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CAPE TOWN ENERGY 2040 VISION AND ASSOCIATED ENERGY AND CARBON TARGETS

Trade and Investment Department
Environmental Resource Management Department
September 2015

Making progress possible. Together.

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Energy 2040 Vision for Cape Town

Exploring the implications of different energy futures for the City of Cape Town up to 2040

Builds on previous data/models

State of Energy 2003
State of Energy and Energy Futures 2011

Stakeholder engagement/input

data collection/collation and scenario formulation - Input from Econ Dev, Electricity, Transport and other departments. Dept. of Energy, Eskom, etc.

Aligns with Western Cape energy & climate 2015 model

major scenarios, key interventions and overall emissions/energy projections

Consultation with Stockholm Environmental Institute, Energy Research Centre UCT

LEAP software developers

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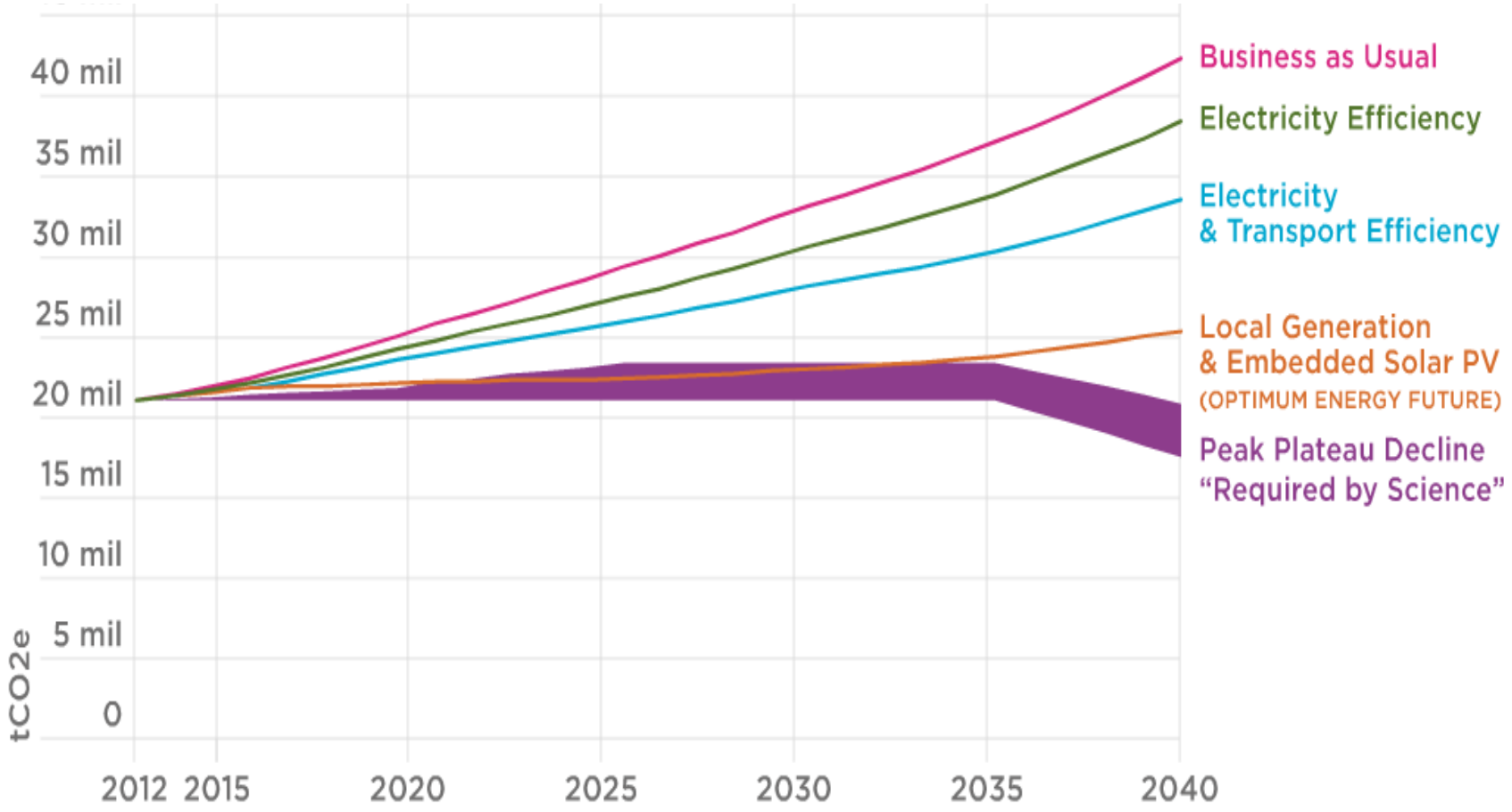
Cape Town's Energy2040 vision
– from business-as-usual to an optimum realistic energy future



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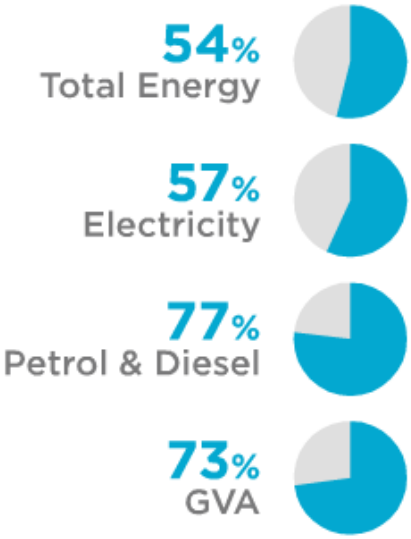
CAPE TOWN IN CONTEXT

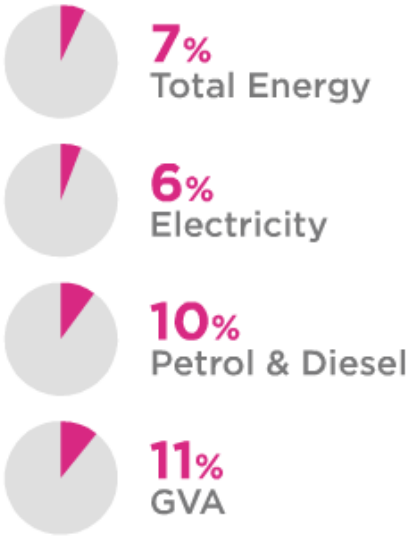
Western Cape



64% Population

National

7% Population



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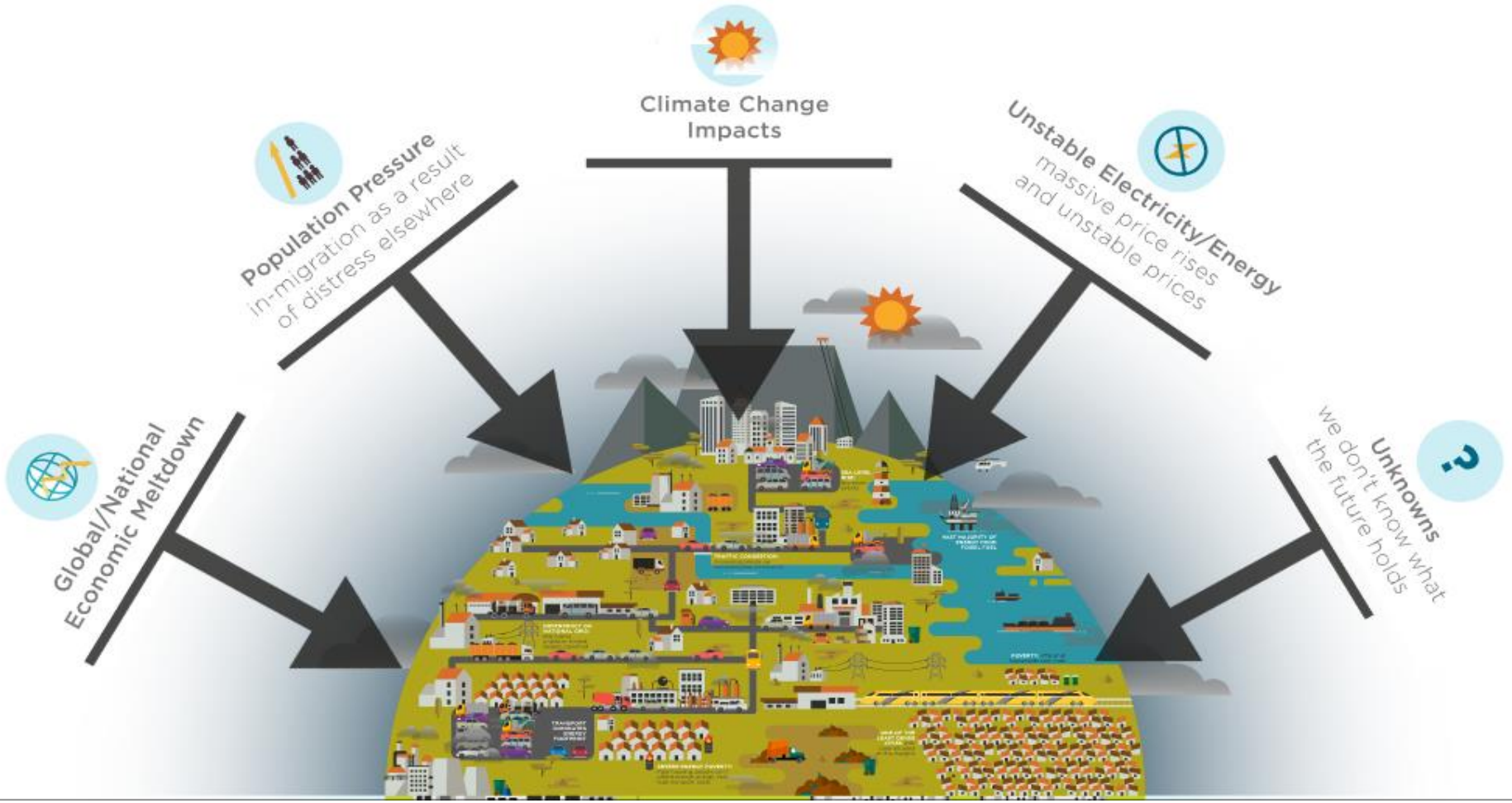
VULNERABLE CITY



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SEVERE ENERGY POVERTY:
Poor housing, people can't afford enough energy, very high transport costs

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Population density

(Census SP, 2011)

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POVERTY: 47% of all households very poor

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TRAFFIC CONGESTION:
Increasing private car ownership/low occupancy

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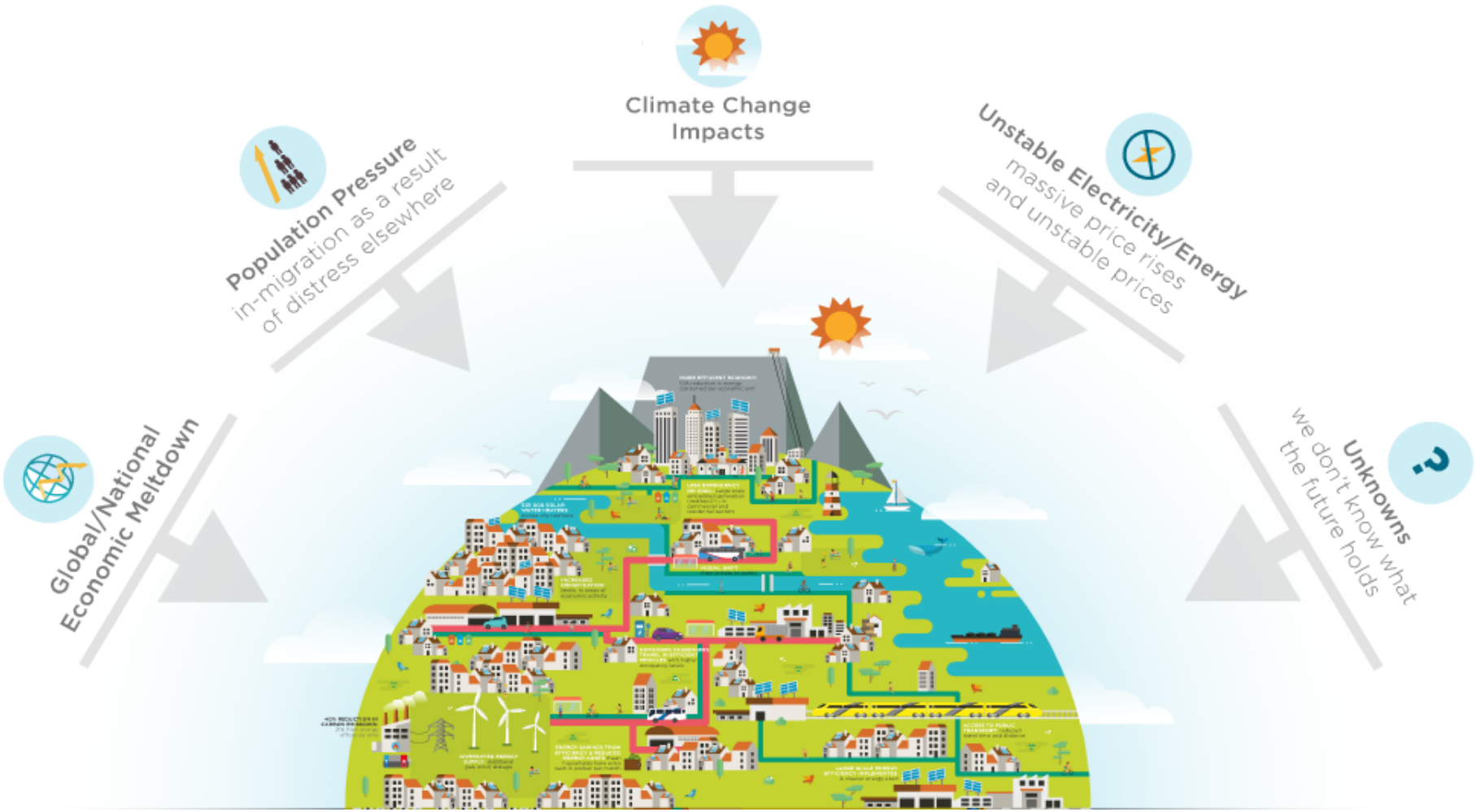
RESILIENT CITY



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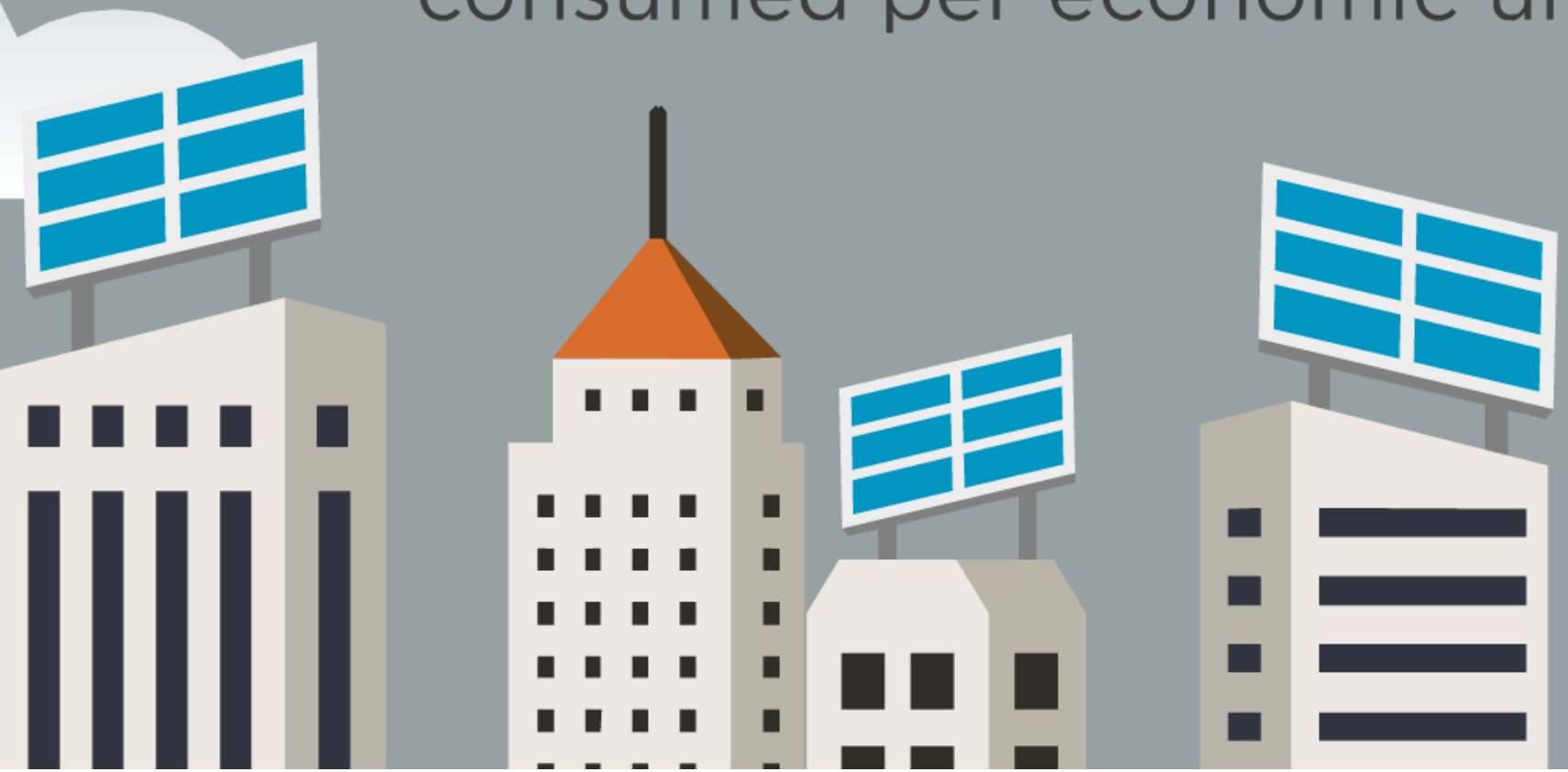
MORE EFFICIENT ECONOMY:
16% reduction in energy consumed per economic unit



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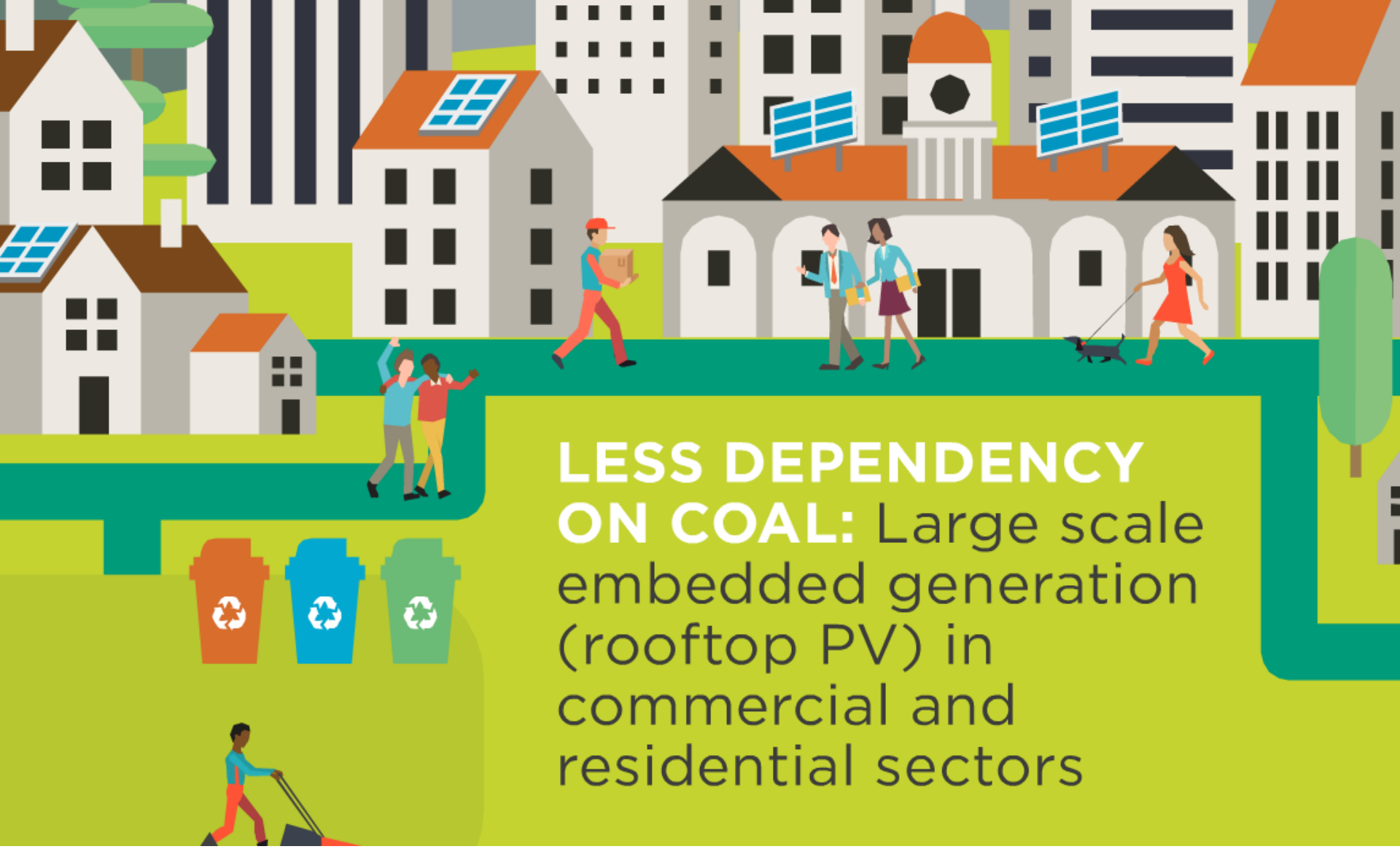

LESS DEPENDENCY ON COAL: Large scale embedded generation (rooftop PV) in commercial and residential sectors

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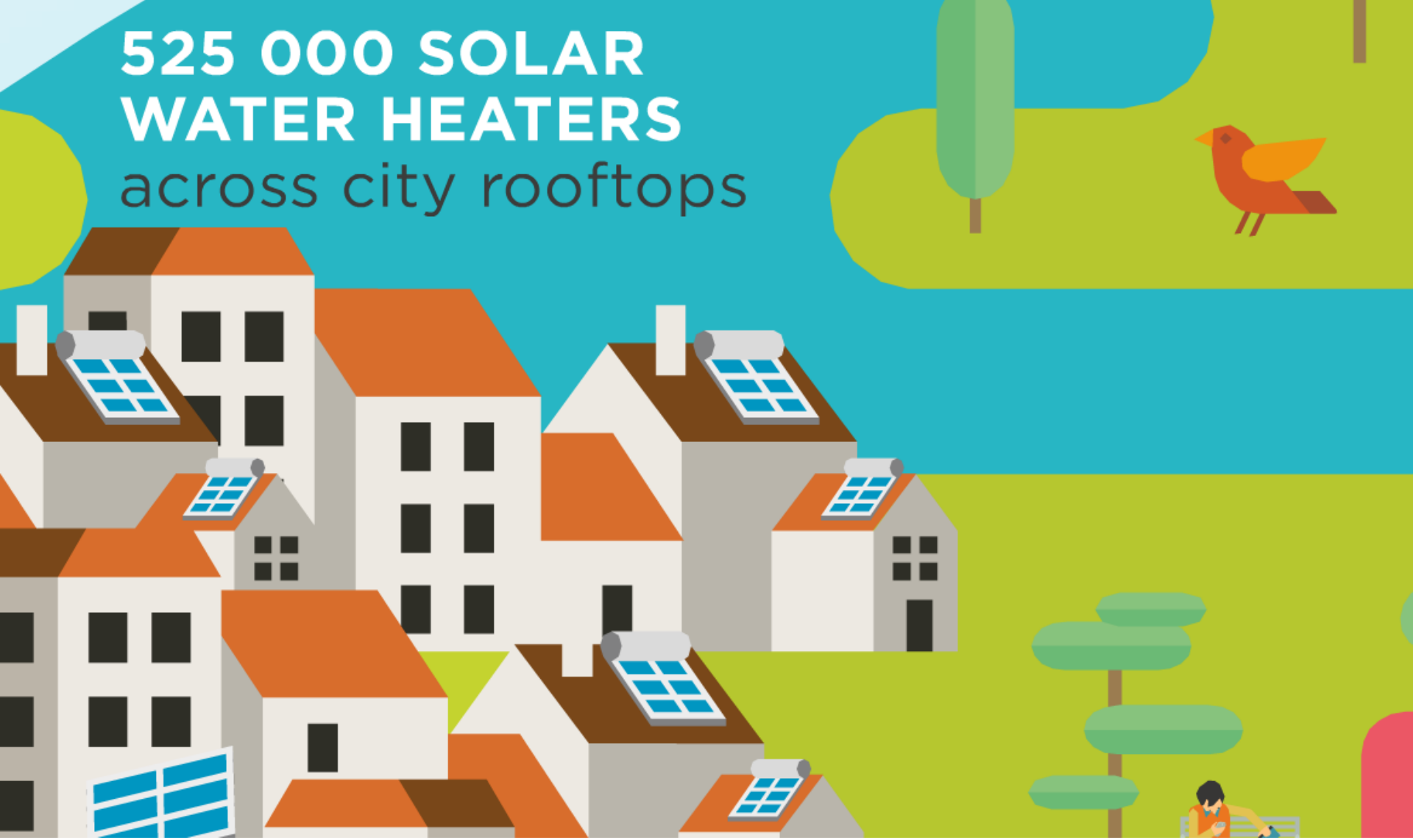
525 000 SOLAR WATER HEATERS
across city rooftops



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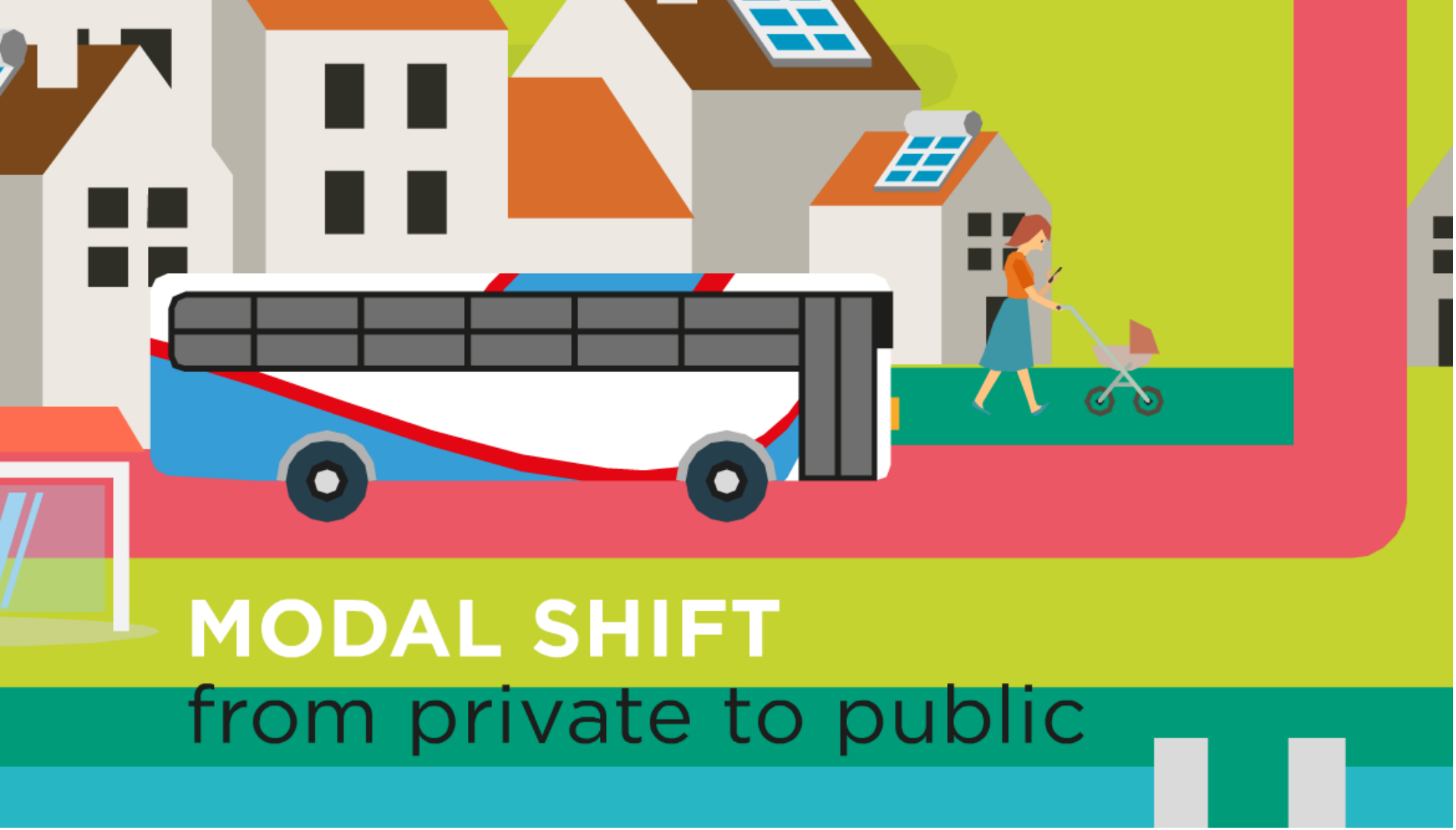

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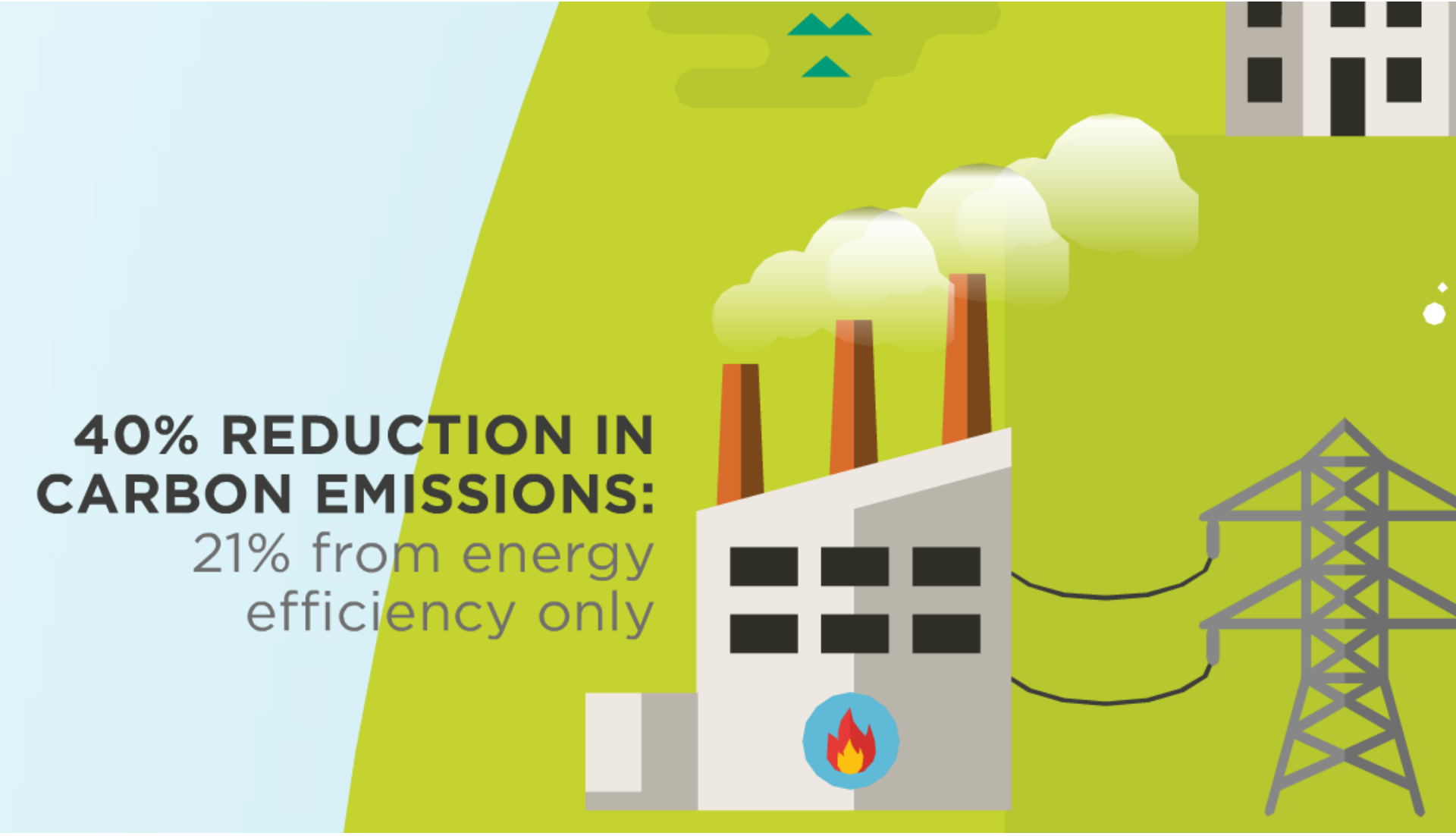
STAD KAAPSTAD



40% REDUCTION IN CARBON EMISSIONS:

21% from energy efficiency only

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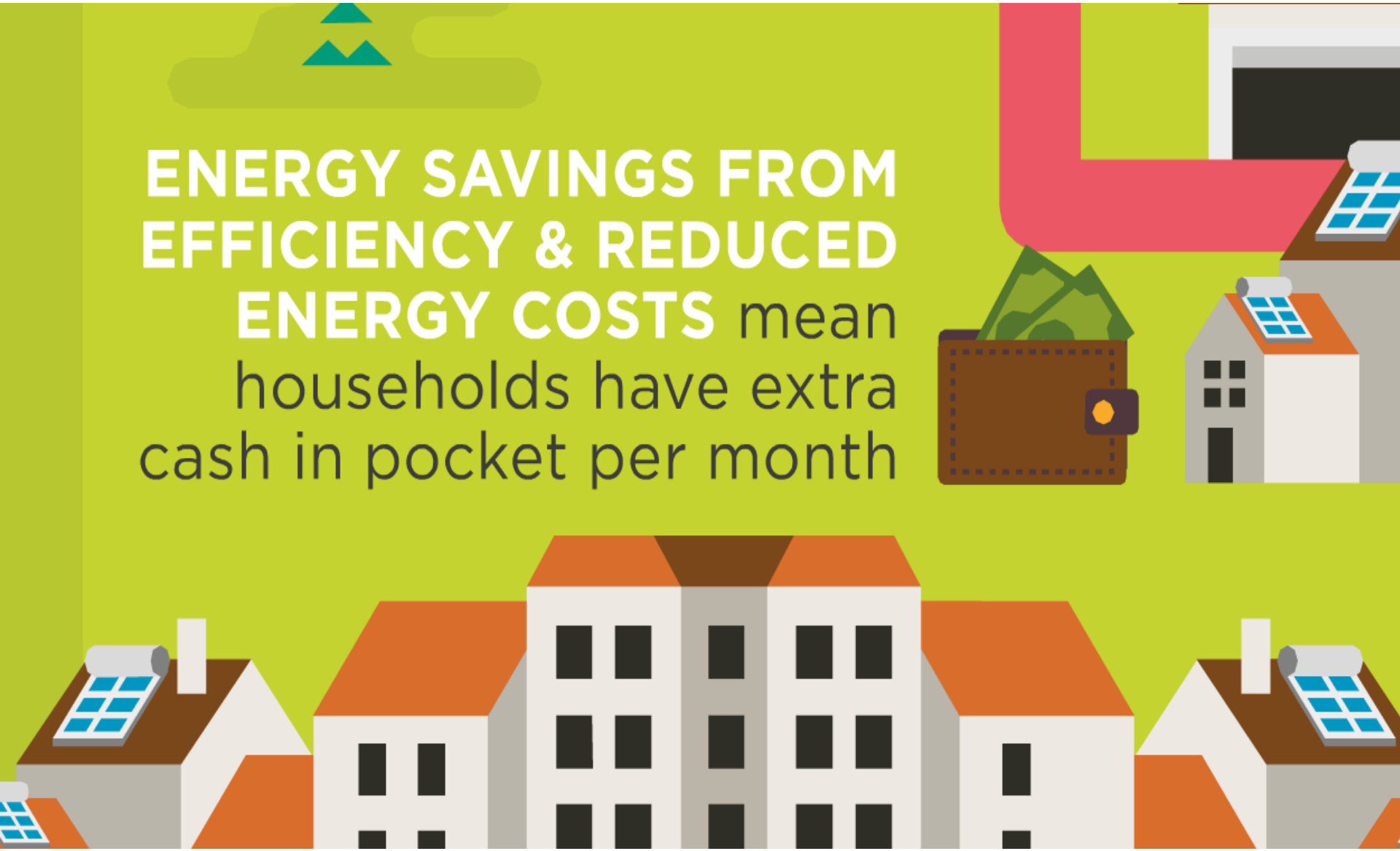

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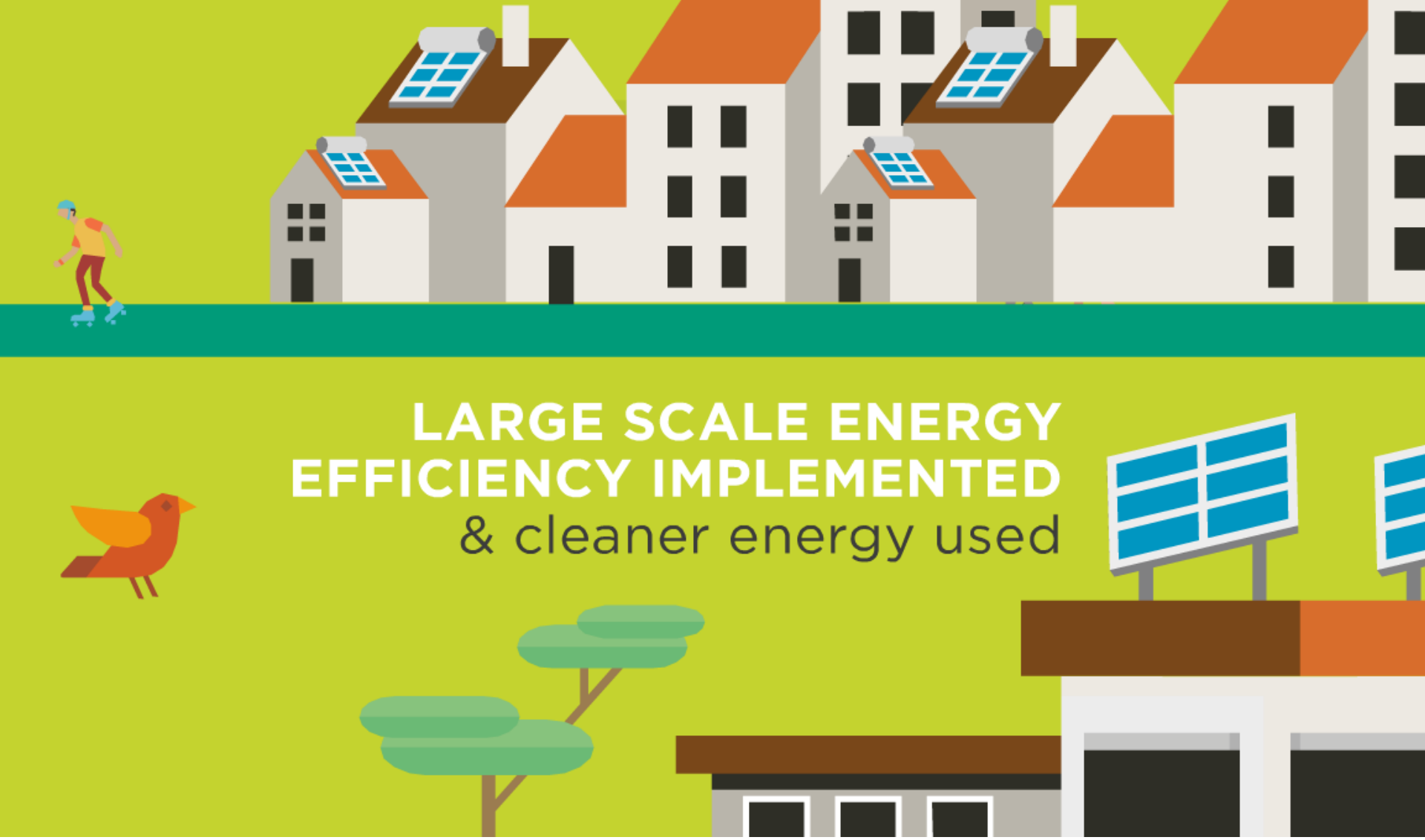
STAD KAAPSTAD



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ACCESS TO PUBLIC TRANSPORT: reduced travel time and distance

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LOOKING AT THE **DETAILS**

CITY OF CAPE TOWN
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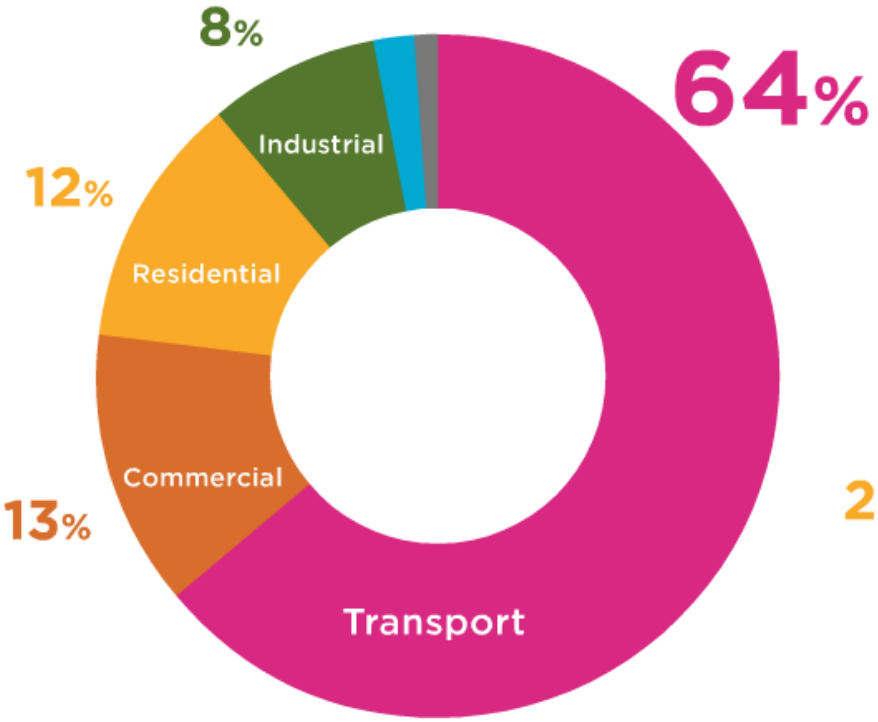
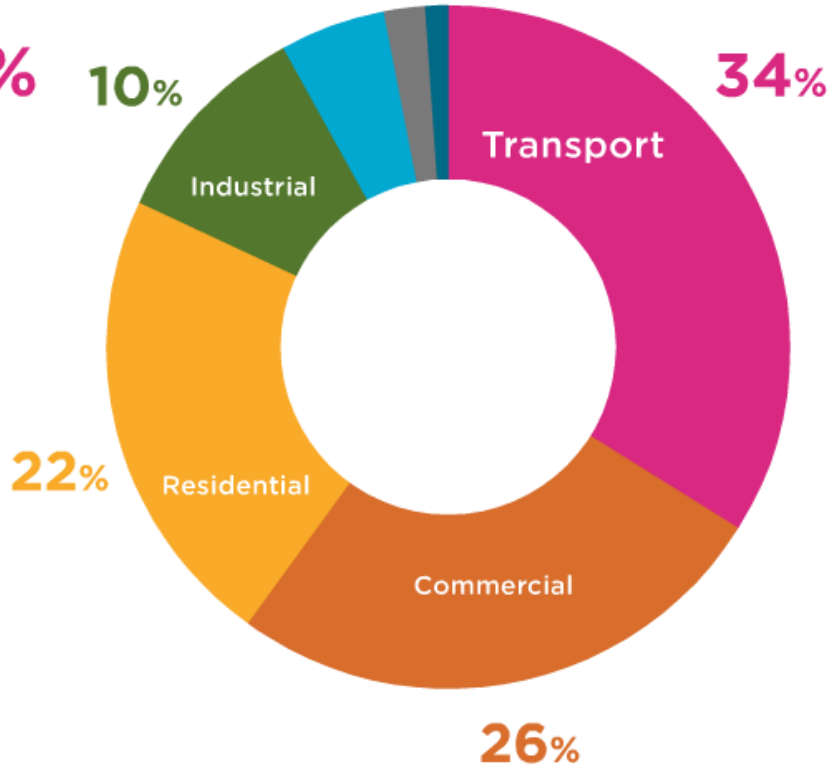
CAPE TOWN
ENERGY CONSUMPTION BY SECTOR (2012)



CAPE TOWN
EMISSIONS BY SECTOR (2012)



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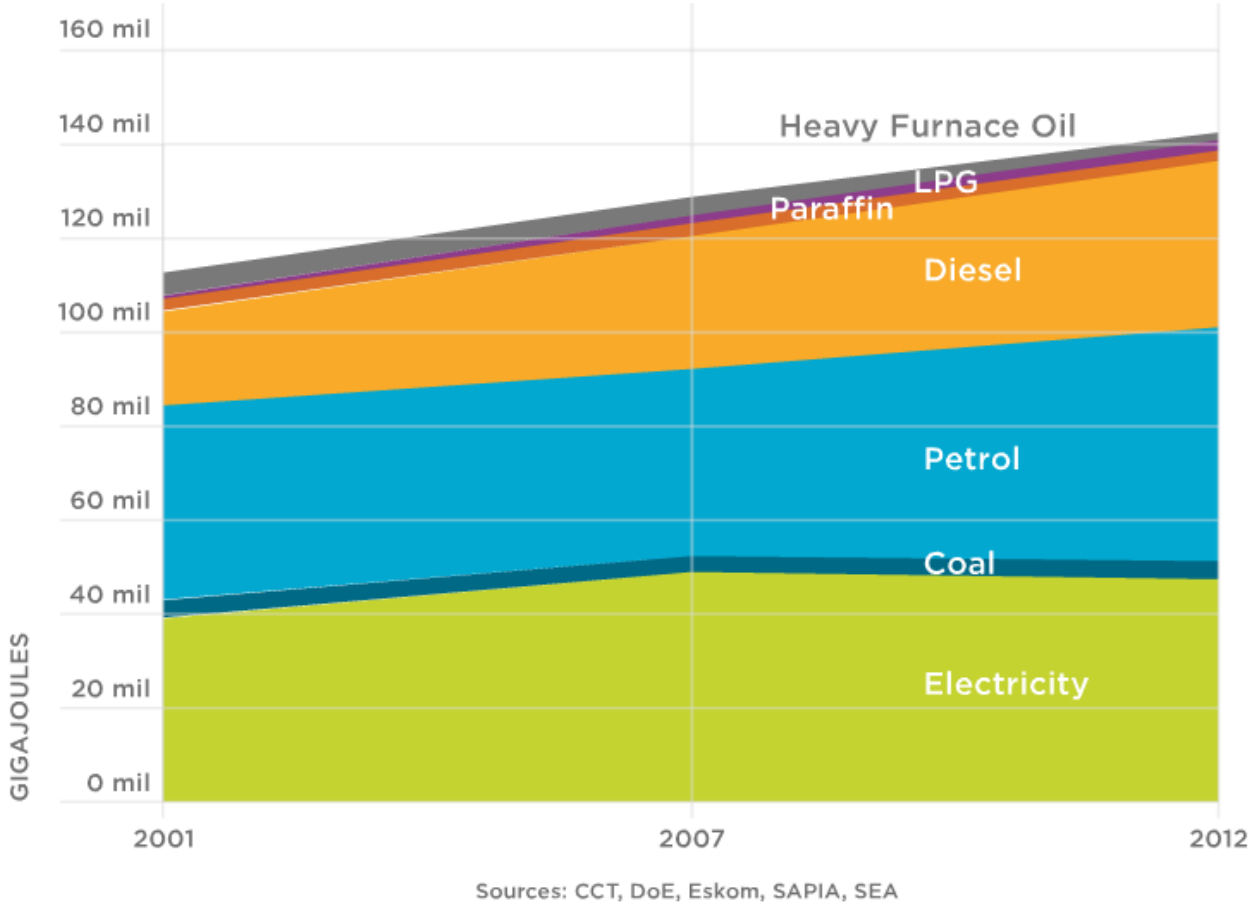
CAPE TOWN
ENERGY CONSUMPTION BY ENERGY SOURCE
2001 - 2012



Sources: CCT, DoE, Eskom, SAPIA, SEA

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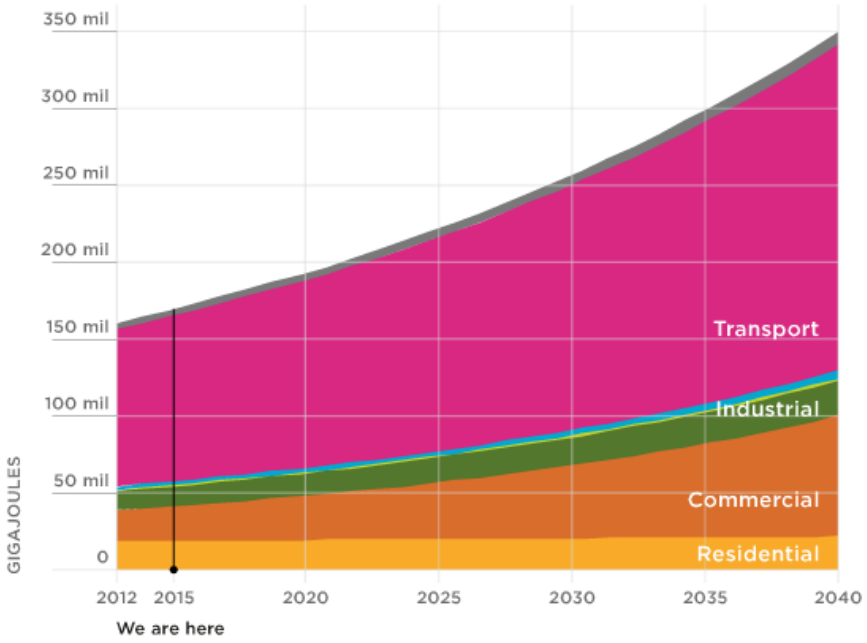
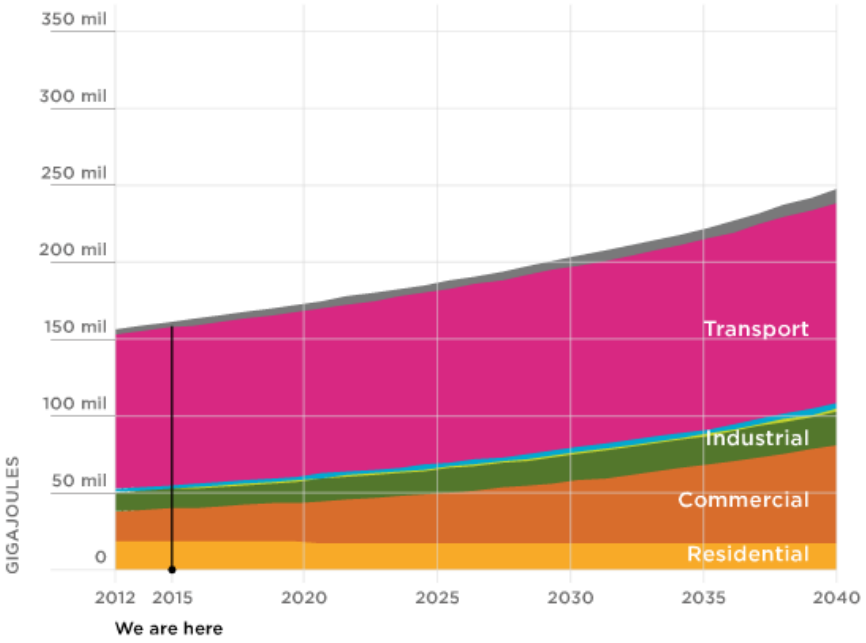
CAPE TOWN
ENERGY DEMAND BY **SECTOR**

BUSINESS AS USUAL



OPTIMUM ENERGY FUTURE



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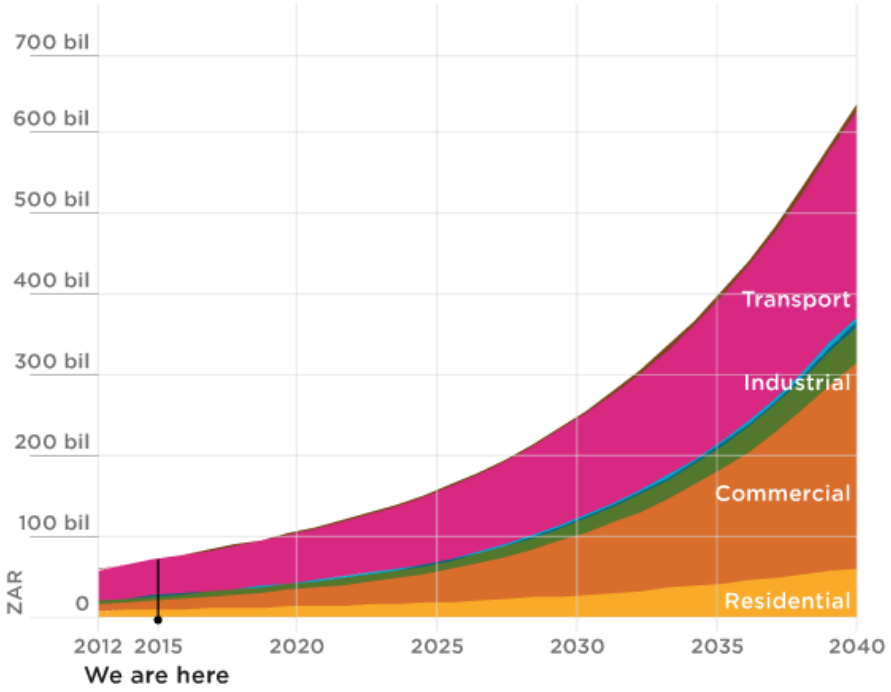
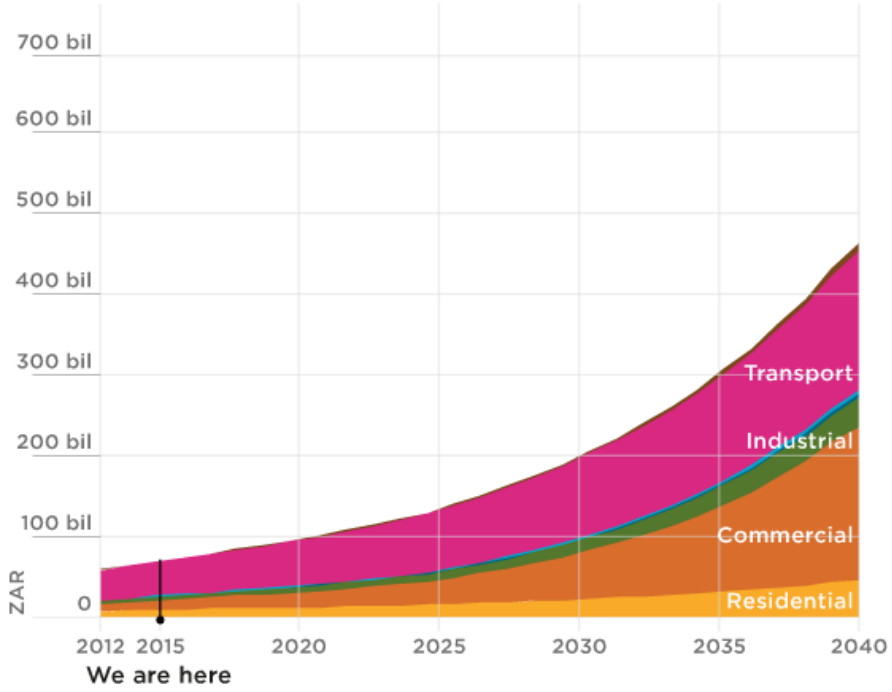
CAPE TOWN

COSTS BY **SECTOR**

BUSINESS AS USUAL



OPTIMUM ENERGY FUTURE



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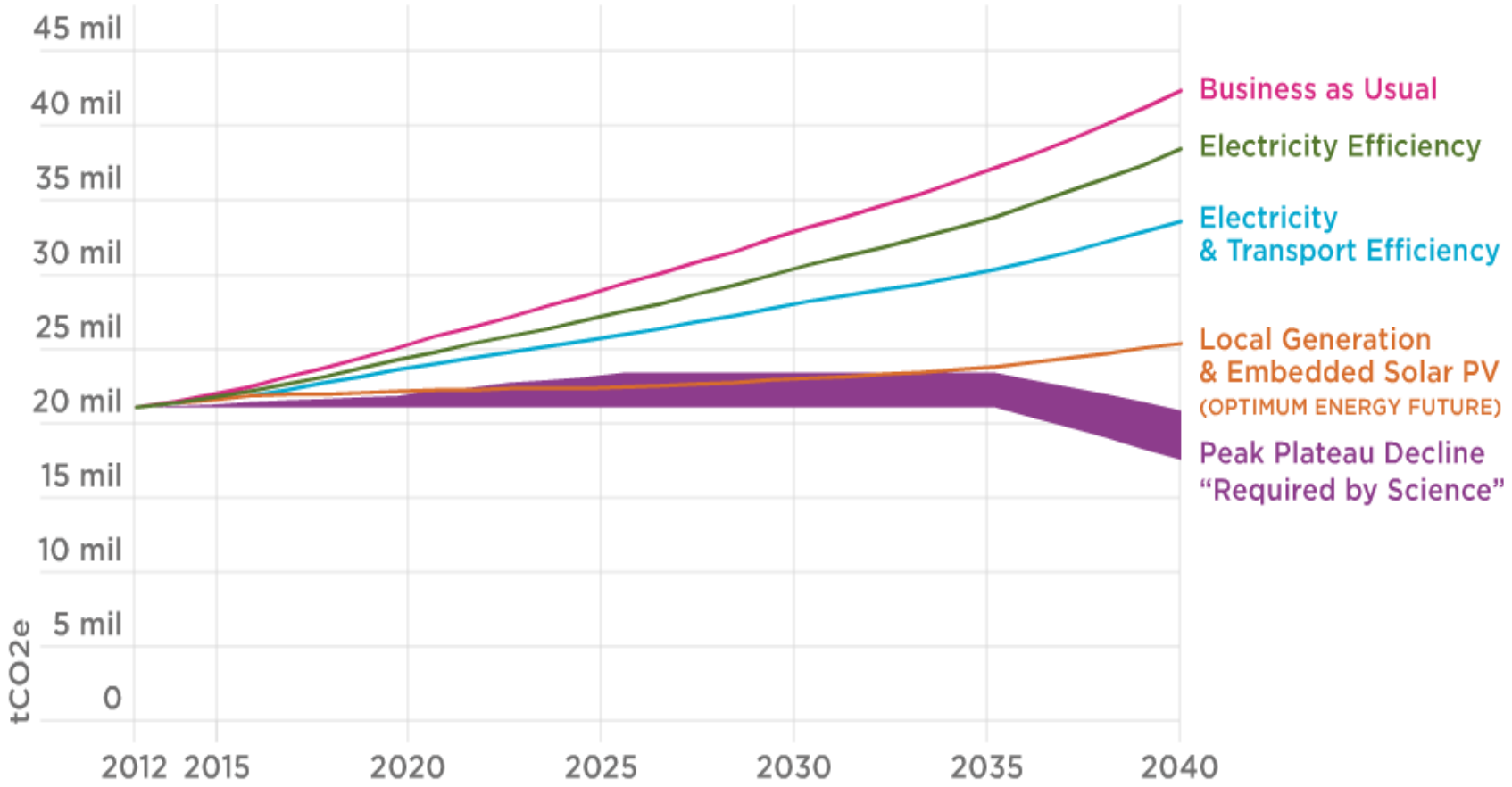
FUTURE EMISSIONS



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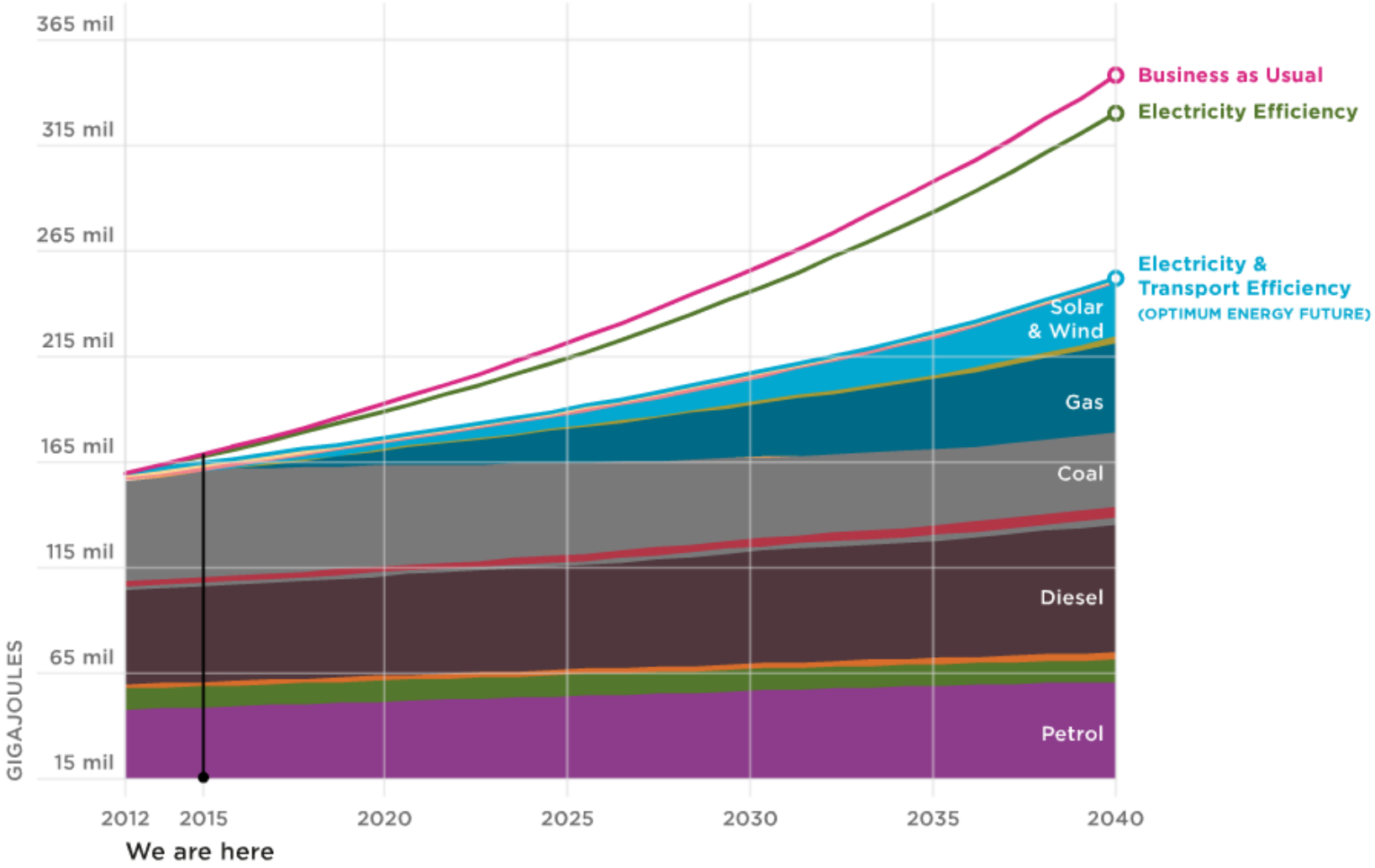
ENERGY DEMAND & SUPPLY BY **SOURCE**



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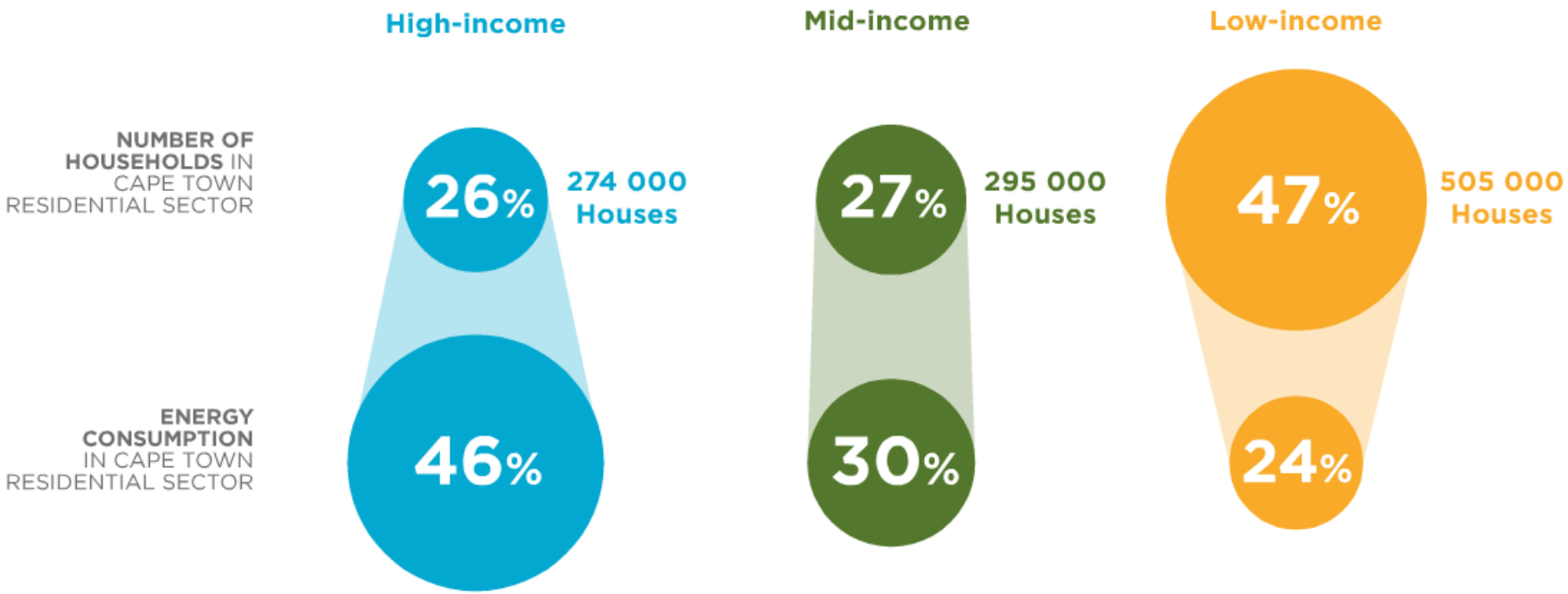
RESIDENTIAL SECTOR

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

2012 CAPE TOWN RESIDENTIAL



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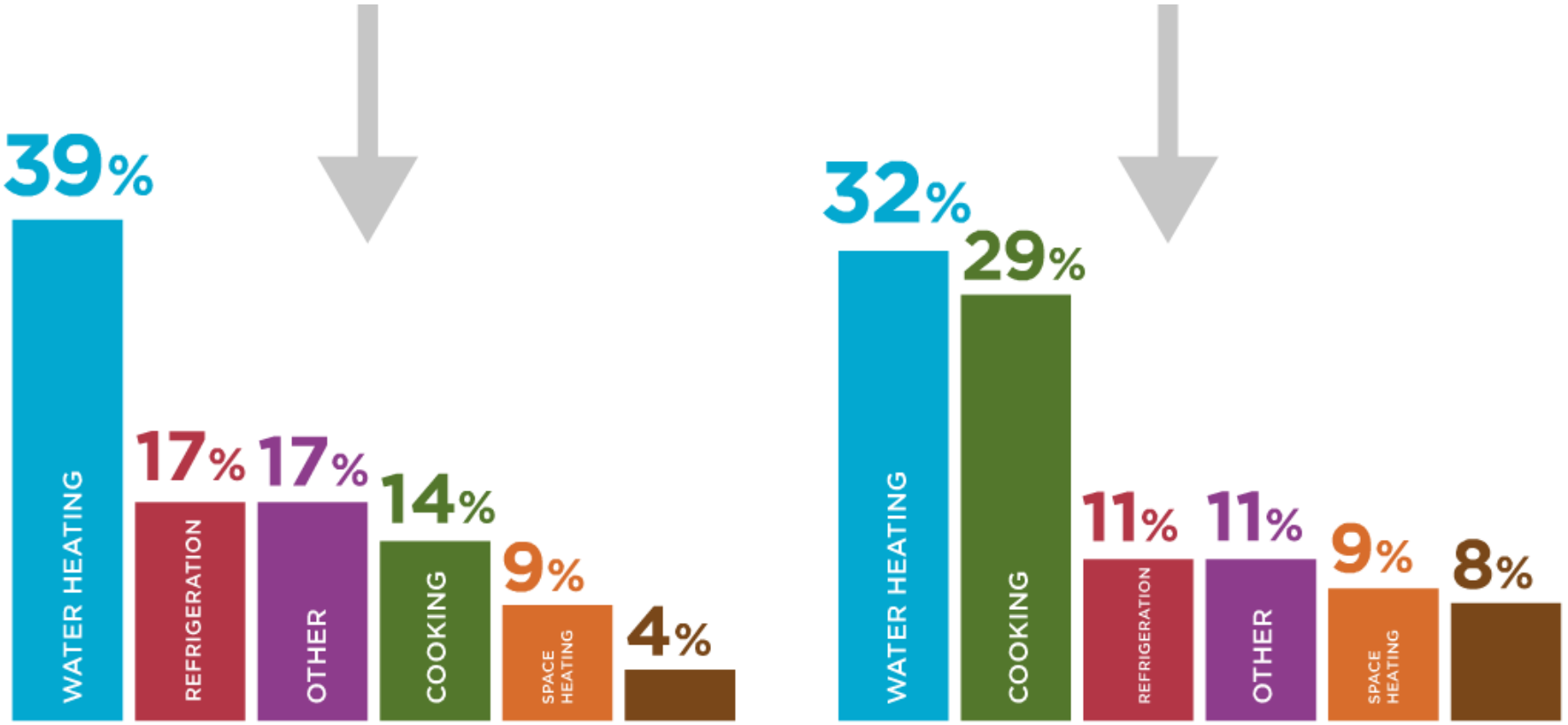
ISIXEKO SASEKAPA
STAD KAAPSTAD



MID - HIGH INCOME
HOUSEHOLD ENERGY CONSUMPTION

LOW-INCOME
HOUSEHOLD ENERGY CONSUMPTION

- Lighting
- Space heating
- Refrigeration
- Cooking
- Water heating
- Other electrical

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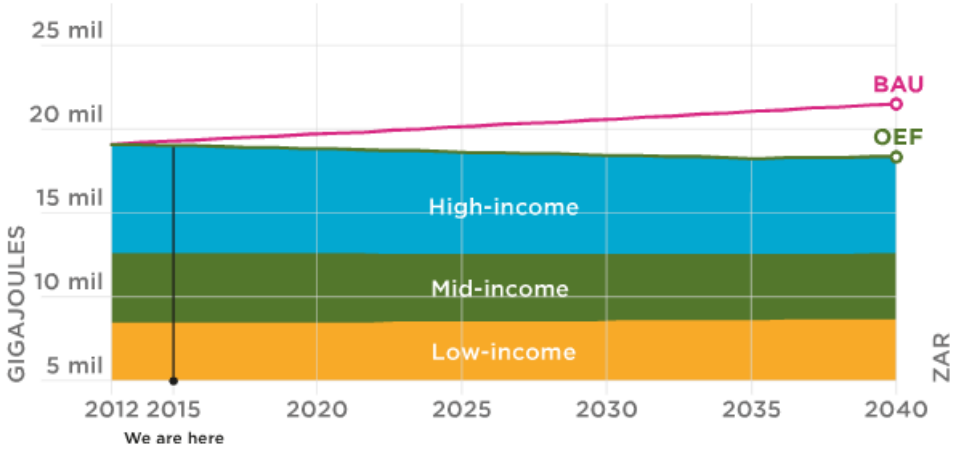
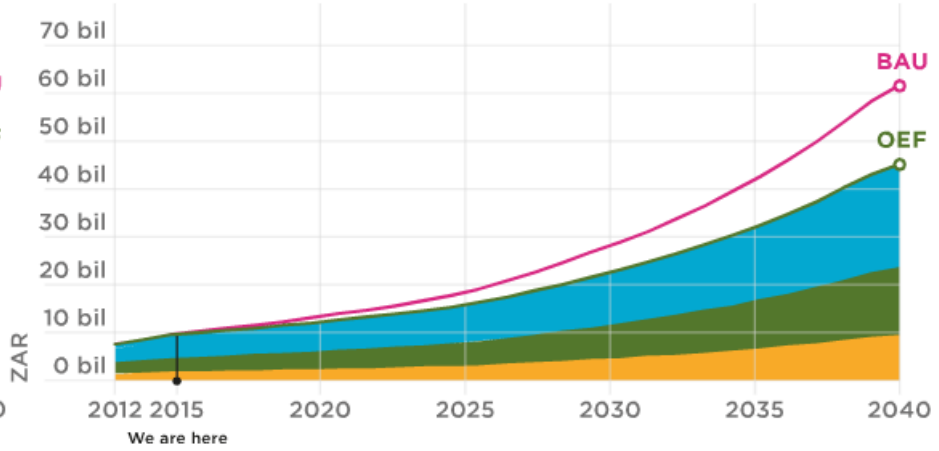
CAPE TOWN RESIDENTIAL

ENERGY CONSUMPTION



COSTS (TODAY'S RANDS)



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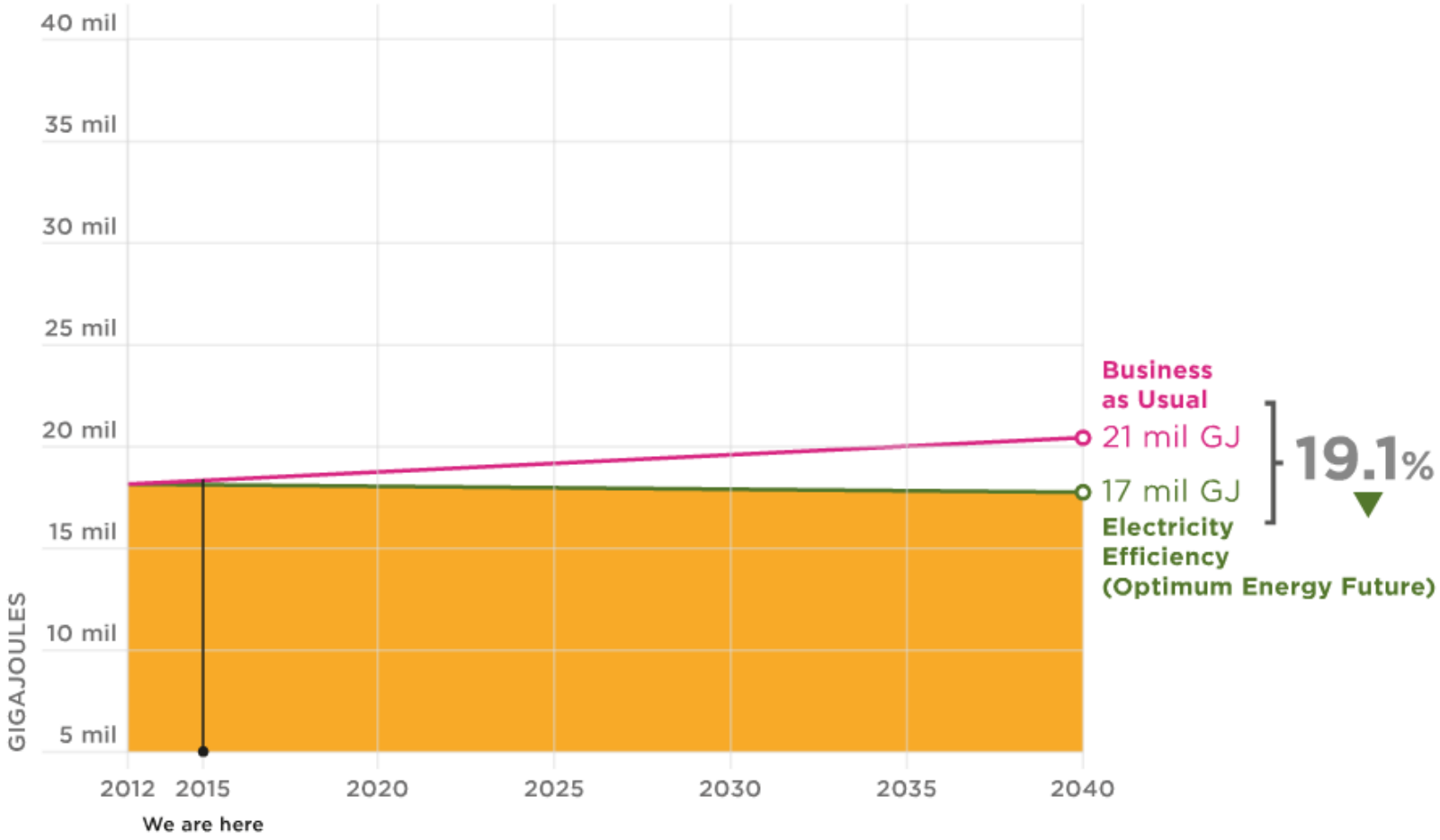
RESIDENTIAL

ELECTRICITY DEMAND



CITY OF CAPE TOWN
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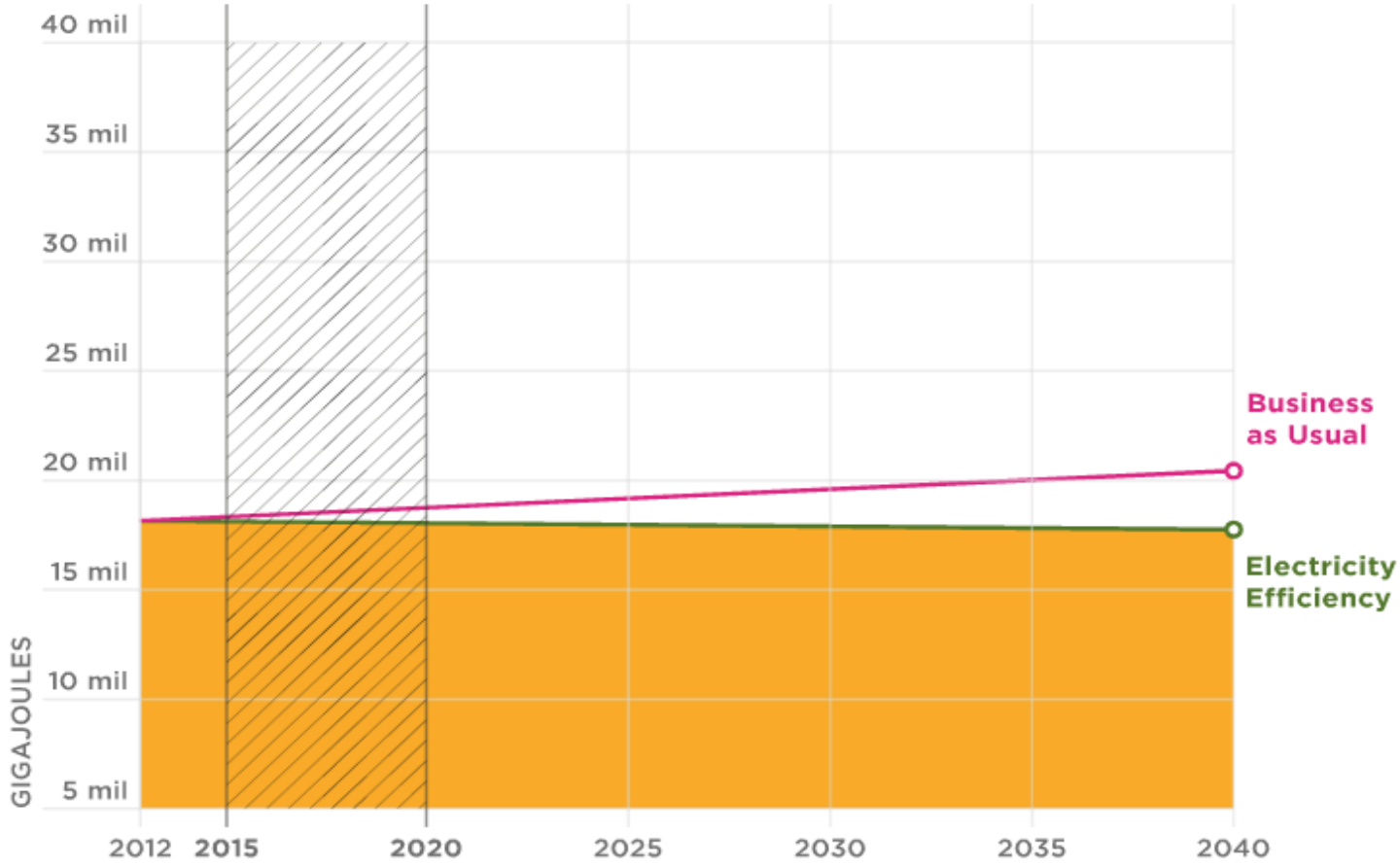
RESIDENTIAL

5 YEAR PROGRAMME



CITY OF CAPE TOWN
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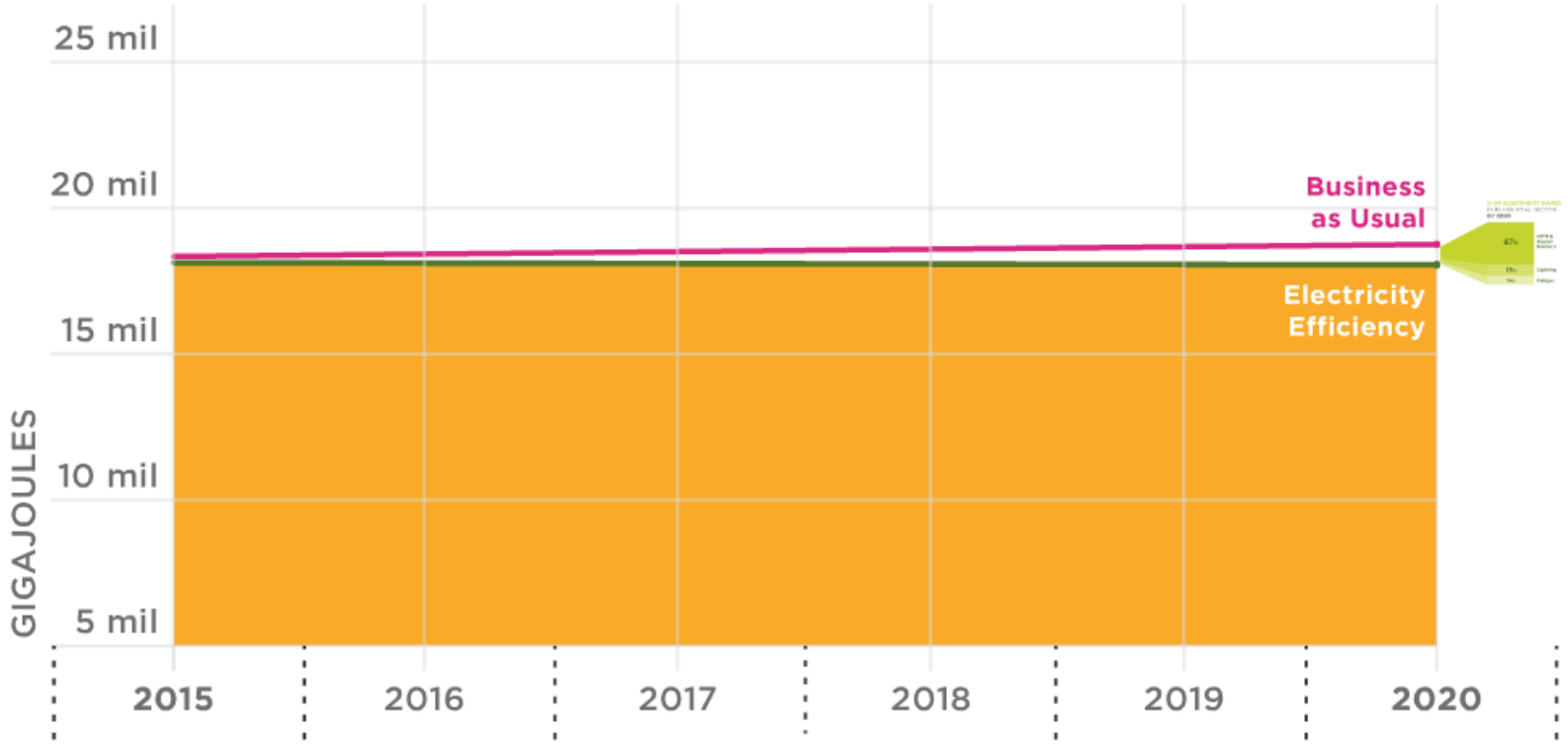
RESIDENTIAL

5 YEAR PROGRAMME



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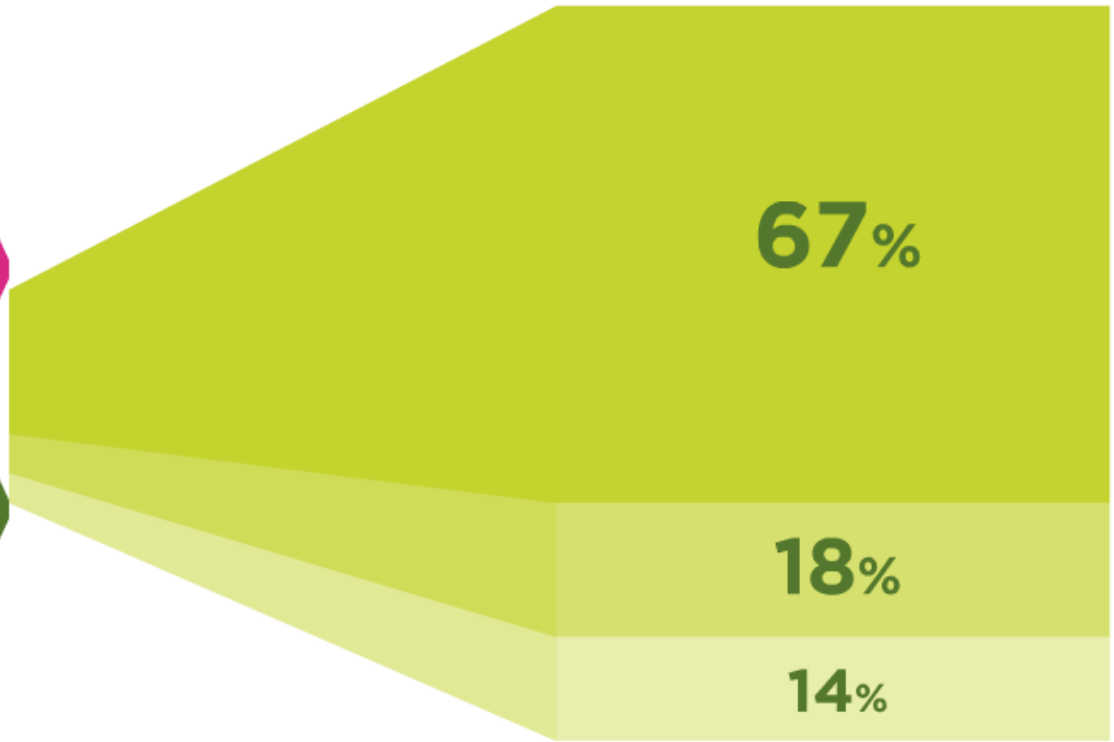
% OF ELECTRICITY SAVED
IN RESIDENTIAL SECTOR
BY 2020



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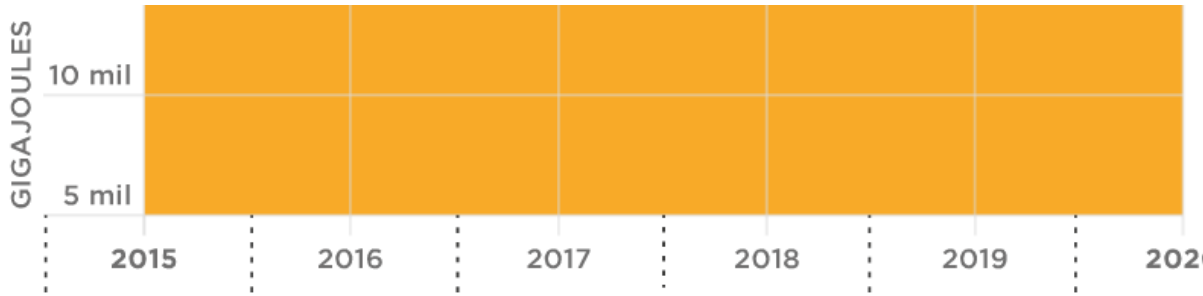
STAD KAAPSTAD



INTERVENTIONS:	Total Households:						PENETRATION:
SWH (low & high pressure)	25 000	36 500	53 500	72 000	92 500	116 000	10%
Efficient Lighting	784 000	806 000	828 000	850 000	872 000	894 000	80%
Efficient Fridges	293 000	324 500	356 000	387 500	419 000	450 500	40%
Geyser Blankets & Efficient Shower Heads	104 500	110 000	115 500	121 000	126 500	132 000	12%
Electricity Pricing							
Revenue Protection							

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ENERGY POVERTY

INTERVENTIONS:	2015	2016	2017	2018	2019	2020	PENETRATION:
			Total Households:				
Electrification	94%						100%
Alternative Fuels							
Efficient Applia nces							
Communication & Education							
Efficient Housing							
Solar Water Heaters						25 000	10%

Workshop sheet

ENERGY POVERTY

INTERVENTIONS:	AWARENESS:	LEGISLATION:	FINANCE:	GOVT INSTALLATION PROGRAMMES:	STANDARDS & QUALITY:
Electrification			Department of Energy Insurance programme, DoE Low income SWH programme, Levy on Electricity tariff	Electrification programme	SABS standards
Alternative Fuels					SABS standards
Efficient Appliances					SABS standards
Communication & Education	Technology & behaviour change campaign				SABS standards
Efficient Housing		New build regulation enforcement		Ceiling retrofit programme	SABS standards
Solar Water Heaters			Levy on Electricity tariff	DoE programme, Levy on Electricity tariff	SABS standards

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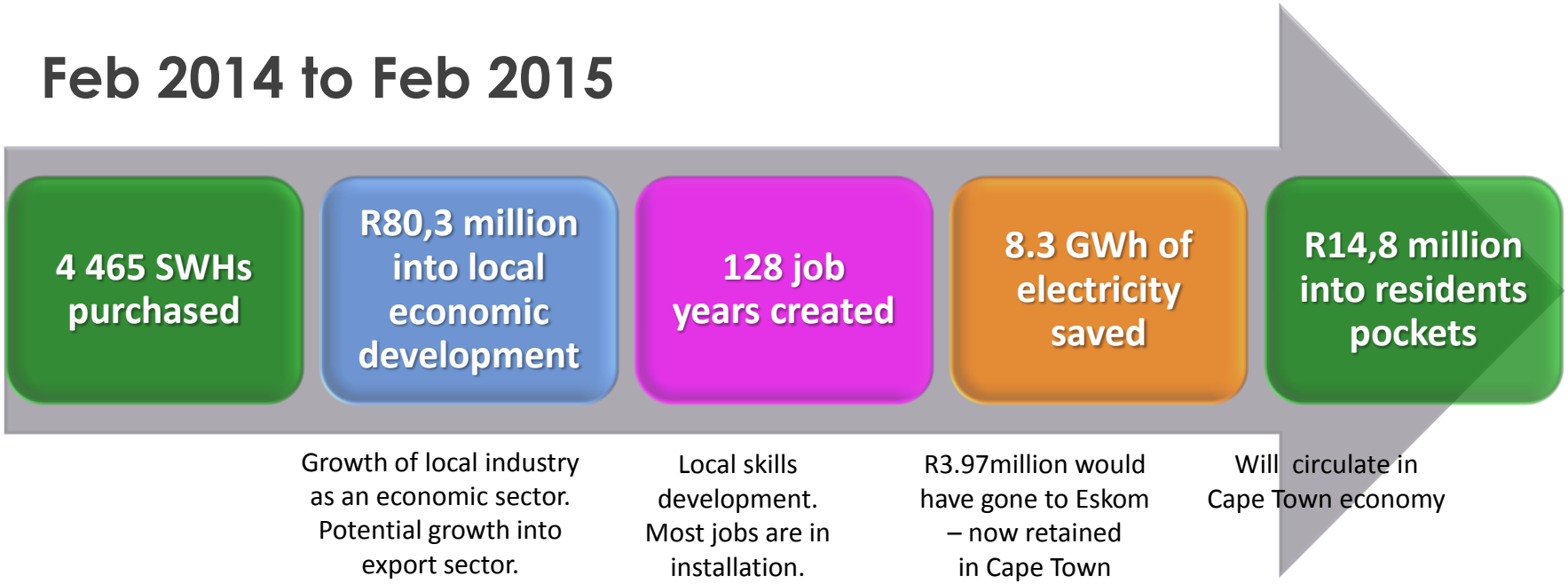
Project example: Economic benefits of SWH Programme:

Feb 2014 to Feb 2015



Targets

SWH TARGET 2017	MONEY INTO ECONOMY	JOB YEARS	ELECTRICITY SAVED
60 000 – 150 000	R1 billion to R2,7 billion	1 713 – 4 244	210 – 480 GWh

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COMMERCIAL
SECTOR

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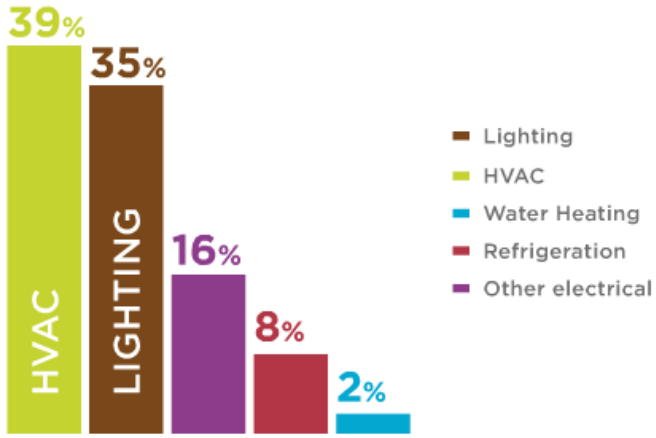
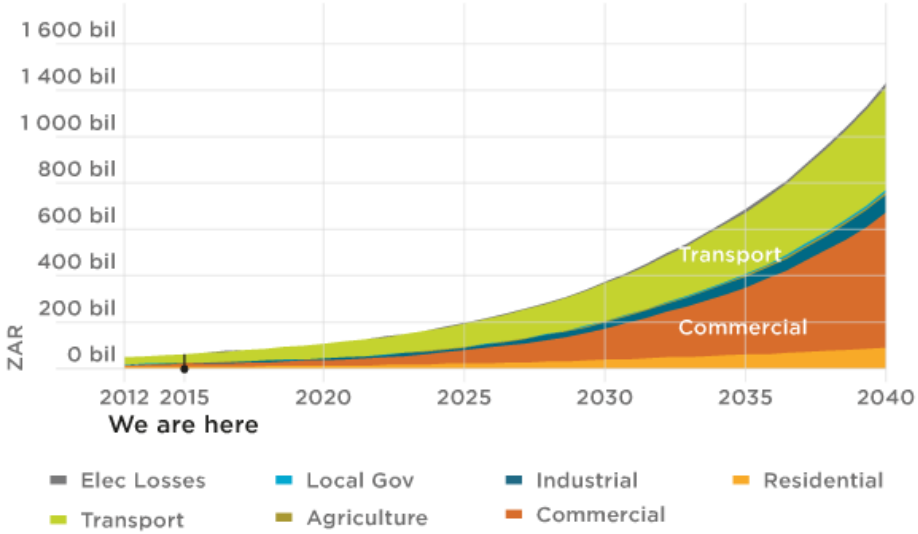
2012 CAPE TOWN
COMMERCIAL



COMMERCIAL SECTOR
ELECTRICITY CONSUMPTION

COSTS BY SECTOR
BUSINESS AS USUAL



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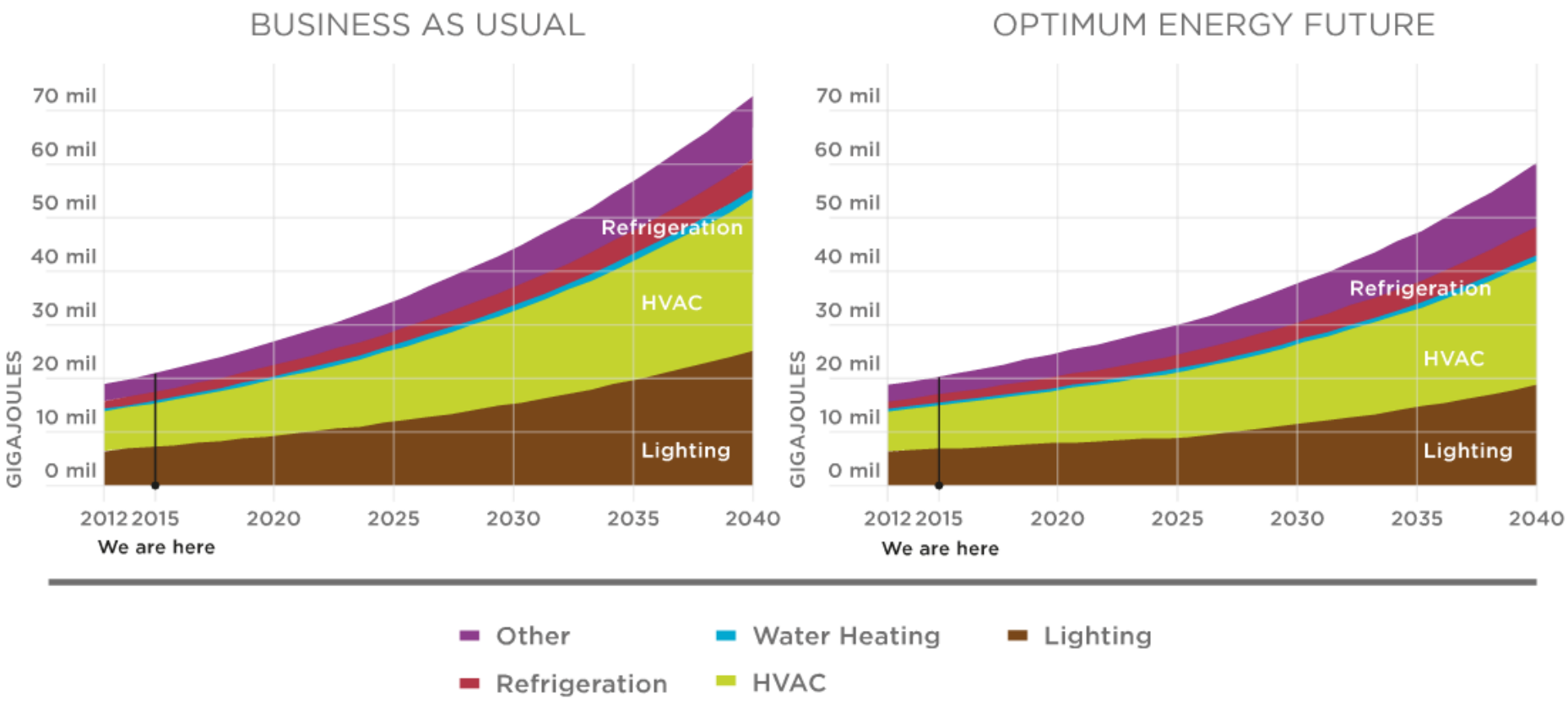
2012 CAPE TOWN
COMMERCIAL
ENERGY CONSUMPTION



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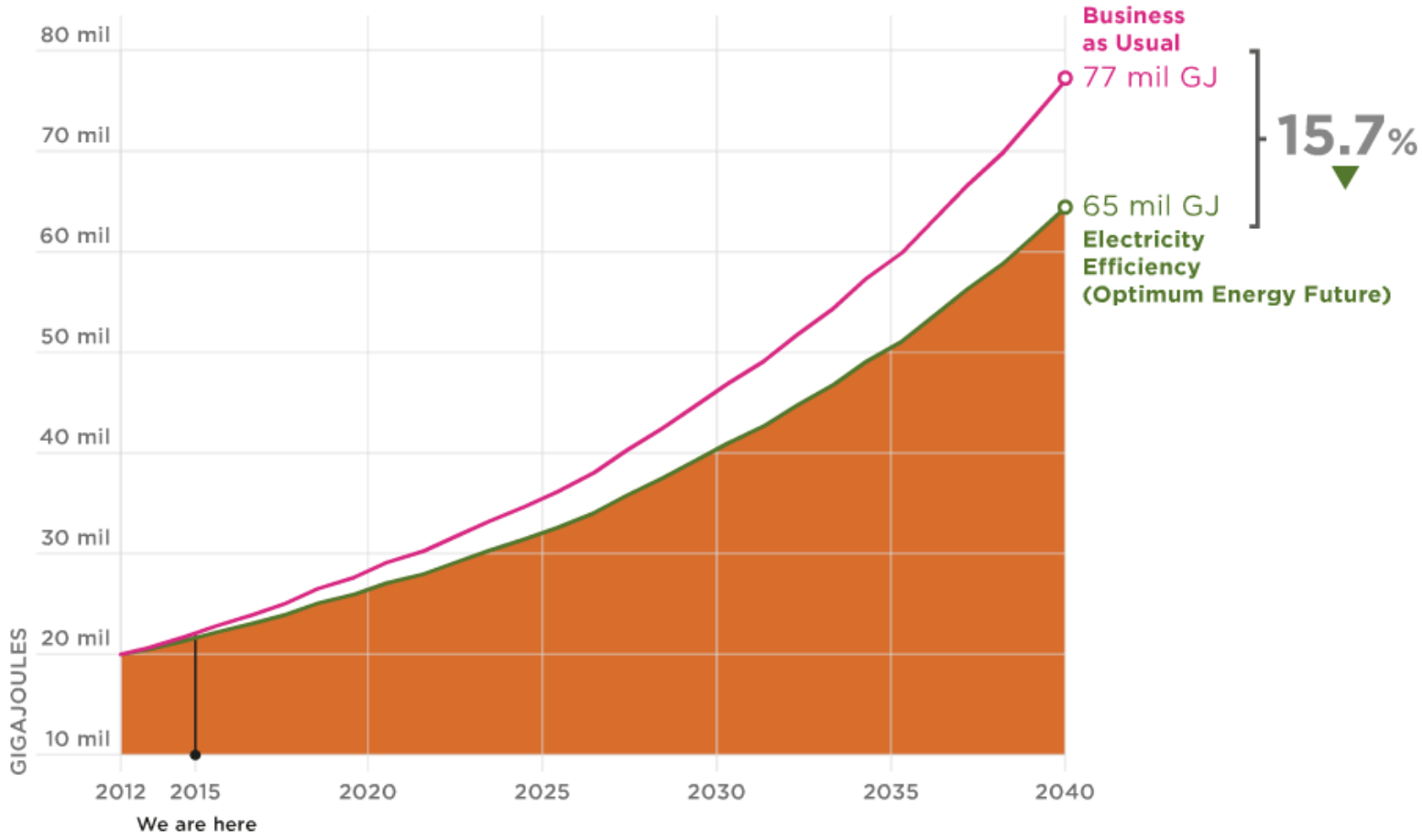
COMMERCIAL

ENERGY DEMAND



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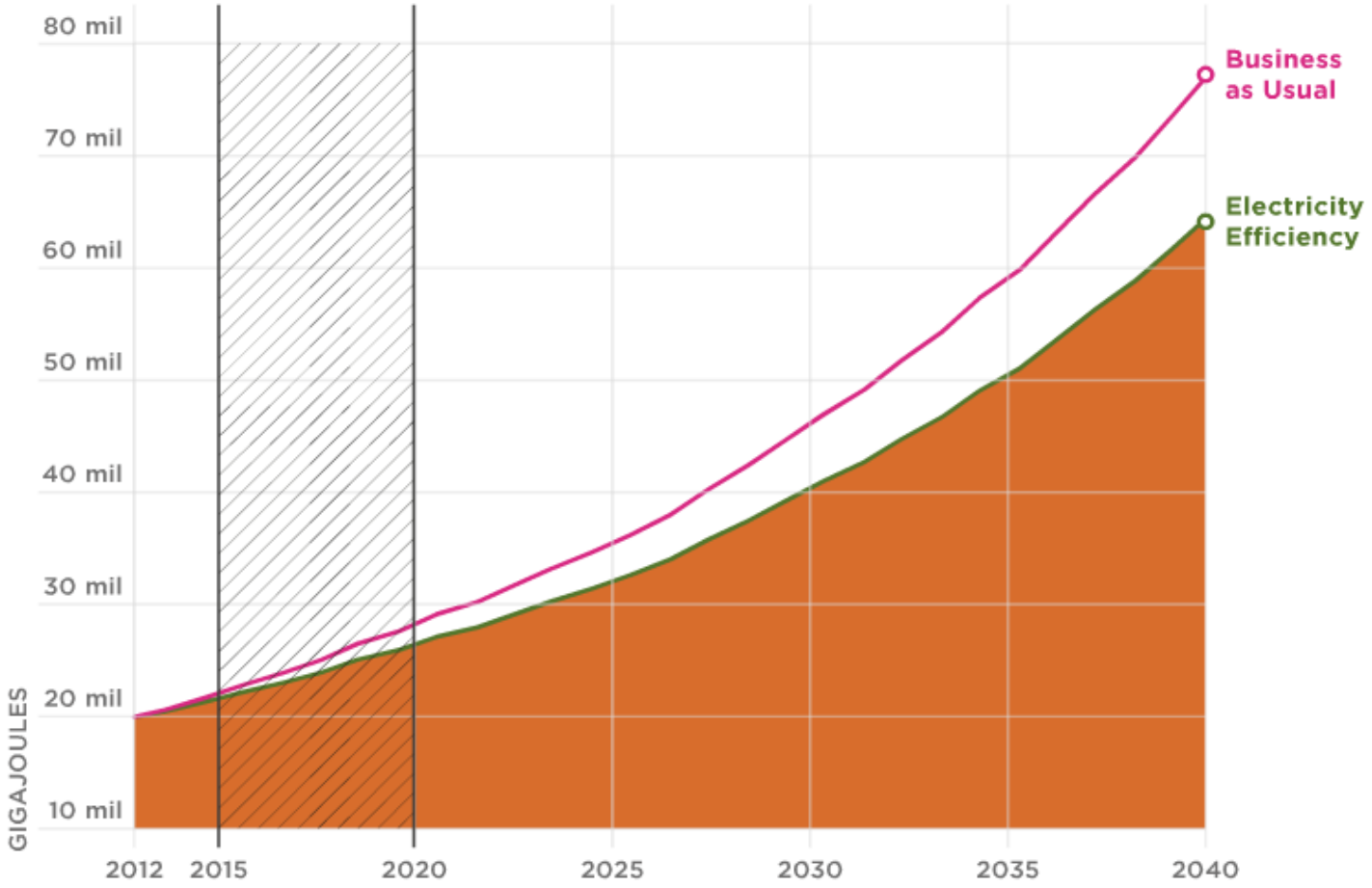
STAD KAAPSTAD

COMMERCIAL

5 YEAR PROGRAMME



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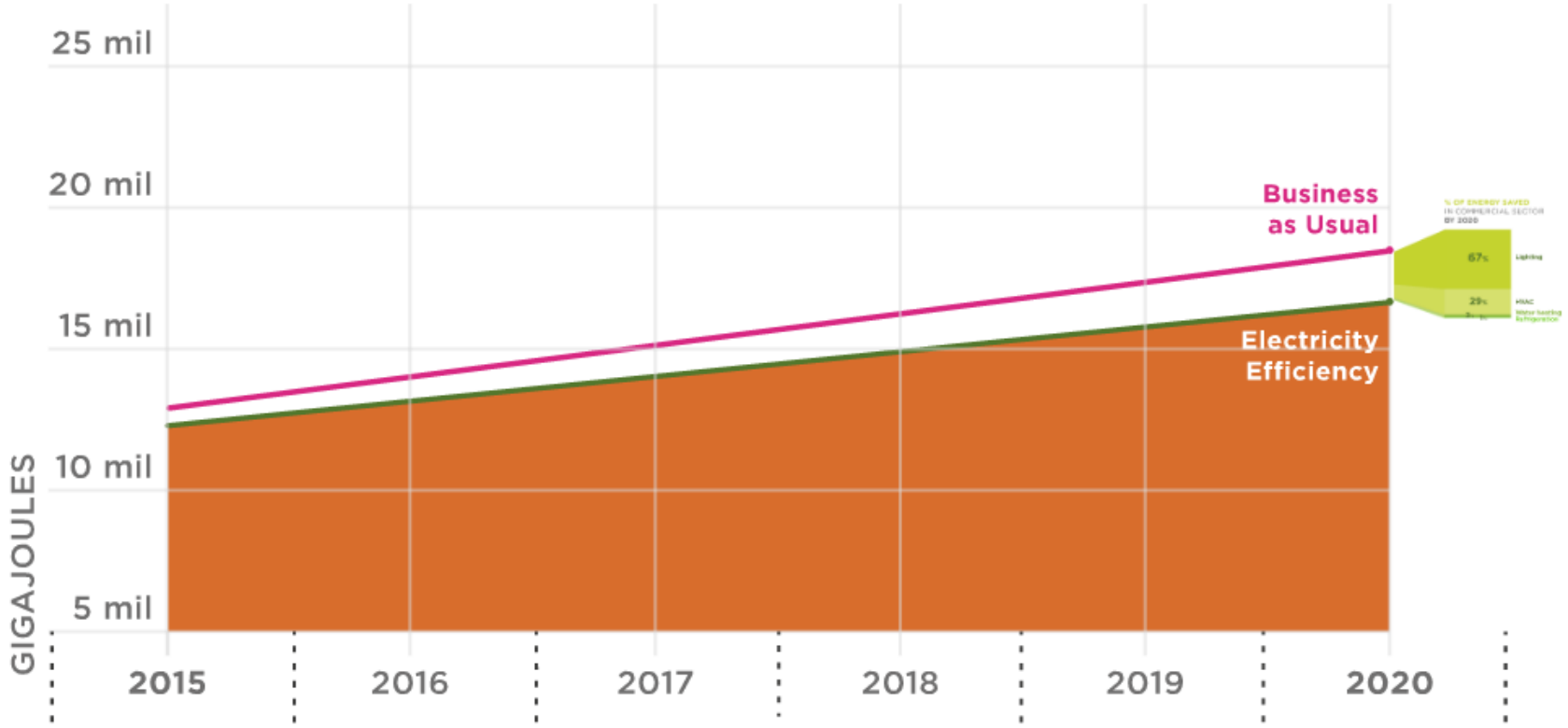
STAD KAAPSTAD

COMMERCIAL

5 YEAR PROGRAMME



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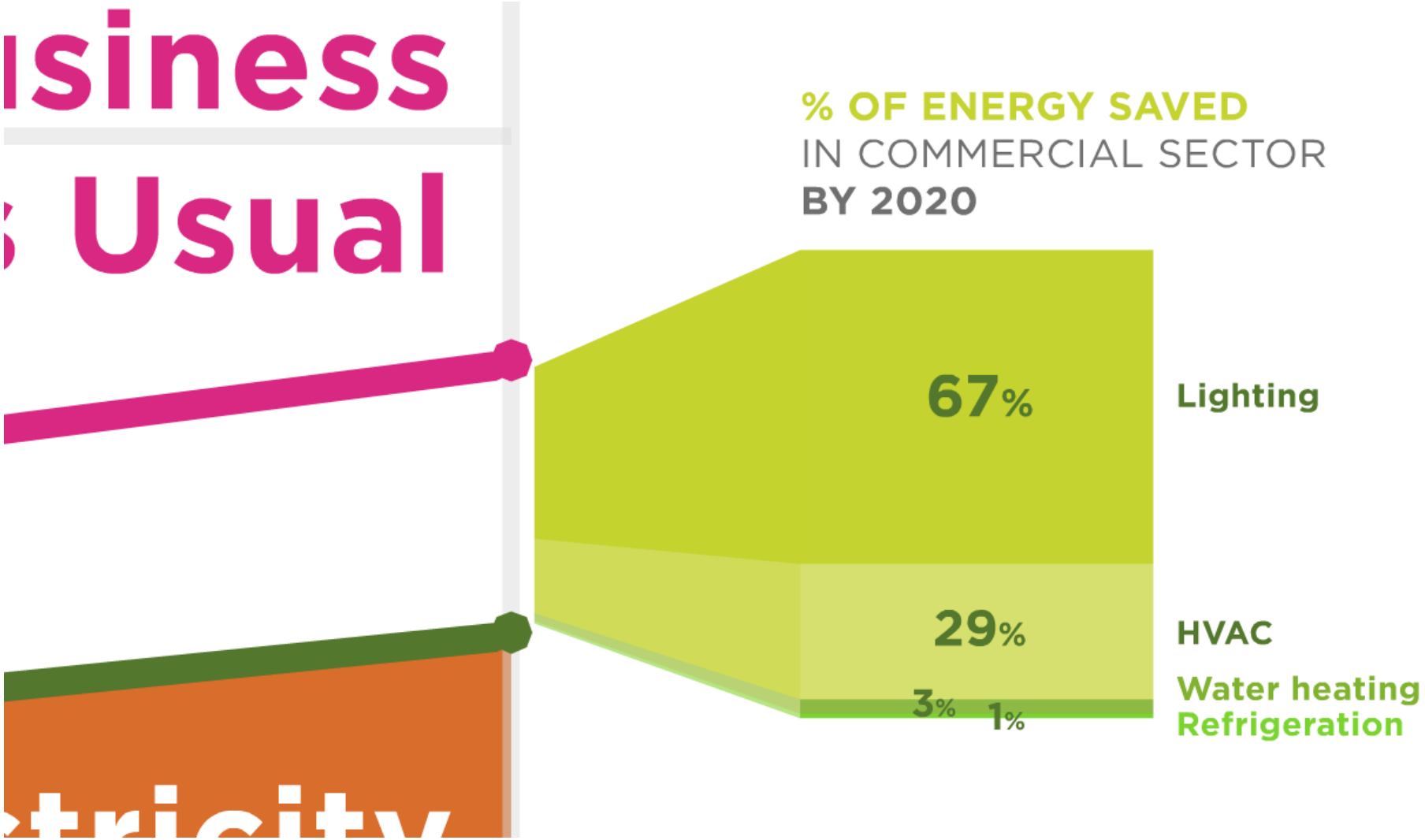
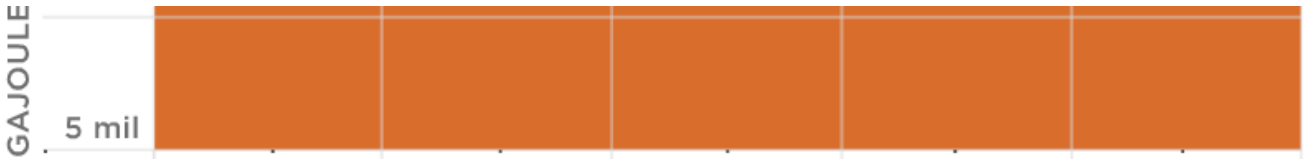
ISIXEKO SASEKAPA
STAD KAAPSTAD



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD



INTERVENTIONS:	2015	2016	2017	2018	2019	2020	PENETRATION:
Efficient Lighting	62%	65%	69%	73%	77%	81%	80%
Efficient HVAC	11%	15%	18%	22%	26%	30%	10%
Efficient Water Heatings	5%	6%	8%	9%	11%	12%	40%
Efficient Refrigeration	11%	15%	18%	22%	26%	30%	12%

CITY OF CAPE TOWN
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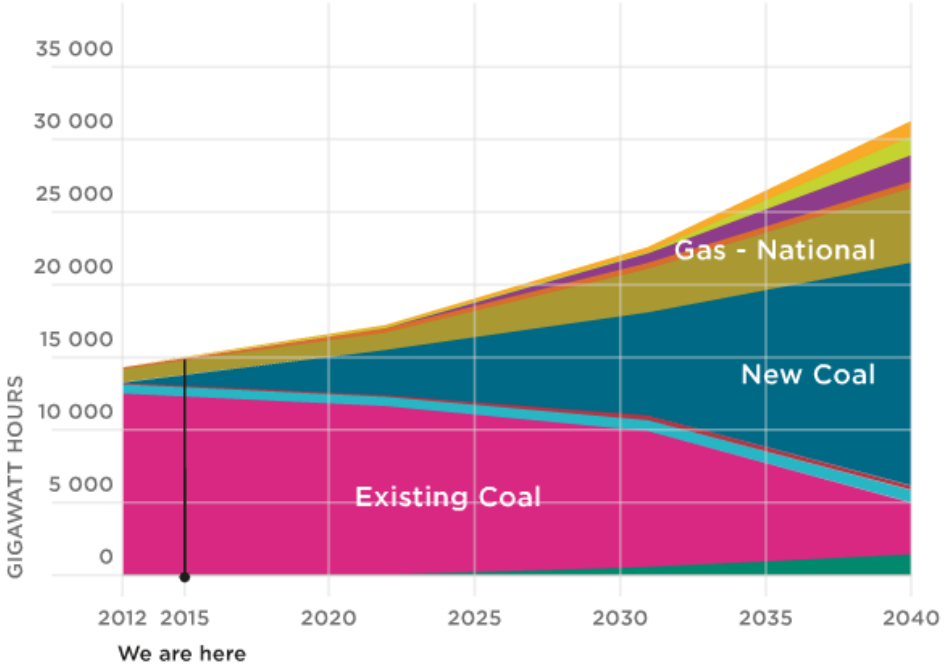
STAD KAAPSTAD

CAPE TOWN
ELECTRICITY SUPPLY

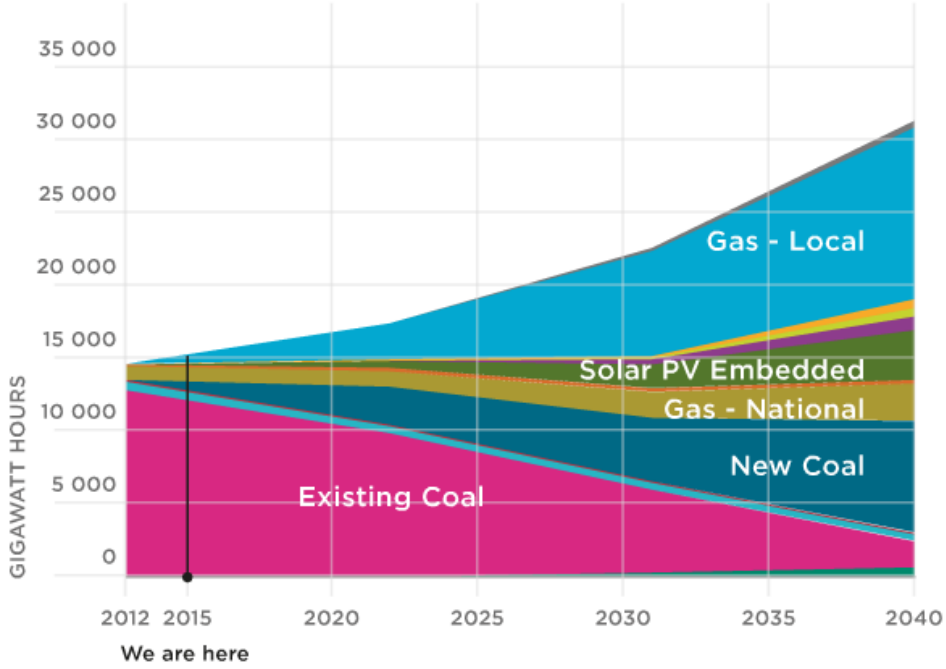
CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

CAPE TOWN
ELECTRICITY SUPPLY

OPTIMUM ENERGY FUTURE
NO LOCAL GENERATION & EMBEDDED PV



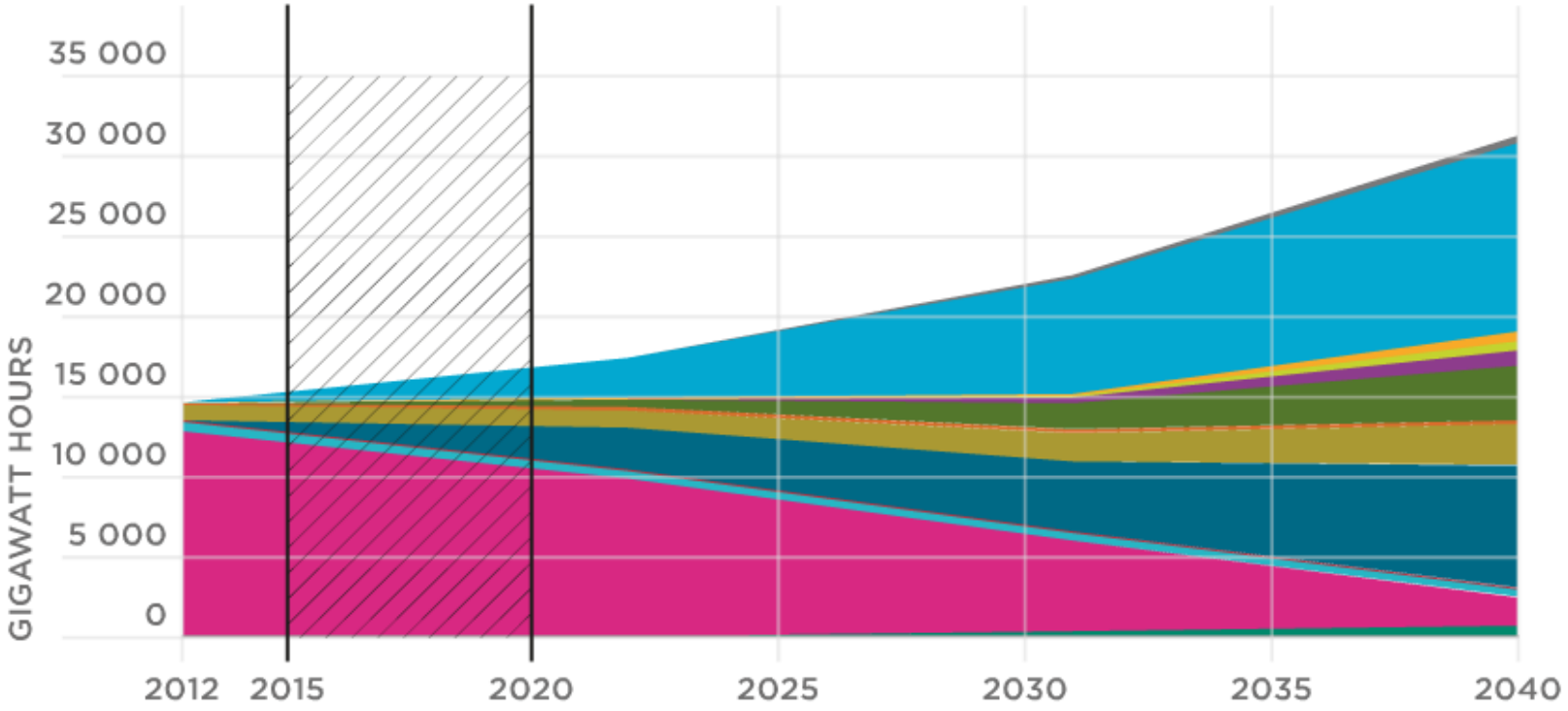
OPTIMUM ENERGY FUTURE
WITH LOCAL GENERATION & EMBEDDED PV



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

INTERVENTIONS
ELECTRICITY SUPPLY

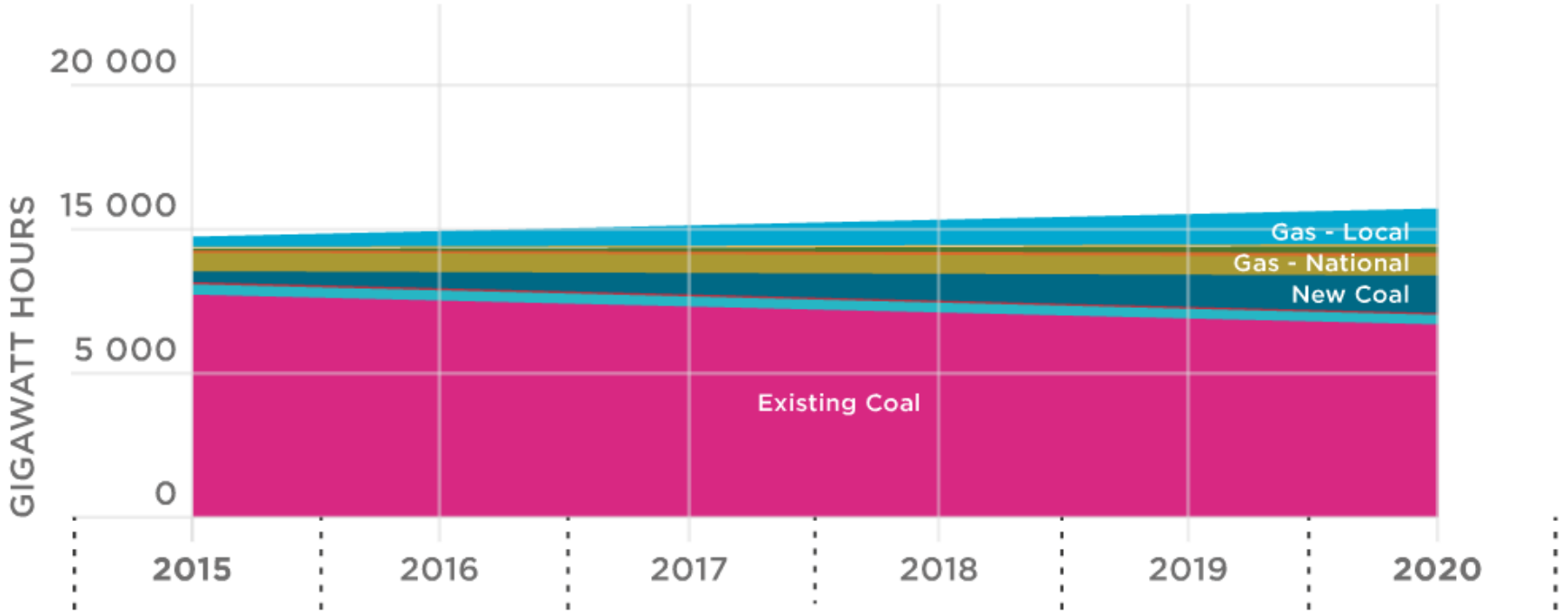
5 YEAR PROGRAMME



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

INTERVENTIONS
ELECTRICITY SUPPLY

5 YEAR PROGRAMME



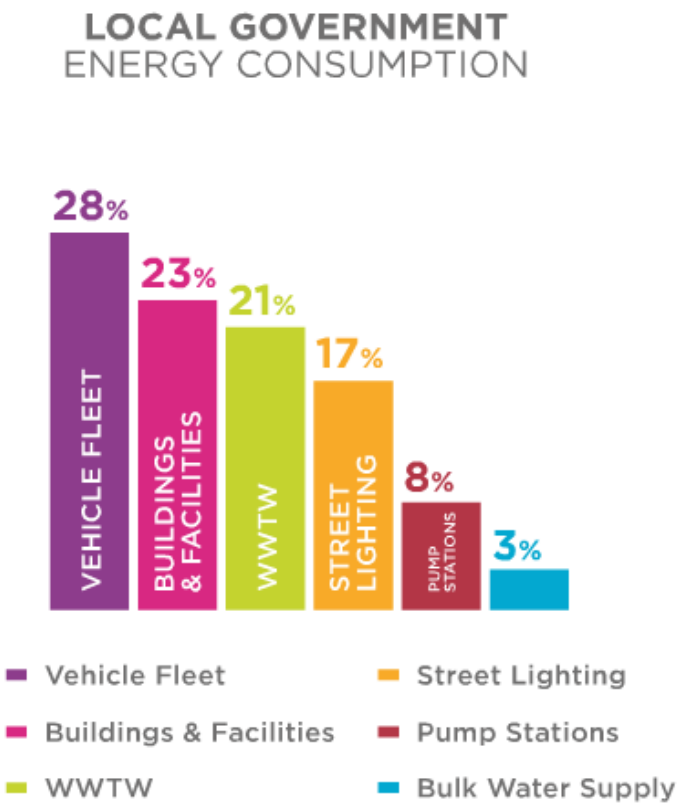
CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

INTERVENTIONS:	MEGAWATT:					
Embedded Generation - Residential	0.5	9	18	27	36	45
Embedded Generation - Small Commercial	0	2	3	5	6	8
Embedded Generation Large Commercial + Industrial	4	14	24	34	44	54
RE IPP / Own Generation (Wind)	0	0	0	0	0	100
LNG Generation	0	0	0	0	0	300

LOCAL GOVERNMENT

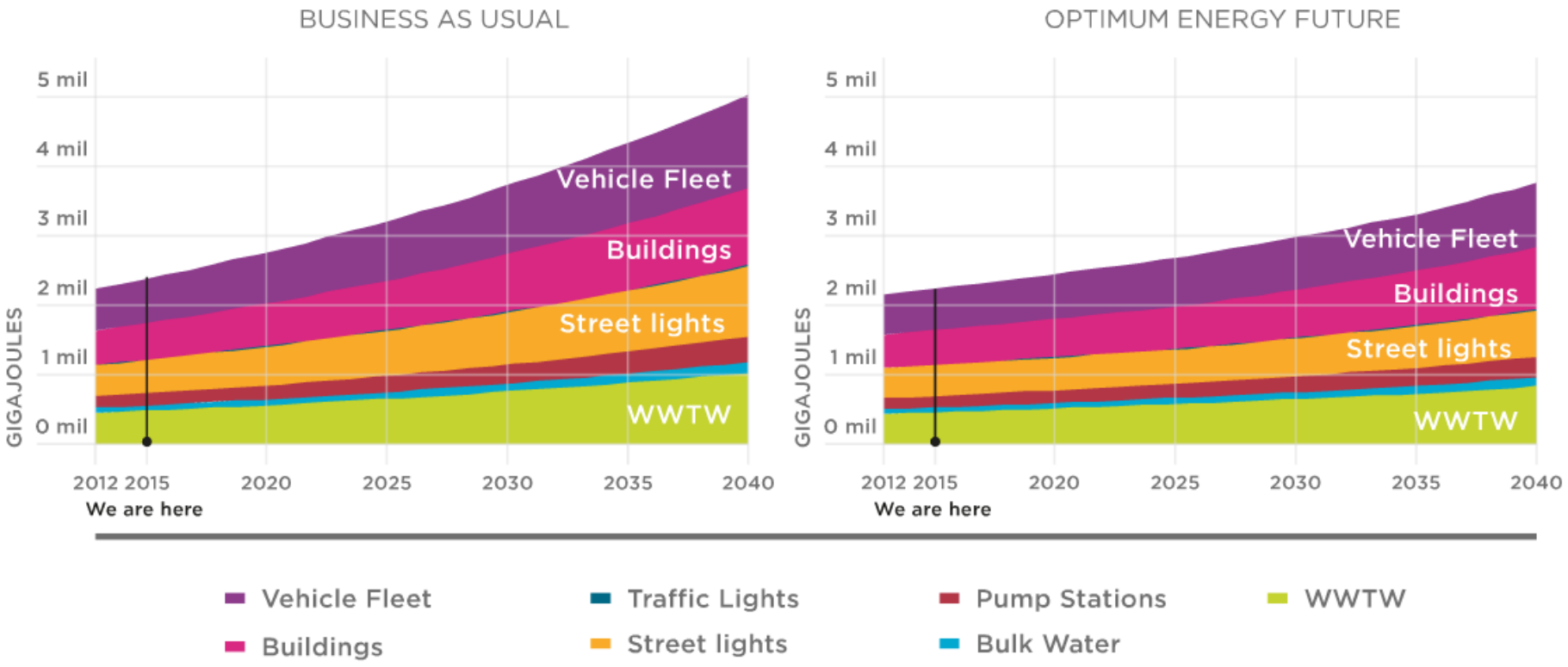
CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

2012 CAPE TOWN
LOCAL GOVERNMENT



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

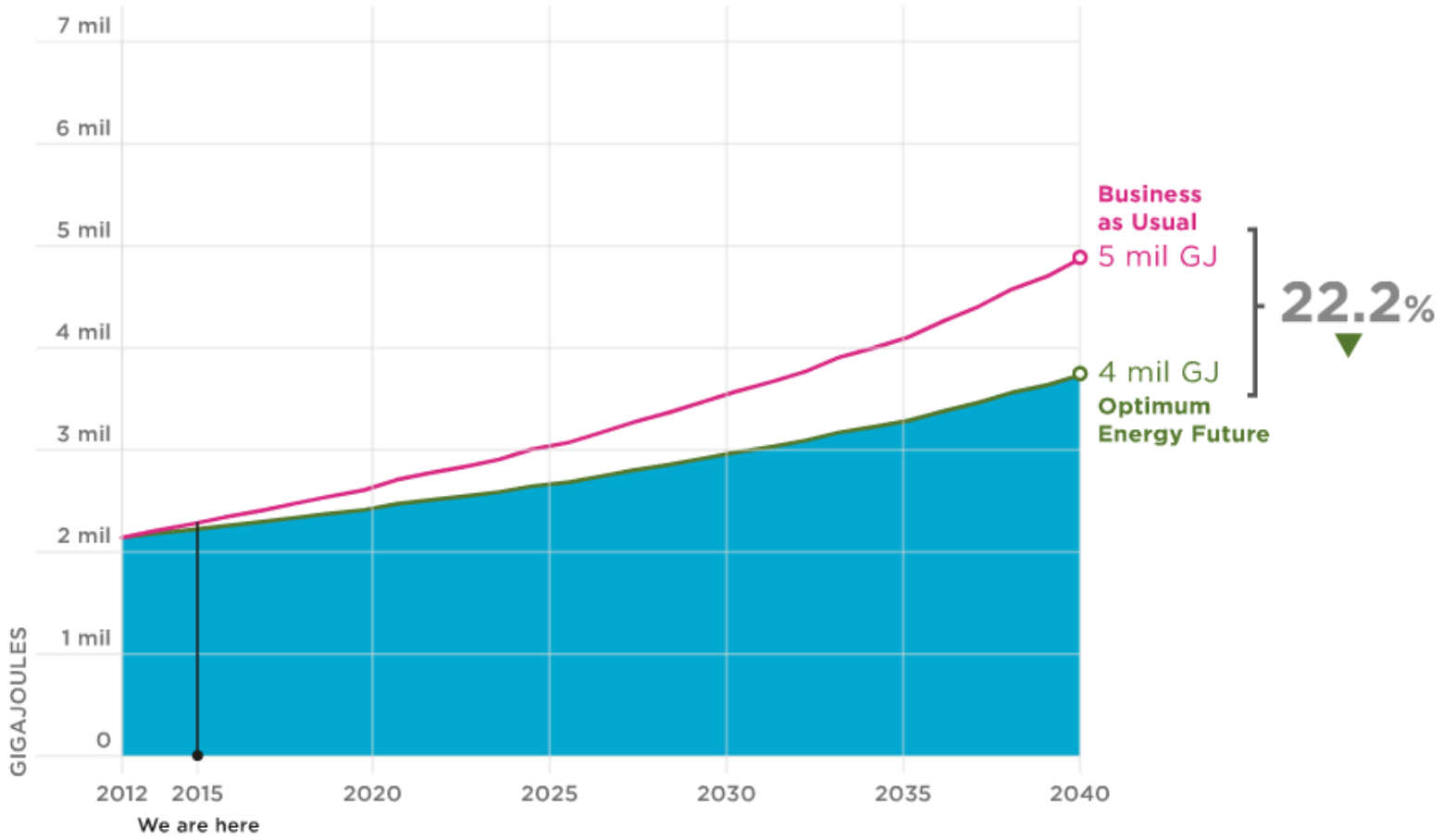
2012 CAPE TOWN
LOCAL GOVERNMENT
ENERGY CONSUMPTION



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

LOCAL GOVERNMENT

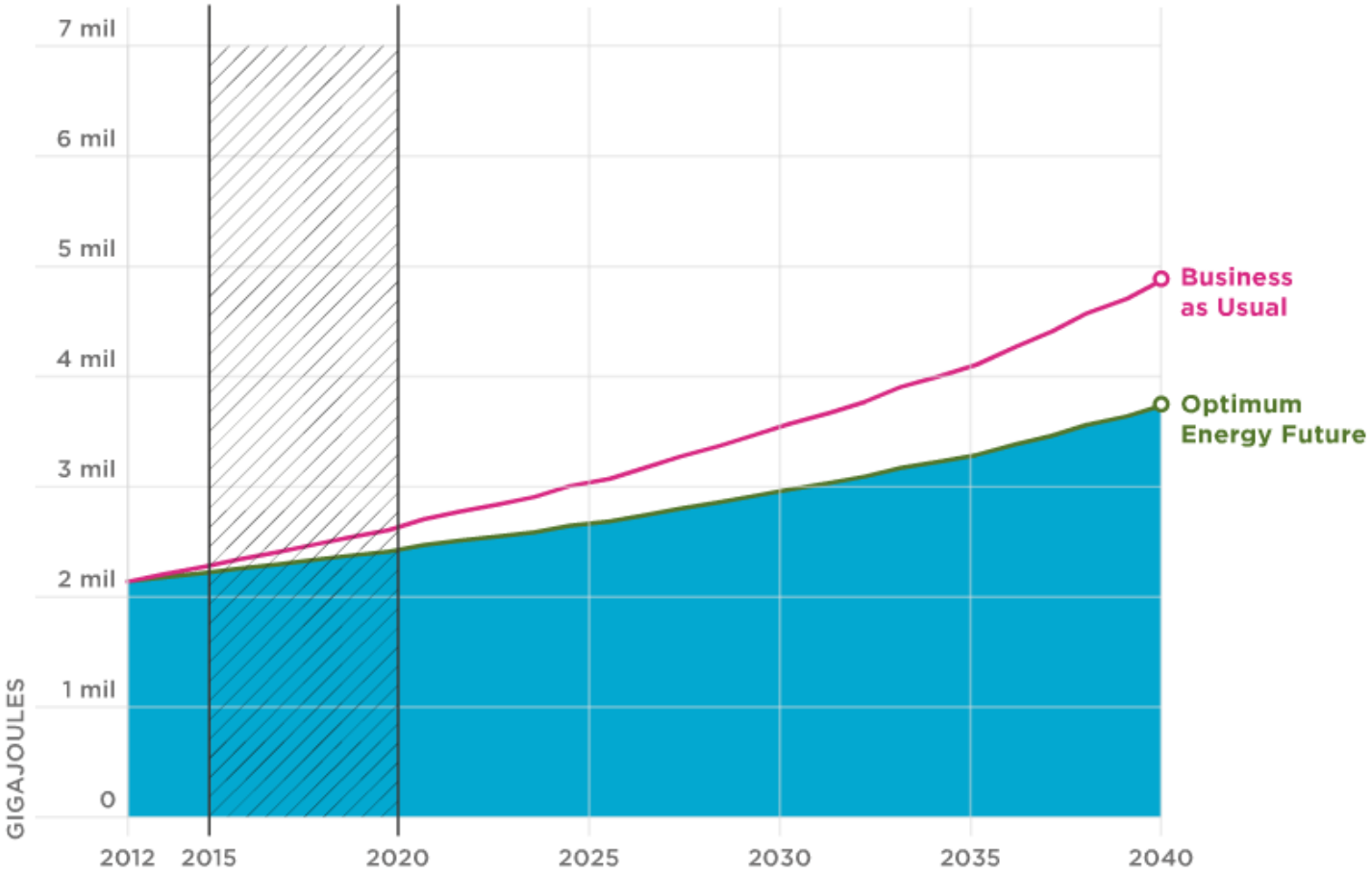
ENERGY DEMAND



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

LOCAL GOVERNMENT

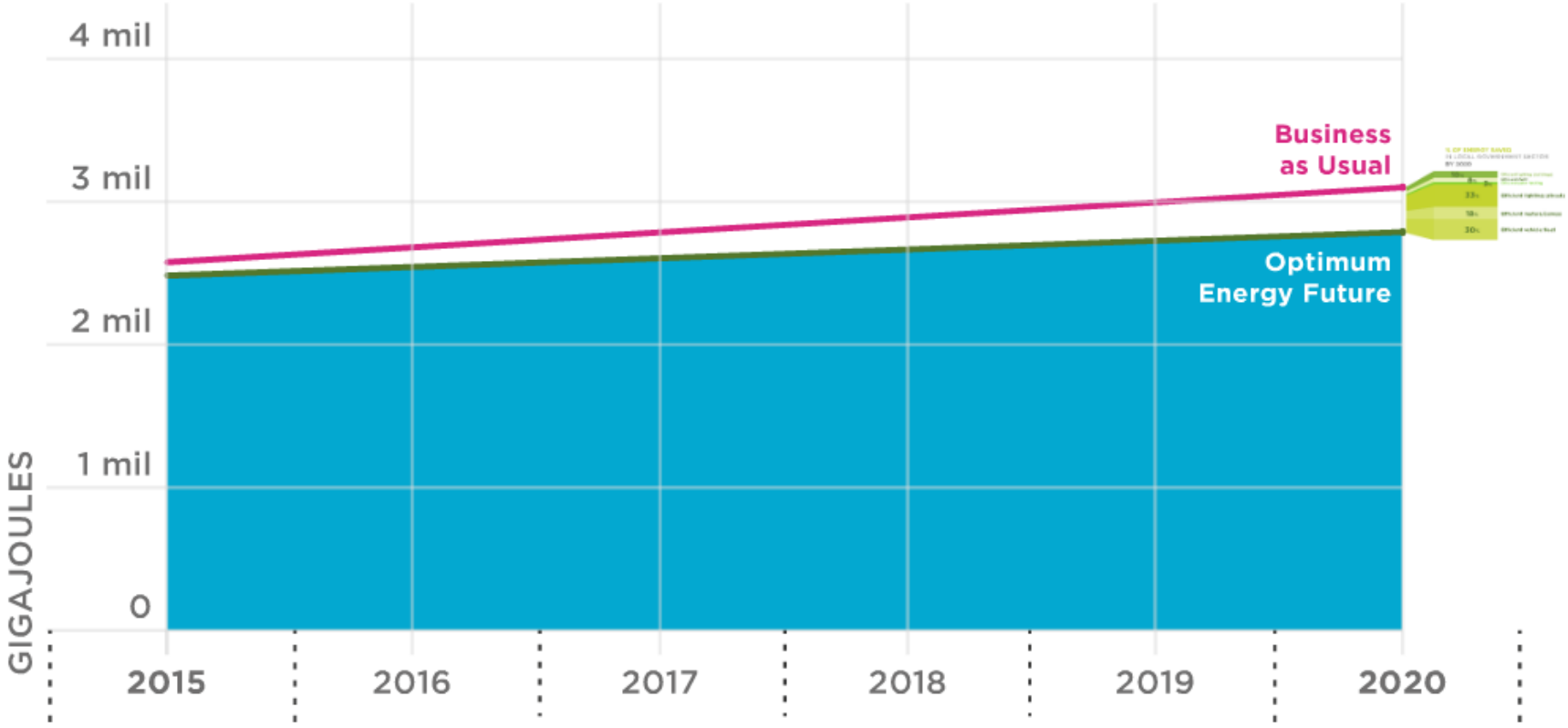
5 YEAR PROGRAMME



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

LOCAL GOVERNMENT

5 YEAR PROGRAMME



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

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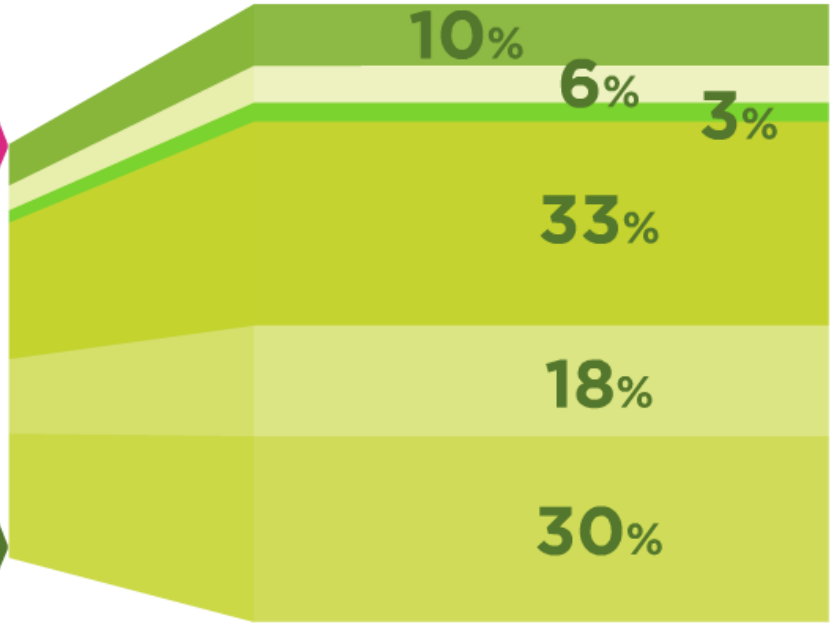
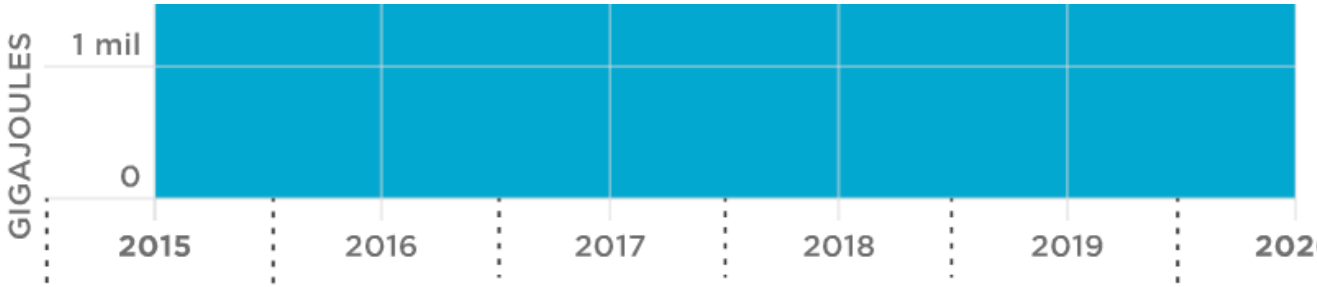
% OF ENERGY SAVED
IN LOCAL GOVERNMENT SECTOR
BY 2020



Efficient lighting (buildings)
Efficient HVAC
Efficient water heating
Efficient lighting (street)
Efficient motors/pumps
Efficient vehicle fleet

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

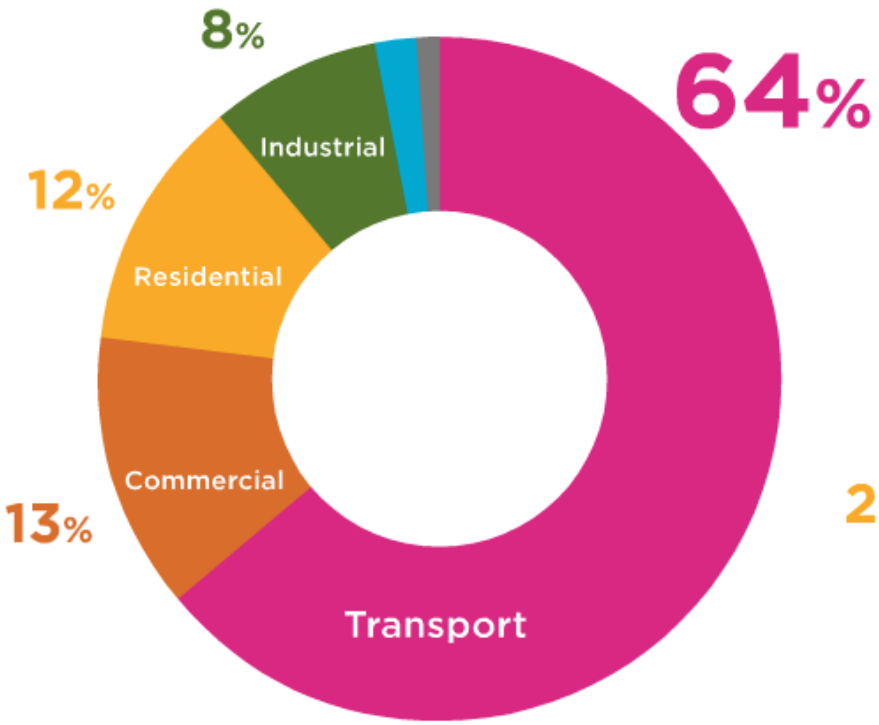


INTERVENTIONS:	PENETRATION:					
Efficient Streetlights	68%	71%	74%	78%	81%	84%
Efficient WWTW	11%	15%	18%	22%	26%	30%
Efficient Buildings - Lighting	73%	76%	78%	81%	84%	87%
Efficient Buildings - HVAC	20%	23%	26%	30%	33%	36%
Efficient Buildings - Water Heating	12%	16%	20%	23%	27%	31%
Efficient Vehicle Fleet	11%	15%	18%	22%	26%	30%

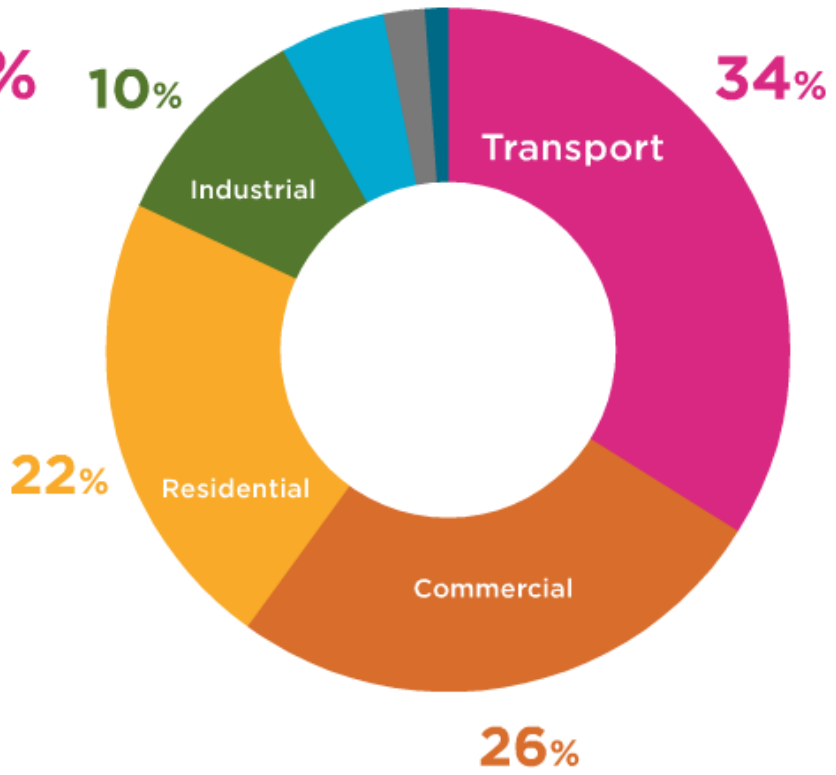
TRANSPORT
SECTOR

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

CAPE TOWN
ENERGY CONSUMPTION
BY SECTOR (2012)



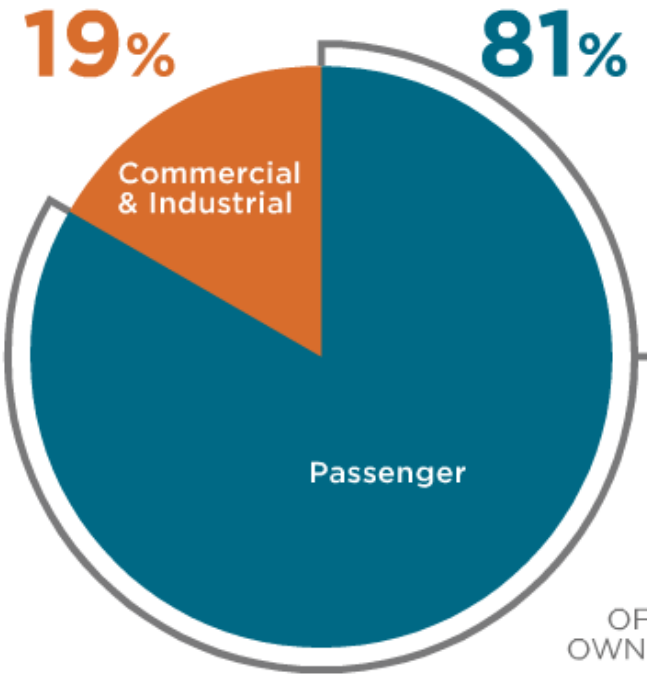
CAPE TOWN
EMISSIONS
BY SECTOR (2012)



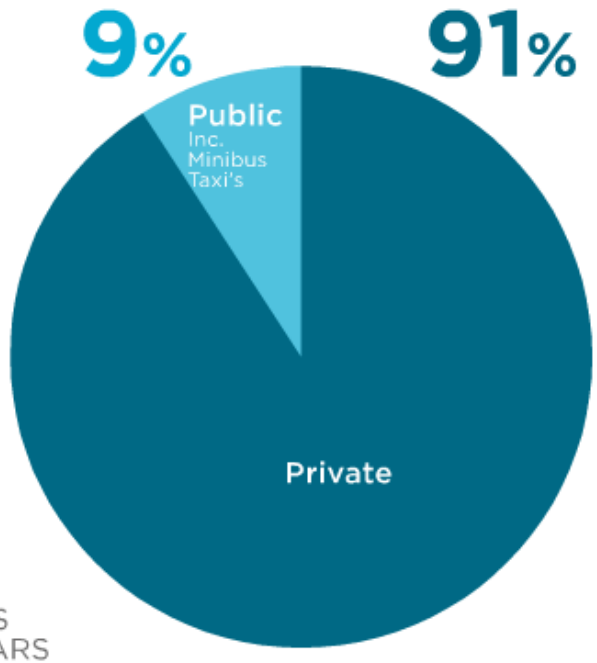
CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

2012 CAPE TOWN
TRANSPORT

TRANSPORT SECTOR
ENERGY CONSUMPTION
(EXCUDING AVIATION & MARINE)



PASSENGER TRANSPORT
ENERGY CONSUMPTION

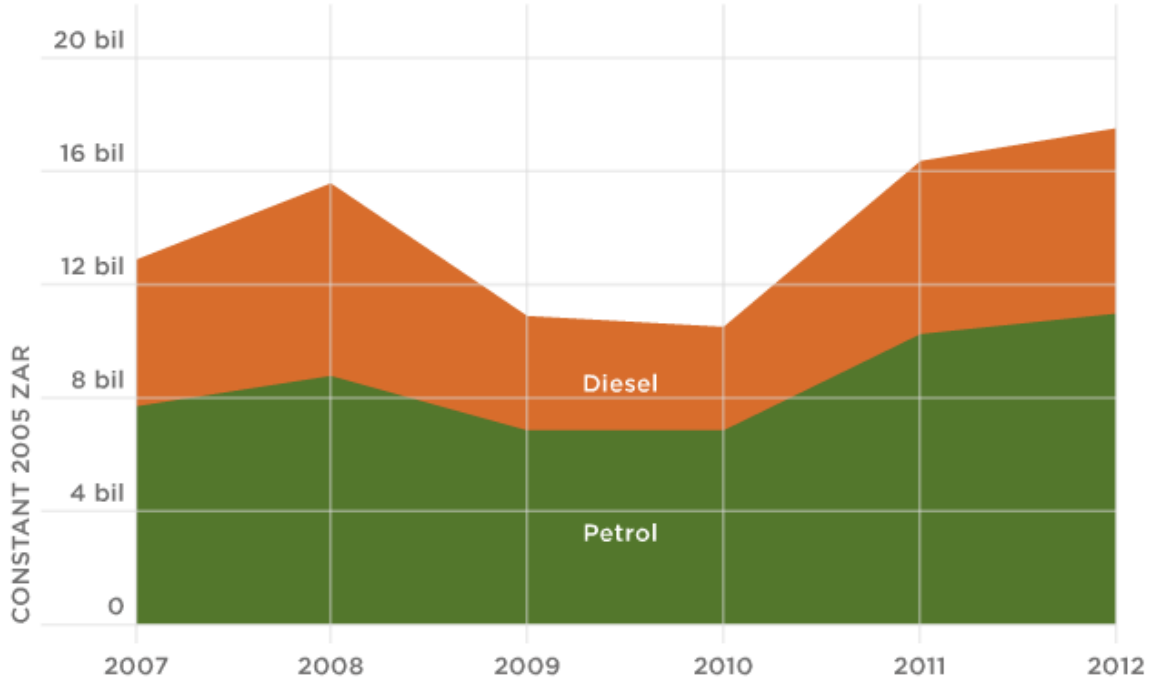


46%
OF HOUSEHOLDS
OWN 1 OR MORE CARS

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

2012 CAPE TOWN TRANSPORT

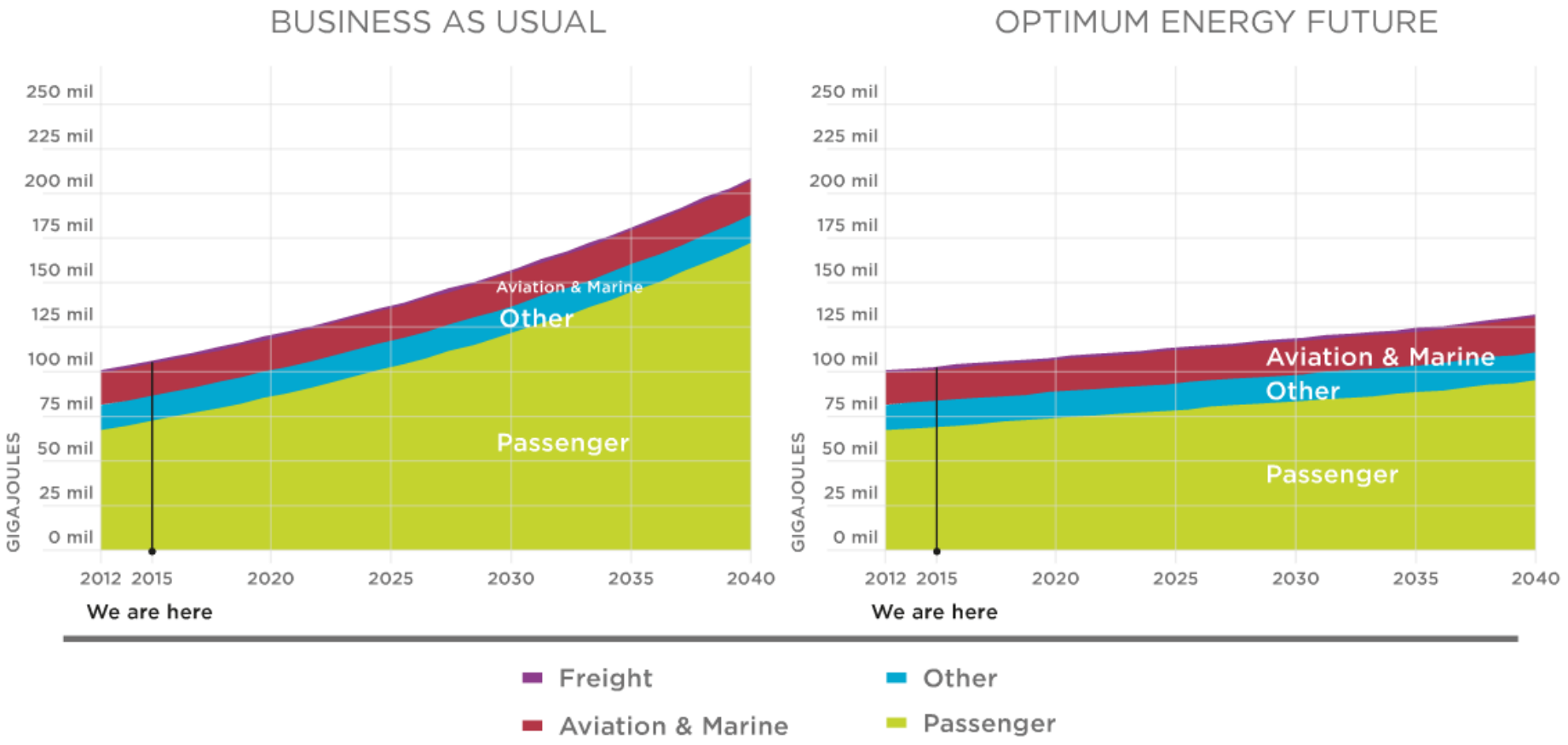
TOTAL LIQUID FUEL COSTS OVER TIME (today's Rands)



Sources:
DoE, SAPIA,
StatsSA

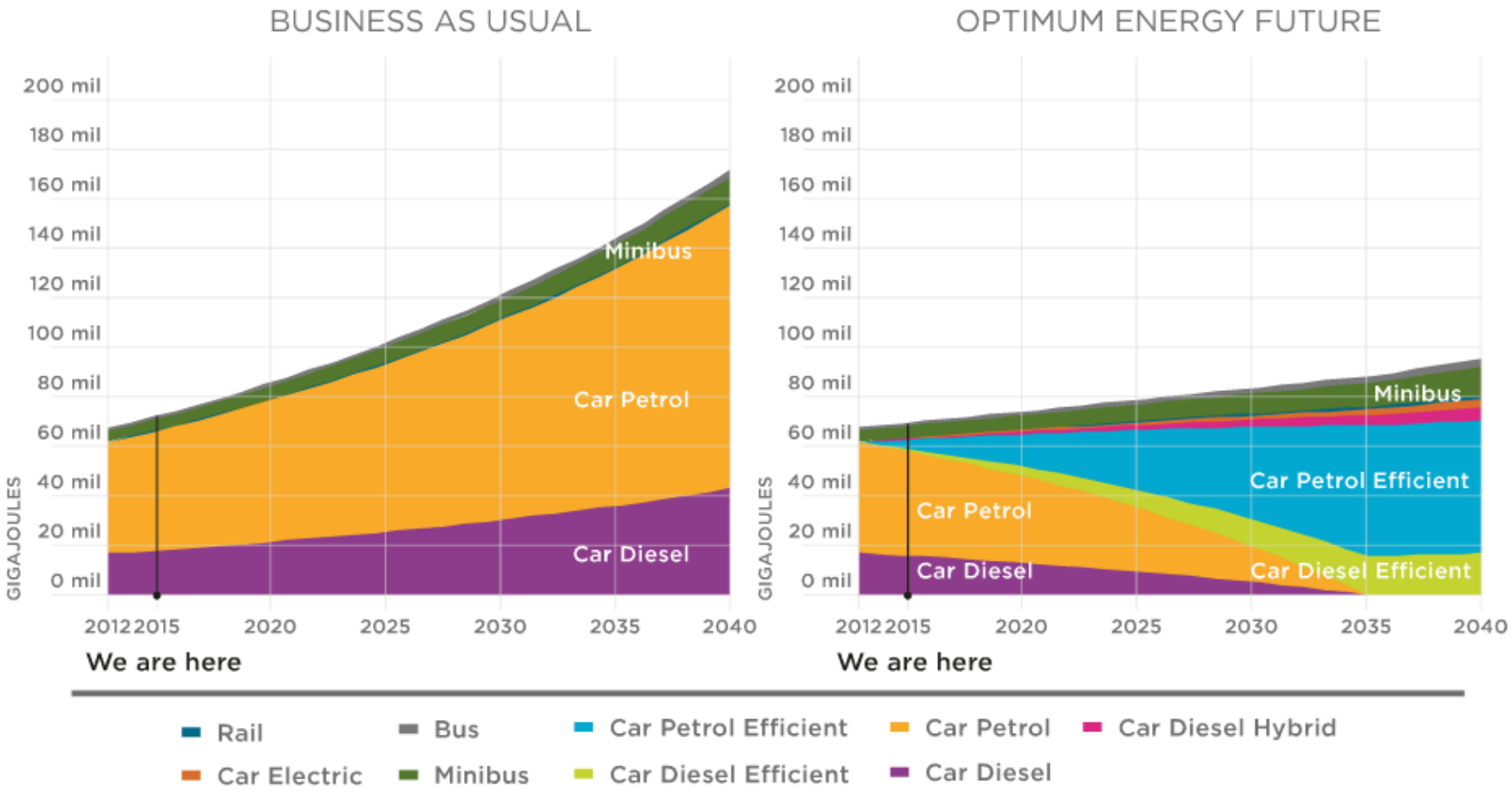
CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

TRANSPORT
ENERGY CONSUMPTION



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

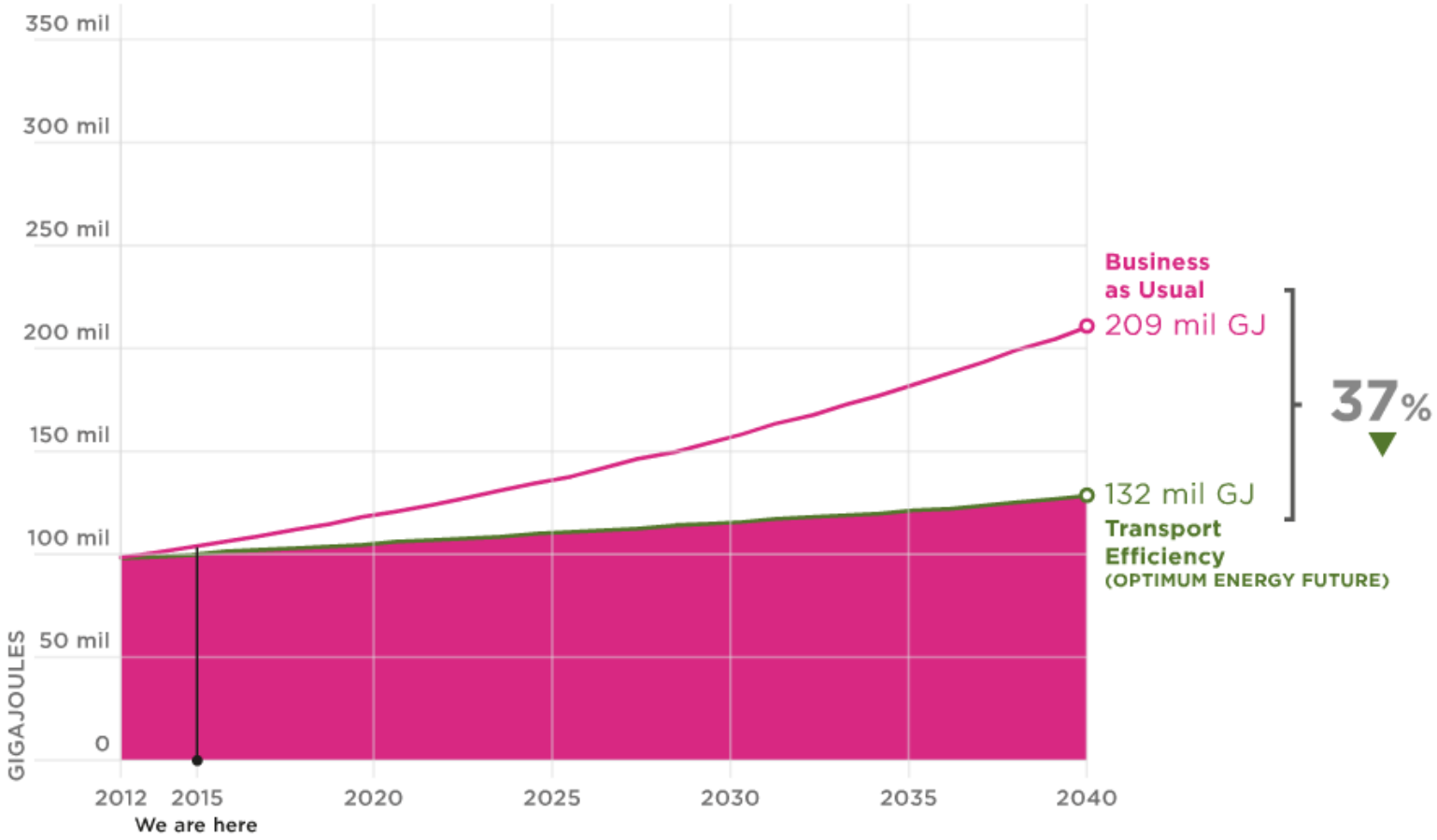
TRANSPORT
PASSENGER ENERGY CONSUMPTION



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

TRANSPORT

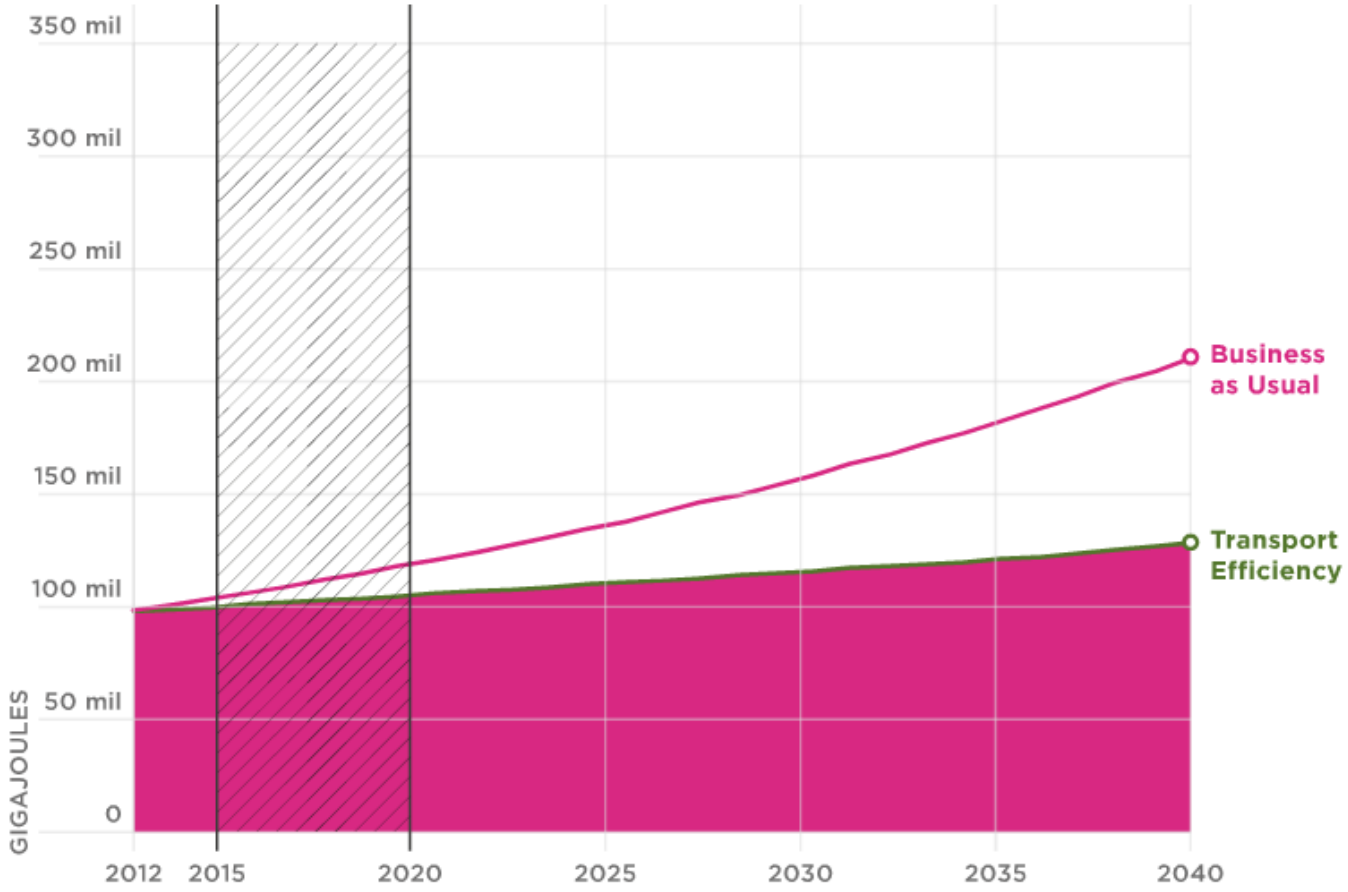
ENERGY DEMAND



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

TRANSPORT

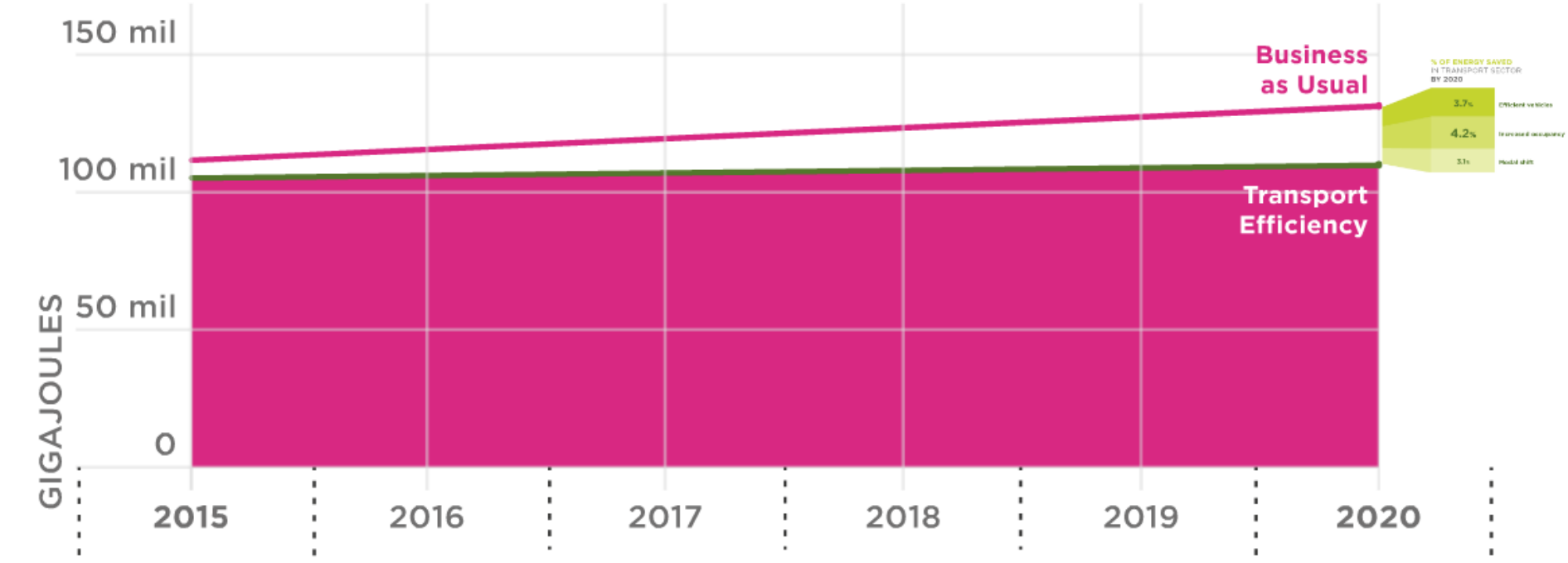
5 YEAR PROGRAMME



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

TRANSPORT

5 YEAR PROGRAMME



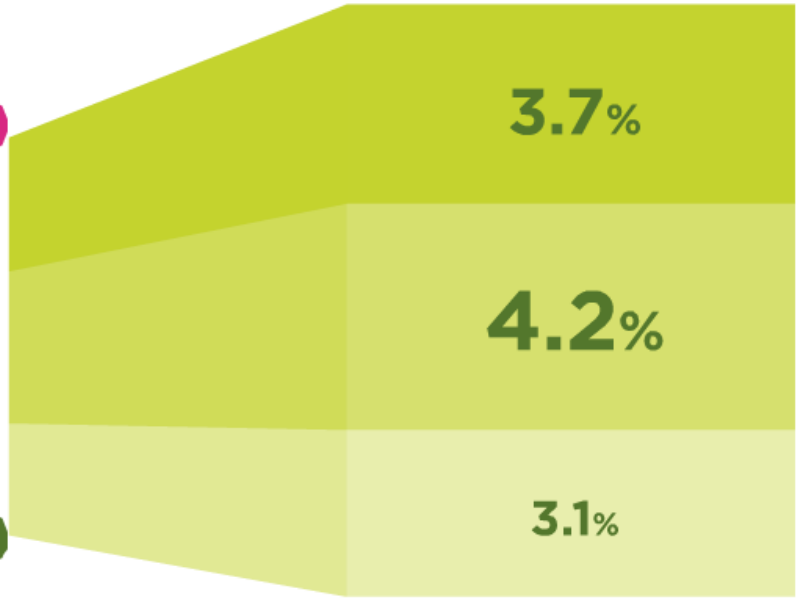
CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

siness

Usual

sport

% OF ENERGY SAVED
IN TRANSPORT SECTOR
BY 2020



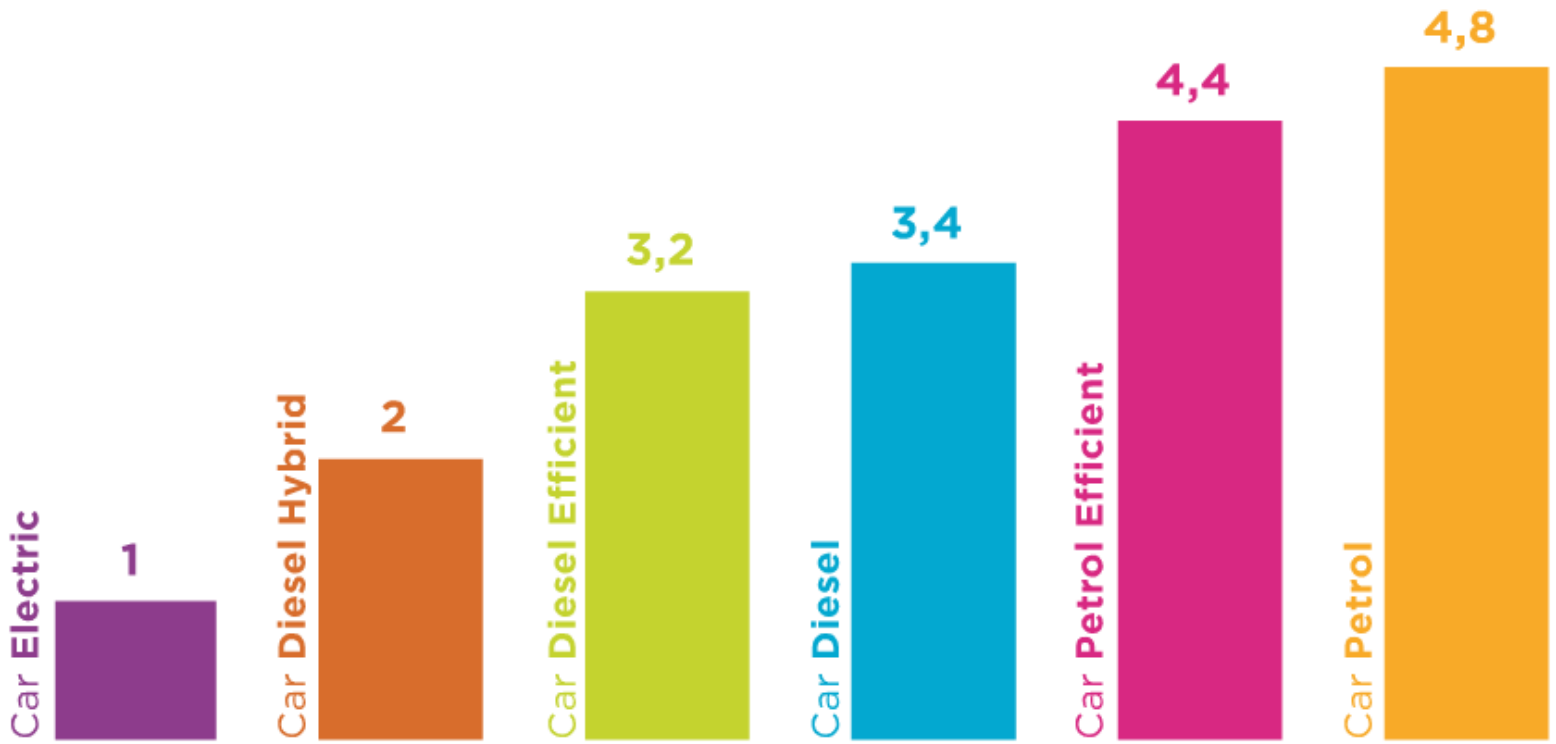
CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

TRANSPORT

Impact of Efficiency Measures

PRIVATE EFFICIENT VEHICLE COMPARISON

RELATIVE ENERGY / PASS-KM



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
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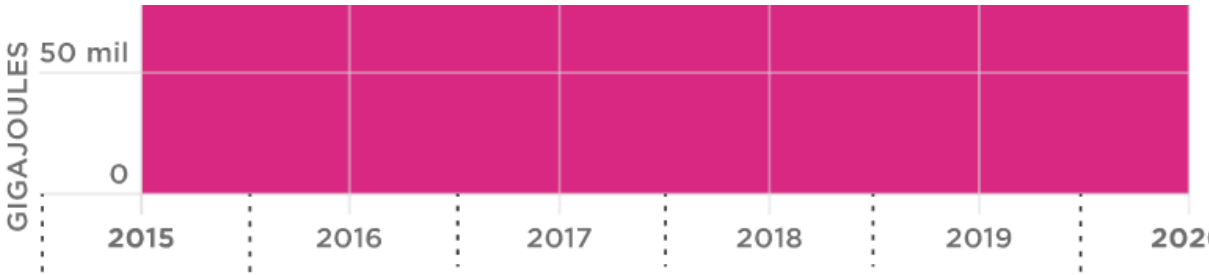


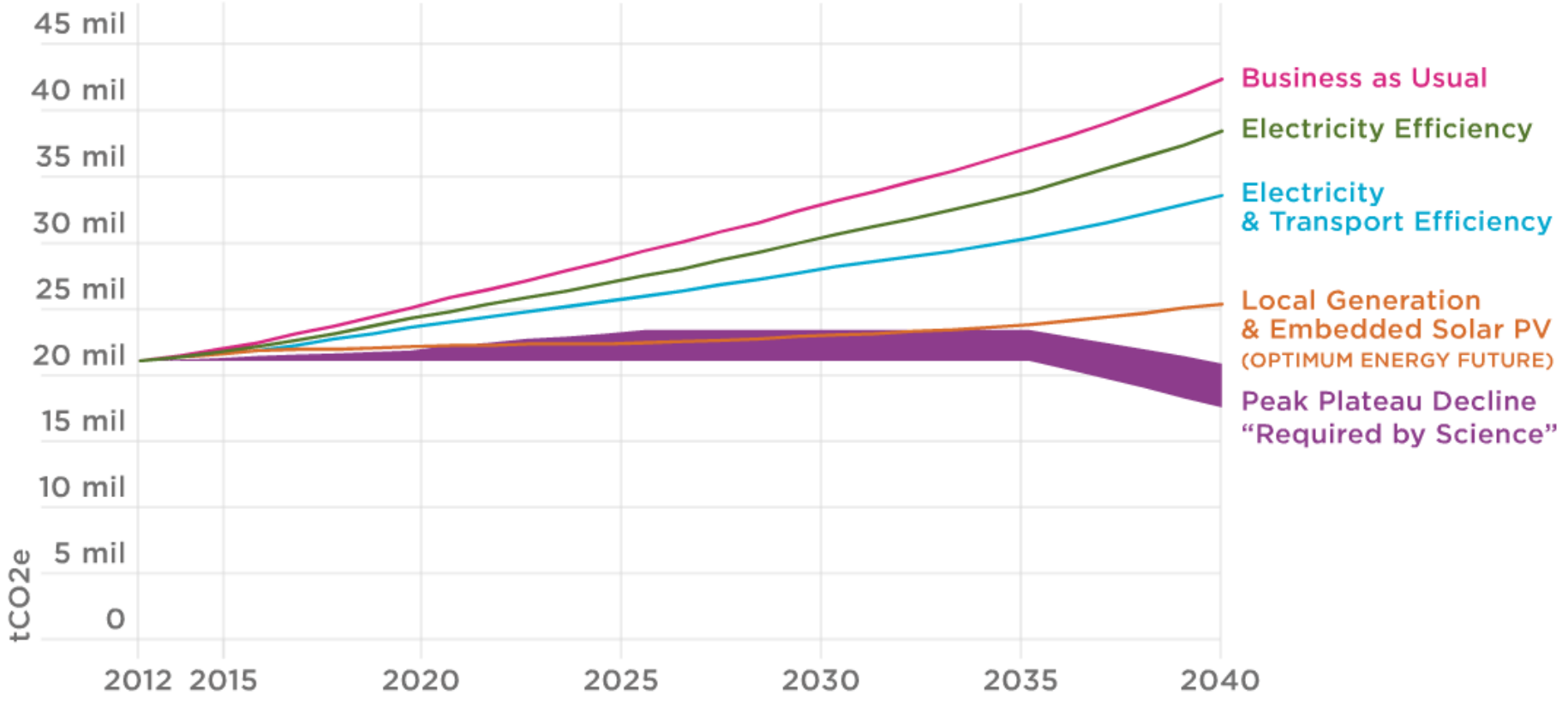
	INTERVENTIONS:	PENETRATION (Number of Cars):						PENETRATION:
PRIVATE TRANSPORT	Car Electric	0	2 000	4 500	7 000	9 500	12 500	1.3%
	Car Diesel Hybrid	0	2 000	4 500	7 000	9 500	12 500	1.3%
	Car Petrol Efficient	0	5 500	11 000	17 000	23 500	30 000	3%
	Car Diesel Efficient	0	5 500	11 000	17 000	23 500	30 000	3%
		Passengers per Car:						
	Occupancy per Car	1.45	1.46	1.48	1.49	1.51	1.53	

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

PUBLIC TRANSPORT

INTERVENTIONS:	2015	2016	2017	2018	2019	2020
			PENETRATION (Number of Taxis & Buses):			
Efficient Minibus & Bus	11%	15%	18%	22%	26%	30%
			% of Total Passanger Kilometers:			
Expanded use of BRT	7%	9%	10%	11%	12%	14%
Private to Public Modal Shift	36.5%	36.9%	37.4%	37.8%	38.2%	38.6%
			% of Total Tonne Kilometers			
Freight: Shift from Road to Rail	24.3%	24.9%	25.5%	26%	26.6%	27.2%

FUTURE EMISSIONS



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

"Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution."

Albert Einstein

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Thank You

For queries contact

Making progress possible. Together.