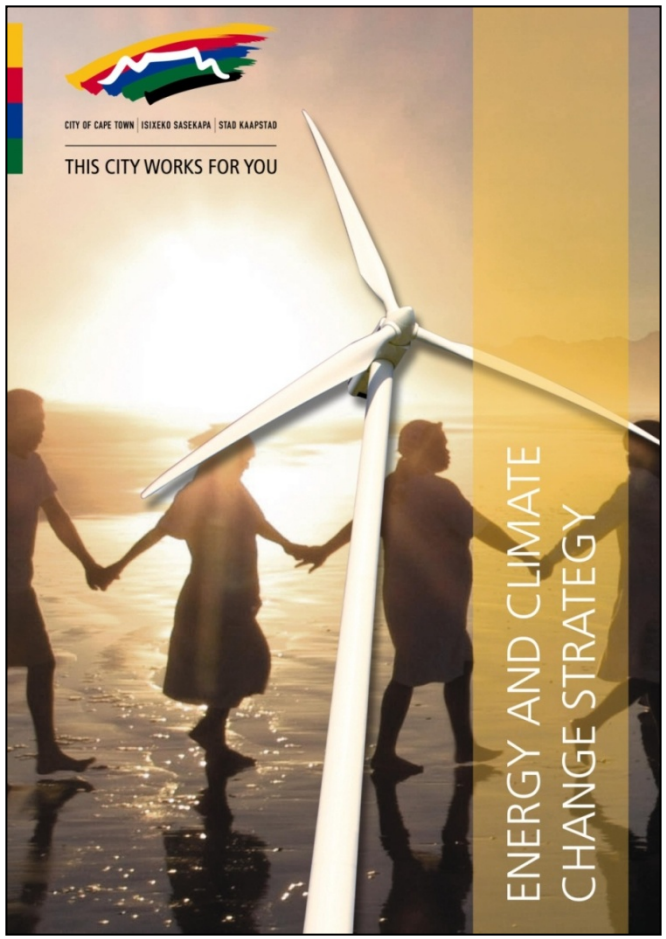
CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD

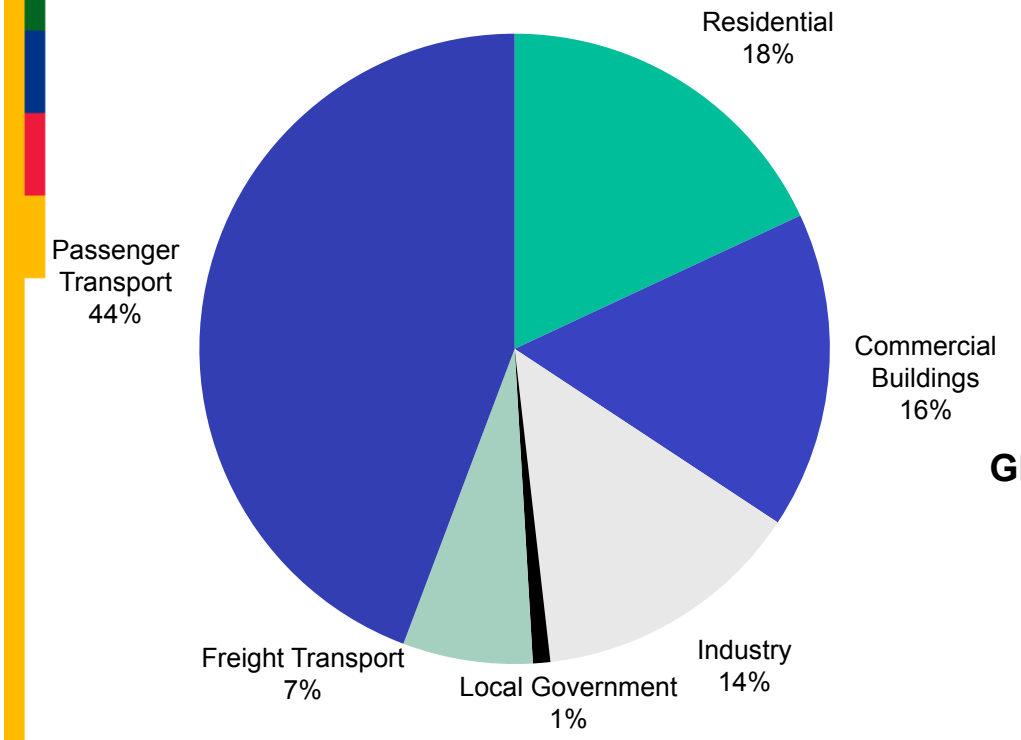


City of Cape Town

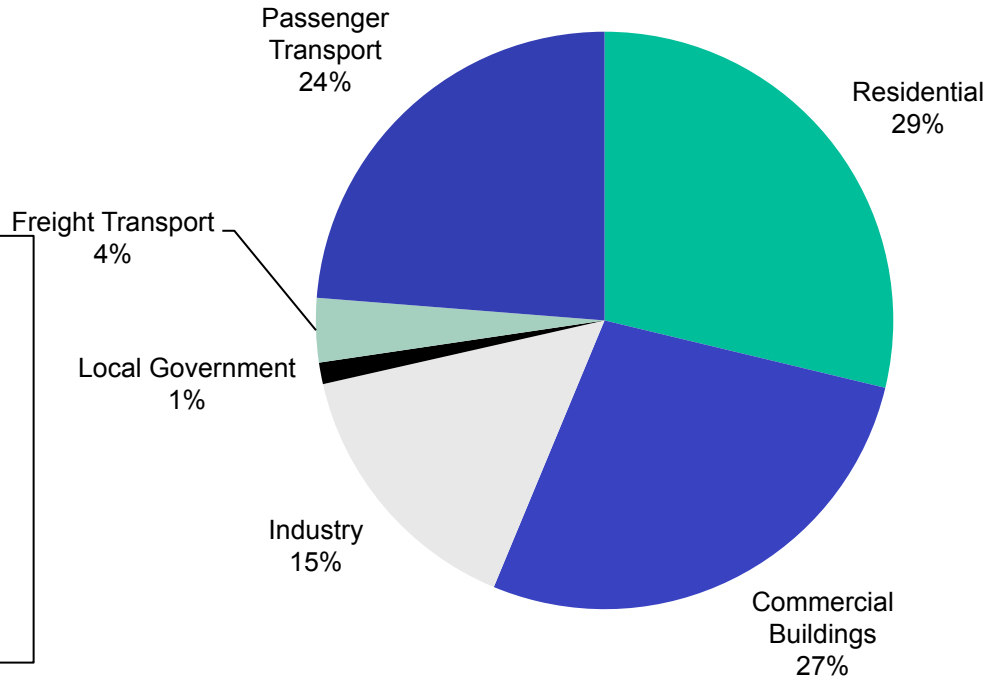
Energy and Climate Action Plan and Projects

Sarah Ward
Energy and Climate Change
City of Cape Town

Energy Consumption by Sector in Cape Town, 2007



GHG Emissions by Sector in Cape Town, 2007



Cape Town in the Western Cape

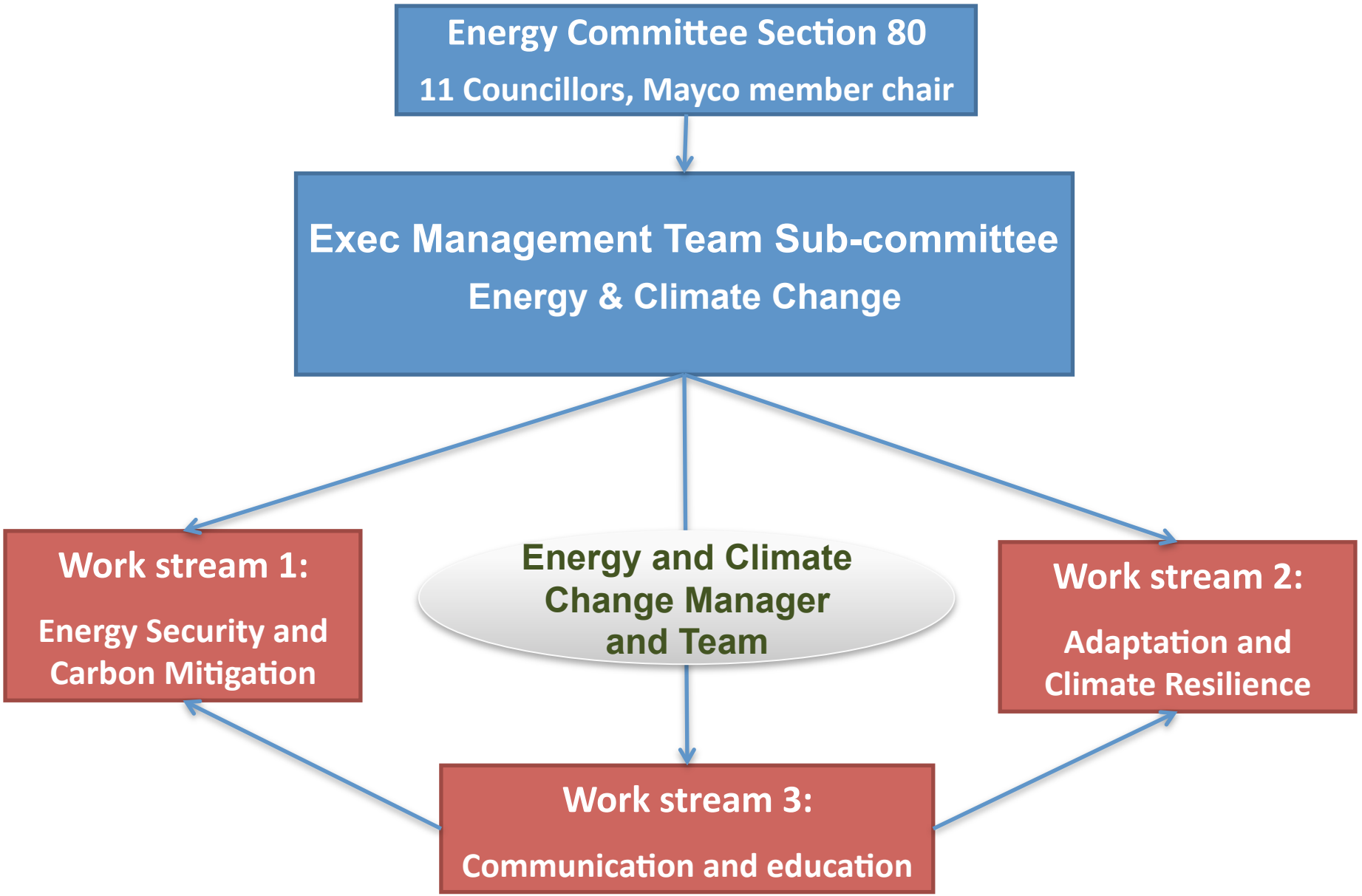
50% of total energy

66% electricity

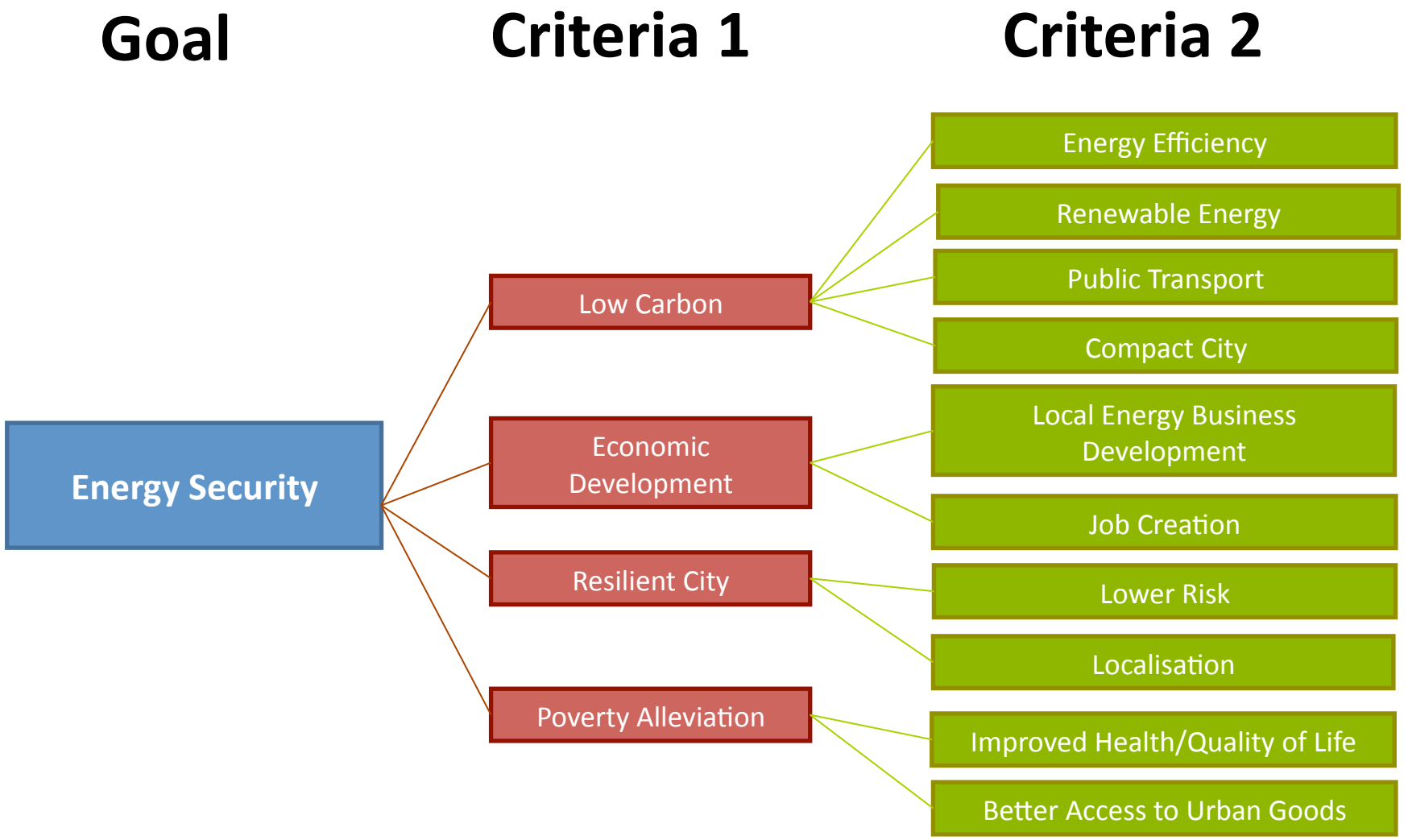
66% CO_2

75% GDP

IDP Strategic Focus area : Energy for a Sustainable City



Strategic Approach



Energy and Climate Action Plan

OBJECTIVE 2. 10% RENEWABLE AND CLEANER ENERGY SUPPLY BY 2020; ALL GROWTH IN ELECTRICITY DEMAND TO BE MET BY CLEANER / RENEWABLE SUPPLY

Programme and Project Info / Status								Budget			
								2009_10		2010_11	
Prog ID	Programme	Proj ID	Project	Department(s) Responsible (lead Dept listed first)	Start Date	End Date	Carbon Income Budget Reductn	Internal (Rands)	External (Rands)	Internal CCT (Rands)	External (Rands)
								Actual	Actual	Actual	Actual
2.1	**Renewable Energy large scale supply**	2.1.1	Darling Power Purchase Agreement and sale of Green Electricity Certificates	Electricity	2000	2008					
		2.1.2	Power Purchase Agreements with Independent Power Producers	Electricity	Ongoing						
		2.1.3	REFIT for cities	ERM / Electricity	2010						
		2.1.4	Combined cycle generation from natural gas sources (eg. Kudu/Ibubhezi)	Electricity							
2.2	**Electricity generation from municipal operations**	2.2.1	Anaerobic digestion phase1 - methane yield assessment	Solid Waste	Dec 09	Apr 2010	CI/BR				
		2.2.2	Anaerobic digestion phase2 - Conceptual design of dry fermenter and associated economics	Solid Waste	Mar 2010	May 2010	CI?				
			Anaerobic digestion phase 3 - Pilot								
		2.2.3	dry fermentation & aerobic composting	Solid Waste	no info		CI?				
		2.2.4	Anaerobic digestion - Pilot wet fermentation	Solid Waste	no info		CI?				
		2.2.5	Waste oil collection for biodiesel production assessment (R&D)	Solid Waste	no info		CI?				

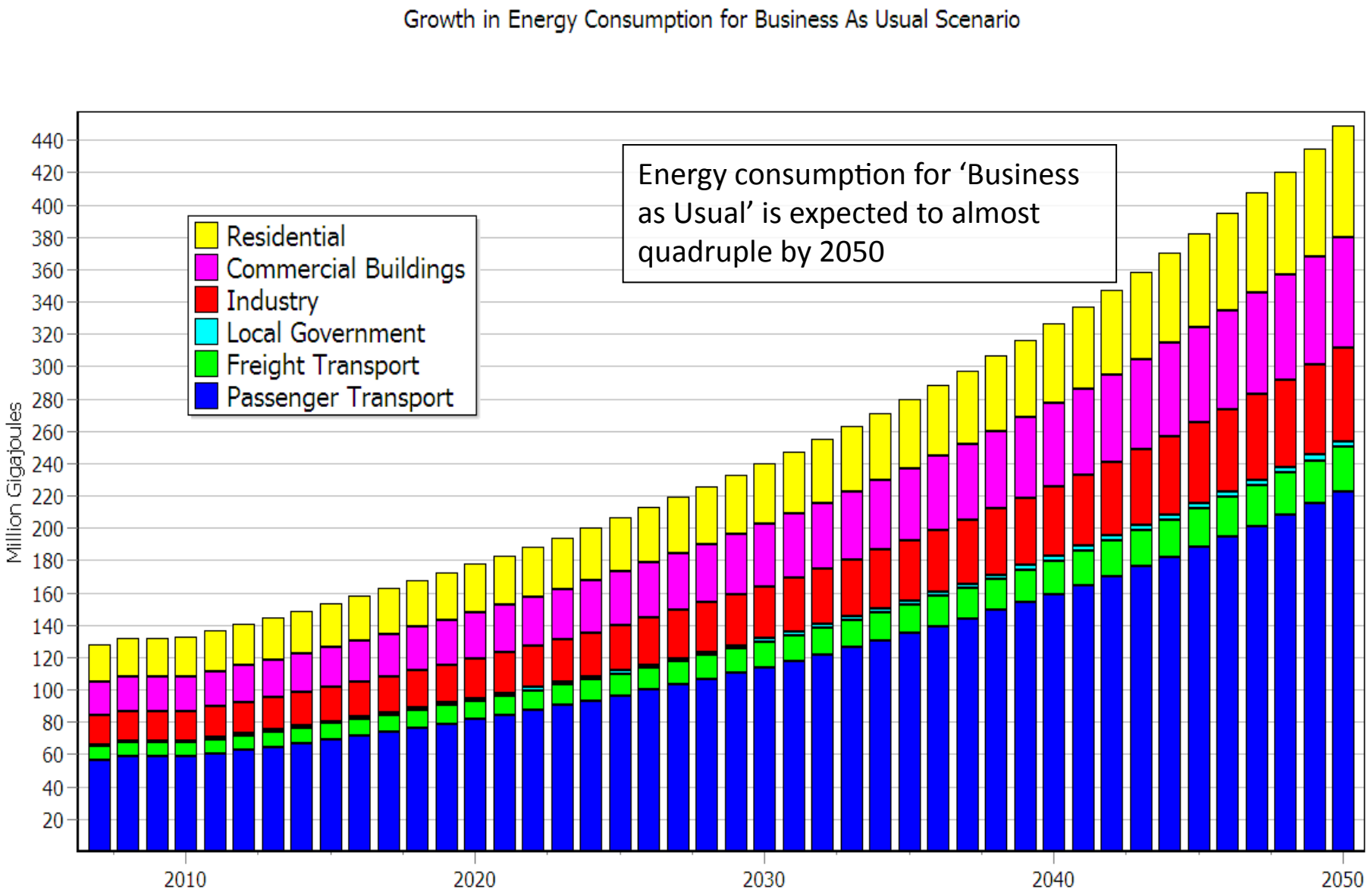
Energy & Climate Action Plan: Objectives

Objective 1	City-Wide 10% Reduction in Electricity Consumption on Unconstrained Growth by 2012 (3.3%/annum 2010-2012)
Objective 2	10% Renewable and Cleaner Energy Supply by 2020; all growth in electricity demand to be met by cleaner/renewable supply
Objective 3	Council Operations: 10% Reduction in Energy Consumption on Unconstrained Growth by 2012 (3.3%/Annum 2010-2012); all growth in demand to be met by cleaner / renewable supply
Objective 4	Compact resource efficient city development
Objective 5	Sustainable transport system
Objective 6	Adapting to and building resilience to climate change impacts (city wide)
Objective 7	More resilient low income/vulnerable communities
Objective 8	Development of carbon sales potential of all projects
Objective 9	Local economic development in energy sector
Objective 10	Awareness: E&CC communications and education programmes (driven by Objectives 1-9)
Overall	Energy and Climate Change resources, research, development and monitoring

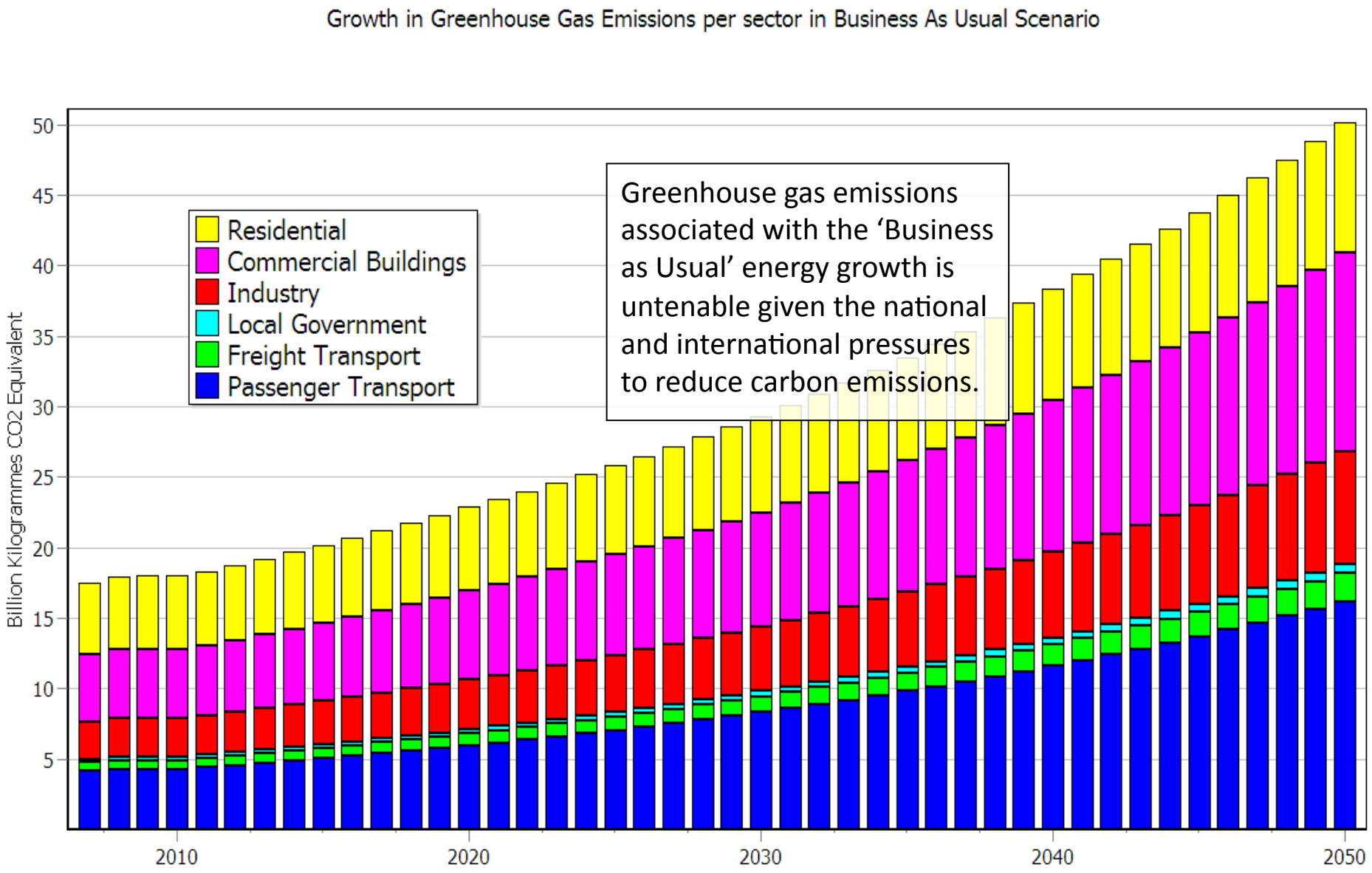
CAPE TOWN OPTIMUM ENERGY FUTURE

The key results modelled for the Cape Town Optimum Energy Future are modelled to highlight the impact of this energy direction versus the business as usual trajectory

Energy Growth into the Future BAU



Greenhouse Gas Emissions into the Future BAU

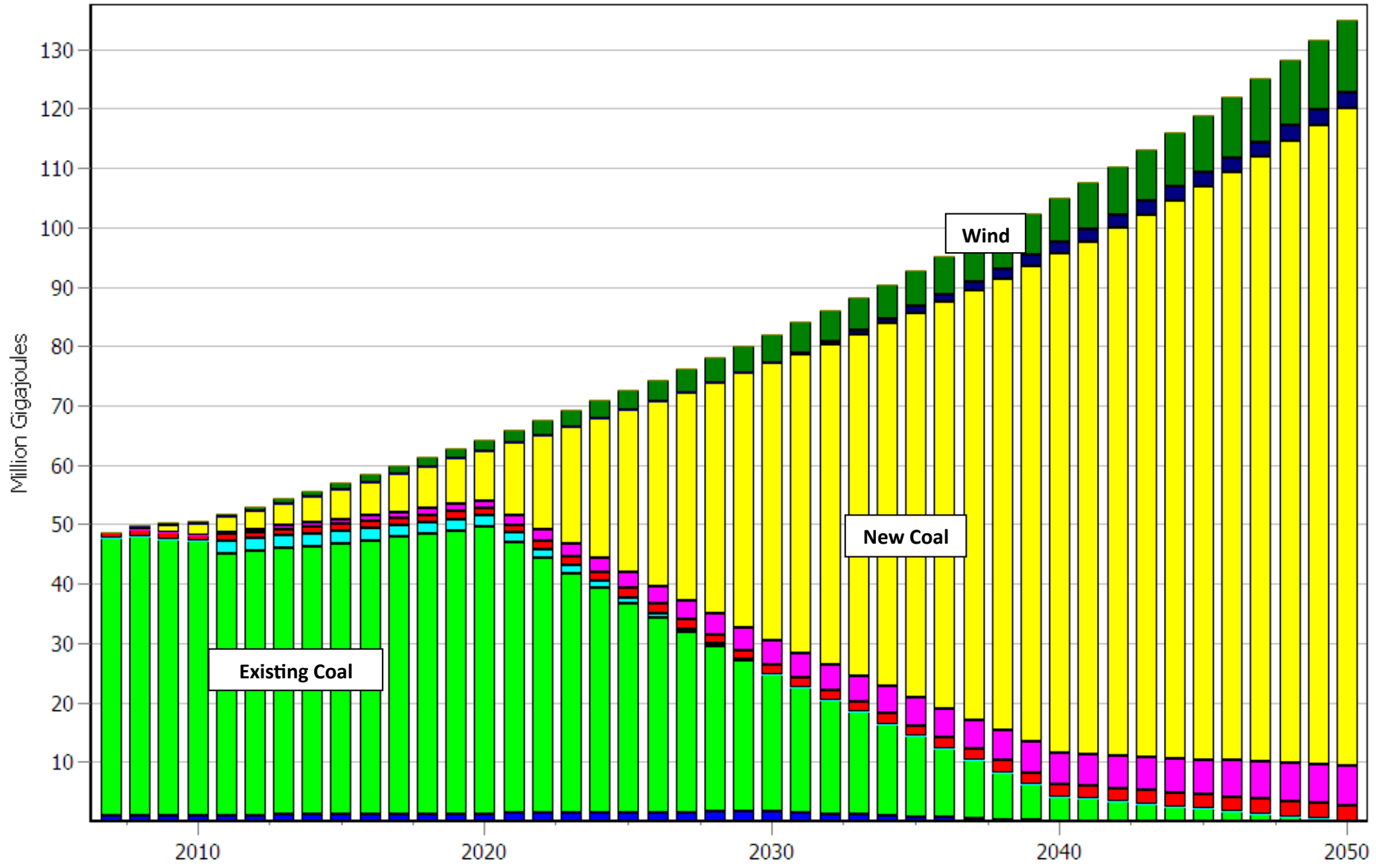


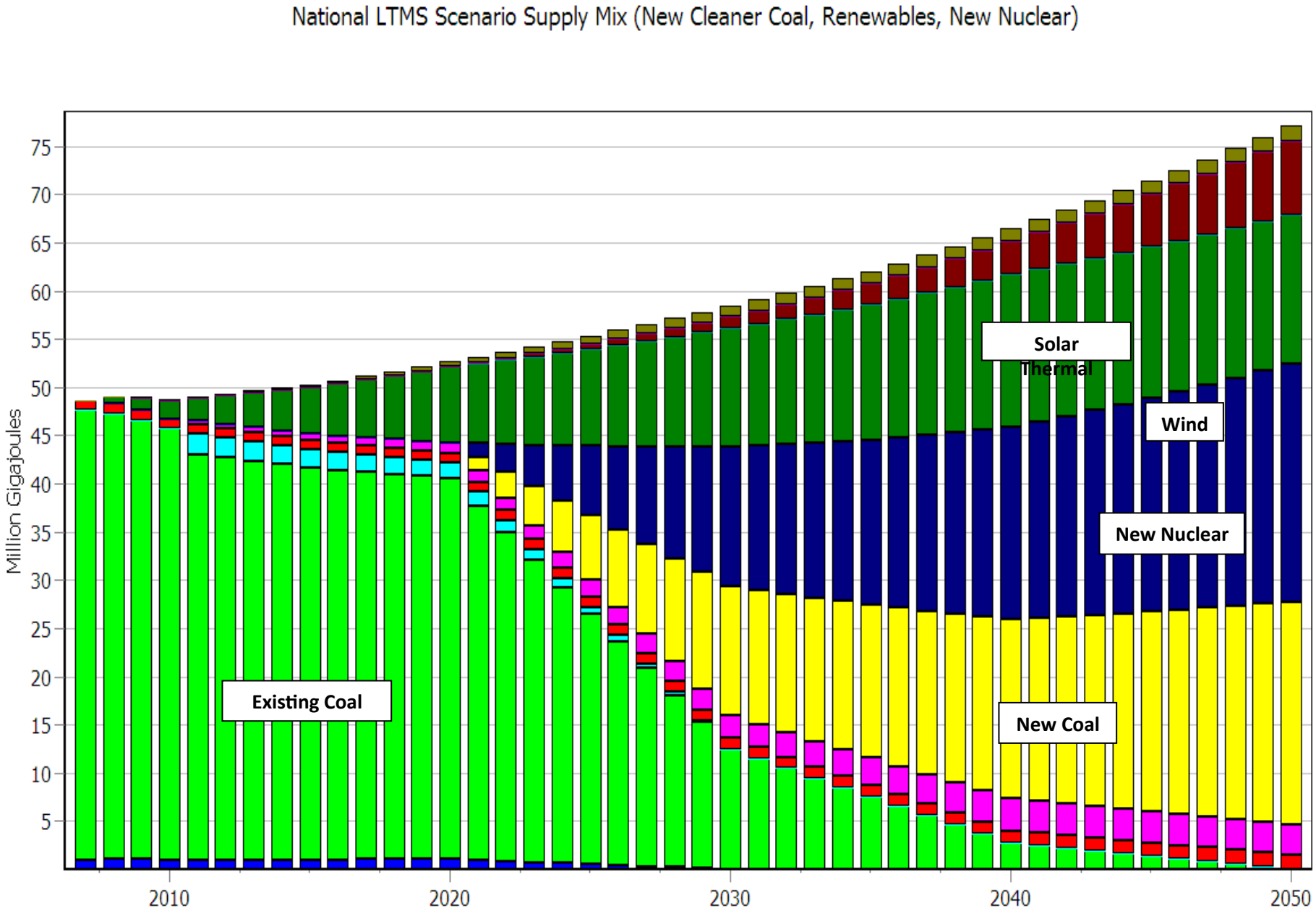
Macro Scenarios

- **Business as usual**
  - What the situation would look like if no significant change of course takes place
- **Policy Targets**
  - The situation if we meet local and national Renewable Energy and Energy Efficient targets
- **Economic growth (high and low growth rates)**
  - Impact on the future of high economic growth (with no interventions)
    - (3.6% energy growth – linked to the GGP)
  - Impact on the future of low economic growth (with no interventions)
    - (1.9% energy growth – linked to the GGP)
- **National LTMS (applied to Cape Town)**
  - What scale of Renewable Energy and Energy Efficiency intervention is required to meet this carbon reduction profile
- **Cape Town Optimum Energy Future**
  - What is an optimised approach given the competing demands of meeting the national LTMS carbon trajectory, economic growth, welfare etc.

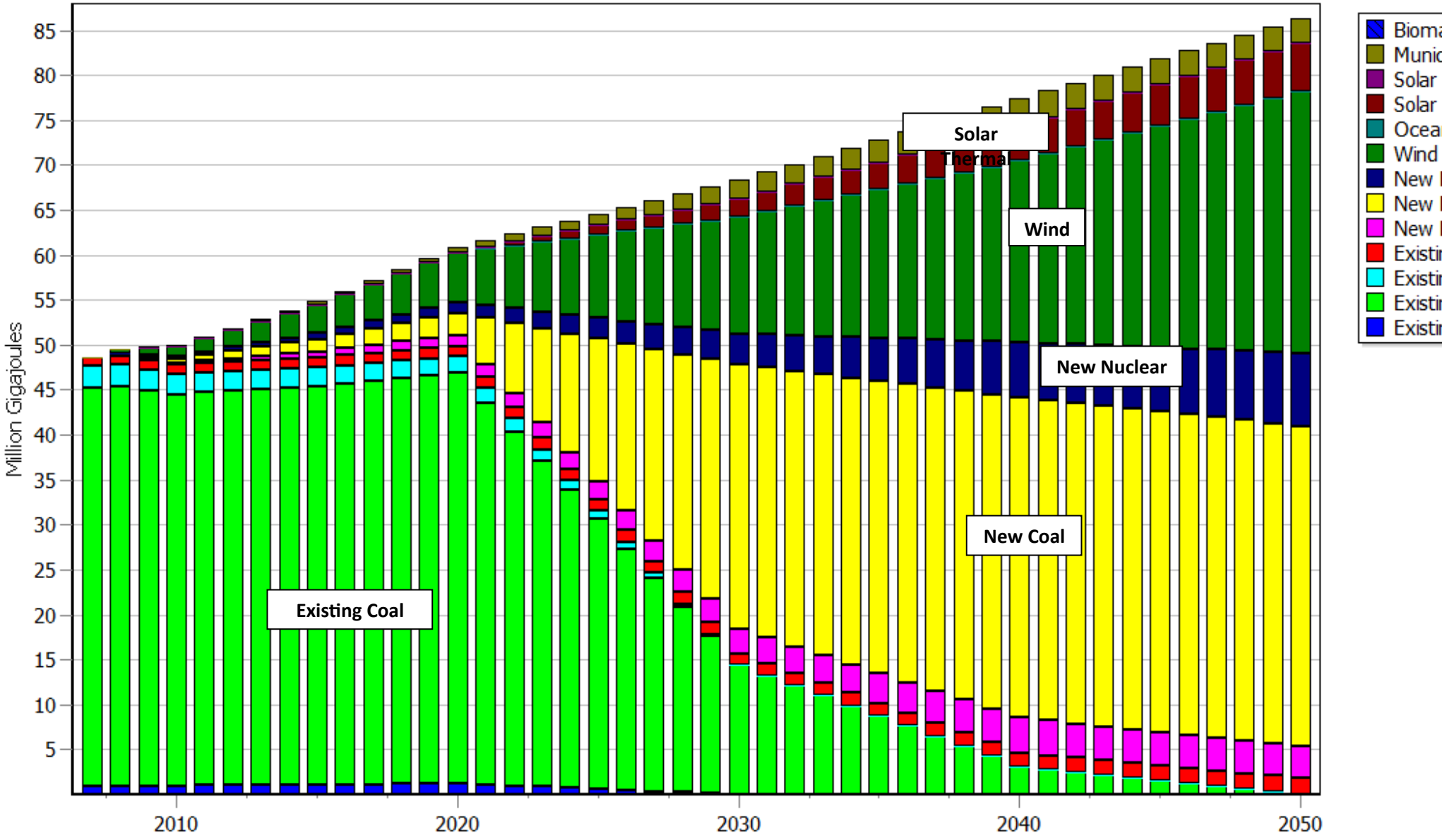
IRP supply mix and a secure future

BUSINESS AS USUAL ELECTRICITY SUPPLY MIX?

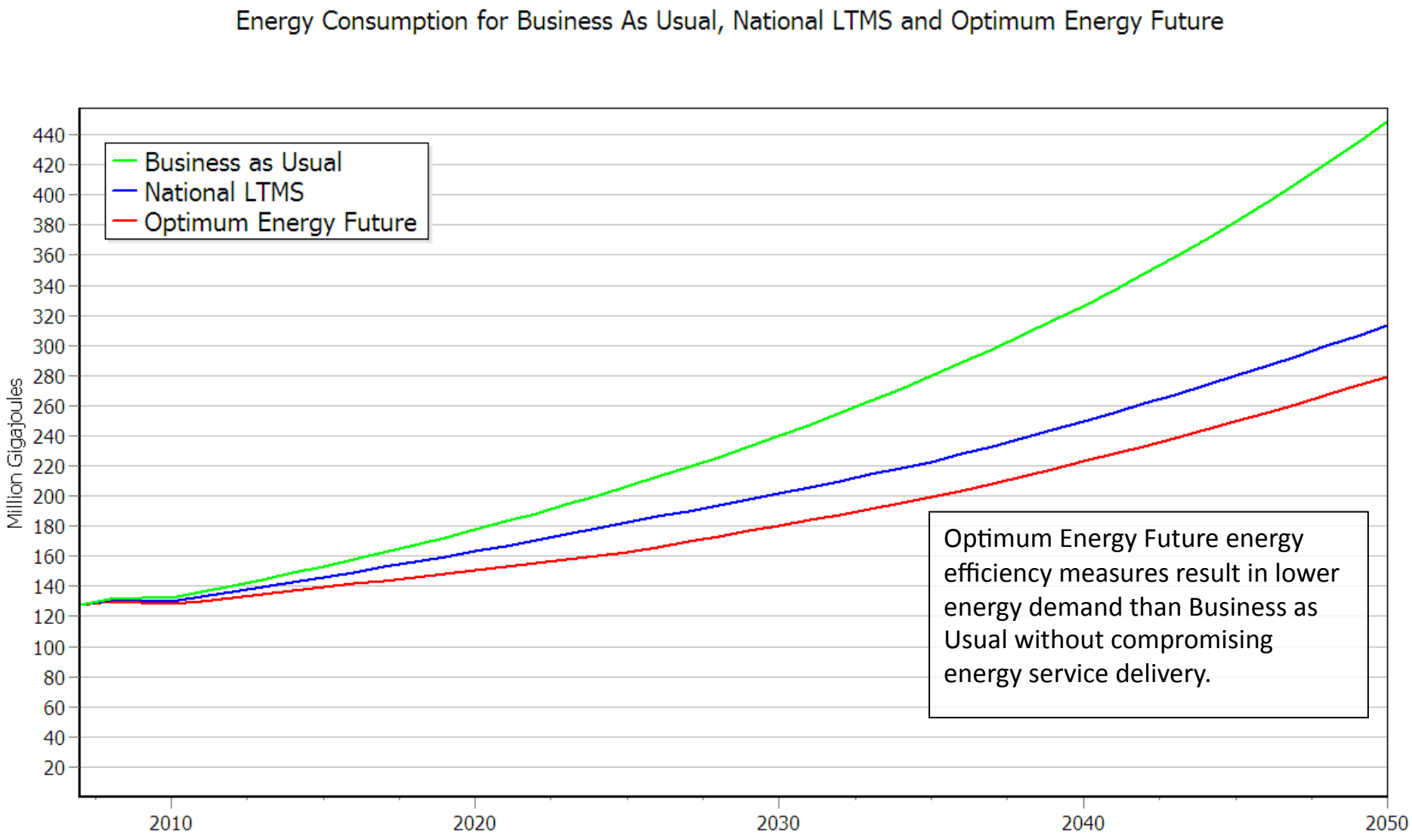



National LTMS Scenario Supply Mix (New Cleaner Coal, Renewables, New Nuclear)
Million Gigajoules
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
2010
2020
2030
2040
2050
Existing Coal
New Coal
New Nuclear
Wind
Solar Thermal

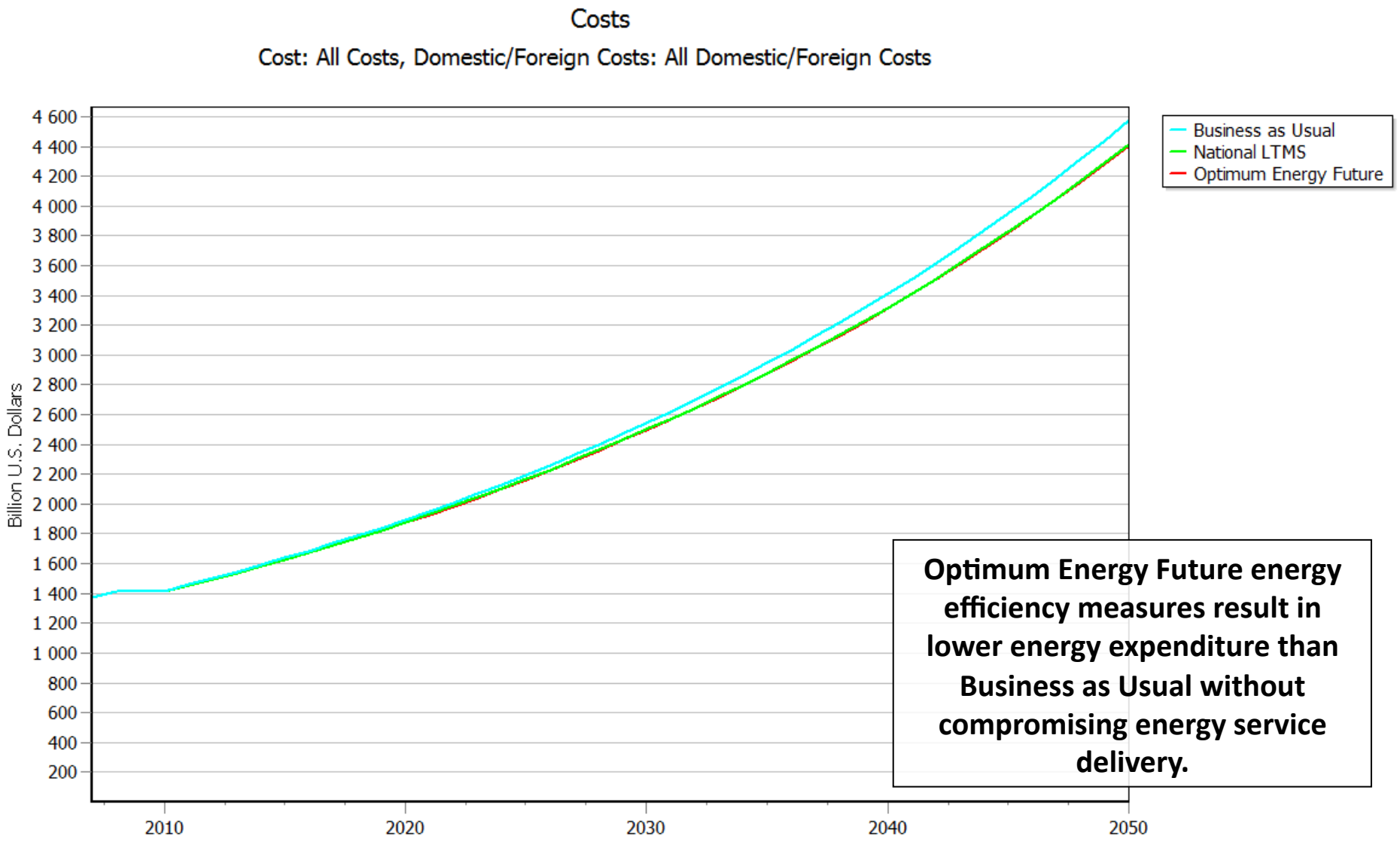
CAPE TOWN OPTIMUM ENERGY FUTURE ELEC SUPPLY MIX



Energy Consumption for Different Scenarios

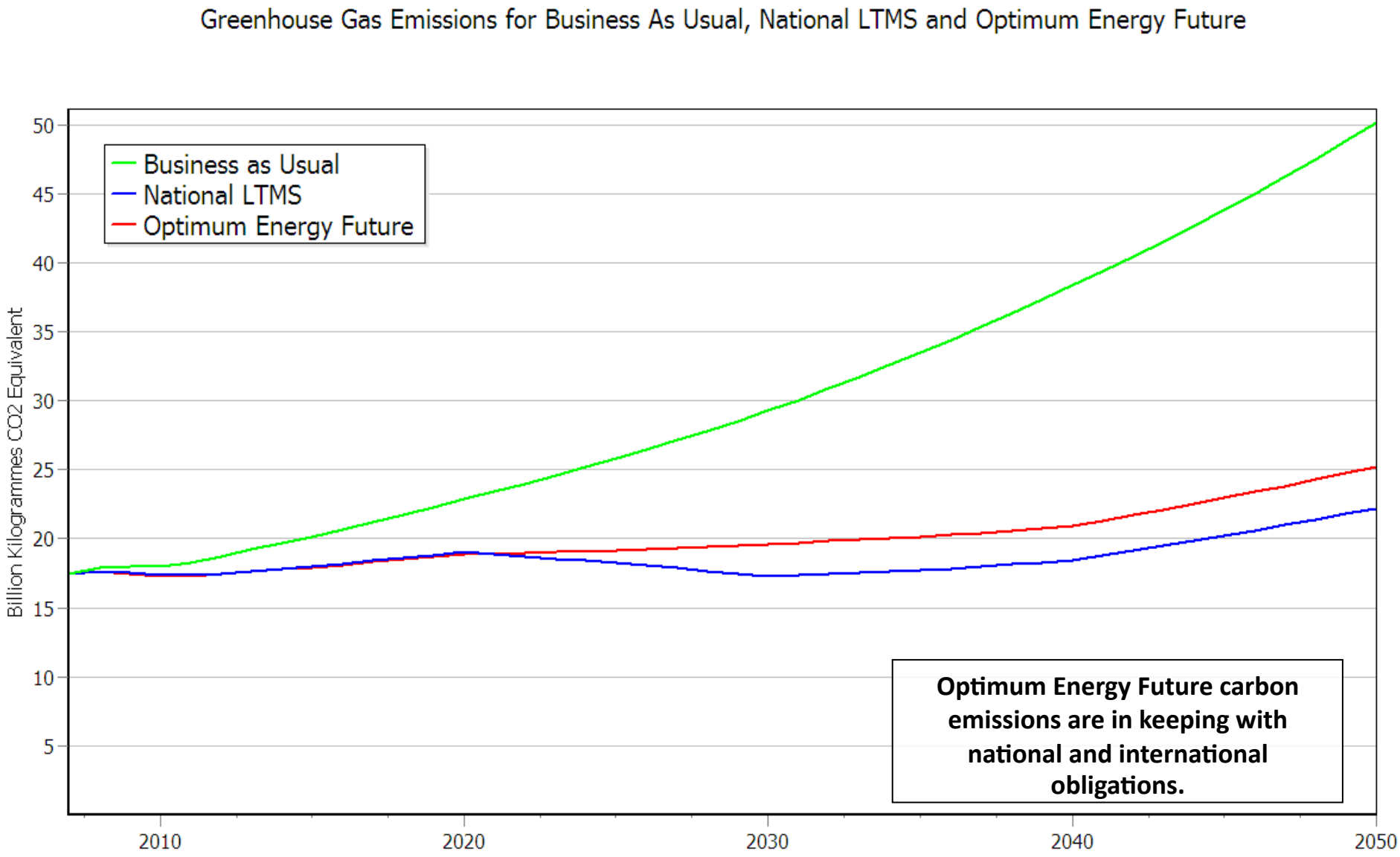


Total End User Expenditure for Scenarios



Optimum Energy Future energy efficiency measures result in lower energy expenditure than Business as Usual without compromising energy service delivery.

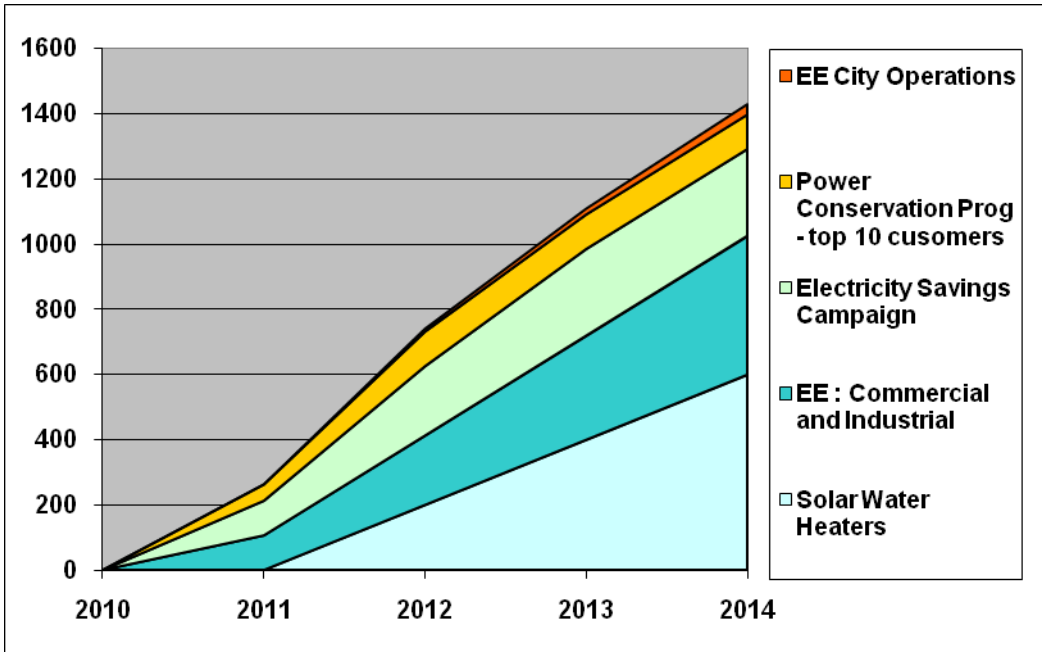
Greenhouse Gas Emissions for different scenarios



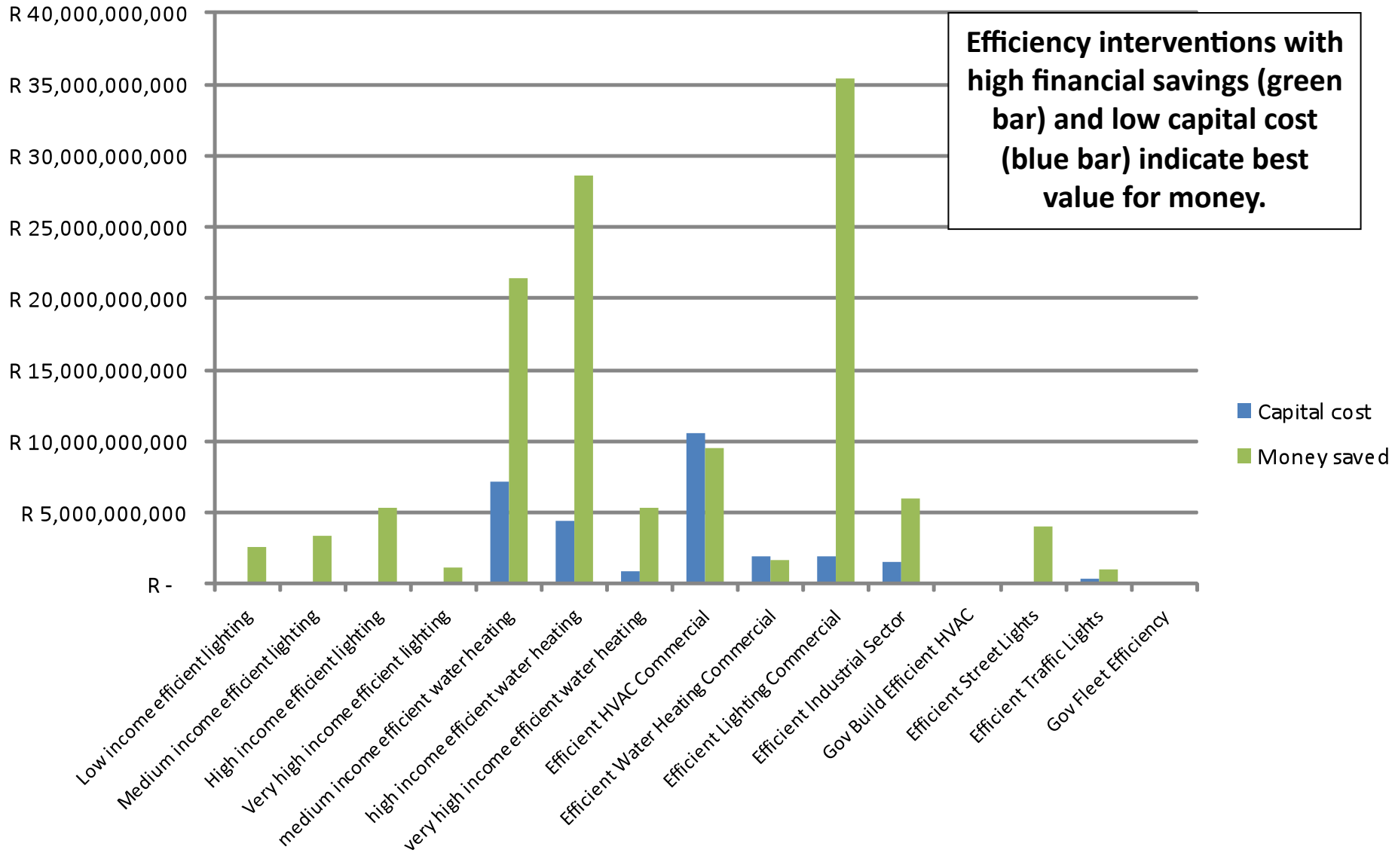
Obj 1: 10% electricity consumption reduction by 2012 on unconstrained use

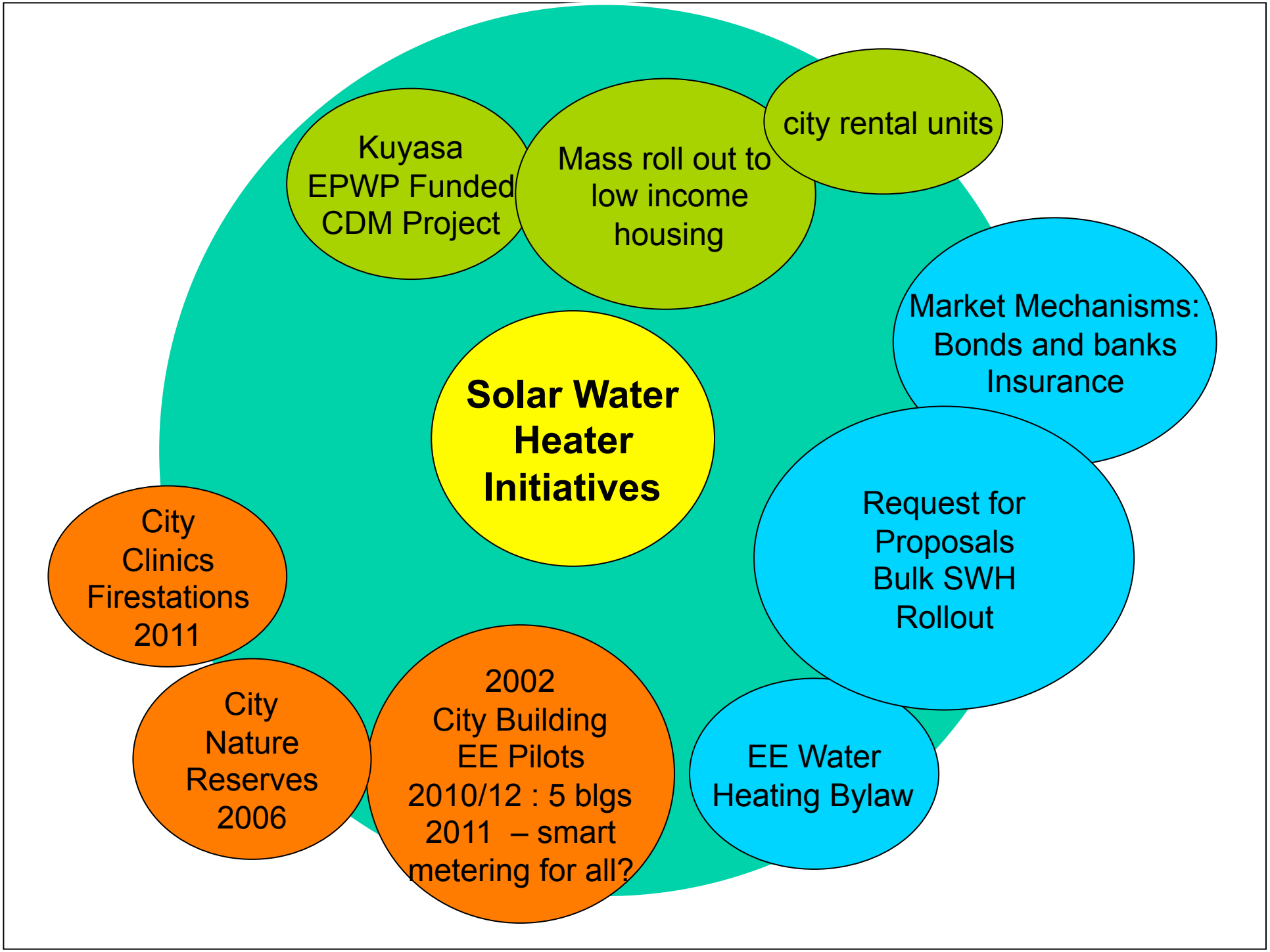
- Electricity consumption reduction : mandatory
- Solar Water Heating roll out
- Smart Metering
- Limiting electricity supply to new developments
- Green Development Guidelines -> Bylaws
- Electricity savings campaigns
- City operations

Electricity Consumption Reduction Projects



EE priorities from the OEF




Kuyasa
EPWP Funded
CDM Project
Mass roll out to
low income
housing
city rental units
Market Mechanisms:
Bonds and banks
Insurance
Solar Water
Heater
Initiatives
Request for
Proposals
Bulk SWH
Rollout
City
Clinics
Firestations
2011
City
Nature
Reserves
2006
2002
City Building
EE Pilots
2010/12 : 5 blgs
2011 – smart
metering for all?
EE Water
Heating Bylaw

CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD

THIS CITY WORKS FOR YOU

BE SMART:
save electricity, save money.

Welcome

This Electricity Savings website is full of practical information to help you take action to save electricity. **The top ten ways to save** are right here at your fingertips, and a great deal more. Once you've taken the first steps for your own savings, be sure to spread the word – tell your family, your work colleagues, people in your community, your neighbours. If you have a domestic worker, help them take action too. And be sure to involve the children in your life, to help them develop smart habits of electricity use, and a sharp eye for how to save money – skills that will last them a lifetime.

Saving electricity is good for everyone. You can save money, reduce the risk of load shedding, and make your own personal contribution to Cape Town's environment. More>>

Why save

Why I save

Gisella Kaiser, Cape Town

'The first thing I did was to replace our two electric water heaters with one solar water heater – the company I bought it from had a payment plan, so I could pay it off if necessary. That made it a lot easier.'

Current South African electricity

Energy Champions

SAVE

Smart Living. Smart Saving.
For all the right reasons.

Eskom

SACSC
South African Council of Shopping Centres

SAPOA
THE VOICE OF COMMERCIAL PROPERTY
www.sapoa.org.za

CITY OF CAPE TOWN | ISIXEKO SASEKAPA | STAD KAAPSTAD
THIS CITY WORKS FOR YOU

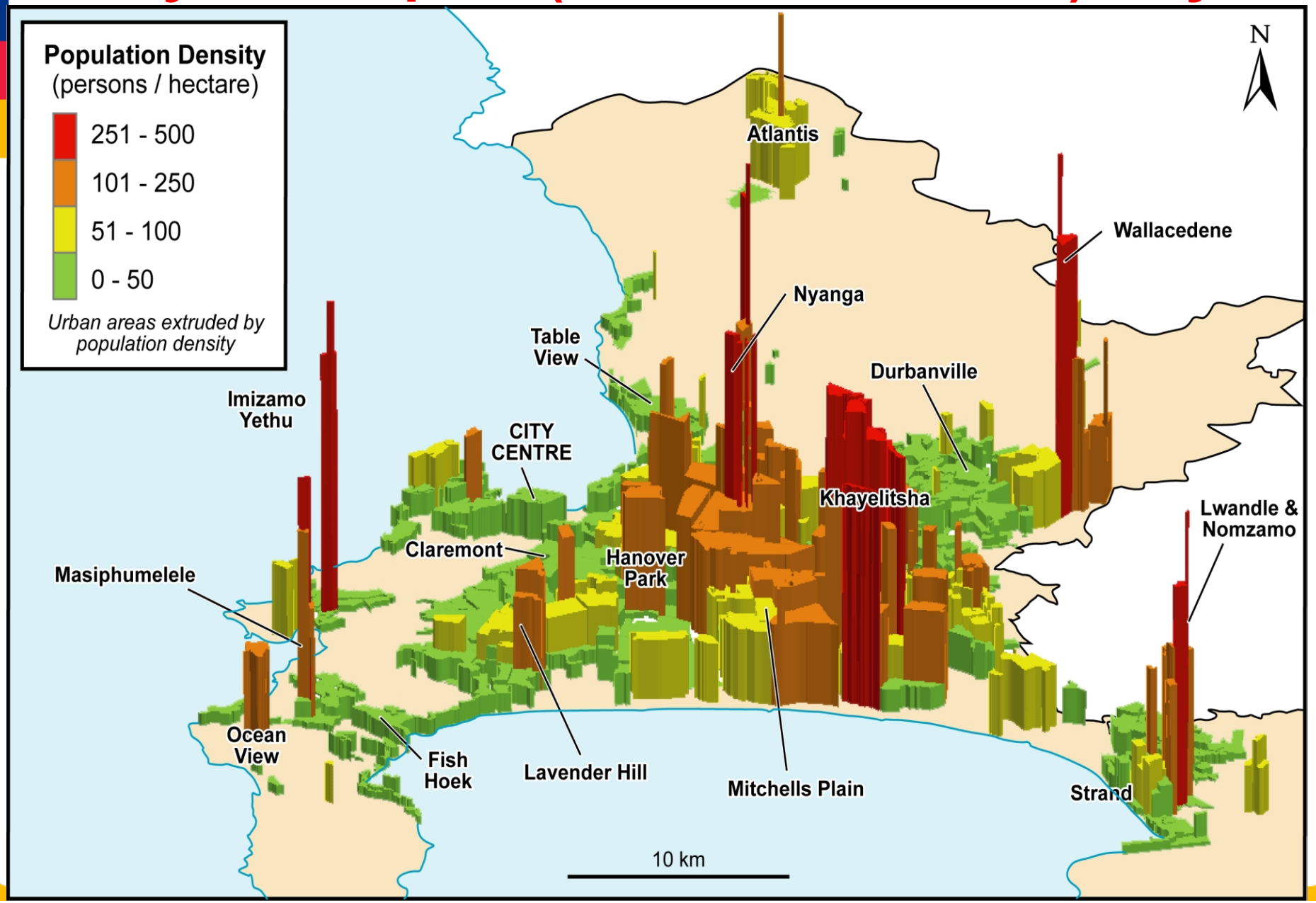
ENERGY EFFICIENCY FORUM
for Commercial Buildings

- Bi-annual get together with high level input
- Hosted Forum on 14 September, 7 speakers, 110 attendees
- Marketplace in December - energy efficiency goods/ services

Obj 2. 10 % Renewable Energy supply by 2020

- RE large scale supply – REFIT, IRP, green economy, Darling PPA, Green Energy Certificates
- RE and cleaner energy supply from Council operations
- RE small scale supply – domestic/commercial regulations / net metering
- RE supply at Eskom rates to City

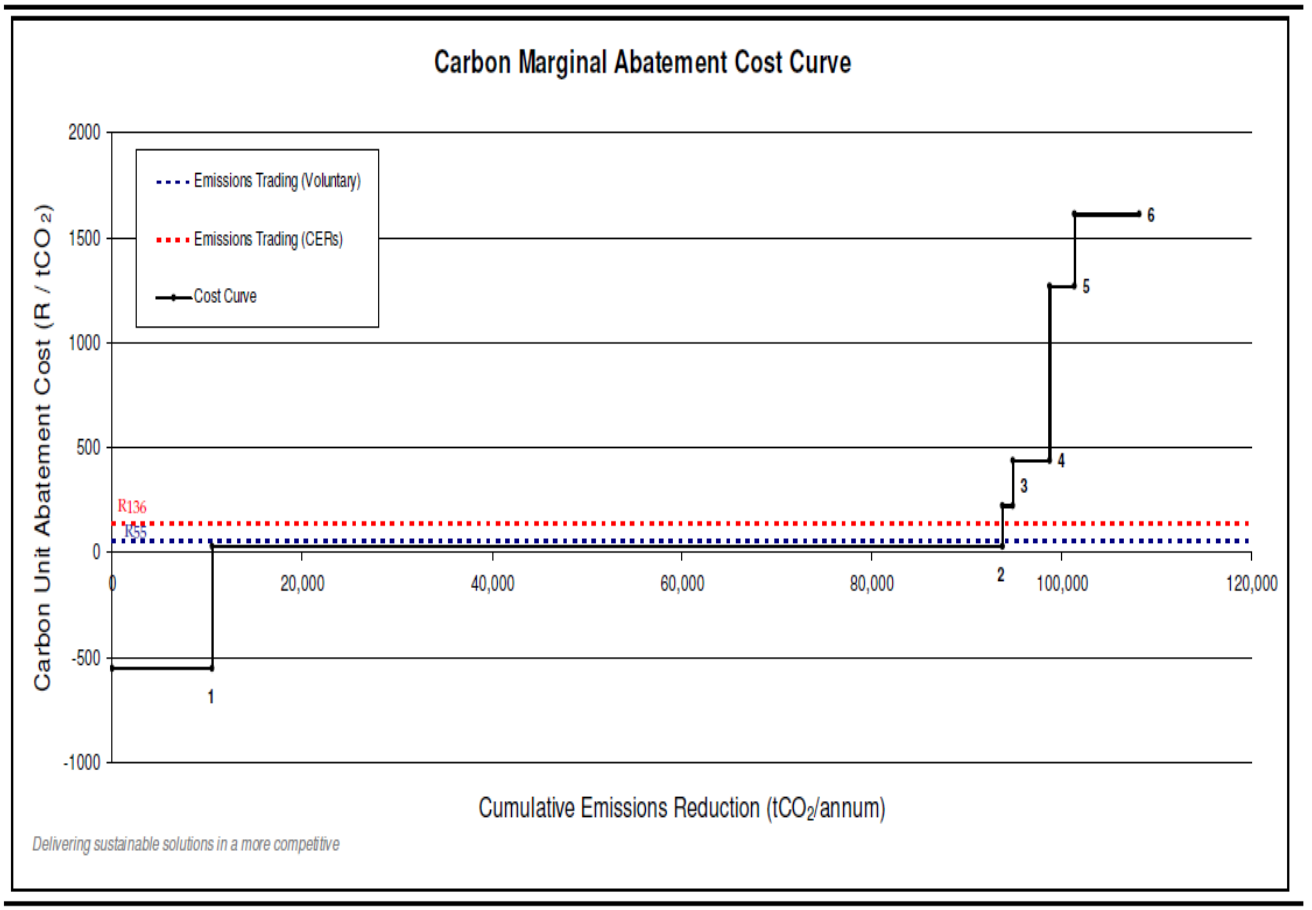
Obj 4. Compact (resource efficient) City



Obj 8. Development of Project Carbon Sales Potential

- Carbon projects scoping and development
- Carbon projects policy
- Carbon sales

Figure 5.1 City of Cape Town MAC Curve

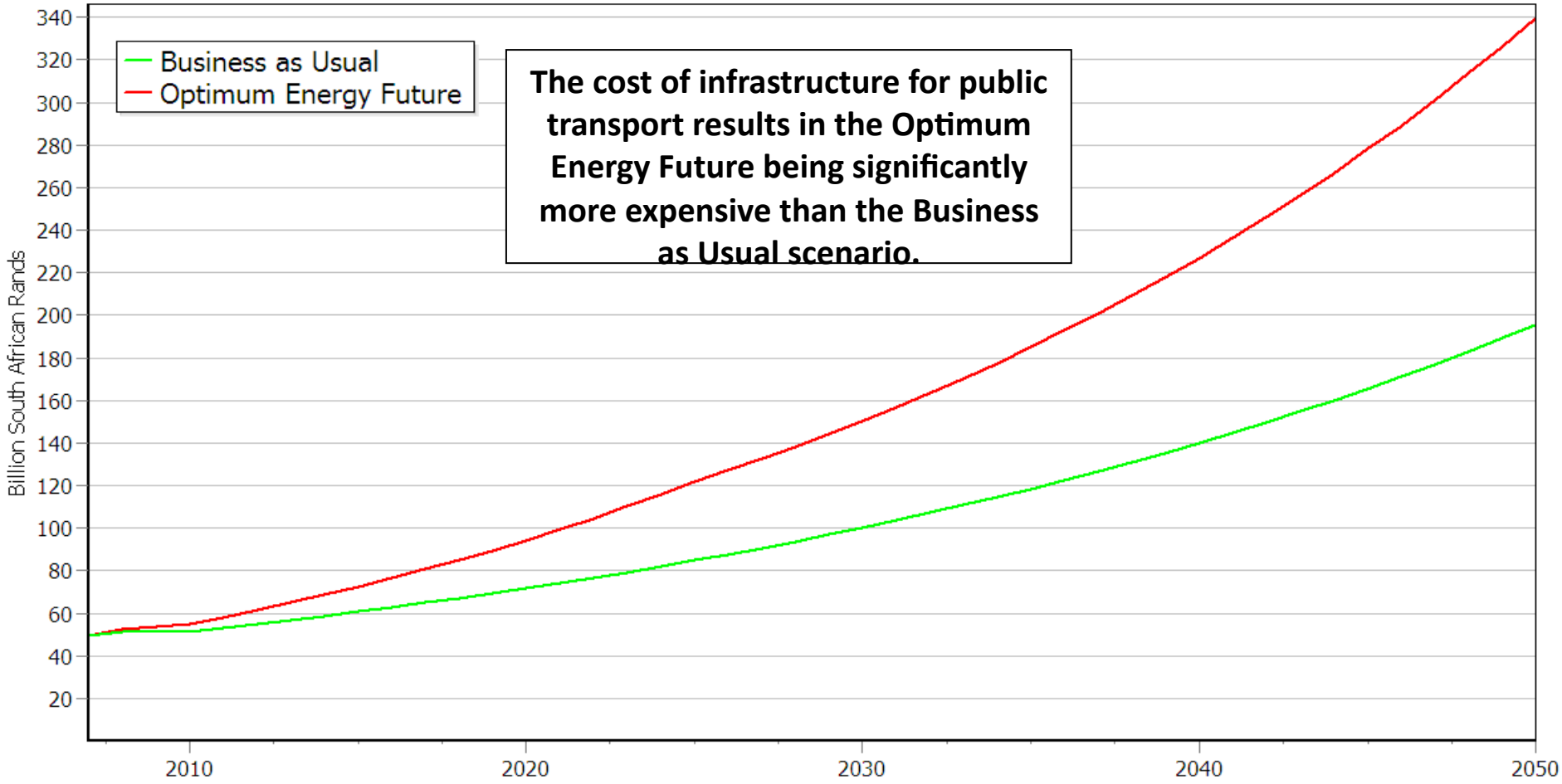


1. Traffic light retrofit
2. Low cost housing ceiling retrofit
3. Council building retrofit
4. Biodigesters
5. Energy efficient pumps
6. Streetlight retrofit

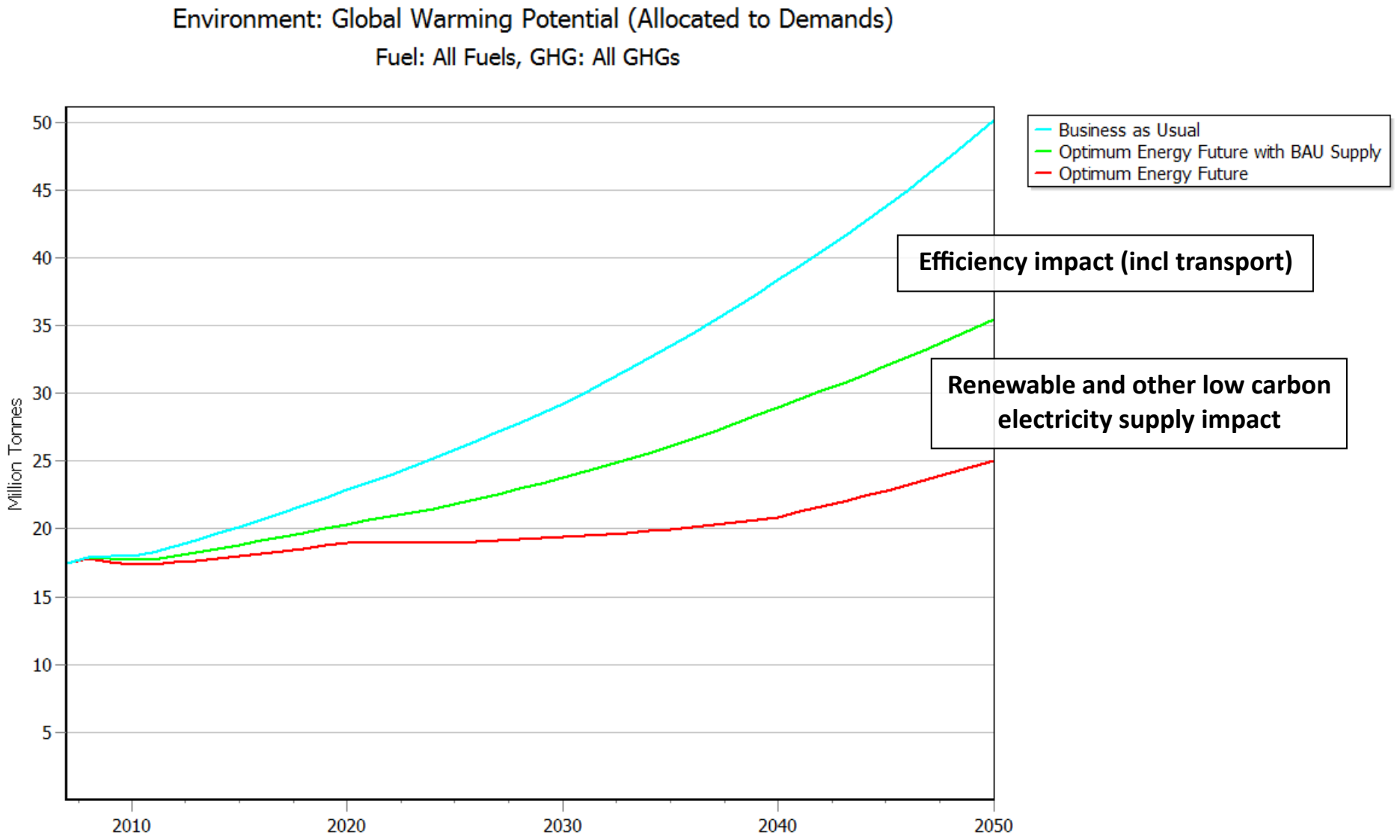
THANK YOU

KEY ISSUE 7: INFRASTRUCTURE COSTS LINKED TO PUBLIC TRANSPORT MODAL SHIFT ARE HIGH. THE CITY MAY STRUGGLE TO FIND THIS MONEY, YET SIGNIFICANTLY IMPROVED PUBLIC TRANSPORT FACILITIES ARE ESSENTIAL TO A SUSTAINABLE CITY.

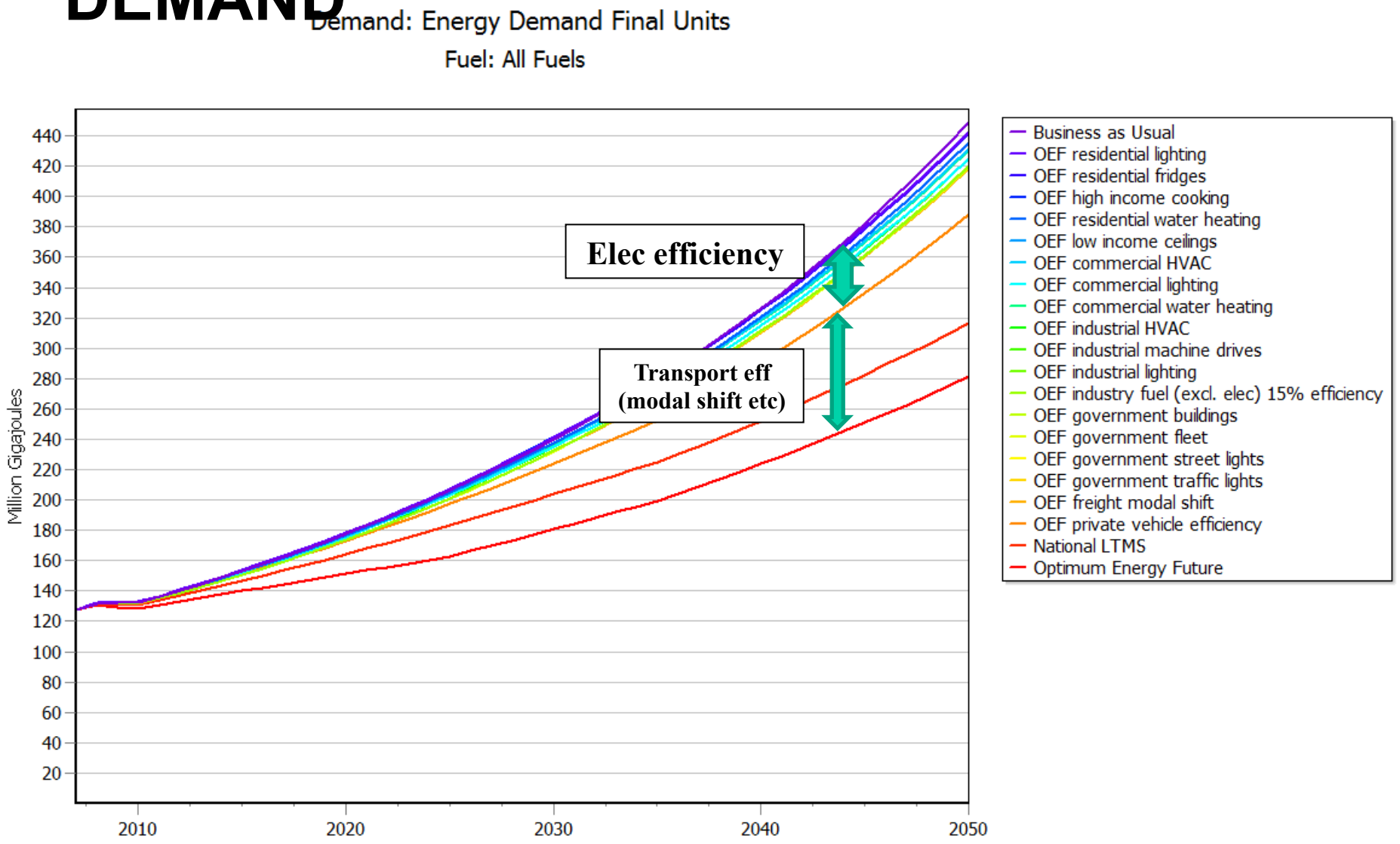
Passenger Transport Costs, including Transport Infrastructure Costs



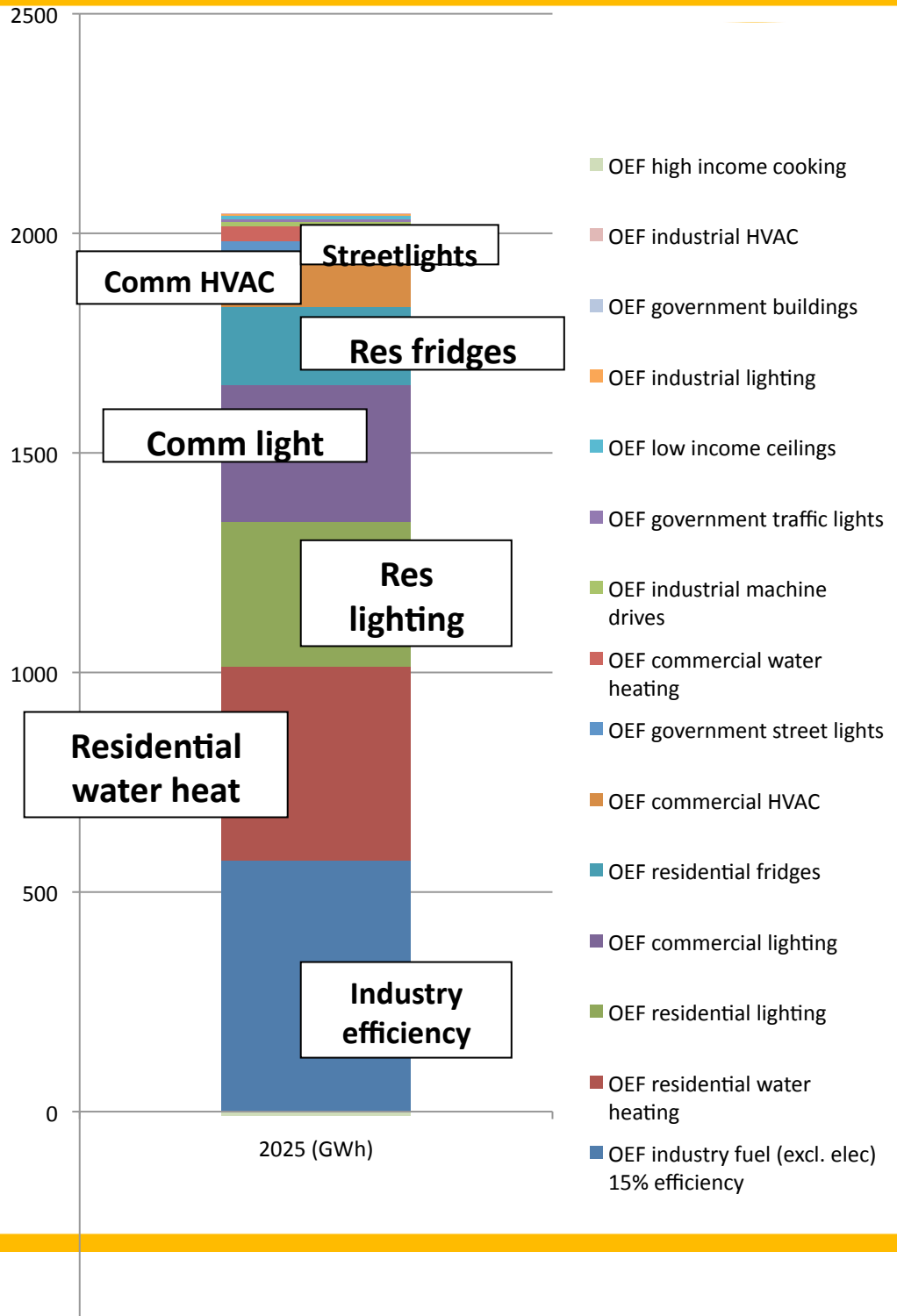
Energy efficiency and Greenhouse Gas Emissions



IMPACT OF EFFICIENCY ON TOTAL DEMAND



Ranking of efficiency interventions by impact



KEY ISSUE 3: THE COST OF AN ELECTRICITY

Table 4: Generation mixes and costs for different scenarios in 2050

	Scenario: Business As Usual		Scenario : Optimum Energy Future		Scenario : National LTMS	
	% mix	R/kwh	%	R/kwh	%	R/kwh
Municipal Waste	0%	R 0.44	3%	R 0.44	2%	R 0.44
Solar Thermal Electricity	0%	R 1.50	8%	R 1.50	10%	R 1.50
Wind	9%	R 1.00	26%	R 1.00	20%	R 1.00
New Nuclear	2%	R 0.69	9%	R 0.69	32%	R 0.69
New Fossil Base	82%	R 0.42	48%	R 0.42	32%	R 0.42
New mid and peak (Gas Turbines)	5%	R 3.40	4%	R 3.40	4%	R 3.40
Existing Hydro	2%	R 0.10	2%	R 0.10	0%	R 0.10
Existing mid and peak (Gas Turbines)	0%	R 3.40	0%	R 3.40	0%	R 3.40
Existing Base	0%	R 0.20	0%	R 0.20	0%	R 0.20
Existing Nuclear	0%	R 0.69	0%	R 0.69	0%	R 0.69
Average Generation Costs		**R 0.62**		**R 0.80**		**R 0.85**

The Optimum Energy Future

Sector	Interventions
Residential	Efficient lighting
	Efficient water heating (solar water heaters or heat pumps)
Commercial	Efficient Heating, Ventilation and Air Conditioning (HVAC)
	Efficient water heating
	Efficient lighting
Industrial	Efficient motors
	Efficient HVAC
	Efficient lighting
Local Government	Buildings: efficient lighting
	Buildings: efficient HVAC
	Efficient street lighting
	LED traffic lights
	Fleet fuel efficiency
Freight Transport	Freight from road to rail
Passenger Transport	Hybrid and electric private vehicles
	Public transport vehicle efficiency
	Modal shift from private to public transport
Electricity Supply Mix	Renewable energy in mix

KEY ISSUES THAT NEED TO BE CONSIDERED IN FUTURE PLANNING EXERCISES

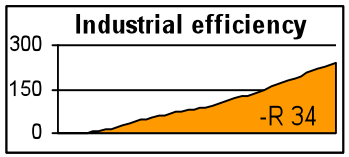
- **Peak Oil** - huge financial impacts on transport
  - Need public transport

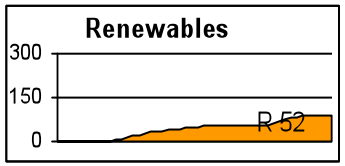
- **Densification** of the city - enable public transport

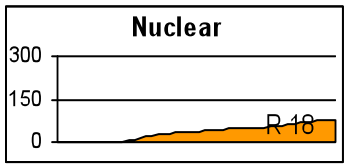
- The **fast growing informal residential sector** will place increasing demands on City's ability to provide services

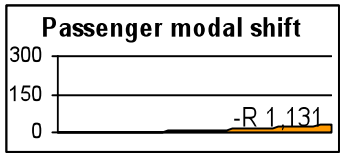
Long Term Mitigation Scenarios LTMS Wedges

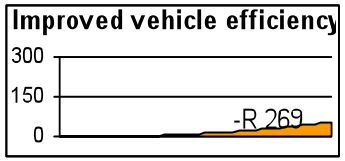
Start Now



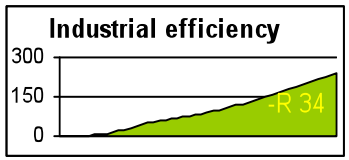


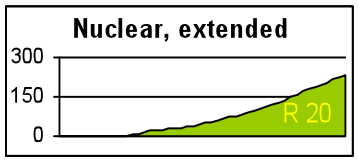


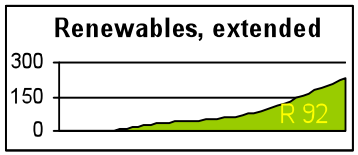


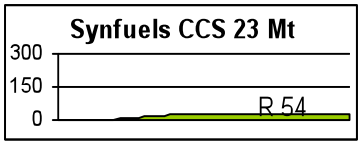


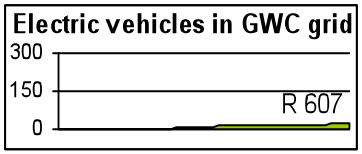
Scale Up



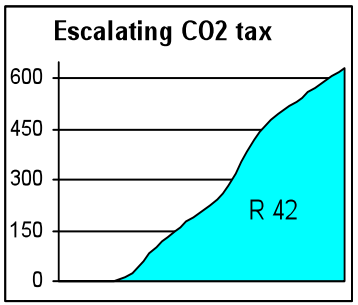


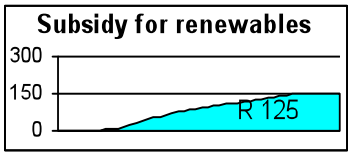


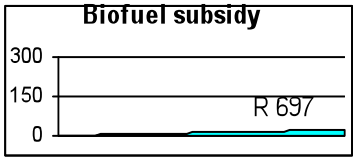


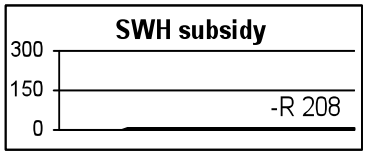


Use the Market

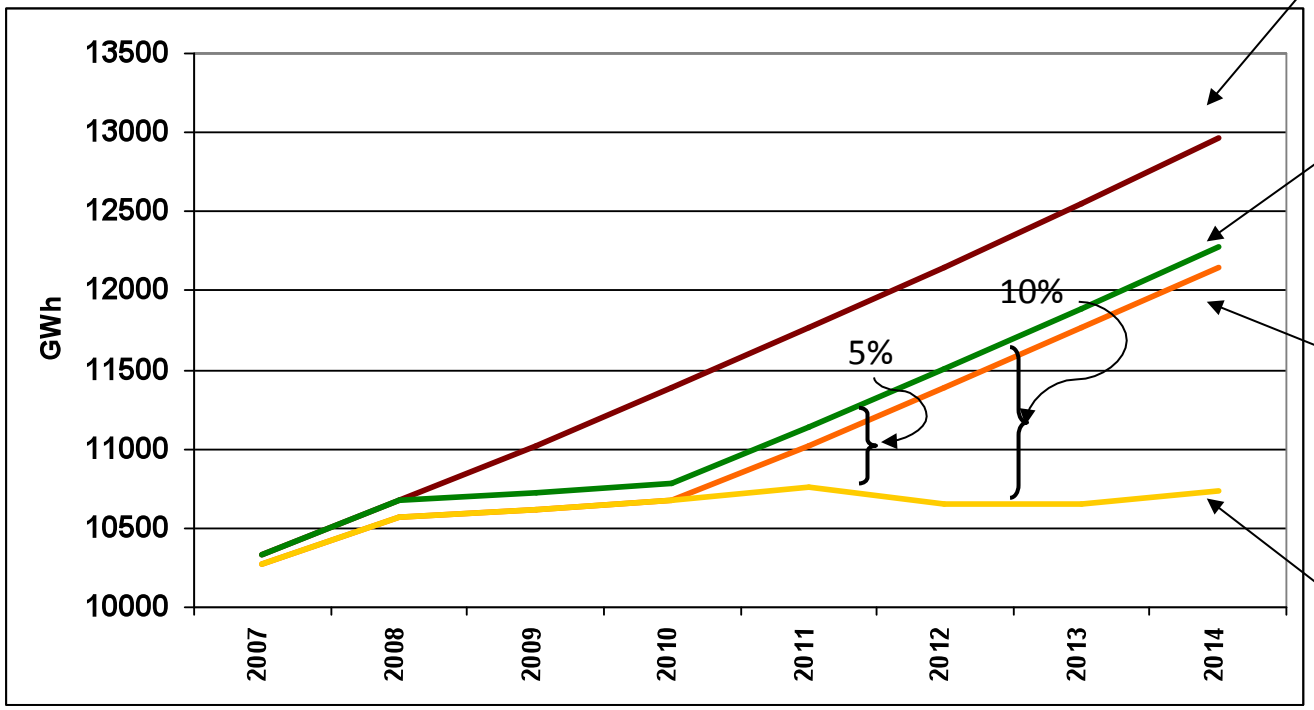








Electricity Consumption Reduction



1. Business as Usual no recession

2. BAU with recession

3. With efficiencies learnt from load shedding

10% electricity consumption reduction to be achieved by 2012 on BAU baseline

Savings achieved using different baselines

	2009	2010	2011	2012	2013	2014
1	3.69%	6.27%	8.50%	12.35%	15.09%	17.24%
2	1.02%	0.98%	3.34%	7.41%	10.30%	12.58%
3	0.00%	0.00%	2.38%	6.49%	9.41%	11.71%

Leaping hurdles

Capital for projects

Capacity to develop / run projects, find finance

Finance run the City, risk averse, not very adaptive, change is scary, no investment focus

Mandates??

Official will/ political will

Carbon income?

MFMA