Eskom Integrated Demand Management: The Way Forward

Presented by :
Integrated Demand Management (IDM)

Date : November 2018

The 90s and early 2000s

INDUSTRELEK
WORLD CLASS ENERGY SOLUTIONS FOR INDUSTRY

AGRELEK
ESKOM AN ADVISORY SERVICE FOR AGRICULTURE

ELEKTRO WISE
ESKOM ELECTRICITY ADVICE FOR THE HOME

ELEKTROSERVE
ELECTRICAL ADVICE FOR BUSINESS

Information and planning:
- Defined market segments
- Market information
- Customer information
- Market planning

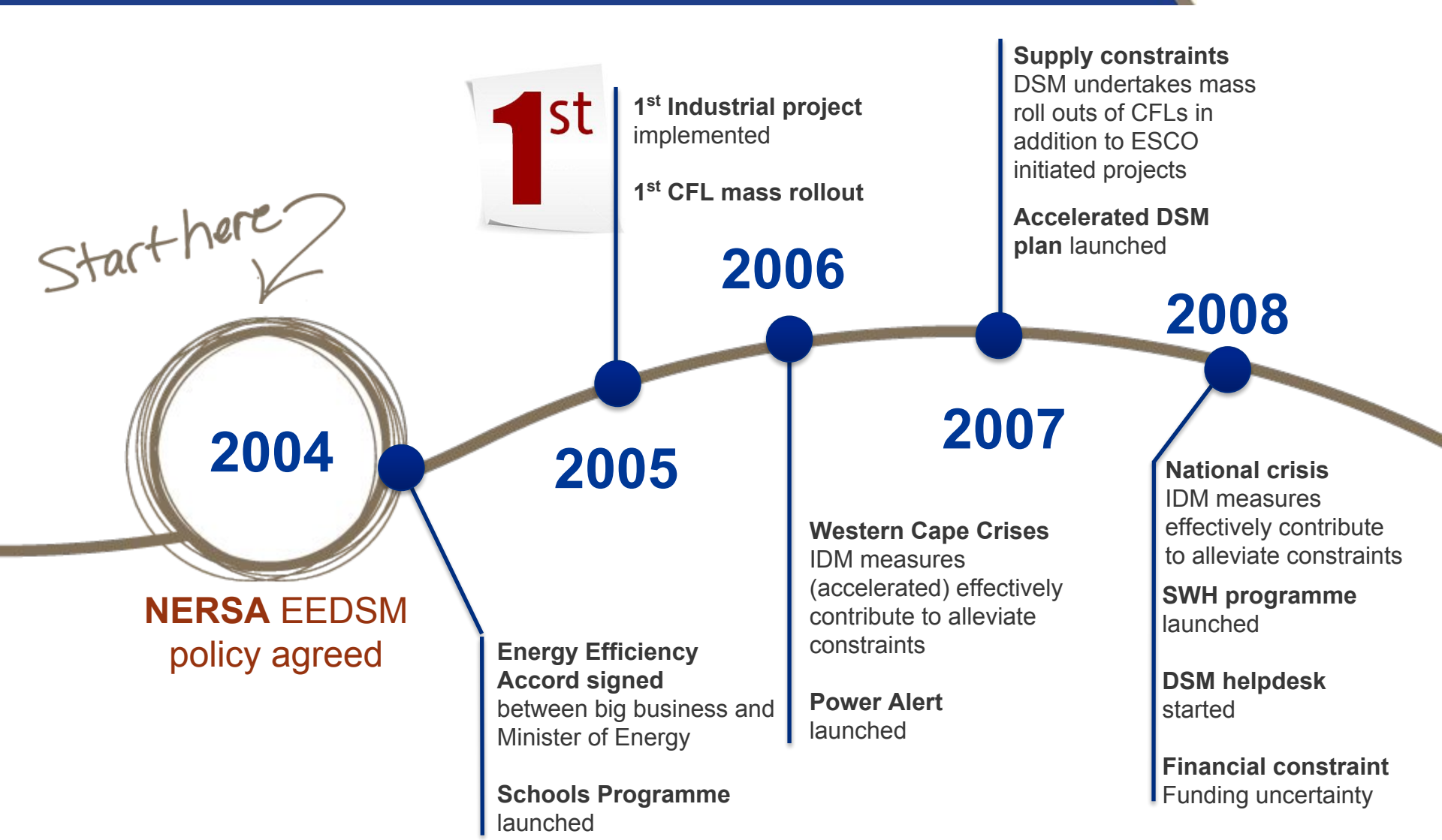
Service:
- Sales advisors
- Call centre
- Energy audits
- EUE development
- Targeted programmes per sector

Logo:
- Symbol of quality
- Had a level of awareness
- Identity and vehicle to communicate with specific market segments

Targeted Programmes to encourage load shifting and additional sales

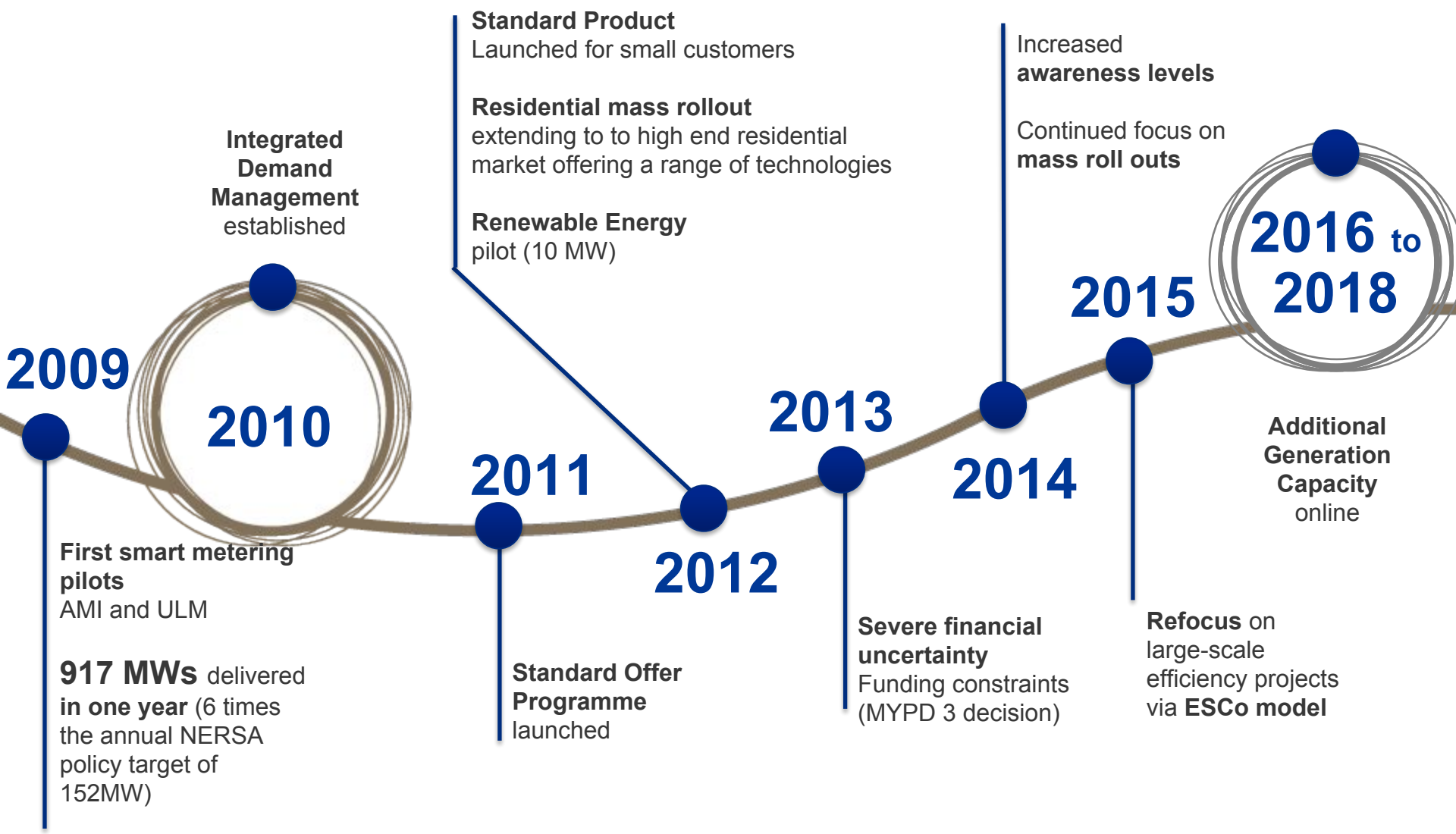
A Key Customer Relationship management approach, through Key Customer Account Executives, was adopted for Eskom Large Customers

From small beginnings to national challenges…



Consumer physic: **Blissful ignorance** **Load shedding**

IDM has demonstrated agility and resilience for more than a decade and had some fun along the way ….



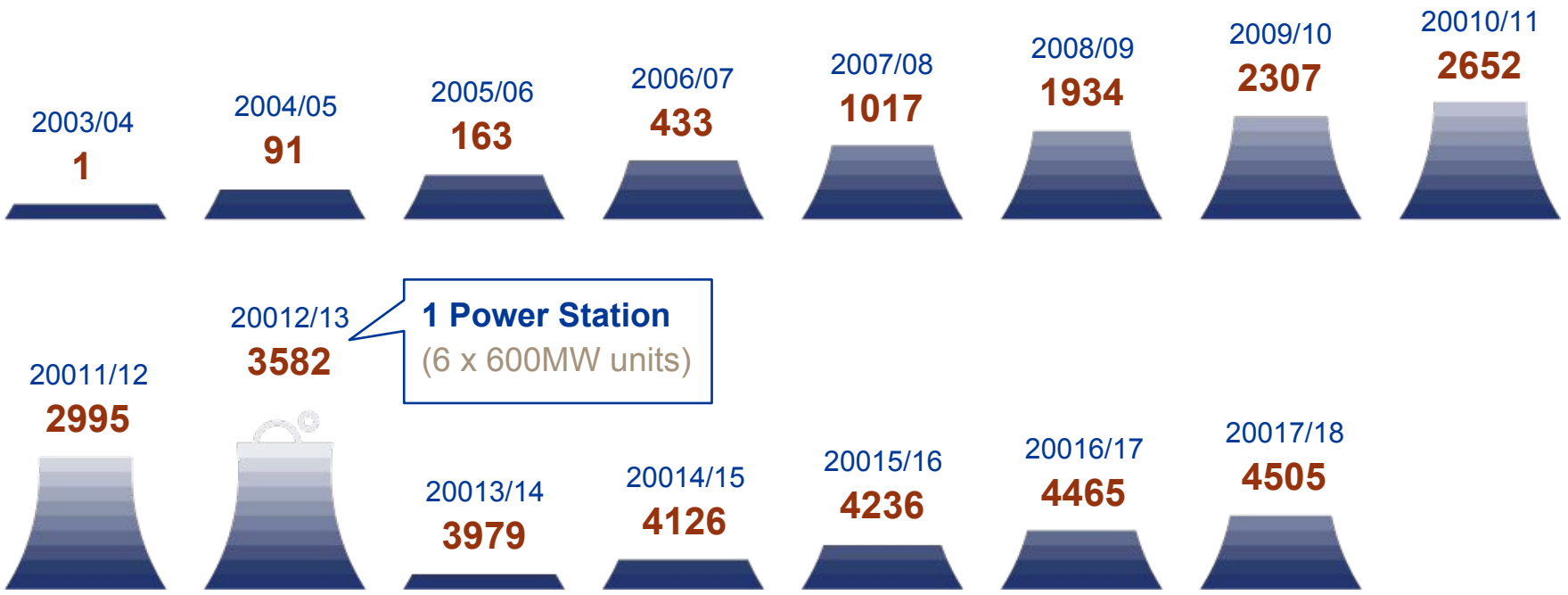
Consumer physic: **Re-orientation** **Stability**

Efficiency measures have proven to be critical for reducing pressure on the power system

Once implemented, energy efficiency interventions are in place for the duration of the **technology life**, allowing savings 'capacity' to be built over time. Since inception, IDM (DSM) initiatives have effectively displaced the equivalent **capacity of an average power station in SA**.

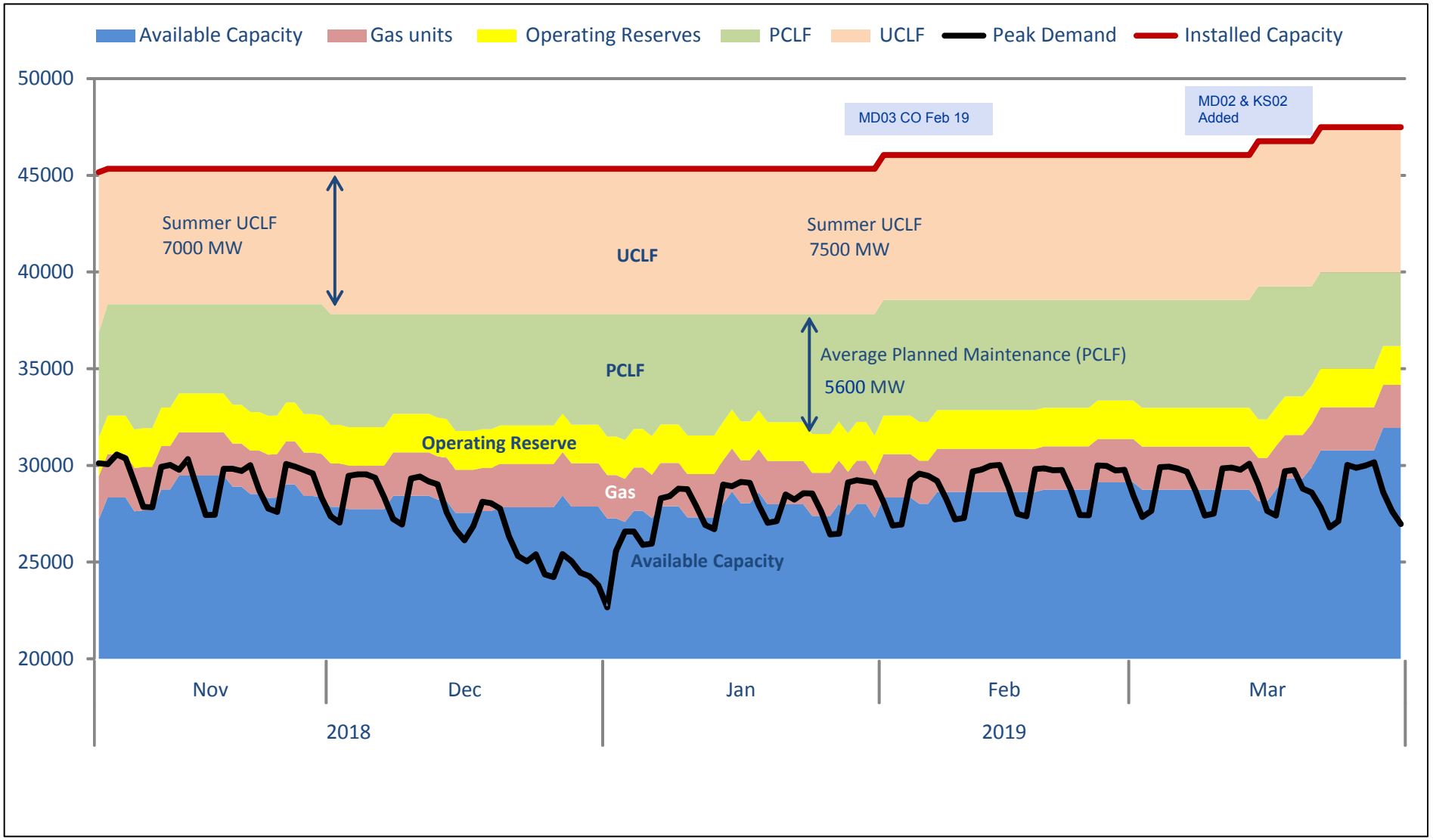
IDM **cumulative** capacity performance over time

Measured in MW



Measured and Verified capacity savings as at Financial Year End 2018, provided by Integrated Demand Management PMO

Capacity Outlook Until March 2019

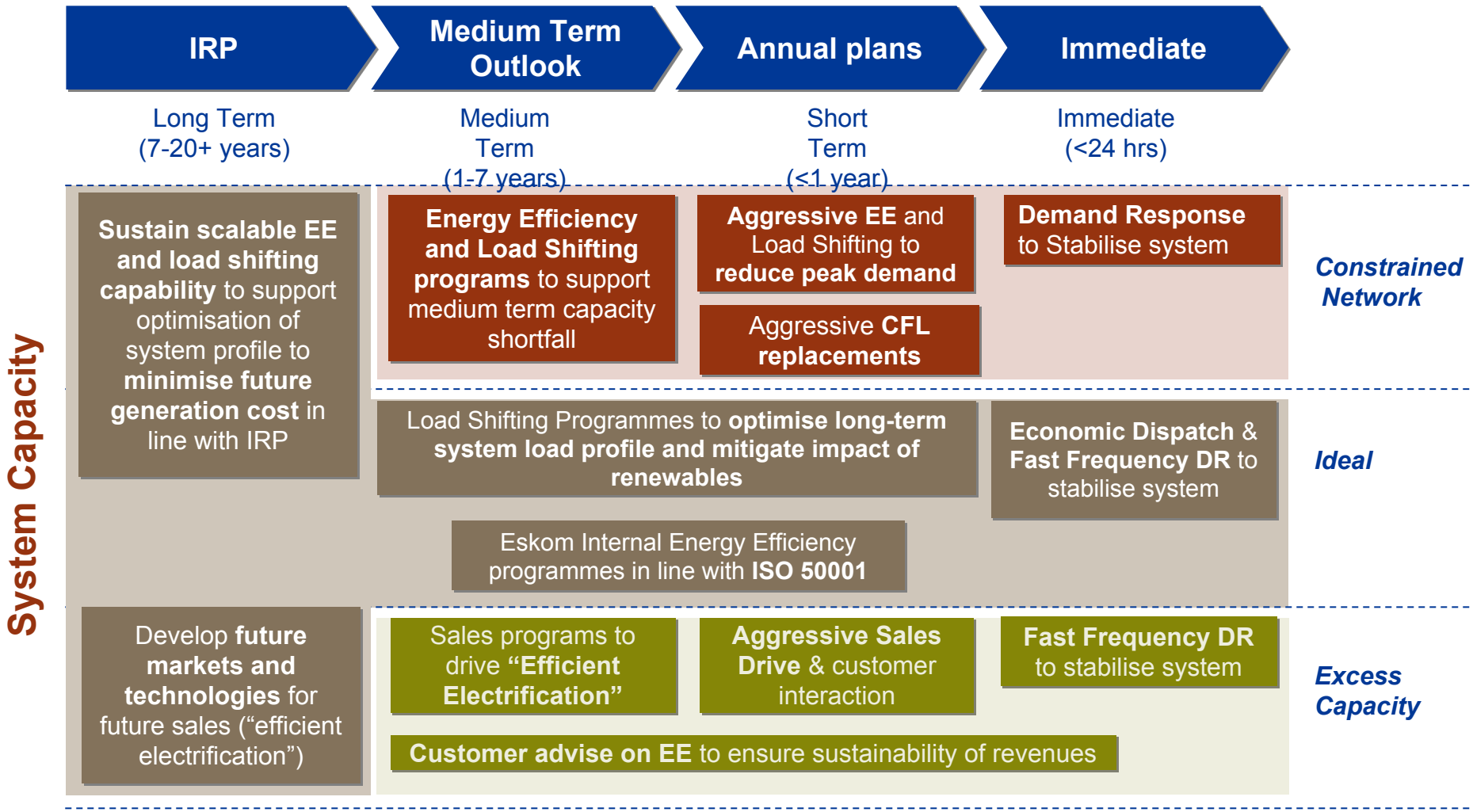


Source: Tetris Plan V4.36 – 05 November 2018

Strategic questions

- How do we manage the **perceived conflict** between **optimised energy consumption** and Eskom's **drive to increase sales**?
- How do we motivate for **investment in long-term benefits** towards an optimal **long-term system load profile** in a financially constrained environment?
- What will **renewable generation** do to supply and demand balance and what can be done to mitigate the **impact on the system**?
- How can we make sure that we **sustain the capacity** to do energy efficiency? The **balance in the demand and supply situation is cyclical** and it will again be required in the future.
- How can the IDM solutions development **skills** be utilised to **drive additional, efficient sales?**
- How can we **mitigate against an increasing residential peak** and avoid impacting the economically productive sectors?
- How do we ensure that the IDM programme is **robust and adaptable** to sudden changes in the demand and supply balance?
- How do we influence **NERSA's perspective** on the role of the IDM programme in managing the electricity system during excess capacity periods?

IDM focus depends on state of the system and the required response time



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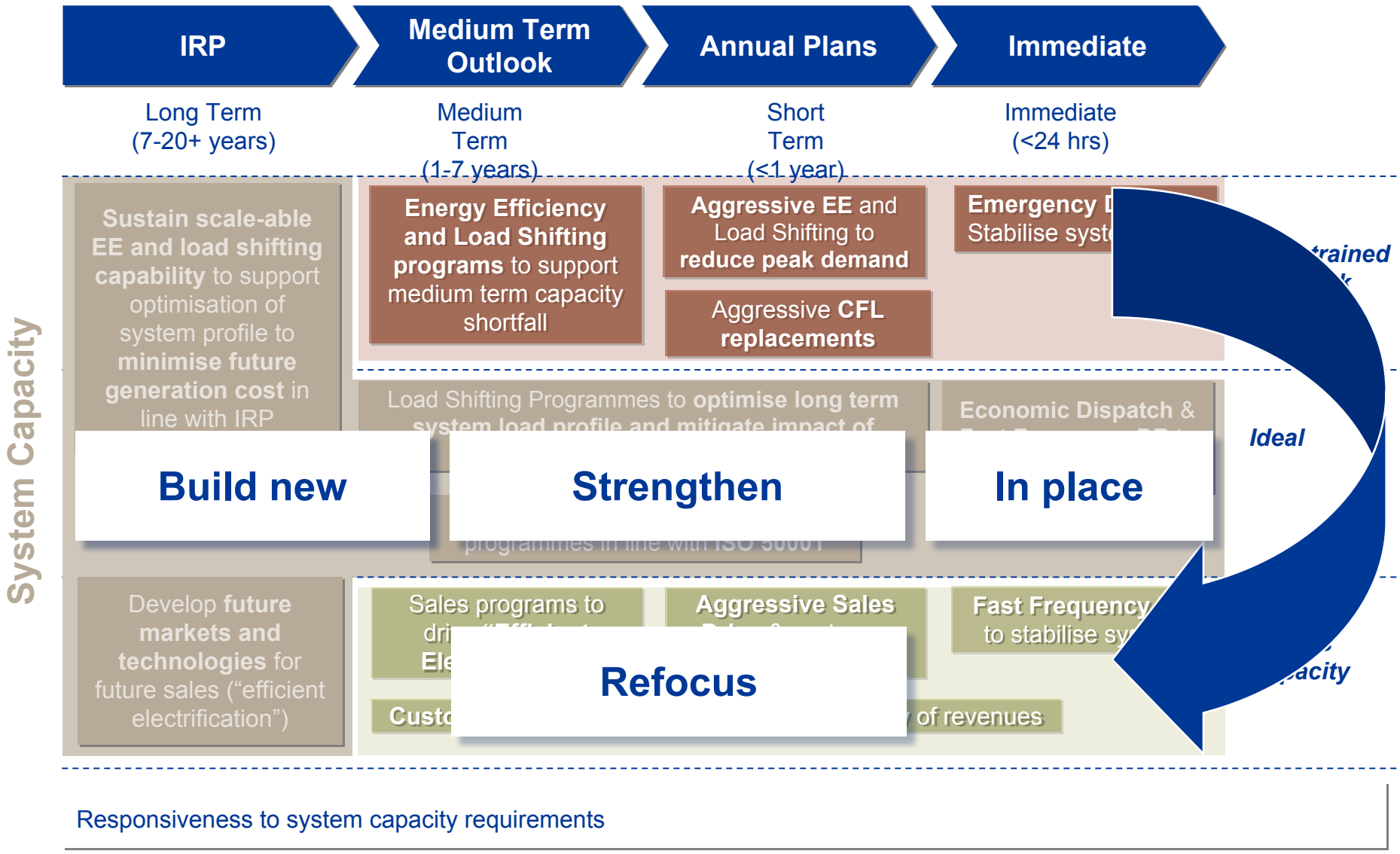


Responsiveness to system capacity requirements

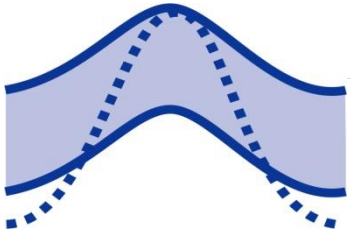
The current focus is to optimise the load profile to allow for additional baseload sales

Profile

System load optimisation

- Get customers to **shift load to off-peak**
- **Reduction in the customer's bill for** using electricity in cheaper periods
- Optimise **long-term system profile** to reduce the long-term cost of Generation

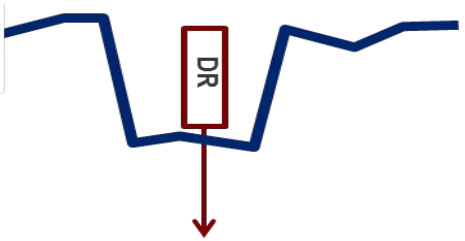
Demand



Increase sales

- Use the space created from load optimisation to increase **high load factor (24/7) sales**
- Additional sales result in **recovering fixed cost and reduce cost per unit**

Flexibility



Demand response

- Incentivise **customers to reduce demand** when system is constrained
- **Economic dispatch** to reduce OCGT cost
- **Fast frequency response** to protect the system to cope with increased renewables

Increase base sales and at the **same time assist the System Operator** to maintain a **healthy demand-supply balance** by changing customer usage profiles

Functional areas

System load optimisation

- Get customers to **shift load to off-peak**
- Optimise long-term system profile to reduce the long-term cost of Gx
- Peak load reduction of **>3600MW** achieved to date = 1 large power station

Expert advice

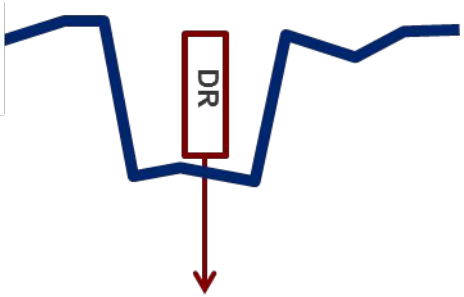
- **Advise customers** on efficient use of electricity
- Drive **additional sales**
- Focus **"beyond the meter"**

Solution development

- Develop **Sales Products**
- **Rebate programmes** to increase sales
- Programmes to **unlock new connections**

Marketing

- M**arket IDM programmes**
- **Schools education** programme
- **Real time system status** reporting
- Media engagement and monitoring



Demand response

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Energy efficiency

- Large scale energy efficiency programmes when required
- Implemented **70 million CFLs**
- **Internal** Energy Efficiency

IDM assists the System Operator to maintain a healthy demand-supply balance by changing customer usage profiles to support an optimal system load profile

Eskom is pursuing a comprehensive solutions portfolio to stimulate economic growth

Incentivise incremental sales

Providing financial incentives for sales in addition to setting historical baseline consumption

The Offer: Additional bulk sales incentive for ±150 largest industrial customers

Boiler Incentive: Incentivise customers to **switch from fossil fueled to electric boilers**

Generation Displacement: Use rebates to **dis-incentivise self-generation to** increase sales / grow the market

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Unlock new connections

Facilitating the process for customers to get connected to the network

Interruptible Supply: Provide contracts **on constrained networks**

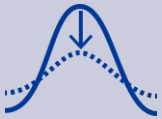
Manage Constrained Networks: Relieve by installing **PV / Battery Storage / DR**

Self-Build: Customers **build own connection** in shorter time and at at less cost

Reduce "Punitive" Charge: Allow **paying off** connection fees + **reduce cost of** deposits, tariff conversions and NMD changes

Expert advice

Providing technical support to facilitate additional use of electricity



Load Profile Optimisation: to **effectively use energy** within **available capacity**

Alternative Funding: Government incentives and grants can be **leveraged** to start **new businesses**

Energy Efficiency: Incentives and grants can be **leveraged** for the establishment of **new businesses** and to **stimulate economic activity**

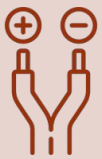
Strategic initiatives

Developing new market and technologies to sustain and increase future sale

Transport Electrification: Promote conversion to electricity

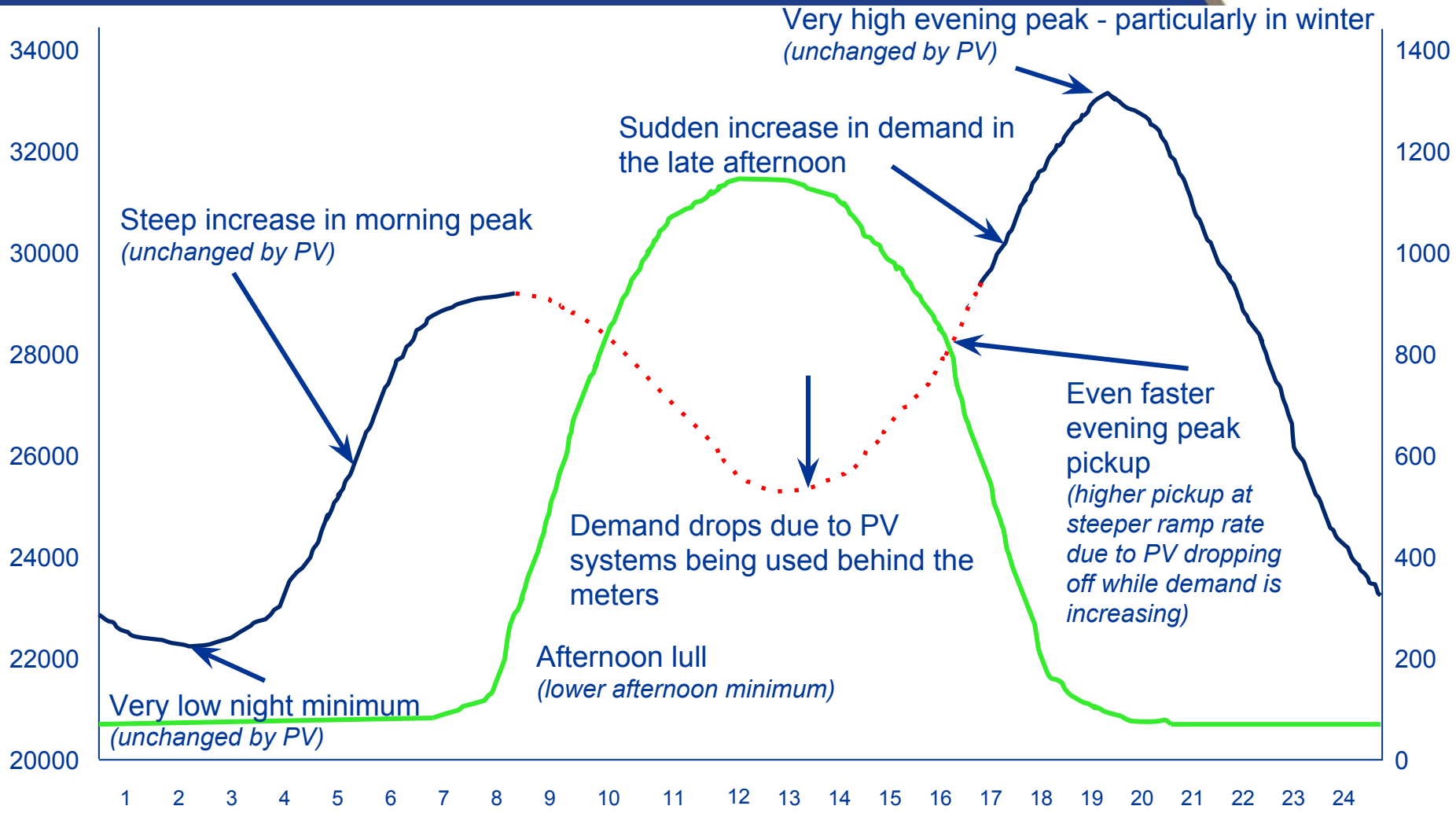
Renewables: Offer customer-based renewable solutions and green tariffs

Storage: Provide storage in conjunction with renewables for security of supply and premium connections



System Optimisation: Long-term load profile optimization to reduce future cost of supply

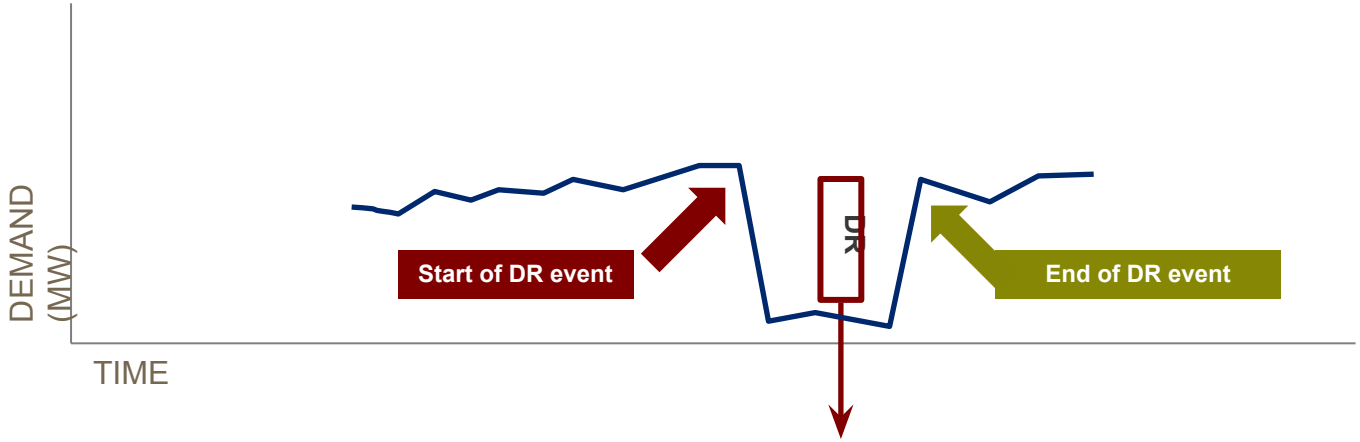
Demand Response: Evolving demand profile - showing the effects of PV



Combined effect of **the reducing supply from PV systems** in the late afternoons and the **quick pick-up in peak demand** leaves the **system vulnerable** for short period – **Demand Response** can **assist in stabilising** the system during this period

Demand Response: Offers system flexibility / ad hoc dispatch when most needed

Eskom's Demand Response (DR) Programme, known as the Virtual Power Station (VPS), has been an **integral part** of the services employed by the System Operator (SO) to **monitor, control and operate the national power network in a safe, economical and reliable manner since 2006.** The Certified[1] Demand Response Capacity offered by customers for rapid demand reduction has been significantly increased since 2010.



Capacity (MW)	2011 FY	2012 FY	2013 FY	2014 FY	2015 FY	2016 FY	2017 FY	2018 FY
	699	767	753	948	1 330[2]	1466.2	1267	1296

Note 1: Certified capacity is the proven (on one or more occasions) capacity in MW that can be reduced and sustained by the participating customer.
Note 2: Includes instantaneous DR (892 MW) and supplemental DR (369 MW).

Demand Response: Change in future focus to a more flexible lever along the DR continuum

Initiative:	Description:
Emergency Demand Response	• Consider **variable rates based** on customer participation – **frequency and duration**
Residential Demand Response	• Municipalities have ripple control systems to manage **geyser load** • Munics benefit in terms of Eskom TOU tariff • Partnering agreements with aggregators
Aggressively expand Demand Response solutions to large customers	• **Aggressive marketing** of DR to large **municipal customers** • Sign up **municipal own load** - compensation **against outstanding debt**
Wider and/or deeper participation by Eskom Top 500 customers	• **Increase volume** of DR **to current DR base** • Marketing focus on the customers within the **Eskom Top 500** that do not participate in DR.
Non-Dispatchable Demand Response	• **Planned and scheduled** Demand Response for fixed period and fix rates

Solution: Alternate Funding

Government incentives/grants for businesses and economic growth

Eskom

Five Government Tax Allowances (discounts on tax payable) and Grants (cost sharing non-refundable, tax-free cash payments) encourages growth in SA

Win-Win Partnerships:

The Eskom **objective(s) when using the Incentives and Grants** are to inform customers who can potentially use this incentive to:

- Establish **new operations or businesses** (Greenfields) with efficient electrical technologies and processes;
- **Expand existing operations** with more efficient electrical solutions;
- Convert from **other energy sources** to more efficient electrical solutions; and,
- Install and use efficient technologies and processes to decrease electricity use **during specific** times of the day when electricity demand is high on the Eskom network.
- **Specialist Consultants** available for support.

Opportunities:	More Information:
12L Tax Allowance Supporting businesses that use energy efficiently and invest in modern, energy efficient equipment	SANEDI at 011 038 4300 Internet search 12L Tax Allowance
12I Tax Allowance Supporting Greenfields (new industrial projects that utilise new manufacturing assets) and Brownfields (expansions or upgrades of existing industrial projects)	DTI at 012 394 1069 Internet search 12I Tax Allowance
Critical Infrastructure Programme (CIP) Supporting the construction of critical bulk infrastructure as a measure to stimulating investment and business growth	DTI at 012 394 5827 Internet search “Critical Infrastructure Programme”
Agro-Processing Support Scheme (APSS) Supporting investment in businesses that specialise in agro-processing and agro-beneficiation	DTI at 012 394 1618 Internet search “Agro-processing Support Scheme”
Aquaculture Development and Enhancement Programme (ADEP) Supporting investment in businesses engaged in primary, secondary and ancillary aquaculture activities in both marine and freshwater environments	DTI at 012 394 5815 Internet search “Aquaculture Development and Enhancement Programme”

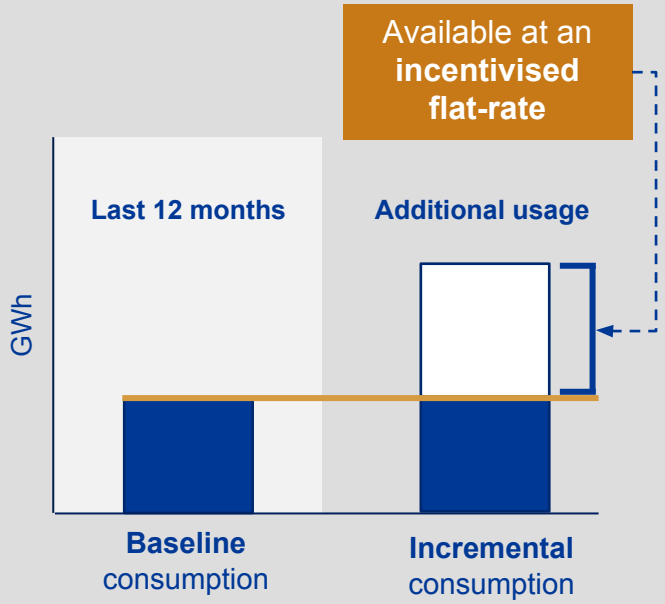
Grants and incentives are not administered by Eskom.
Full details are available from the relevant organisations.

Solution: The Offer Pilot Programme

Incentivised rates to large customers for additional electricity usage

The incentive will offer additional electricity usage to large customers at a lower effective rate, within the framework of existing tariff structures.

Concept principle(s):



Available to:

Customers with ~100GWh/a consumption

Eskom or Municipal customers

2-year commitment

Increased usage of 25GWh per annum

Available for a maximum of 500MW

Benefits:

- An effective flat-rate enables even production schedules during all tariff periods
- The incentive rate will be lower than average rate currently paid
- Growth in electricity sales will reduce unit cost of electricity and curb future tariff increases
- Additional production, economic activity and job creation supports the national economy

There is a need to move towards specialised pricing arrangements to target sales in specific economic sectors

Electric mobility: Promote conversion to electricity-driven technologies

Eskom

Electrical solutions for people transportation and bulk materials handling (conveyors, hybrid haulage trucks, electric rail networks) are increasingly cost competitive compared to conventional alternatives and considerably cleaner

Concept principle(s):

E-mobility is globally gaining traction as a preferred mode of transport and materials handling.

The rise of **low cost renewable energy** and **price and technology advances with batteries** is contributing to rapid growth in this industry.

EVs contribute storage capacity on the electricity network, complementing a **diversified energy mix** with a larger % of Variable Renewable Energy

Of interest to:

Customers concerned with the total life cycle cost of vehicle ownership

Materials handling where cost of liquid fuels is a concern

Large vehicle fleet owners concerned with carbon tax

Cities interested in addressing air quality

Eskom offers expert advisory support

Benefits:

Lower carbon footprint resulting in lower carbon tax

No local air or noise pollution

Improved energy security due to a diversified energy mix (locally produced electricity vs imported fuel)

Very **low maintenance costs** due to fewer components

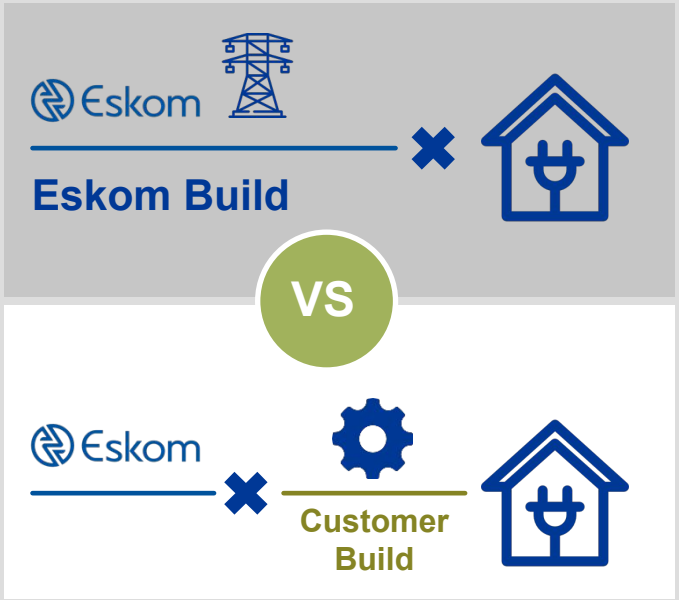
Economic benefit of lower fuel costs due to lower imports

Eskom is supporting the **national drive towards electric transportation** in the interest of sustainability, localisation, efficiency and reduced reliance on imported fuels

The **self-build** option allows a business customer to build their own network connection

Offers customers the option to build their own electricity connection, using Eskom-approved contractors, service providers and suppliers, where they can deliver it more cost and time effectively

Concept principle(s):



Note 1. Go to http://www.eskom.co.za/CustomerCare/NewSupply/Pages/SelfBuild.aspx and https://scot.eskom.co.za for further details and application forms

Available to:

Both existing and new customers

Any business in the commercial, industrial and agricultural sectors

All self-build project applications will be considered irrespective of the size of supply requested

Benefits:

- Customers are able to manage their electricity supply requirements more effectively
- Customers are able to control the timing and, to a greater extent, the cost of their connection(s)
- Gain faster access to an electricity connection
- Expedite production increases by switching on and powering new or expanded business operations sooner

Facilitating connectivity to the national power grid is a measure to support an increase in productive output and stimulate economic growth

Eskom's commitment to implement energy efficiency in-house, is paying off

Eskom's Internal Energy Efficiency Programme was initiated in **2009** with the objective of **saving energy on non-essential[1] load.** More recently, the **focus expanded** to include **all Eskom operations[2]**.

Past focus | non-essential load[1]

15% energy savings target

Target
35 GWh
by 2015

Baseline
reference year
(236 GWh)

Interventions include energy efficient **water heating** (SWH and heat pumps), **lighting** system retrofits and **occupational sensors**, energy efficient **HVAC** systems, new efficient lifts and escalators and **solar PV** installations.

27% savings already achieved

Verified savings at December 2014 already delivered
65.78 GWh

Future focus | Eskom-wide[2]

Policy review to include **all energy carriers and loads**

Strategy to achieve energy savings and reduce operational costs in **all facilities** and **processes**

Energy management system to **effectively manage** and **report** savings

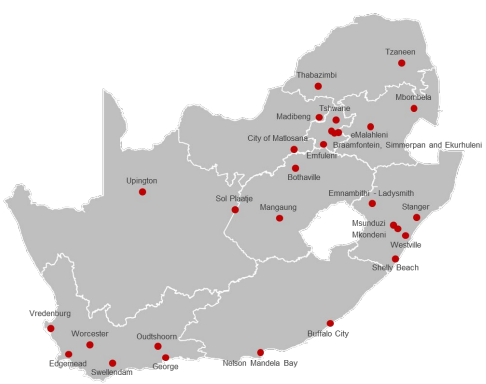
2009 — **FY 2014/2015**

Achieving the same or more, with less energy use
resulting in **decrease in cost of supply, emissions and water consumption**

Note 1. The 2009 – 2015 shareholder compact focused only on savings in Eskom non-essential loads. Non-essential energy consumption is defined as energy consumption that excludes energy in the thermodynamic cycle. It can further be explained as energy used in buildings, depots, service centers, etc.
Note 2. The intended approval process is as follows: Review and update the policy; approve strategy; implement strategy (engage leadership, create business unit work groups, identify opportunities, prioritise opportunities, investigate solutions, implement or fast-track quick hits, manage/adjust programme and report impacts.

Regional energy services: Continuing with a strong **marketing** focus

We have ±65 Customer Advisors, geographically placed, engaging directly with the customers



Note: Indicative map locations, not positioned with a GIS system

Location	# of advisors
Braamfontein	3
Bothaville	1
Buffalo City (East London)	1
City of Mtlosana (Klerksdorp)	3
City of Tshwane (Pretoria)	4
Edgemead (Cape Town)	6
Ekurhuleni (Boksburg)	3
eMalahleni (Witbank)	0
Emfuleni (Vereeniging)	1
Emnambithi - Ladysmith	1
George	1
Klerksdorp	3
Madibeng (Brits)	1
Mangaung (Bloemfontein)	7
Mbombela (Nelspruit)	1
Mkondeni	3
Msunduzi (Pietermaritzburg)	3
Nelson Mandela Bay (Port Elizabeth)	2
Oudtshoorn	1
Shelley beach / Margate	3
Simmerpan	1
Sol Plaatje (Kimberley)	2
Stanger	1
Swellendam	1
Thabazimbi	1
Tzaneen	1
Upington	1
Vredenburg	1
Westville	5
Worcester	2

Energy services advisors offer a wealth of knowledge to Promote offerings to customers

MARKET FOCUS:
Commercial, industrial, mining and agricultural sectors

COST:
available at no charge

Equipped with a 7 module **Energy Management Information Pack** to guide the development and implementation of an energy management plan and measures

Advisors leverage off their Marketing and Branding experience during the Eskom growth phase in the 90s

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Targeted Programmes to encourage load shifting and additional sales

A Key Customer Relationship management approach, through Key Customer Account Executives, was adopted for Eskom Large Customers

Advisors use a set of Products, many with unique Pricing characteristic to drive additional sales

Incentivise incremental sales	Unlock new connections	Expert advice	Strategic Initiatives
Provide financial incentives for sales in addition to setting historic baseline consumption	Facilitate the process for customers to get connected to the network	Provide technical support to facilitate additional use of electricity	Develop new market and technologies to sustain and increase future sale)
The Offer: Additional bulk sales incentive for ±150 largest industrial customers	**Interruptible Supply:** To provide contracts on constrained networks	**Load Profile Optimization:** to effectively use energy within available capacity	**Transport Electrification:** Promote conversion to electricity
Boiler Incentive: Incentivise customers to switch from fossil fueled to electric boilers	**Manage Constrained Networks:** Relieve by installing PV / Battery Storage / DR	**Alternate Funding:** Government incentives and grants can be leveraged for new businesses	**Renewables:** Offer customer-based renewables solutions and green tariff
Generation Displacement: Use rebates to disincentivise self-generation to increase sales / grow the market	**Self-Build:** Customers build own connection in shorter time, at less cost	**Energy Efficiency:** Incentives and grants can be leveraged for establishment of new businesses and stimulate economic activity	**Storage:** Provide storage in conjunction with renewables for secure supply and premium connections
	Reduce "Punitive" Charge: Allow pay off connection fees + reduce cost of deposits, tariff conversions and NMD changes		**System Optimisation:** Long-term load profile optimization to reduce future cost of supply

Looking Forward … Immediate Focus

- Driving **energy efficient sales** in support of economic development
- Developing **future electricity markets**
- Utilisation of **PV and battery storage** in market focussed solutions
- **Shifting of load** to optimise the long term system load profile and manage the impact of renewables
- Developing **Demand Response** solutions in the **residential** market
- More extensive, customer focussed **Demand Response Solutions.**