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Preparing for the future of energy: Overview of SEM

Leila Mahomed Weideman
Director: Sustainable Energy Markets

Energy & Climate Change Directorate
2019

Making progress possible. Together.

Context

The world we operating in

* Falling tech costs: RE competitive * Rapid tech dev eg storage, EV, blockchain, IoT * Climate Crisis * Utilities moving to wires & grid balancing business * Move from centralized to distributed, & competitive market system * A more aware consumer, wanting choice

Eskom restructuring & financial constraints * Loadshedding * Policy gap & vacuum * Carbon Tax Act * LNG push

City reliance on electricity revenue * Aging infrastructure * Utility death spiral as customers go off or partially off grid as tariffs increase * Carbon targets * Increasing unemployment and poverty

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Characterized by Rapid Change & Uncertainty

Current challenges facing EDI in SA

The challenges facing the Electricity Distribution Industry (EDI) in South Africa and the changing energy landscape globally to a decentralised and increasingly unbundled, market driven, distributed energy system means that an alternative business model for local government utilities needs to be explored and established. The City has to increasingly deal with the challenges of

- Reduction in electricity sales
- Customer retention
- Increasing tariffs above CPIX and customer's ability to pay
- City's growth in subsidised services
- Electricity bulk supply constraints (resulting in possible load shedding)
- Challenges associated with carbon emissions targets, the climate crisis
- The impact of energy efficiency, renewable energy and new technologies on existing systems and models

Energy & Climate Changes Directorate's SDBIP 2019

The response – institutional changes and innovation incubator

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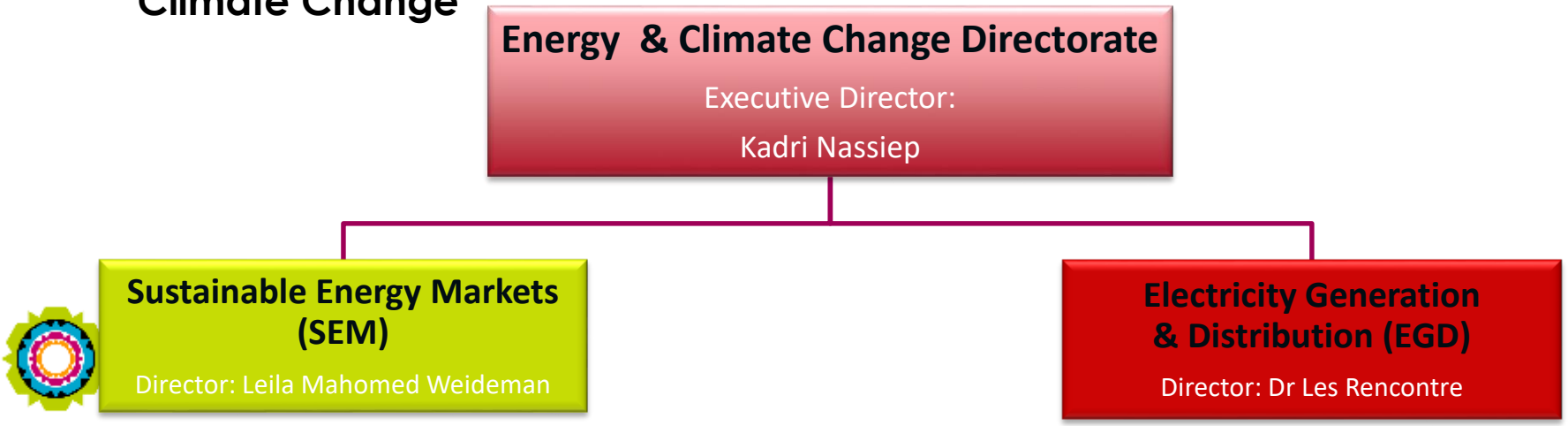
Creation of SEM: direct response to the transition and required innovation

- In order to put the necessary new emphasis on cleaner and more sustainable energy, the City created a **Sustainable Energy Markets Department in mid 2017 under the new Energy Directorate** as part of ODTP process.
- Important shift in the City's thinking around energy - moving away from only operating as an electricity distributor and **starting to explore options to generate and diversify the City's energy supply, as well as drive innovation in this sector.**
- **New Dept** brought staff working for many **years on green energy and climate mitigation** into one team and made provision for more skills and capacity to deliver on ambitious targets
- End of 2018 the Directorate's name was amended by Council to **Energy & Climate Change**



Mandate of Sustainable Energy Markets

100% • Clean • Accessible • Reliable • Equitable • Safe

To work towards **energy security and energy diversification and to drive innovation in energy supply** in the City.

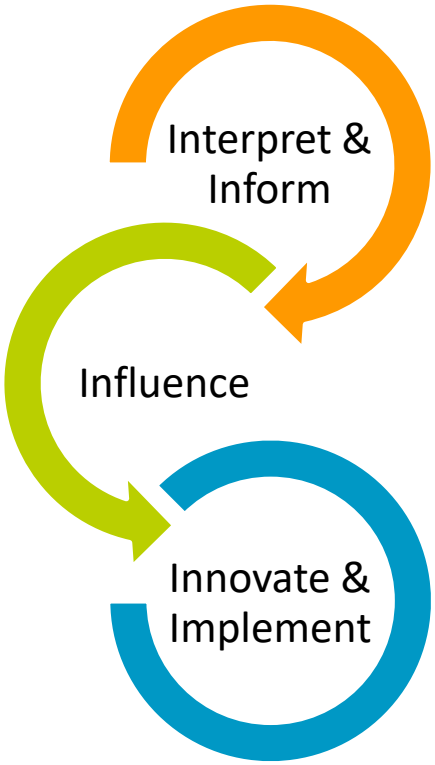
To address how the City **can provide / support access by low income households** to the best possible energy services which are sustainable, lower in cost to all parties, cleaner, and offer choice and flexibility.

To co-ordinate and drive the **City's climate change mitigation and transversal work**, towards adoption of ambitious, evidence-based climate actions plans and to accelerate implementation of transformative climate actions.

IDP 2017 - 2022 :

- Clean energy supply
- Energy efficiency in City operations
- Carbon emissions reduction
- Reducing energy poverty for the poorest households
- Reducing City's reliance on electricity sales

Our role: The 3 I's towards change



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Innovation & Change can be an uncomfortable space

Our team

Small team:

- 23 staff members
- Incl 3 secondments
- + 5 interns

- 70% staff have post graduate degrees
- +90% of all staff have B. Degrees

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Our Location

- Energy Headquarters at Bloemhof, Bellville
- Satellite office, Wale Street, CBD

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Our Budget

- Rates funded, loans, grant (DSM)
- Limited budget
- CAPEX
  - Rooftop PV on City Buildings
  - Metering Project
  - Energy Efficiency in City Operations
- OPEX
  - Consulting, Research, Legal fees

Our Structure

inward

outward

local

global

Sus ble Energy ets

Generation Development & Municipal Ops Efficiency

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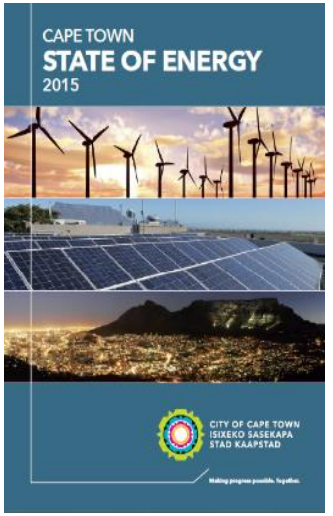
Renewable Energy & Energy Efficiency Facilitation

Low Income Energy Services Delivery & Built Environment

Climate Change & Integration Platforms



SEM Projects: Driving Energy Action

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Our project and activity drivers

- Customer retention
- Creation of new markets & business sustainability
- Increase affordability and ability to pay
- Risk management
- Cost containment

Energy security & diversification and

Low carbon development

Figure 2.5 Three Exploratory Scenarios: Qualitative Directions of Change

	Technological change	Environmental concern	Growth	Security	Emissions
Clean but not sparkling	↗	↗	↗	↗	↗
Dynamic but careless	↗	→	↗	↘	↗
Bright skies	↗	↗	↗	↗	→

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What we do

Sustainable Energy Markets

Generation Development & Municipal Ops Efficiency

- Medium size Own Generation Programme
- Large scale IPP Programme & Court challenge
- Rooftop PV on City facilities
- LNG business case & defining role of City
- Wheeling /Trading platform framework development
- Energy Efficiency in City Operations
- Development of Plans, Scenarios
- Regulatory review and response
- Innovation Strategy development
- Project co-ordination/implementation

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Diversification

Generation Development & Municipal Ops Efficiency

Own Generation Plan

Feasibility Studies, Land audit for ground mounted PV, BP development

IPP Programme

Court challenge; Engaging IPP office & Eskom; Exploring models

LNG distribution study

Almost complete

City Rooftop Programme

Standardising practices & procedures for Municipal owned Distributed Energy Resources (focus on Rooftop Solar PV)

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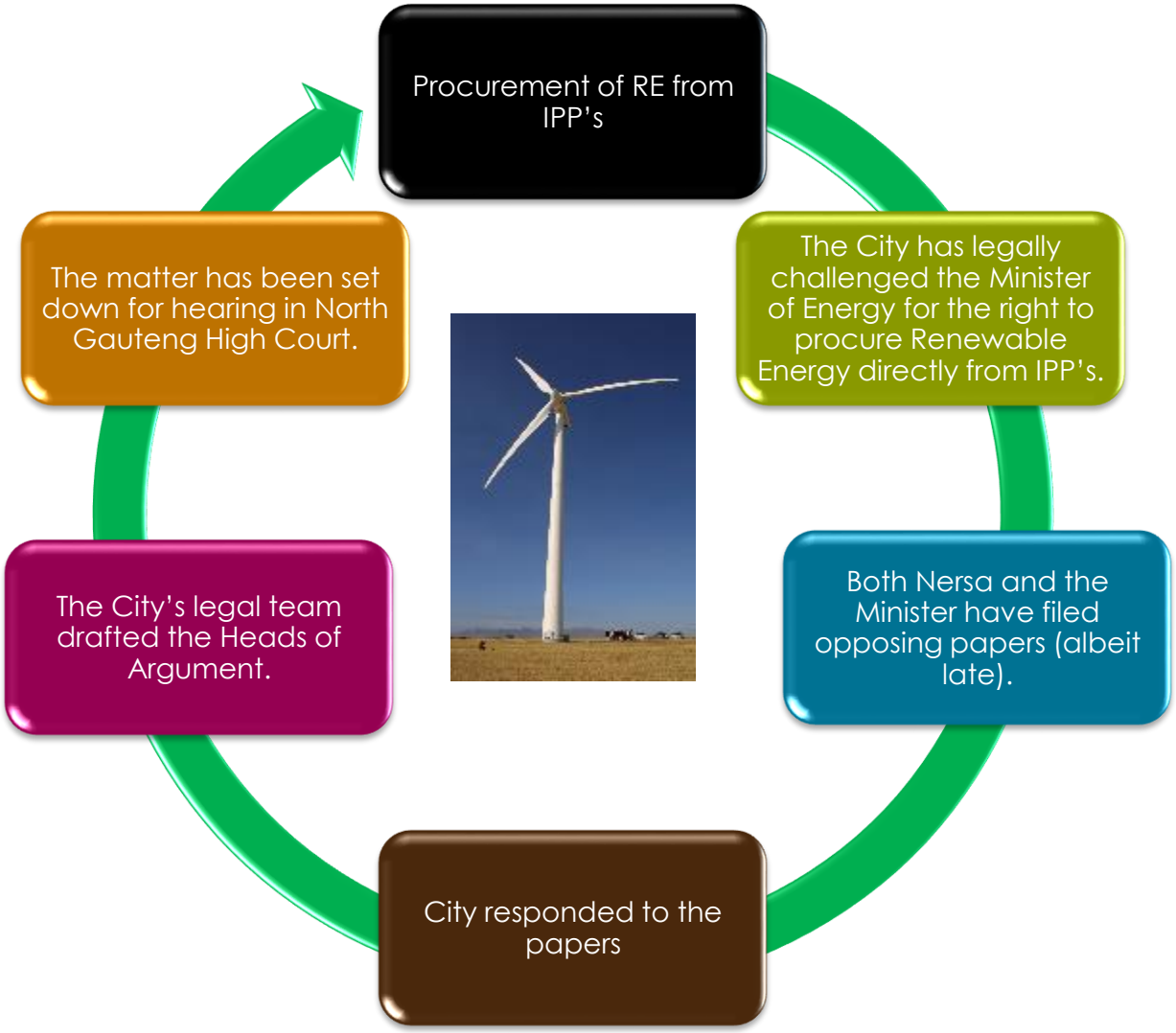
Electricity beyond Eskom

Generation Development & Municipal Ops Efficiency

Current interpretation of legislation prohibits municipalities from purchasing directly from Independent Power Producers. After protracted engagement with national players the City took the Minister of Energy and the National Energy Regulator to court to get a declaratory order to purchase renewable energy. A court date will be set down in September 2019.



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City Rooftop programme

Generation Development & Municipal Ops Efficiency

+1,3MW
(72% on Energy Directorate Buildings)

New 2019-2021: approx. 800 kWp

Existing 2012-2017: 523 kWp

- **Standardising practices and procedures for Municipal owned Distributed Energy Resources (focus on Rooftop Solar PV)**
- Develop a standardized municipal tender process and evaluation criteria and tender documents.
- Develop and finalise a minimum design requirement / specifications for PV systems on municipal facilities.
- Develop and implement an appropriate performance management system for the fleet of rooftop Solar PV systems owned by the City
- Develop and implement a City-wide Municipal Rooftop PV O&M strategy.
- Assessment of potential across City assets

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Wheeling framework & Trading Platform

Generation Development & Municipal Ops Efficiency

Definition: Wheeling is the financial transactions representing the transportation of third party electrical energy (kWh) over the City's distribution network which allows for the third party supplier to sell this electrical energy to a City customer at that customer's point of supply.

- A project implementation task team was established
- A wheeling tariff was submitted for approval
- A series of implementation methodologies & risks were identified and reviewed (we on the 4th iteration)
- It needs now to be tested for "implementability"
- The City is targeting to implement a wheeling framework by the end of the 2020 financial year

Most generators will be required by legislation to obtain a license to generate electricity from NERSA. (Some exemptions apply)

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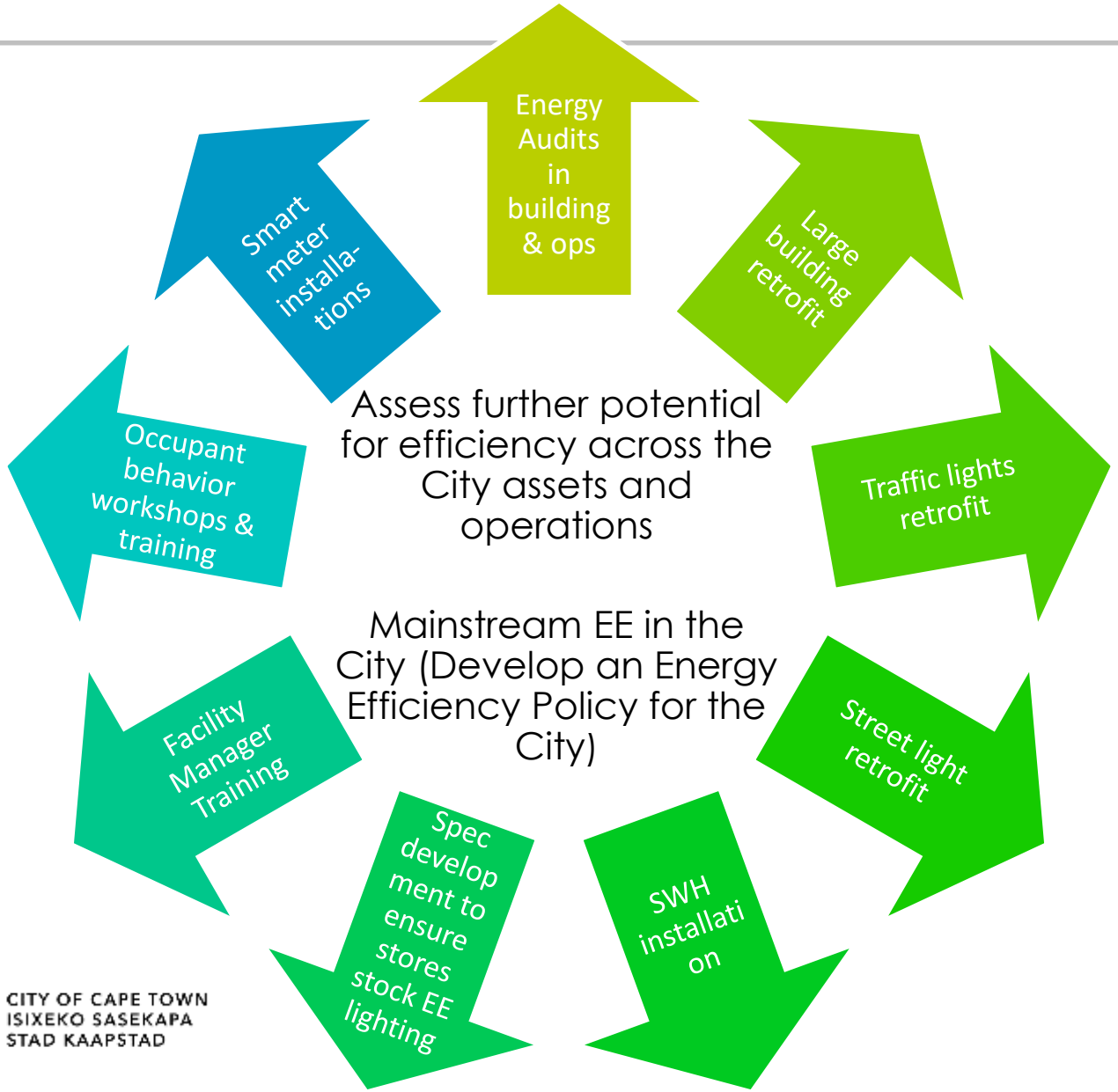
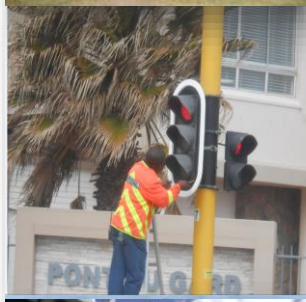
City Wheeling Model – 4 Principles

Generation Development & Municipal Ops Efficiency

- Wheeling is being implemented to facilitate the consumption and supply of renewable energy in the City of Cape Town.
- Energy will be wheeled, excluding green benefits, and the City will not be responsible for the verification or certification of green benefits.
- Customers participating in wheeling (market environment) will be treated separately from other City customers (regulated environment) to ensure that there is no cross-subsidization of energy costs or arbitrage between these two environments.
- Wheeling will only be implemented at medium and high voltage levels ie11kV to 132kV.
- Non-discriminatory & Simple

Energy efficiency in Municipal operations





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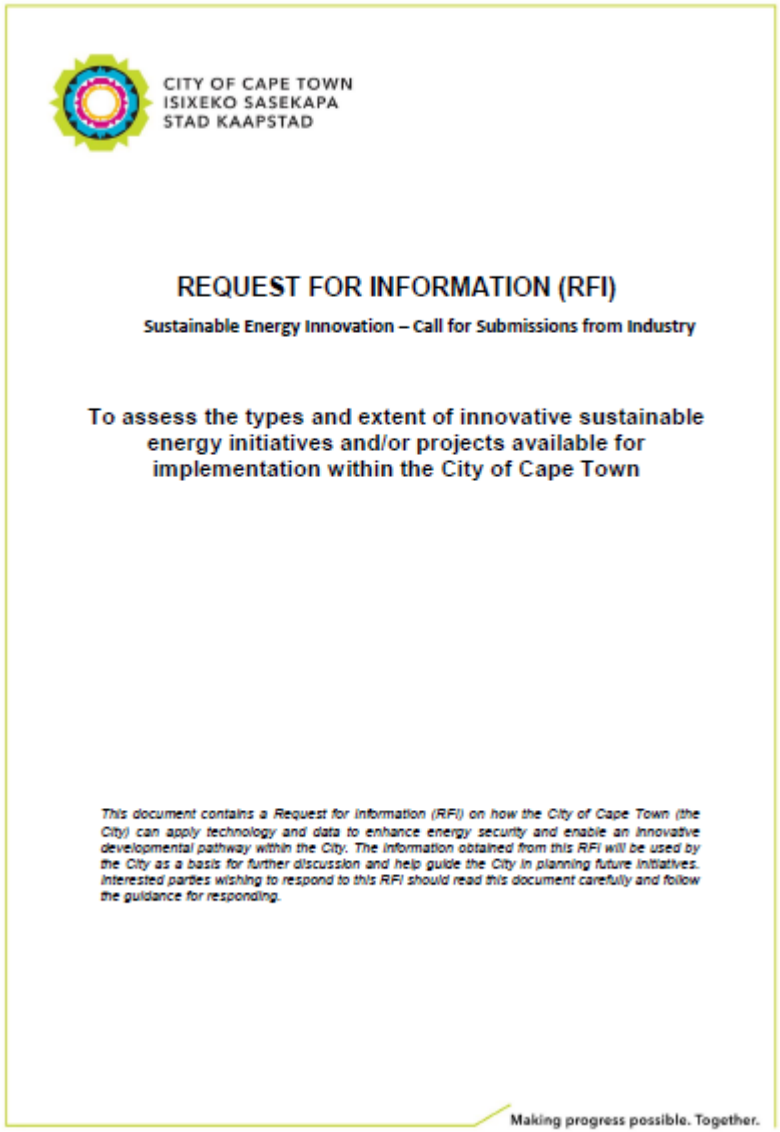
Energy Innovation

- Focus:
  - low carbon
  - poverty alleviation
  - economic development
  - security of supply
  - nexus / transversiality
  - AI, machine learning, 4th IR

- Request for information call (closed date 30 June)
- Project Shortlist by October 2019
- Pilot project decision matrix
- Partnership platform development
- Project implementation
- Cuts across branches



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REQUEST FOR INFORMATION (RFI)

Sustainable Energy Innovation – Call for Submissions from Industry

To assess the types and extent of innovative sustainable energy initiatives and/or projects available for implementation within the City of Cape Town

This document contains a Request for Information (RFI) on how the City of Cape Town (the City) can apply technology and data to enhance energy security and enable an innovative developmental pathway within the City. The information obtained from this RFI will be used by the City as a basis for further discussion and help guide the City in planning future initiatives. Interested parties wishing to respond to this RFI should read this document carefully and follow the guidance for responding.

Making progress possible. Together.

What we do

Sustainable Energy Markets

Generation Development & Municipal Ops Efficiency

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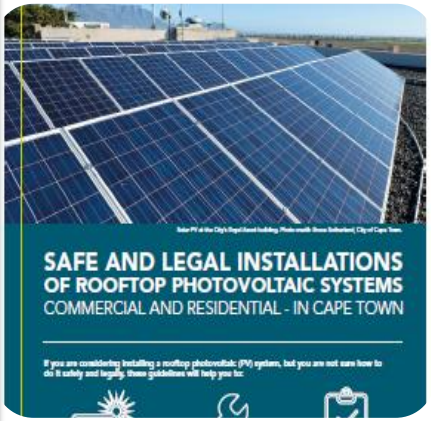
Renewable Energy & Energy Efficiency Facilitation

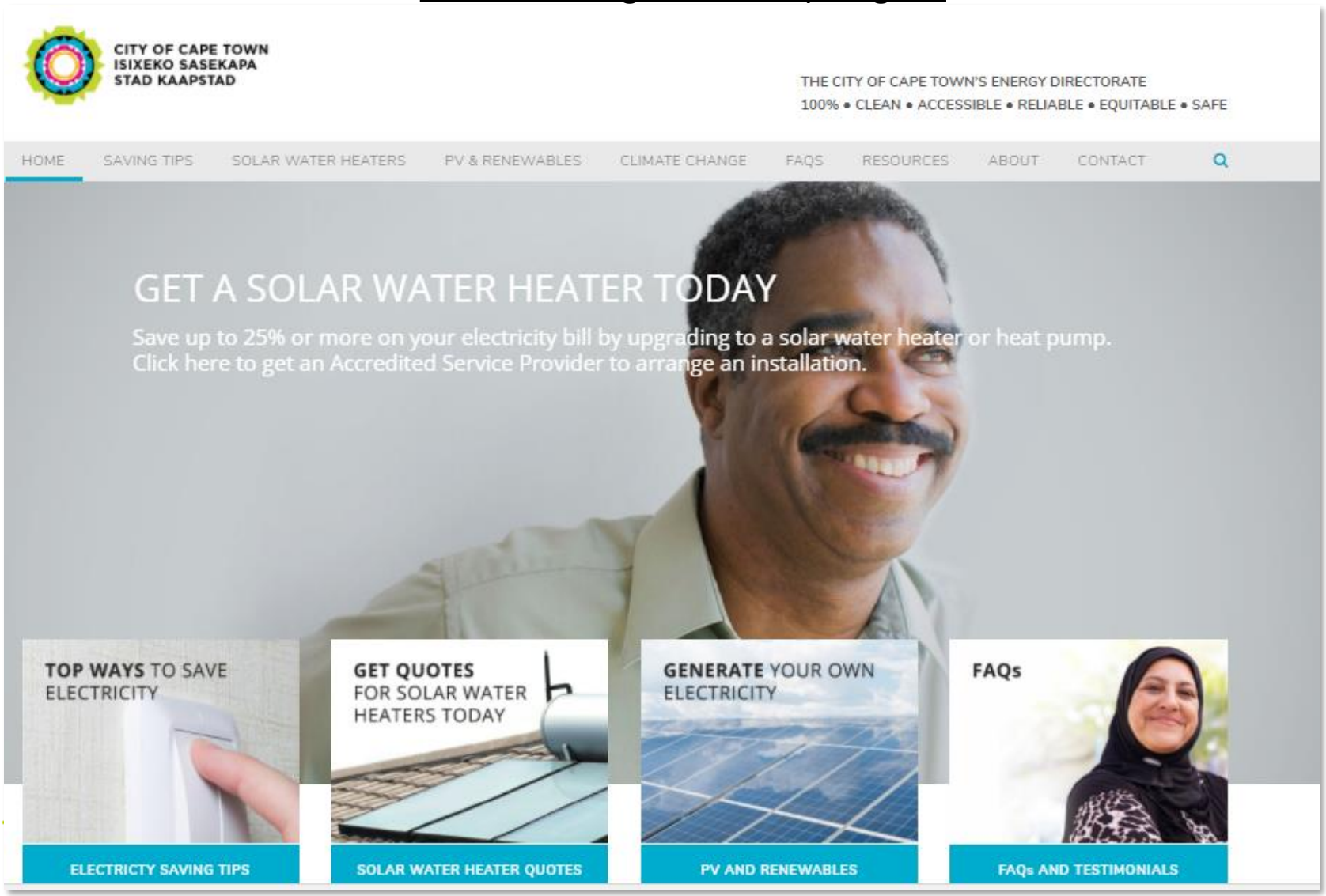


- Promoting and enabling RE/EE in residential, commercial & transport sectors
- Advocacy, campaigns, education, communication, awareness raising
- Training & Stakeholder Forums (EWWF)
- SSEG promotion, accreditation, compliance
- Financing options for uptake of RE/EE (PACE)
- EV Framework development & implementation
- Tariffs and smart meters, digitalisation
- Blockchain tech/ platforms for distributed energy

Electricity Savings Campaign

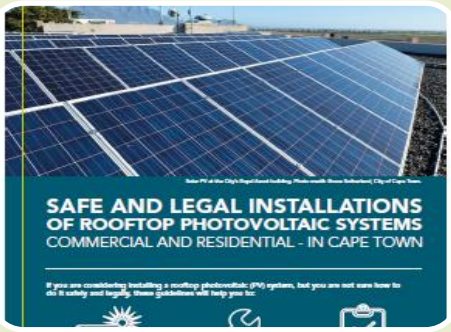
RE & EE
Facilitation & Promotion

www.savingelectricity.org.za



Owning your piece of the sun : SSEG

RE & EE
Facilitation & Promotion



Providing assurance and reliable information

- Development of Guidelines
- Promotion of GreenCard PV
- savingelectricity.org.za

Campaign to Register & Regularise unregistered & unauthorised PV systems:

- Homeowners
- Installers
- Communication of rules and procedures

Retaining our customers:

Innovative financing and ownership models including Property Assessed Clean Energy (PACE)

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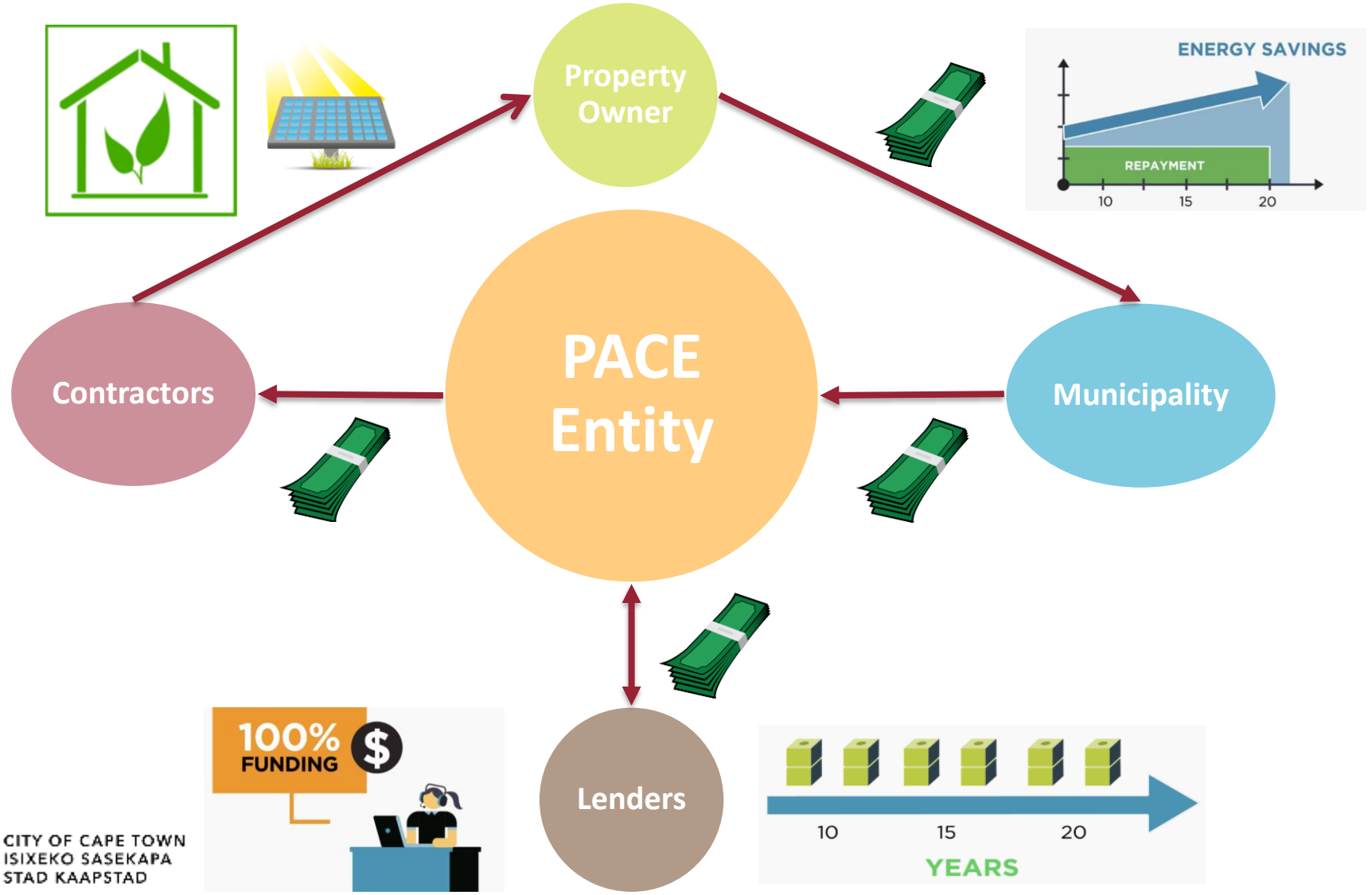
Implemented in collaboration with EGD, GreenCape, SAPVIA

The PACE Model



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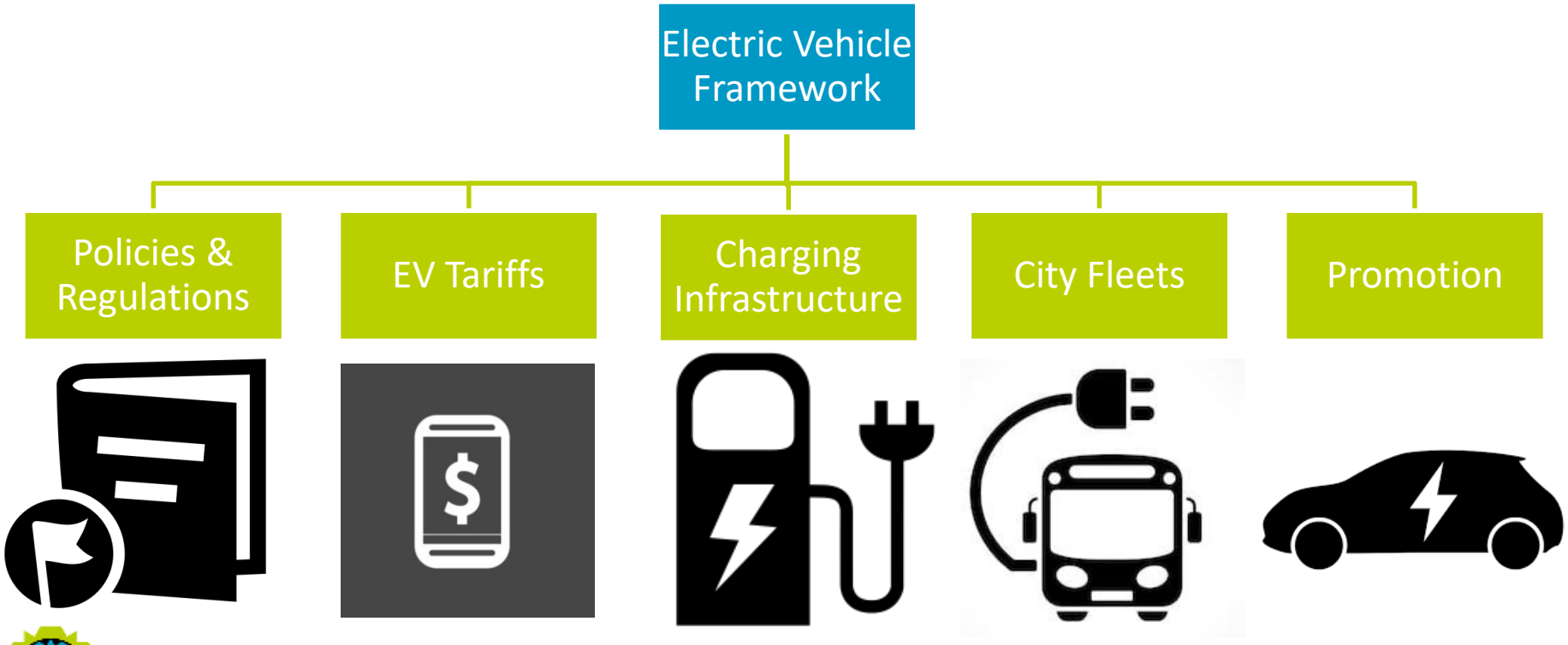
Driving Cape Town Green

RE & EE Facilitation

Objective:
Enable the uptake of EVs to create a new electricity market, reduce vehicle emissions, reduce reliance on imported fuel & reduce cost of transport to create a more inclusive city



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What we do

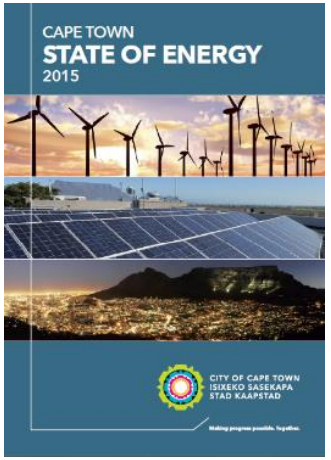
Sustainable Energy Markets

- Focus on unelectrified households
- Conduct research and surveys
- Financial sustainability investigations
- Implementation models for alternatives (Solar Home Systems & Solar kits)
- Project implementation incl SWHs, Ceilings

- TOD / Planning issues
- New Building efficiency
- Low carbon urban development
- Building regulation engagement

Low Income Energy Services Delivery & the Built Environment

Climate Change & Integration Platforms



Cape Town: low income household electricity

Low Income Energy Services Delivery

- Approximately 98% of households in CT have access to electricity (42 530 hhs access via another house/other means)
- About half of low income hhs are supplied by CCT and half by Eskom
- 17 000 households are "un-electrifiable" (all in informal settlements) due to being on encumbered land (private property, flooding etc).

Data source: Stats SA Community Survey 2016 / CCT

1 264 849 households in Cape Town : 500 000 are very poor

Low Income Energy Services

Low Income Energy Services Delivery

City needs to be responsive considering the sustainability of this service and the burden on the City and its people

Stakeholder engagement: LINES multi-stakeholder task team

Research & Knowledge sharing:

1. Completion of Household Energy Use study
2. Finance/economic study initiated
3. Investigate electricity provision options to 'unelectrifiable' areas eg Solar home systems or microgrids, potentially with additional services - wifi/DSTV

Projects:

1. Energy Services:
   - DoE SWH roll out Programme
   - Ceilings retrofit Programme
2. Distribution of wonderbags & solar kits

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“Unelectrifiable” areas: Solar Home Services?

Low Income Energy Services Delivery

Options for the temporary provision of basic services for informal settlements that are “un-electrifiable”.

Solar Home Systems and **Micro-Grids** are an option for these areas:

- These provide a very low level of services compared to grid electricity and are expensive – approx R7/kWh (grid is approx R1/kWh on LL tariff)

- Smaller portable solar kits are being distributed as pilots to unelectrifiable communities:
  - *4 LED Lights*
  - *2 Phone Charger ports*
  - *Battery*
  - *12Wp panel*

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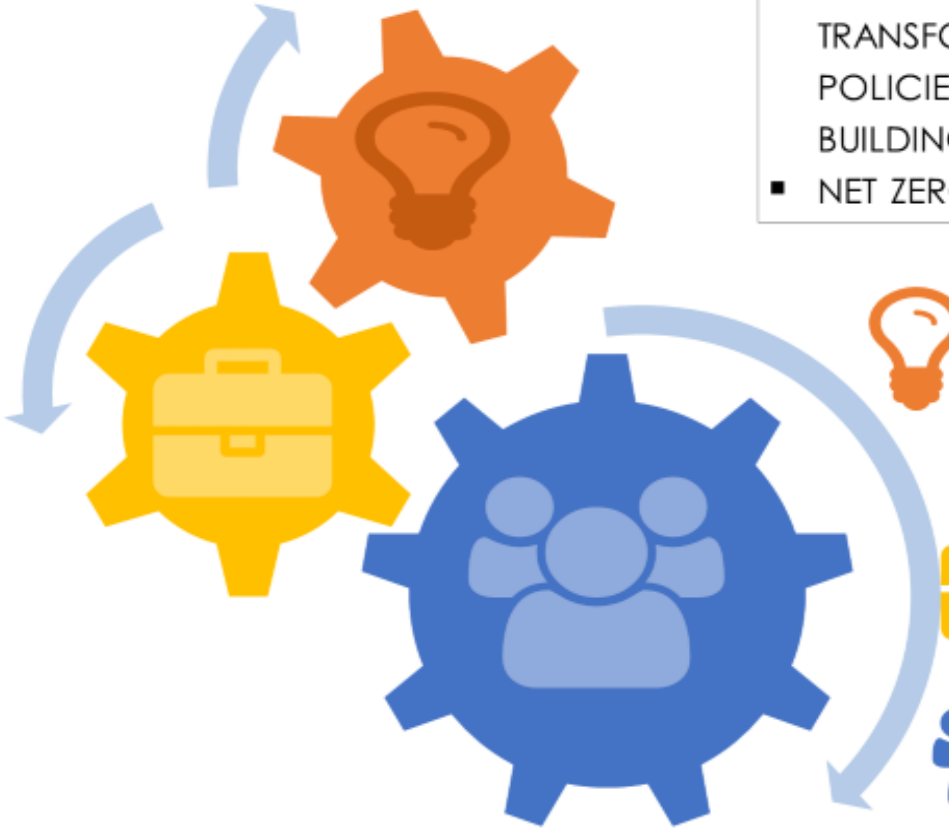
South Africa Buildings Programme

LINES & the Built Environment

CITY OF CAPE TOWN APPROACH

STRATEGIC OBJECTIVE:

- DEVELOPMENT AND IMPLEMENTATION OF TRANSFORMATIONAL ENERGY EFFICIENCY POLICIES AND PROGRAMMES FOR NEW BUILDINGS BY 2020
- NET ZERO CARBON NEW BUILDINGS BY 2030



INFORMATION AND COMMUNICATION

SUSTAINABILITY DECLARATION
RESOURCE EFFICIENT CRITERIA FOR DEVELOPMENT

LAW

NATIONAL BUILDING REGULATIONS
REVISED SANS 10400 PART XA
BUILDING REGULATIONS BYLAW

DEVELOPMENT CONDITIONS

MINIMUM REQUIREMENTS
INCENTIVE/DISINCENTIVE PACKAGES

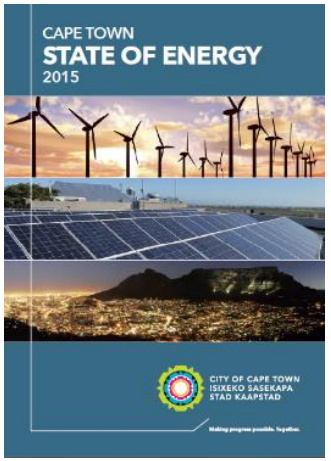
What we do

Sustainable Energy Markets

- Evidence led policy / strategy input
- Energy, energy efficiency & carbon data management and monitoring and reporting
- Modelling eg CN2050, MEMP
- Financial modelling eg valuing savings, investigating funding models

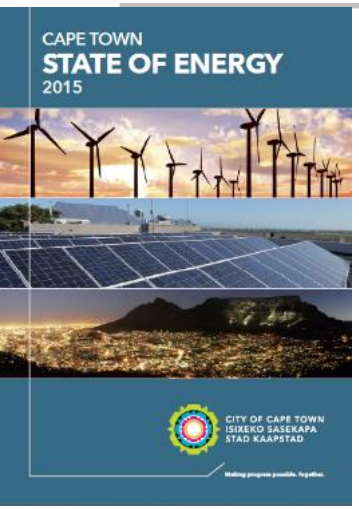
- Co-ordinate Climate Change Mitigation strategy
- Development of Energy Master Plan and Renewable Energy Roadmap
- Plan, Policy, Strategy review and development support
- SDBIP/IDP/Target development and monitoring
- Annual Reports, other City reports
- Development of Integration platforms, tools, technologies

Climate Change & Integration Platforms



Evidence based decision making

Climate Change & Integration Platforms



CDP
DRIVING SUSTAINABLE ECONOMIES

- Data gathering and analysis
- Energy & Carbon & Impacts Modelling & Interpretation
- Setting of targets and goals
- Policy/Strategy/Action Plans Development
- Monitoring, Measuring, Verification
- Reporting at various levels and platforms

Modeling & Plans: 3 Big pieces of work

Climate Change & Integration Platforms

Impact of new tech on City system & a Renewable Energy Roadmap for the City of Cape Town

Towards Carbon Neutrality 2050 for the City of Cape Town

Sustainable energy services provision & revenue model/s for the City of Cape Town

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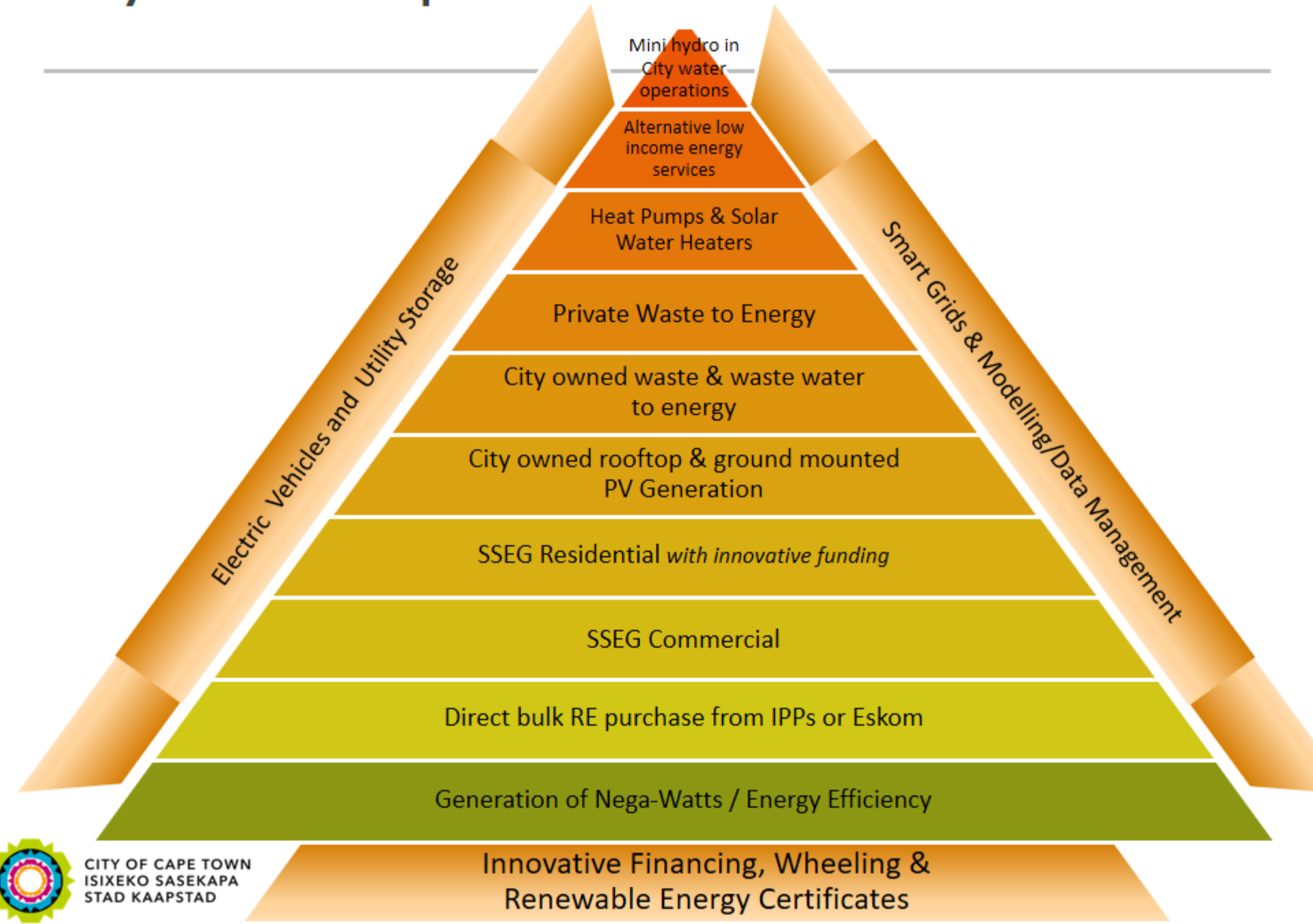
City RE Roadmap



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Monitoring - Smart metering of municipal facilities

1600 facilities
Metering since 2012

500
facilities
710
elect meters
31%

2
water meters
(POC1).
POC2
underway

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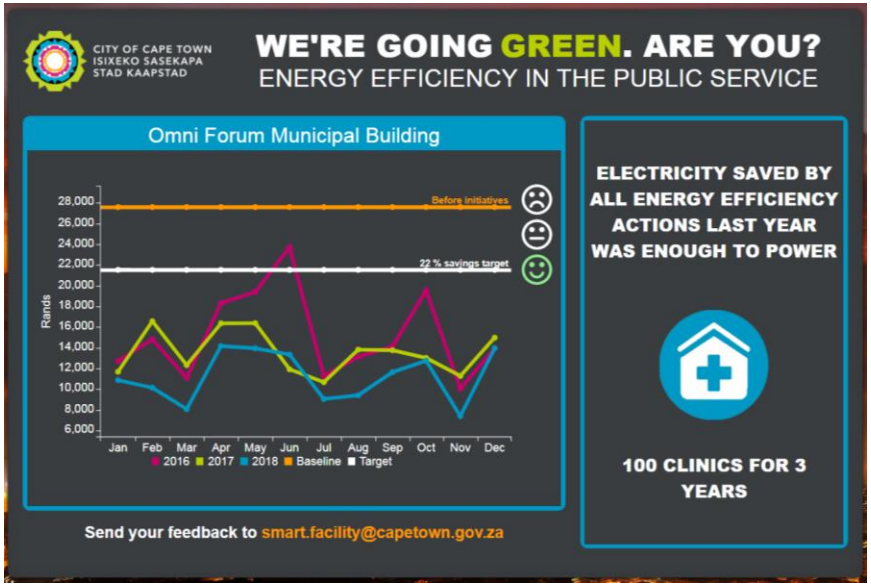
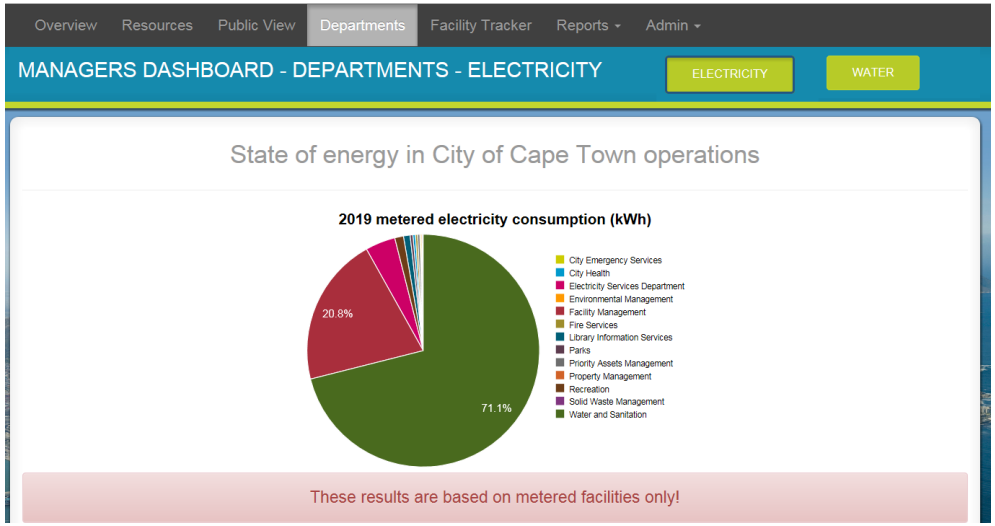
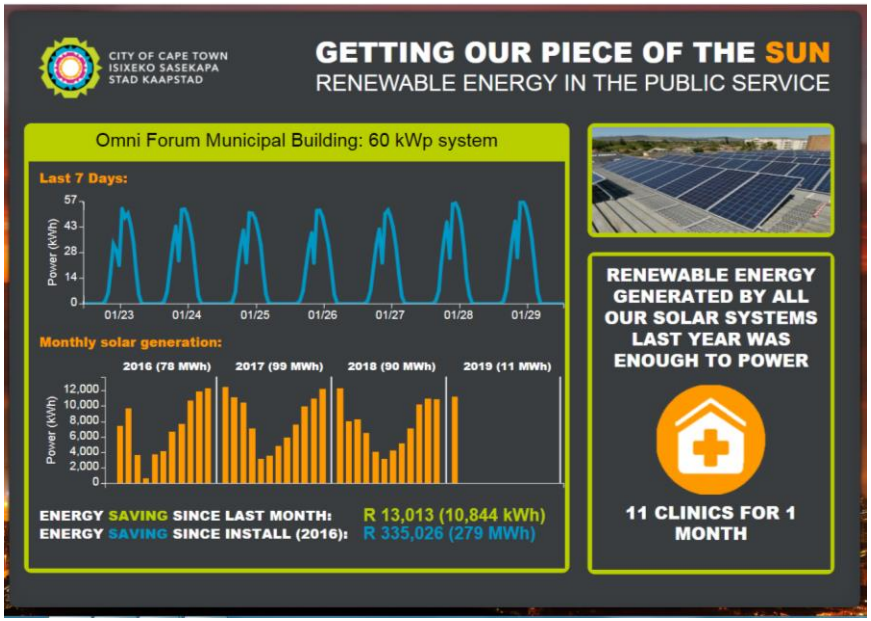
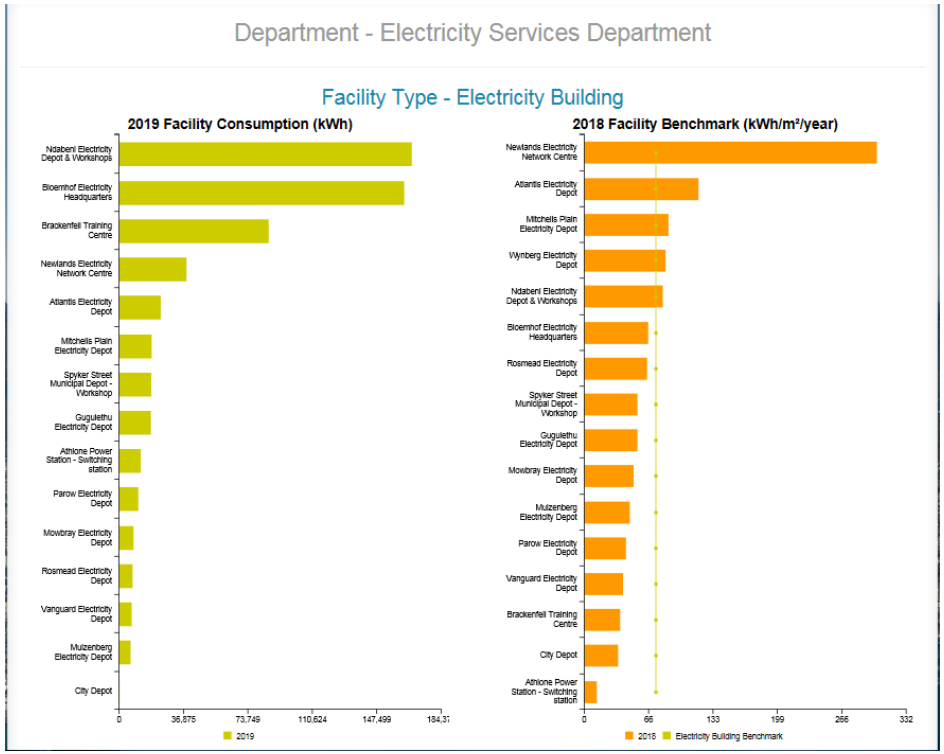
SMART FACILITY









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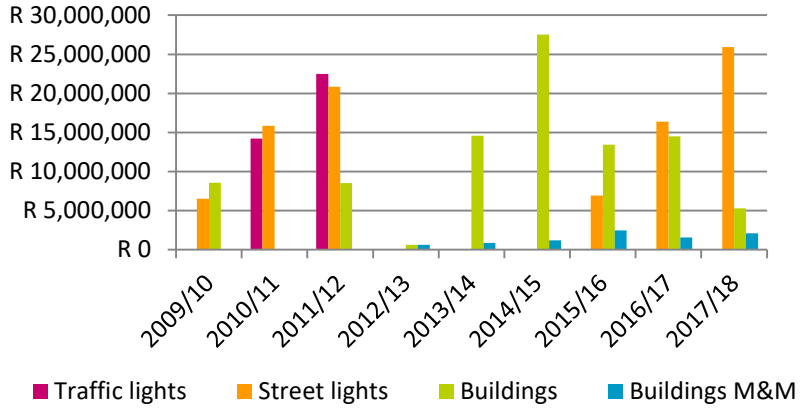
SMART FACILITY

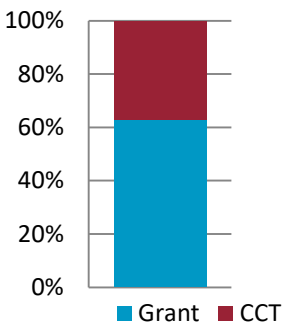
Municipal Ops savings and monitoring

Investment on all EE and RE interventions
(2017/18 Present value assuming 8% nominal discount rate)



Program Area	Project Avg. Years Payback (Discounted) @ Avoided Eskom Bulk Tariffs	Project Avg. Years Payback (Discounted) @ Secondary CCT Tariff
Buildings incl. M&M	13	7
Buildings	12	6
Street Lights	10	4
Traffic Lights	5	3

% split of funding of EE and RE initiatives



Metering and Monitoring Investments:

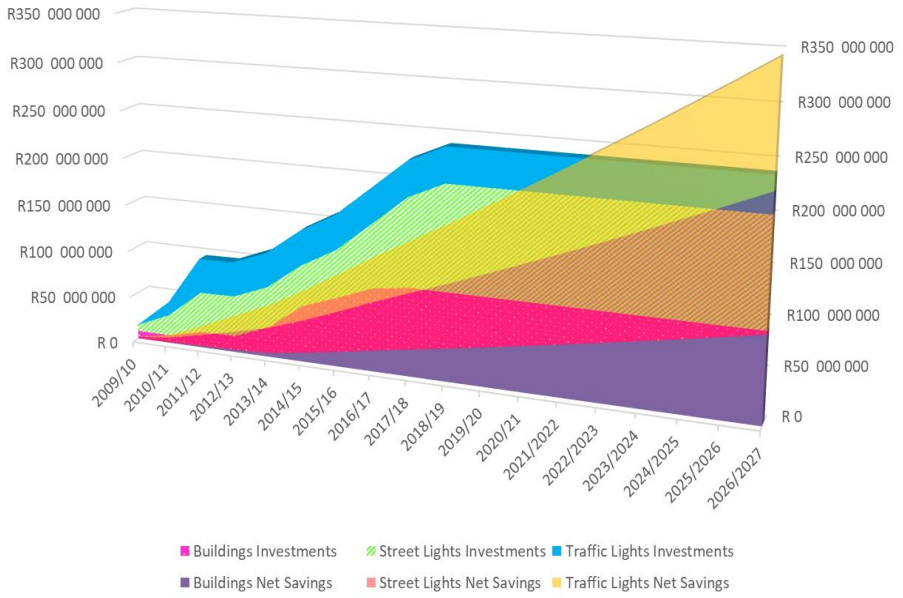
Metering investment:
2013/14-2018/19 (6 years): **R6 809 558**
727 meters (583 main, 144 stat meters)

SMART FACILITY

SmartFacility monitoring application:
2015/16 to 2018/19 (4 years): **R3 178 781**

Validate technology investment Savings but also induce behavioural savings

Cumulative EE Program Investments vs Cumulative Savings [@ avoided Eskom Bulk Tariffs]
(2017/18 Present Value Assuming 8% Nominal Discount Rate)



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Envisioning a Carbon Neutral Cape Town

Climate Change & Integration Platforms

What is Carbon Neutrality?:

Essentially we go from our current Energy2040 'target' of cutting **37%** CO_2 by 2040 to a 'commitment' to cut **100%** CO_2 city-wide by 2050

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Thank You

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