

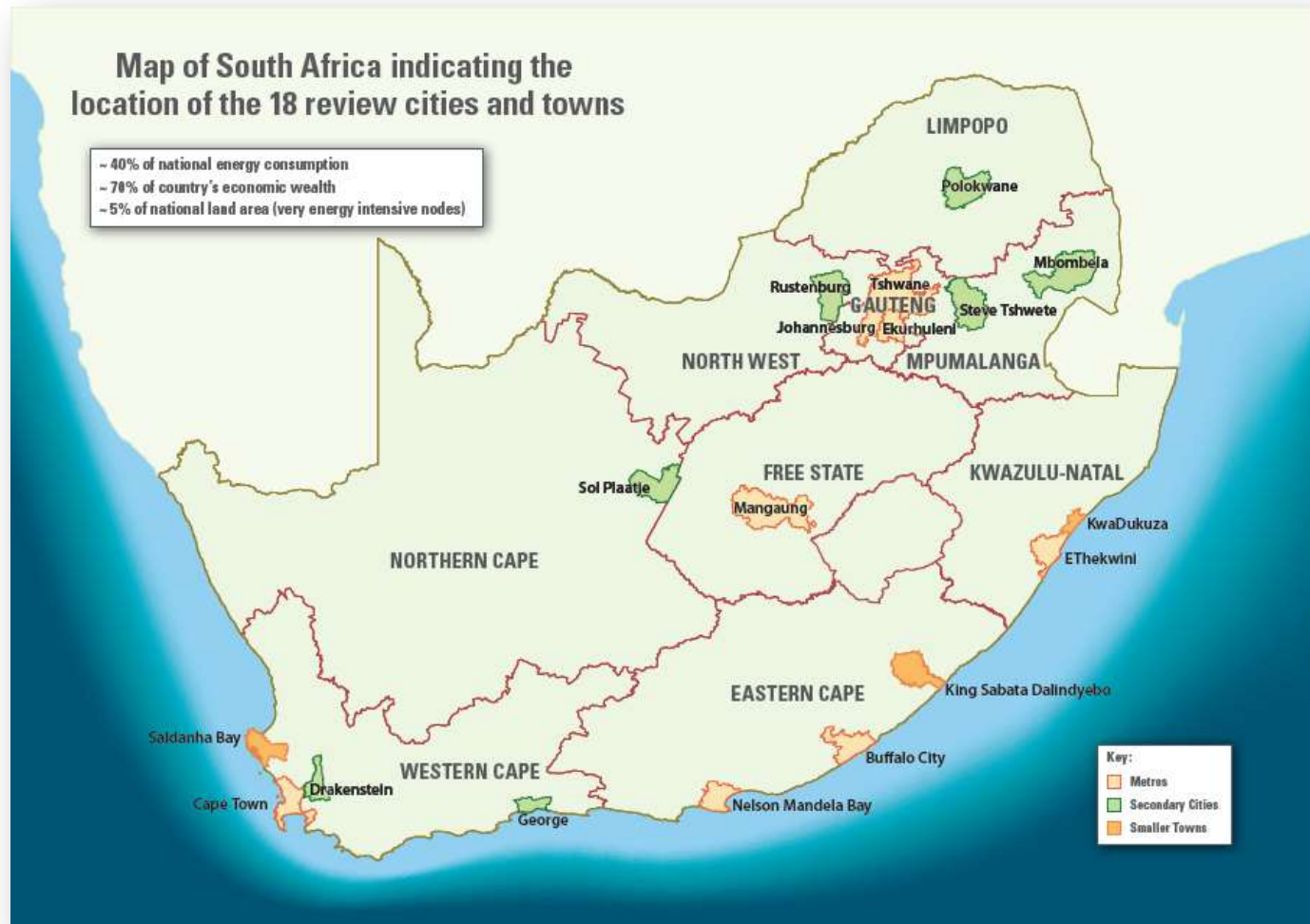
ERLN, August 2015

State of Energy in SA Cities 2015



SUSTAINABLE
ENERGY
AFRICA

State of Energy in SA Cities 2015



- 40% total energy consumed in dense urban nodes
 - 52% petrol and diesel
 - 46% electricity

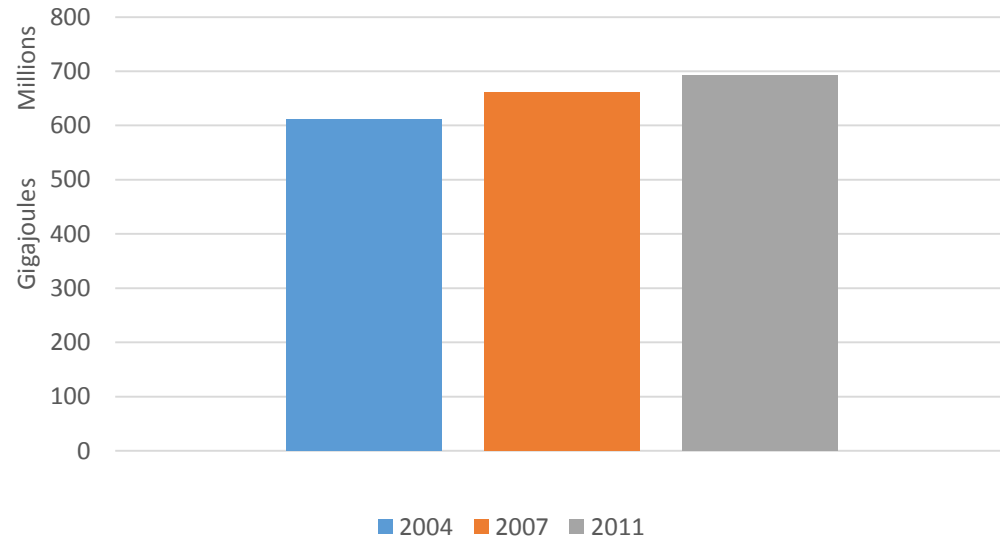
Metro energy: 2004 - 2011

Population growth p.a. 2004-2011: 2.9%

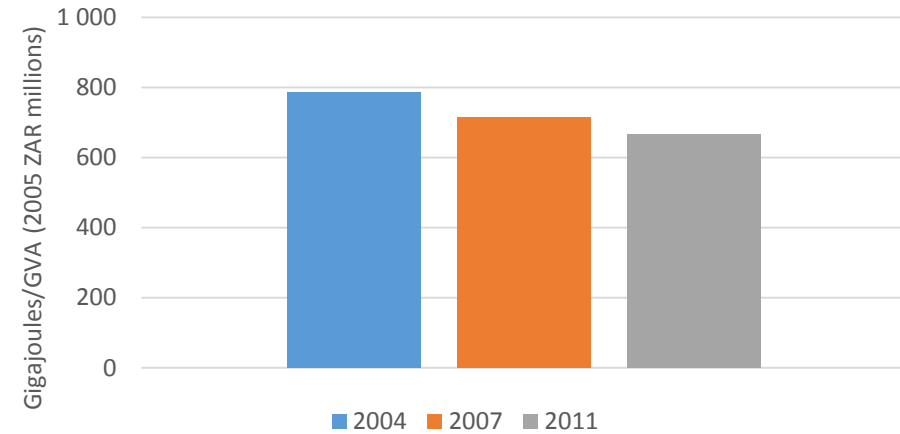
Economic growth p.a. 2004-2011: 4,2%

Energy growth p.a. 2004 – 2011: 2.1%

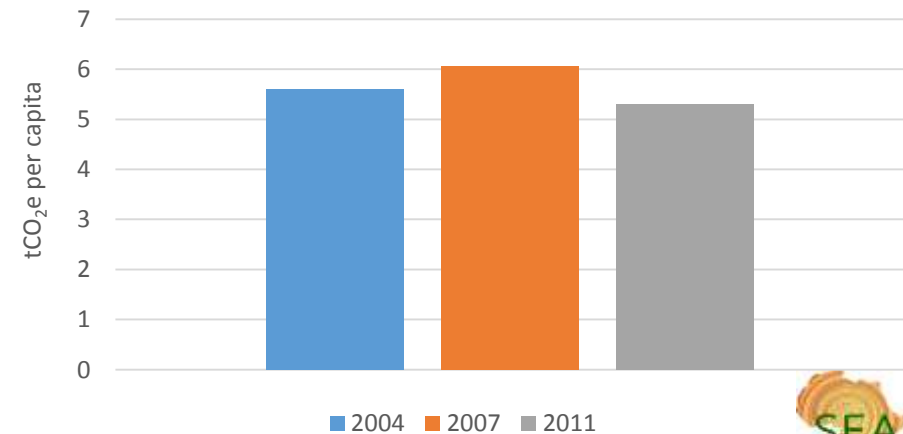
Energy consumption for all metros excluding Mangaung
(all fuels excluding marine and aviation)



Average energy intensity of economy for all metros
(excluding Mangaung)

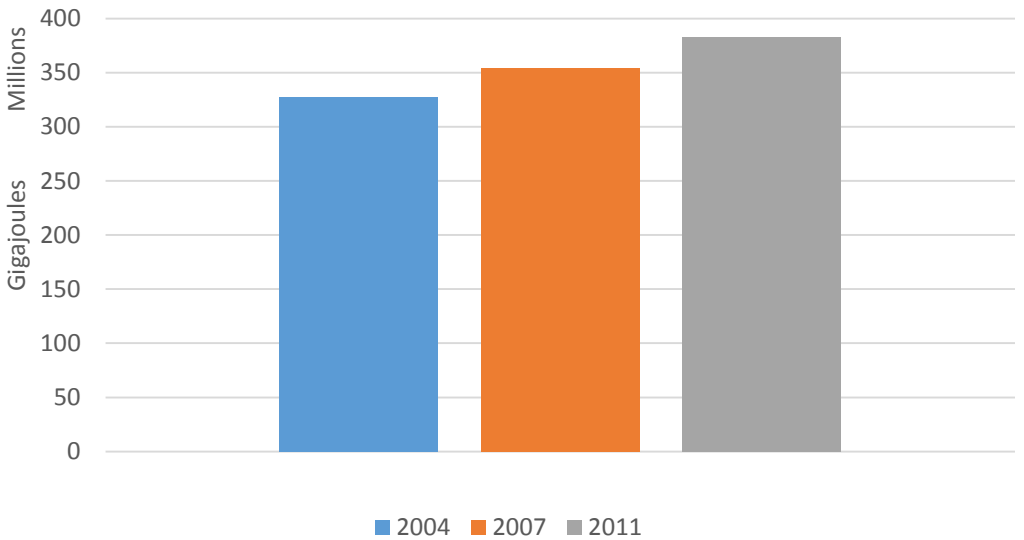


Average emissions intensity of population for all metros
(excluding Mangaung)

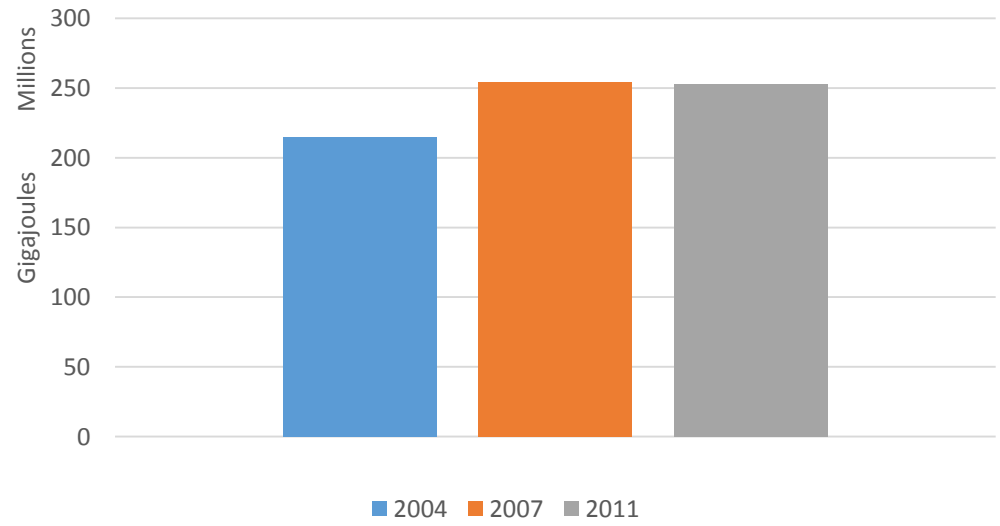


Transport and electricity

Petrol and diesel consumption for all metros
(excluding Mangaung)



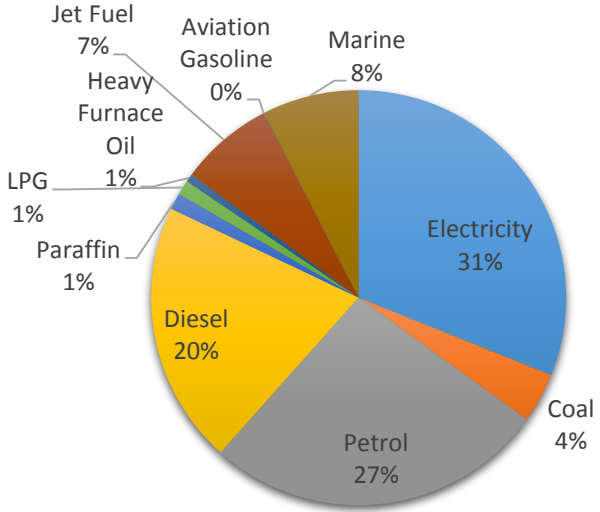
Electricity consumption for all metros
(excluding Mangaung)



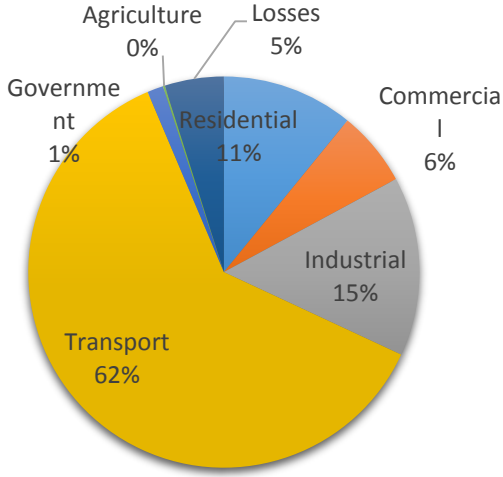
Ave metro energy consumption by fuel and sector



Average metro energy consumption by fuel



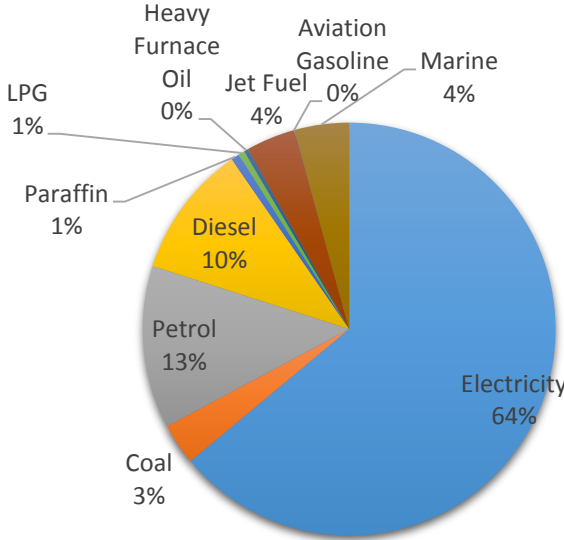
Average metro energy consumption by sector



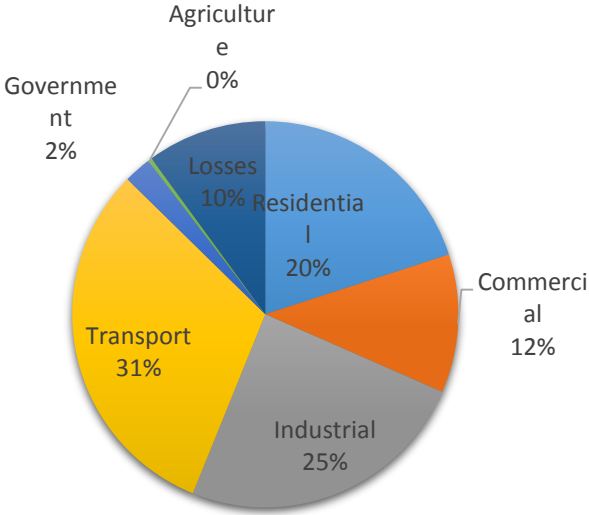
Ave metro energy-related emissions by fuel and sector



Average metro emissions by fuel



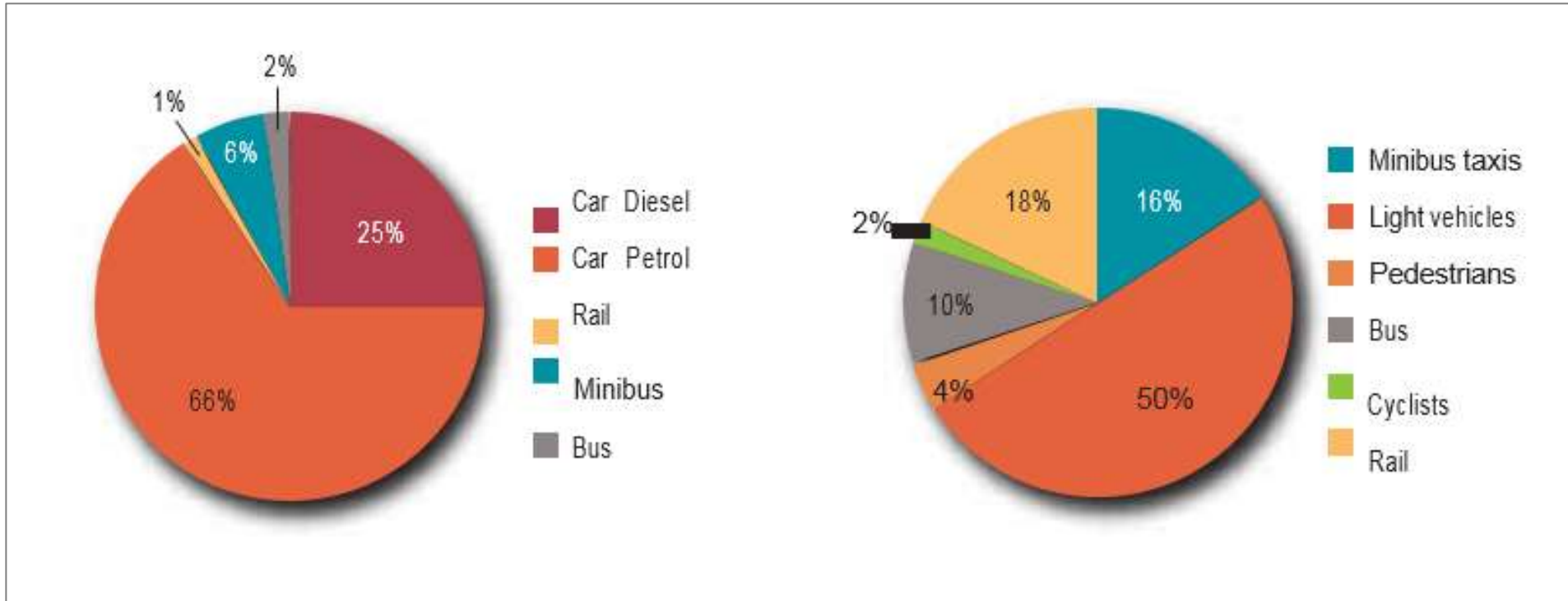
Average metro emissions by sector



South African cities demonstrate high carbon emissions per capita relative to their level of development.



Transport picture:

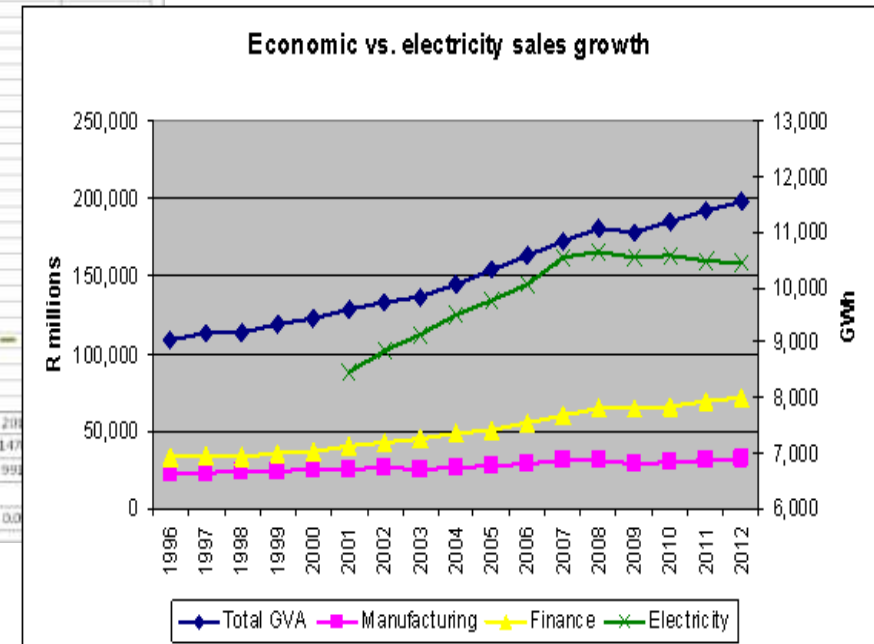
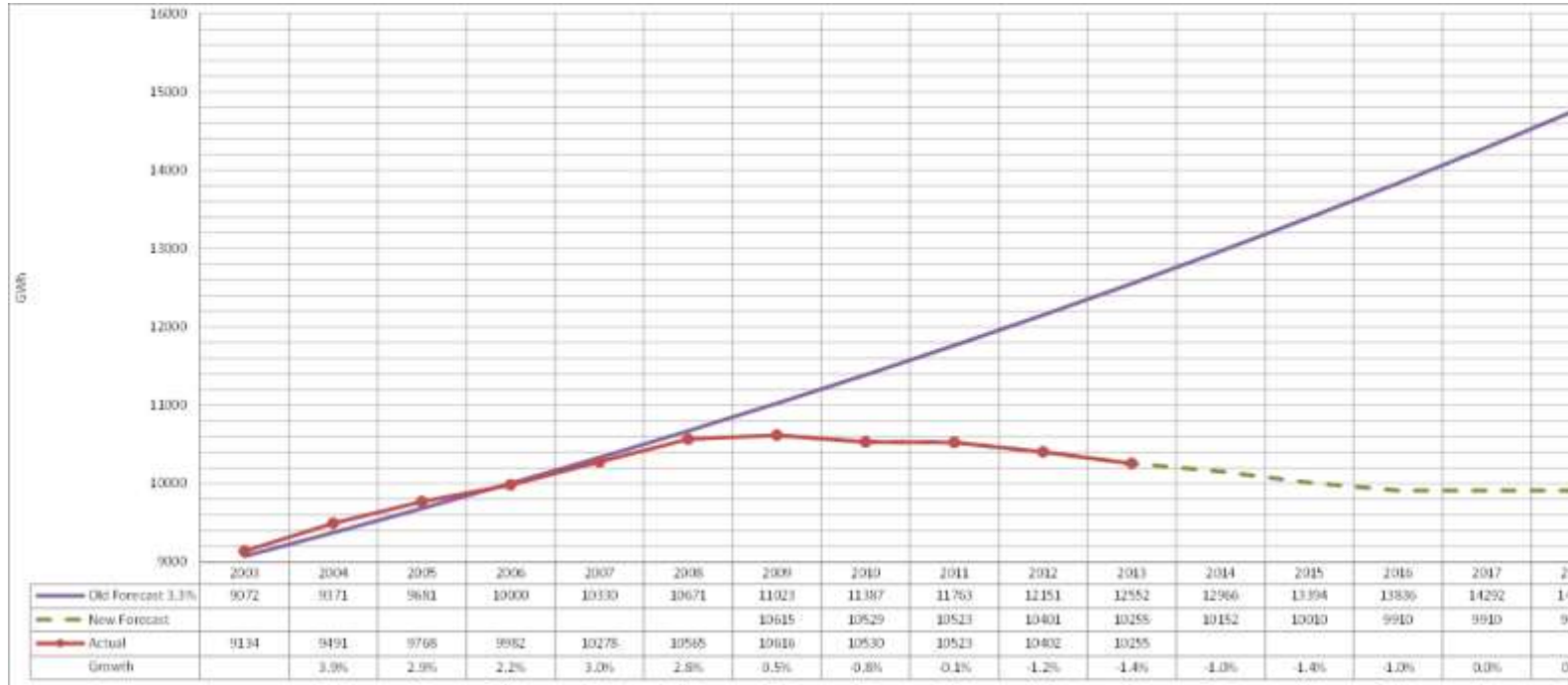
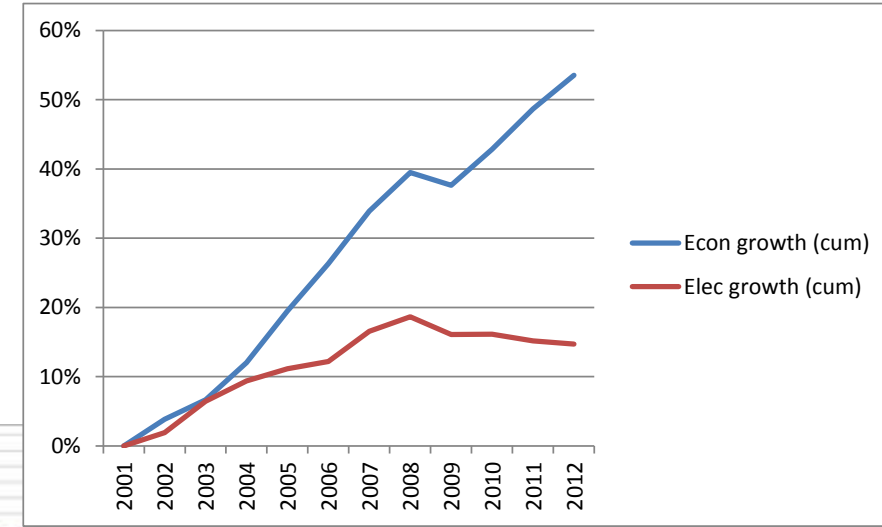


Metro passenger transport
(energy consumption)

Metro passenger transport
(passenger numbers)

Electricity demand reductions

Metro electricity: Cape Town and Durban



Household energy use:

Electricity use to meet basic household energy needs

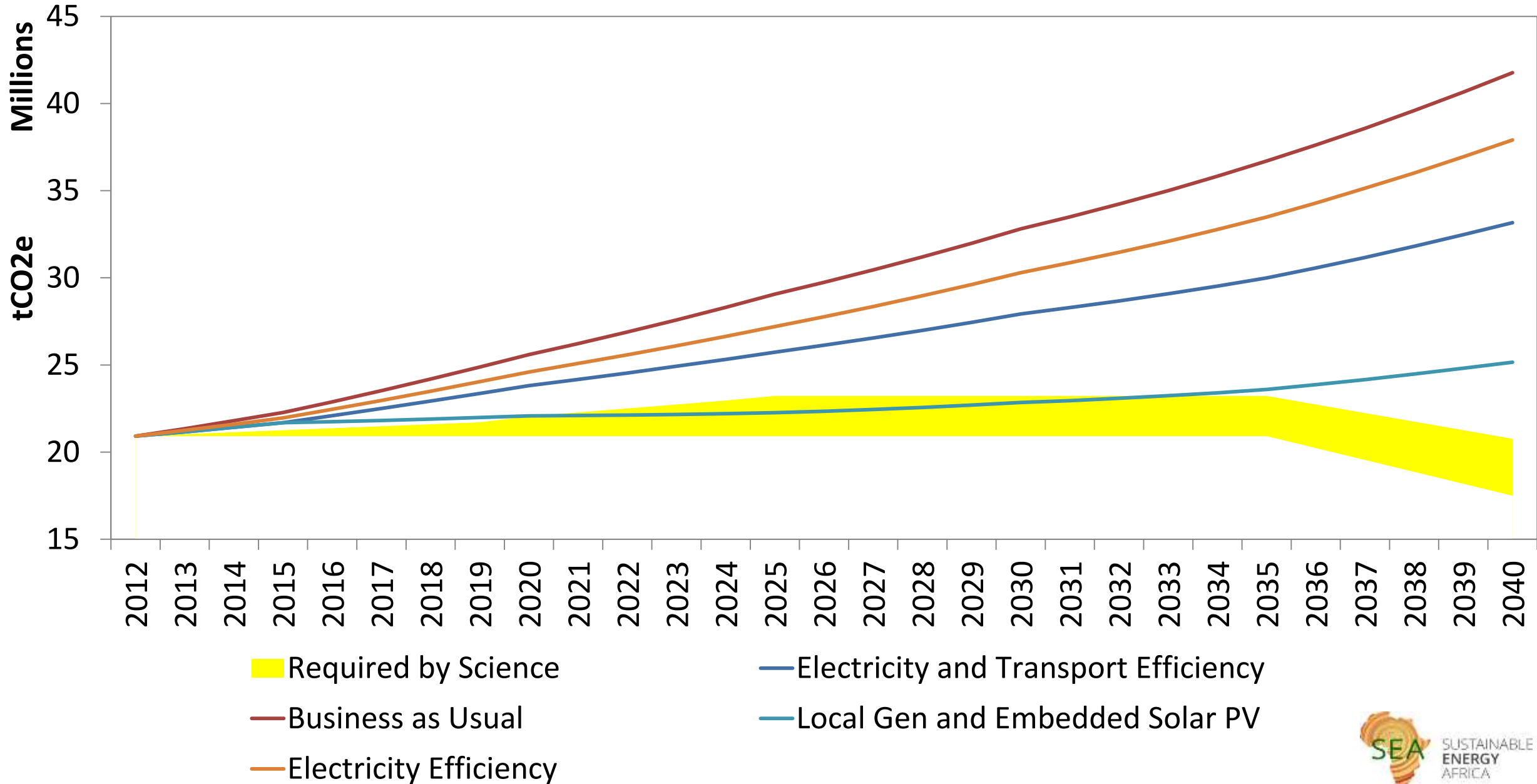
(Stats SA 1996, 2001, 2011)

Households that use electricity for...	Lighting			Cooking			Space Heating		
	1996	2001	2011	1996	2001	2011	1996	2001	2011
Buffalo City	47%	63%	81%	42%	43%	74%	39%	36%	41%
City of Cape Town	87%	89%	94%	80%	80%	88%	75%	75%	63%
City of Johannesburg	85%	85%	91%	80%	79%	87%	79%	77%	82%
City of Tshwane	77%	80%	89%	71%	71%	84%	70%	69%	74%
Ekurhuleni	75%	75%	82%	64%	66%	79%	60%	62%	66%
EThekweni	74%	80%	90%	71%	72%	86%	69%	72%	76%
Mangaung	61%	85%	91%	52%	61%	88%	49%	54%	53%
Nelson Mandela Bay	71%	75%	90%	65%	65%	86%	60%	59%	54%
Metro average	77%	81%	89%	71%	72%	85%	68%	68%	70%
National average	58%	70%	85%	47%	51%	74%	44%	49%	59%

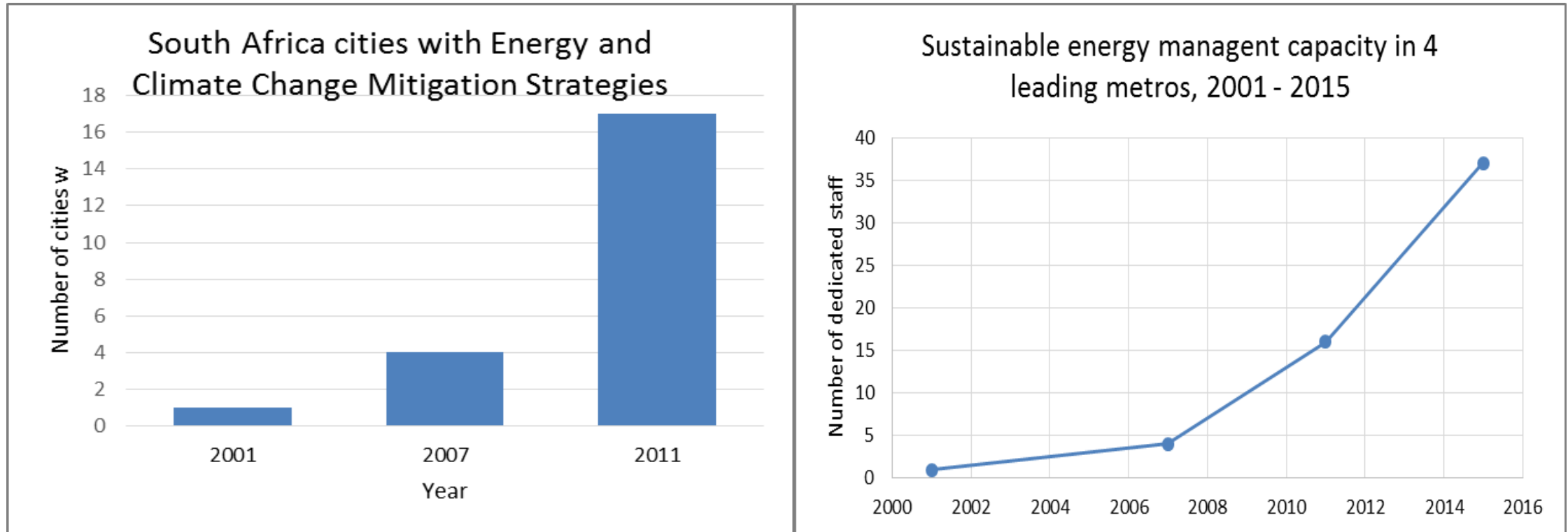


INCREASING USE OF ELECTRICITY

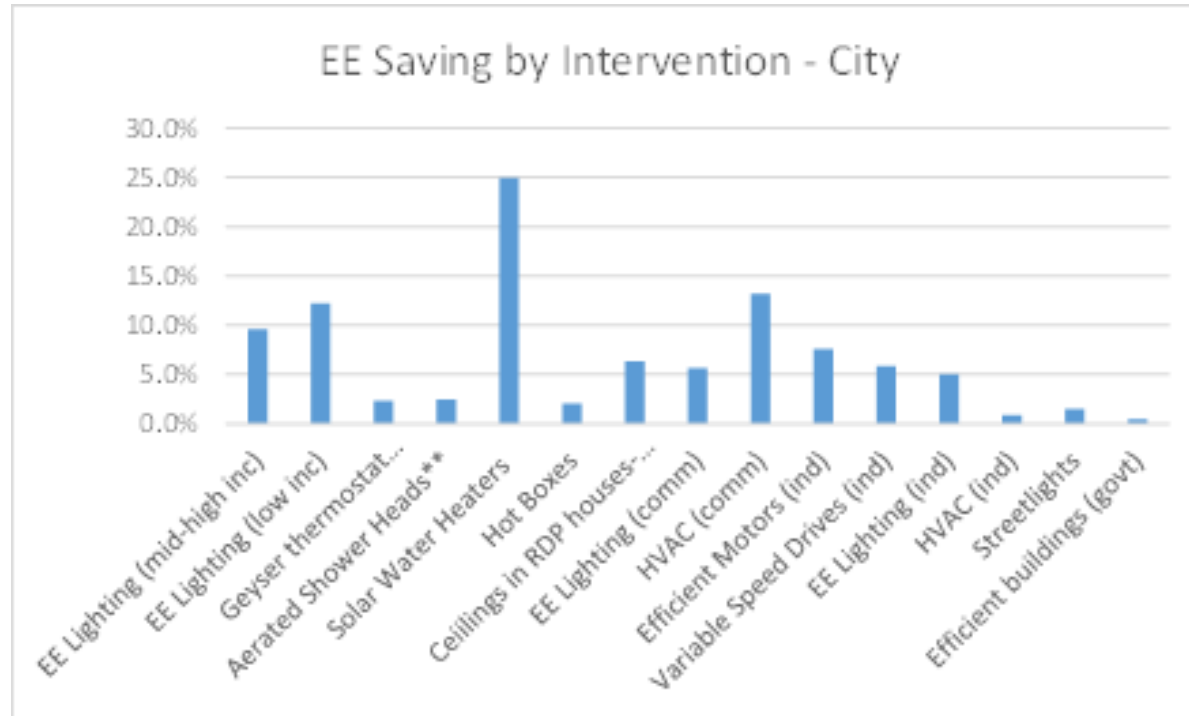
Future Emissions Pathways



Growth in sustainable energy governance



Energy efficiency



- Market driven reality – manage to optimise local benefits
- SANS 10400-XA and SANS 204: all new buildings subject to energy efficiency minimum standards
- Municipal EEDSM Programme
- View ‘freed’ up demand as opportunity for growth and densification within the municipality
- Acknowledge that money saved by end users can feed back into the local economy
- Buffers the poor against price increases

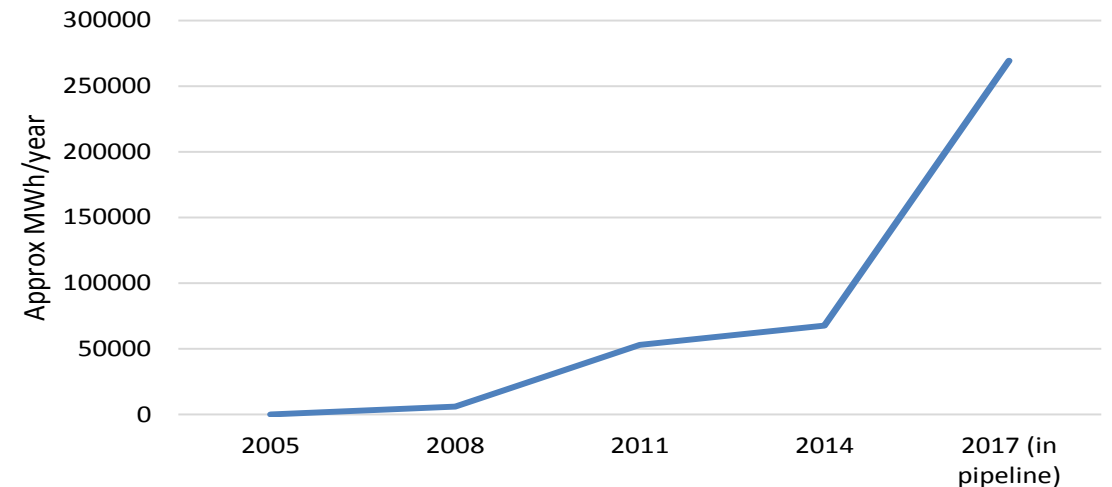
Area	Action	Total actual savings for period 2009/10 to 2013/14	Typical payback period per project type	Lead
Building efficiency	26% of all large City-owned buildings retrofitted since 2009; R60 million investment	R3,7 million 1, 068 MWh 1, 058 tCO ₂ e	8 years	ERMD working with Specialised Technical Services Department
Traffic lighting	100% retrofit with LEDs, and integrated into maintenance and procurement R27 million investment	R38 million 27, 9777 MWh 27, 697 tCO ₂ e	3 years	Public Lighting Development
Street lighting	17% of street lights (all high wattage luminaires) replaced with efficient alternatives. Equal to 25 210 luminaires, R55 million investment	R26 million 19, 718 MWh 19, 520 tCO ₂ e	8 years	ERMD with Transport for Cape Town/ Electricity Services Department
Metering and monitoring	220 smart meters have been installed by the City	Accurate data collection to inform accurate billing of City buildings and inform efficiency strategy		ERMD
Rooftop PV to offset consumption	167 kWp installed on City buildings (rooftops), a further 90 kWp in the pipeline.	Demonstration of leadership; building of staff skills in relation to new technologies and approaches		ERMD, Electricity Services Department, Architecture, other

City Renewable Developments and Targets

Municipality and RE project engagement	Year				
	2005	2008	2011	2014	2017 (in pipeline)
MWh					
City of Cape Town: PPA (wind)			7770	7770	7770
City of Cape Town: rooftop PV				15	135
City of Cape Town: microhydro				2	
Ekurhuleni Metro: PV array				350	350
Ekurhuleni Metro: Landfill gas to electricity				7135	21405
Ekurhuleni Metro: rooftop PV				46	46
Ethekewini Metro: Landfill gas to electricity		6000	45000	45000	45000
City of Johannesburg: wastewater gas to electricity				2331	4662
City of Johannesburg: landfill gas to electricity -					150000
City of Johannesburg: rooftop PV					
Nelson Mandela Bay Metro: wheeling agreement (wind)				5000	5000
City of Tshwane: wheeling agreement (biowaste gas to elec)					35000
Approx. Total MWh/year	0	6000	52770	67647	269368



Municipal (led or assisted) local RE development



Durban solar

- ❑ eThekweni Water and Sanitation (Customer Service Building) = 45 kW
- ❑ Roof area = 510 m²

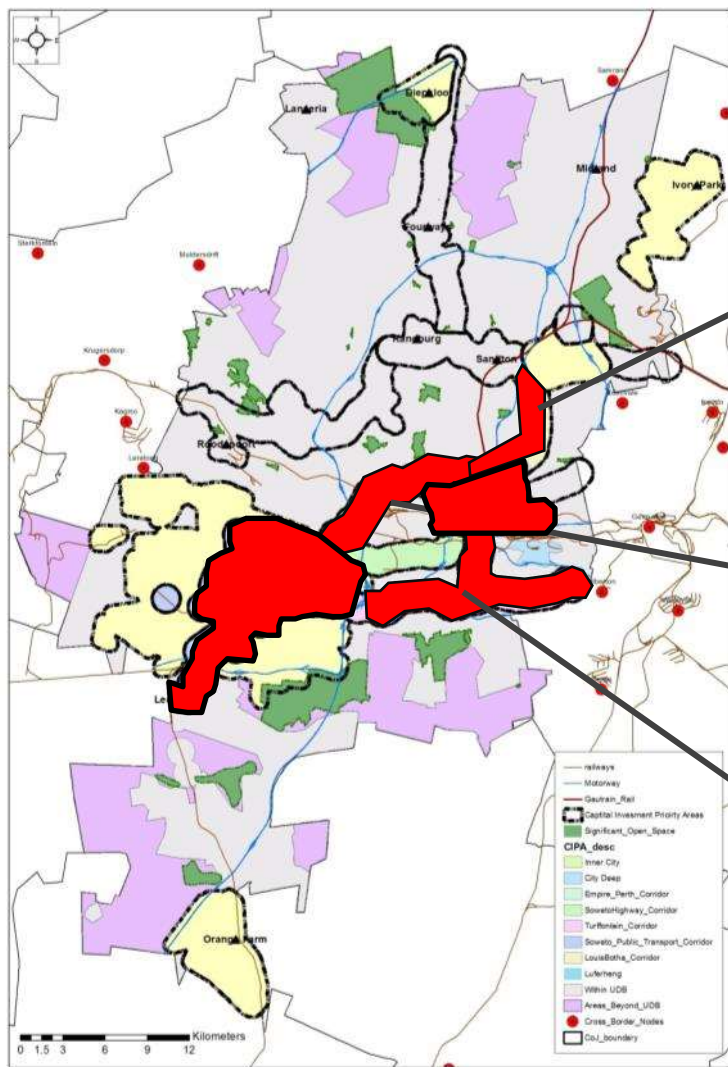




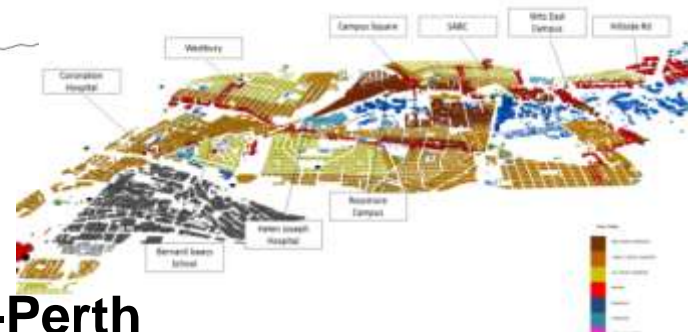
a world class African city

CORRIDORS OF FREEDOM

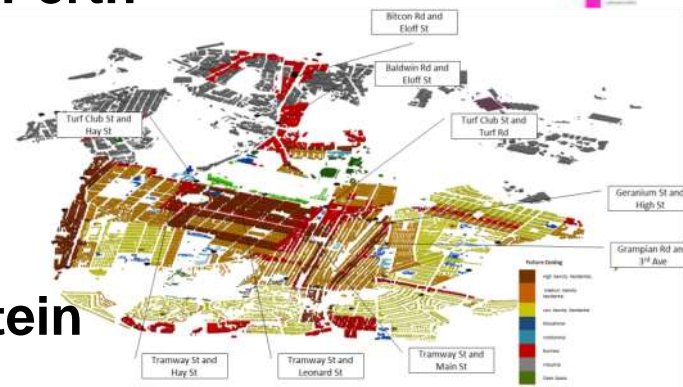
Medium Term City Priorities



Louis Botha



Empire-Perth



Turffontein

Today the corridor looks like this



And we want it to look like this...



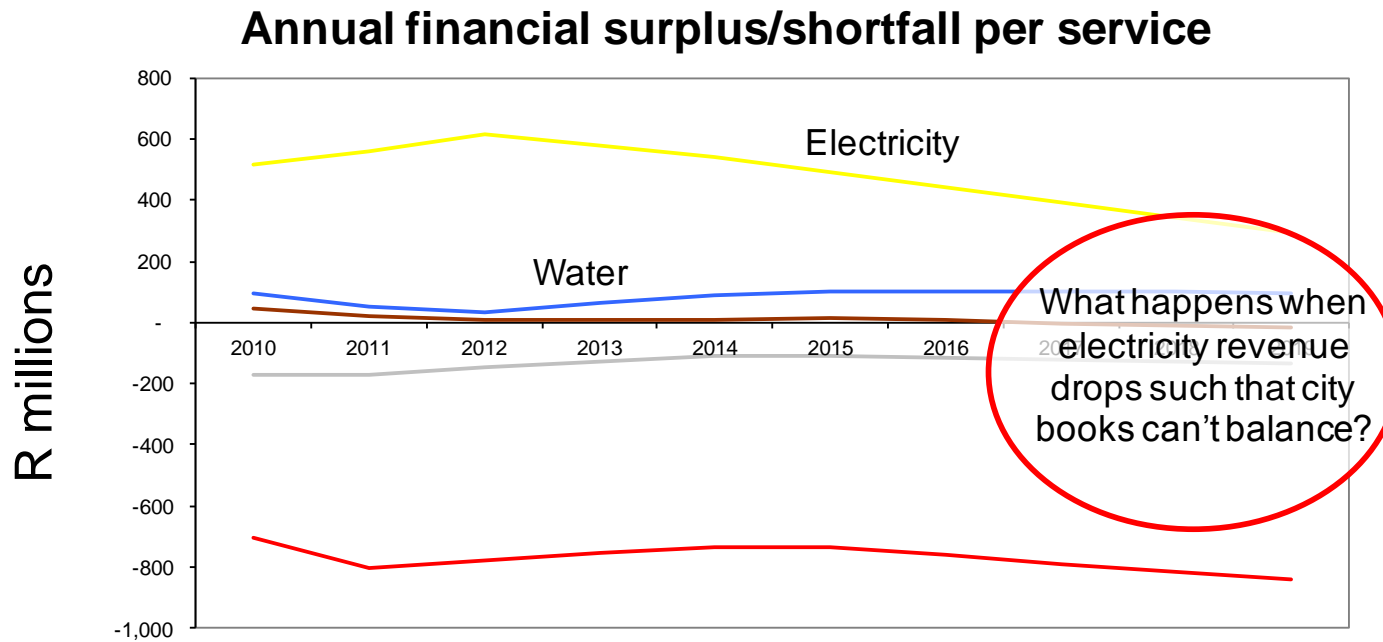
Densification and Energy: Voortrekker Rd Corridor, Cape Town



Transition challenges

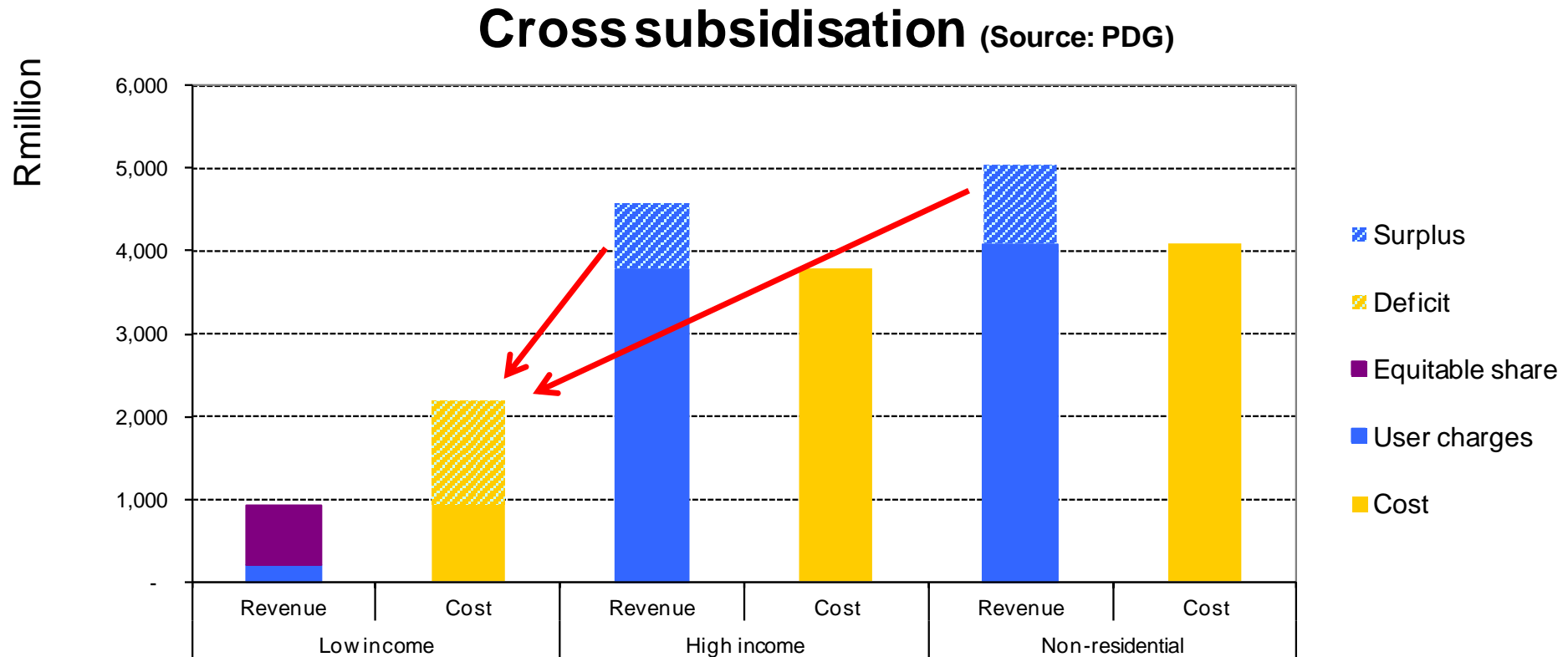
EE and RE impact on municipal revenue

- PV and EE is becoming more affordable to high income households and businesses
- Damaging to the municipal revenue source (loss of electricity sold)



Source: PDG

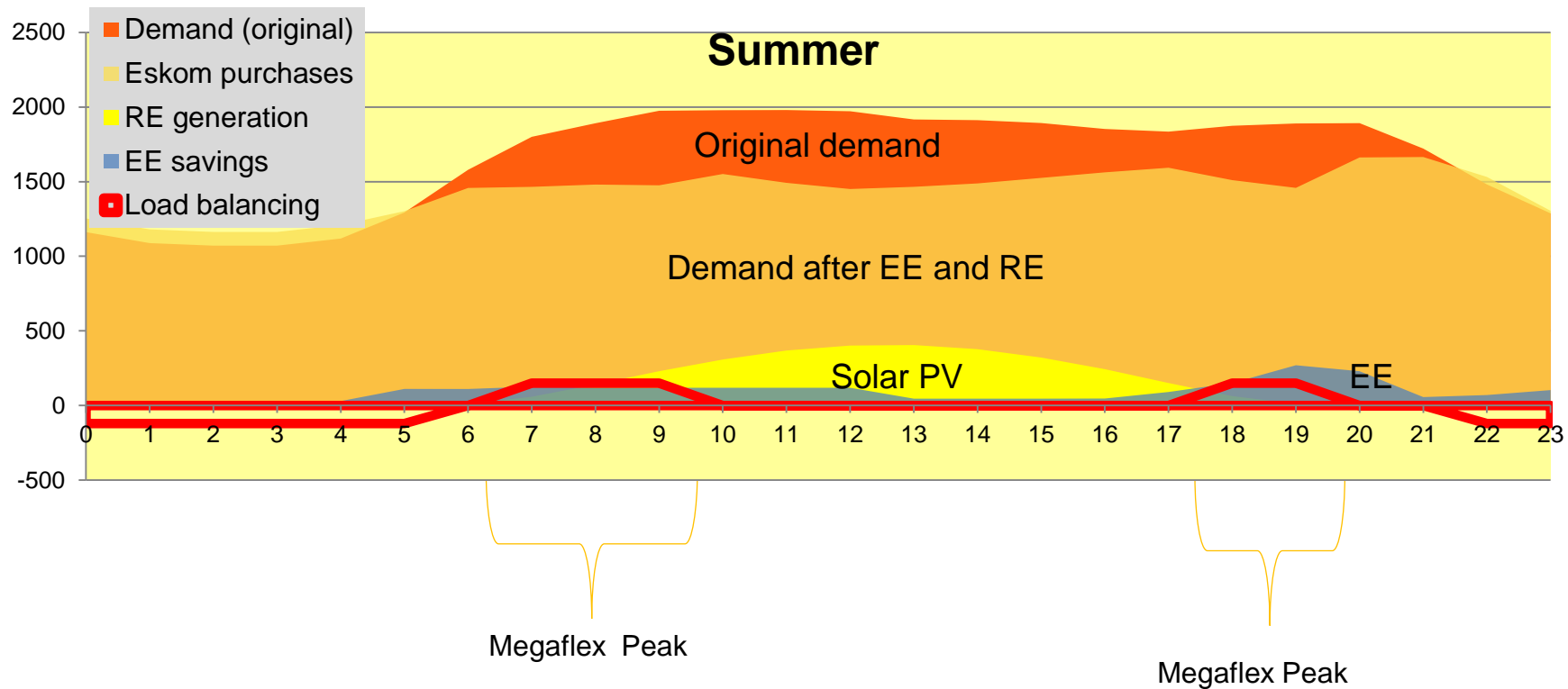
Cross subsidising low income electrification



CT subsidises R150/month for lifeline customers – R540 million/yr from mid-high residential customers

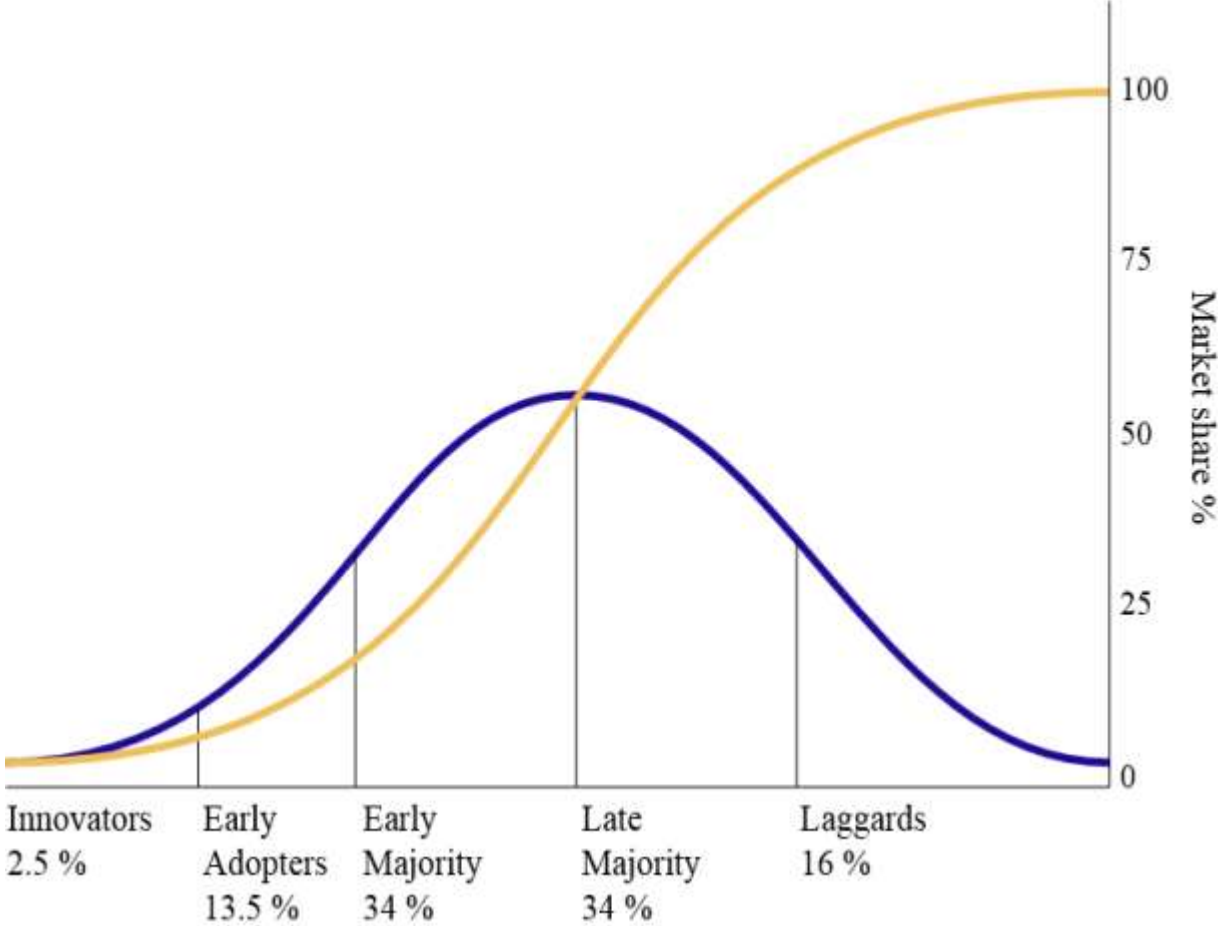


Where does EE and RE affect City finances the most?



- SWH impacts at megaflex peak – least impact on City revenue
- PV impacts- middle of the day – largest impact on City revenue

Technology adoption (Rogers)



Intervention uptake summary

		Yr 10			
	Customers	Uptake range		Projected uptake	
Resid PV	209 103	15%	50%	31 365	104 552
Small Comm PV	19 433	50%	85%	9 717	16 518
Large Comm PV	1 504	15%	50%	226	752
Ind PV	22	15%	50%	3	11
Resid SWH	209 103	50%	85%	104 552	177 738
Resid EE	209 103	50%	85%	104 552	177 738
Small Comm EE	19 433	50%	85%	9 717	16 518
Large Comm EE	1 504	50%	85%	752	1 278
Ind EE	22	50%	85%	11	19

Potential revenue impacts

Percentage of retained income lost (Cape Town study – nightsave portion):

- 3 years low: - 1,7%; 3 years high: - 3,6%
- 5 years low: - 6,1%; 5 years high: - 12,9%
- 10 years low: - **17,5%**; 10 years high: - **38%**

Revenue (and cross subsidy) loss mitigation strategies:

1. Decoupling / Cost reflective tariffs

- Decoupling the electricity tariff into an energy charge (to cover Eskom charges) and a fixed charge (to cover distribution costs). This will secure the municipal business model and encourage EE and RE within a municipality
- Positive: Secures City revenue
- Negative: Slows down green technology uptake, unless other incentives in place

Projected Impact on Revenue (Nightsave portion) – 10yrs Comm/Res at 63c/kWh-almost cost reflective

A cost reflective tariff minimises losses substantially:

	Low Projection		High projection	
Intervention	Loss in 10 yrs	income lost	Loss in 10 yrs	income lost
Res PV	-R 2 665 808	-0.1%	-R 13 397 260	-1%
Comm PV	-R 560 834	0.0%	-R 2 586 530	0%
Ind PV	-R 27 188 036	-1.4%	-R 101 954 876	-5%
Res SWH	-R 8 366 961	-0.4%	-R 16 536 158	-1%
Res EE	-R 626 948	0.0%	-R 1 065 815	0%
Comm EE	-R 3 710 454	-0.2%	-R 6 307 771	0%
Ind EE	-R 9 331 700	-0.5%	-R 15 679 120	-1%
Total	-R 52 450 741	-2.7%	-R 157 527 531	-8%

Revenue (and cross subsidy) loss mitigation strategies:

2. More efficient business processes + customer growth

- More efficient business processes and working hard towards customer growth will assist in absorbing revenue losses

3. Economic benefit study, national intervention

- Determine the impact on City economy from green economy growth – benefit from additional rates customers
- Redesign of national govt municipal funding models

AND need to start reconsidering whole distribution utilities business model....

- Consider Energy Services Utilities, including demand management, energy storage services
- Potential for greater participation of private sector – can release additional sources of finances
- Ensure public benefits (social justice) are protected through policy and legislation with clearly stated goals; strong regulatory frameworks in place; stable financing streams based on government policy

CHALLENGES:

- Current institutional set-ups
- Regulatory frameworks

IRP Update Report (2013) quote: very final point 13.5

“There are short term constrains in the electricity supply industry until 2016. There are however few options available to alleviate the situation in this time period, except increased energy efficiency and demand side responses, and improved utilisation of existing generation resources. These options should be strengthened.”

Welcome

Urban Energy Support is an information portal of relevant documents and resources, with an emphasis on practical tools and guides to support the transition towards sustainable local energy development and a low carbon trajectory for the country in the context of global climate change.

First Steps:

[How to Develop a Sustainable Energy Strategy](#)

[CLICK HERE](#)



Click on a tab in the map to view documents related to their respective municipalities.

RECENTLY ADDED

- [The Minibus Taxi Industry in South Africa: A Servant for the Urban Poor?](#) (0.08Mb) - General
- [Rustenburg Rapid Transport](#) (0.04Mb) - General (Rustenburg)
- [Energy, Climate Change and Transport](#) (0.35Mb) - Tools and Guidelines
- [Making the Case for Public Transport](#) (0.23Mb) - Tools and Guidelines
- [Introduction to Sustainable Transport](#) (0.21Mb) - Tools and Guidelines

MOST POPULAR RESOURCES

- [Cape Town Low-Carbon Central City Strategy](#) (6.98Mb) - Strategy (Cape Town)
- [Potential Impact of Efficiency Measures and Distributed Generation on Municipal Electricity Revenue](#) (0.32Mb) - Tools and Guidelines
- [How to Implement Energy Efficiency and Renewable Energy Options](#) (3.61Mb) - Tools and Guidelines
- [Tackling Urban Energy Poverty in South Africa](#) (0.01Mb) - General

HIGHLIGHTS



How to implement renewable energy and energy efficiency options

Efficient public lighting guide



Thank you



For more information:

www.cityenergy.org.za

www.sustainable.org.za

megan@sustainable.org.za

Tel: 021 702 3622

Customer numbers (CoCT Supply)

	Megaflex	Nightsave	Total	Interventions
Residential (mid-high)	83 641	125 462	209 103	SWH, PV, Lighting, Gas stoves
Small Commercial	7 773	11 660	19 433	PV, Lighting, HVAC
Large Comm/Ind (LV)	335	502	837	PV, 5% eff
Large Comm/Ind (MV)	267	400	667	PV, 5% eff
Large Comm/Ind (HV TOU)	9	13	22	PV, 5% eff

Note: Residential based on properties above R500 000, owner occupied, free standing

PV uptake-payback if installation now

		Install now		
Financing arrangement		0%	18% over 5yrs	8.5% over 10yrs
Resid	PBP (year)	10	14	14
	Max annual loss	R 23 534	R 6 528	R 2 344
	Monthly loss	R 1 961	R 544	R 195
Comm	PBP (year)	7	9	6
	Max annual loss	R 16 928	R 4 003	R 823
	Monthly loss	R 1 411	R 334	R 69
Industrial	PBP (year)	11	15	14
	Max annual loss	R 17 964	R 5 040	R 1 860
	Monthly loss	R 1 497	R 420	R 155

PV uptake-payback if installation 5yrs (2% drop in price)

		Install in 5 years		
Financing arrangement		0%	18% over 5yrs	8.5% over 10yrs
Resid	PBP (year)	8	12	11
	Max annual loss	R 26 524	R 6 914	R 2 088
	Monthly loss in 2013 ZAR	R 1 771	R 462	R 139
Comm	PBP (year)	5	7	1
	Max annual loss	R 18 221	R 3 317	-R 350
	Monthly loss in 2013 ZAR	R 1 216	R 221	-R 23
Industrial	PBP (year)	8	11	11
	Max annual loss	R 20 066	R 5 162	R 1 494
	Monthly loss in 2013 ZAR	R 1 340	R 345	R 100

PV uptake-payback if installation 5yrs (8% drop in price)

		Install in 5 years		
Financing arrangement		0%	18% over 5yrs	8.5% over 10yrs
Resid	PBP (year)	7	10	7
	Max annual loss	R 20 632	R 5 029	R 1 190
	Monthly loss in 2013 ZAR	R 1 377	R 336	R 79
Comm	PBP (year)	4	6	1
	Max annual loss	R 13 743	R 1 885	-R 1 033
	Monthly loss in 2013 ZAR	R 917	R 126	-R 69
Industrial	PBP (year)	7	10	6
	Max annual loss	R 15 588	R 3 730	R 812
	Monthly loss in 2013 ZAR	R 1 041	R 249	R 54

PV uptake-payback if installation 10yrs (2% drop in price pa)

		Install in 10 years		
Financing arrangement		0%	18% over 5yrs	8.5% over 10 yrs
Resid	PBP (year)	7	10	8
	Max annual loss	R 31 111	R 7 676	R 1 910
	Monthly loss in 2013 ZAR	R 1 574	R 388	R 97
Comm	PBP (year)	4	6	1
	Max annual loss	R 20 837	R 3 026	-R 1 356
	Monthly loss in 2013 ZAR	R 1 054	R 153	-R 69
Industrial	PBP (year)	7	10	7
	Max annual loss	R 23 510	R 5 700	R 1 317
	Monthly loss in 2013 ZAR	R 1 190	R 288	R 67

PV uptake-payback if installation 10yrs (8% drop in price pa)

		Install in 10 years		
Financing arrangement		0%	18% over 5yrs	8.5% over 10 yrs
Resid	PBP (year)	5	7	1
	Max annual loss	R 17 256	R 3 246	-R 202
	Monthly loss in 2013 ZAR	R 873	R 164	-R 10
Comm	PBP (year)	3	1	1
	Max annual loss	R 10 307	-R 341	-R 2 961
	Monthly loss in 2013 ZAR	R 522	-R 17	-R 150
Industrial	PBP (year)	5	7	1
	Max annual loss	R 12 980	R 2 332	-R 288
	Monthly loss in 2013 ZAR	R 657	R 118	-R 15