulatory Act amendments, ESI wholesale market reform, and submitted inputs as President of the AMEU. He was responsible for the corporatization of a municipal electricity utility in creating Centlec Pty (Ltd) and worked as GM for EDI Holdings responsible for the restructuring of the EDI in SA for the envisaged mergers between ESKOM and municipal distribution utilities. He is a professional engineer, hold a B Eng (Electrical) from Stellenbosch, B Com (UNISA), M Com (Business Economics) from the Free State University and a Government Certificate of competency. He is the author of more than 19 papers and received several accolades in the ESI in South Africa.*
- *He has 37 years of industry experience in a 24 years municipal career and 17 years Executive management as City Electrical Engineer of Bloemfontein/Mangaung/ CEO of Centlec Pty (LTD) and MD of Tanesco (Tanzania). He served as a board member of PIESA (Power Institute of East and Southern Africa), a board member of Centlec SOE, ATBLA (Apprentices Training Board for Local authorities) and served on the board of ECSA (the Engineering Council of SA). He was a founder member of the ESLC standards committee responsible for the NRS specification in SA. He has lectured tariffs for a number of years at the University of Stellenbosch as guest lectured and have developed engineering curricula for the establishment of a Faculty of Engineering at the Free State University.*

# Thank you!



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