



Cape Town State of Energy and Carbon 2025

Launch Event, 24 June 2026



Welcome

Adrian Stone

Manager: Energy Systems Planning and Analysis • CCT

Agenda

Item	Speaker
Welcome	Adrian Stone Manager: Energy Systems Planning and Analysis • CCT
Opening remarks	Cllr Zimkhitha Sulelo Energy Portfolio Committee Chairperson
Statement from C40	Stephen Davis Head of Energy Strategy & Implementation for C40 Cities Climate Leadership Group
State of Energy and Carbon 2025 Report overview	Prof. David Walwyn & Matthew Burke Representing The Green House
Q&A session	Adrian Stone Manager: Energy Systems Planning and Analysis • CCT
Thanks, and closing	Kadri Nassiep Executive Director: Energy • CCT





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OUR SHARED ENERGY FUTURE: THE 2050 ENERGY STRATEGY FOR THE CITY OF CAPE TOWN

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STATE OF ENERGY AND CARBON 2025

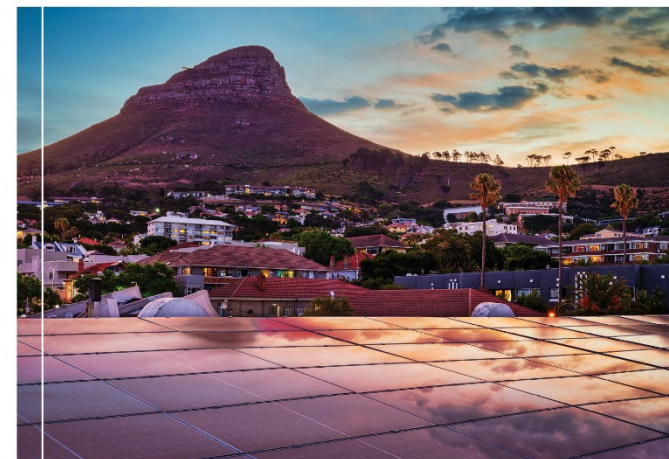
Supplemental report: A baseline assessment of Cape Town's
energy system through the lens of the 2050 Energy Strategy

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SOEC 2025 – Supplemental report



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CAPE TOWN STATE OF ENERGY AND CARBON 2025

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SOEC 2025 – main report



Opening remarks

CLr Zimkhitha Sulelo

Energy Portfolio Committee Chairperson



Statement from C40

Stephen Davis

Head of Energy Strategy & Implementation for C40



State of Energy and Carbon 2025 Report overview

Prof. David Walwyn & Matthew Burke

Representing The Green House



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Well done, City of Cape Town!





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SOEC 2025 highlights video

Can be viewed again on the CCT SOEC webpage, see QR code at the end

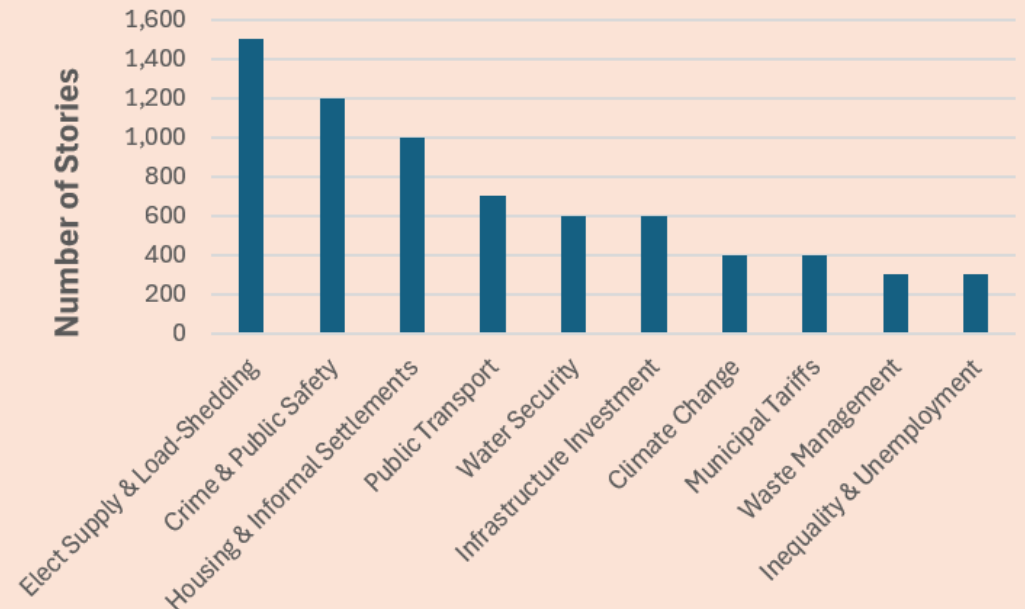
Relevance and Importance: Cape Town in the Media

- Over the last three years, the major issues in the media have been:

- **Energy and electricity challenges**
- **Climate-driven extreme weather**
- **Air pollution and waste management**
- **Municipal tariffs**
- Crime and the failure of the criminal justice system
- Housing and allocation of the budget for infrastructure
- Water supply vulnerability and ageing of infrastructure
- Failure of public transport

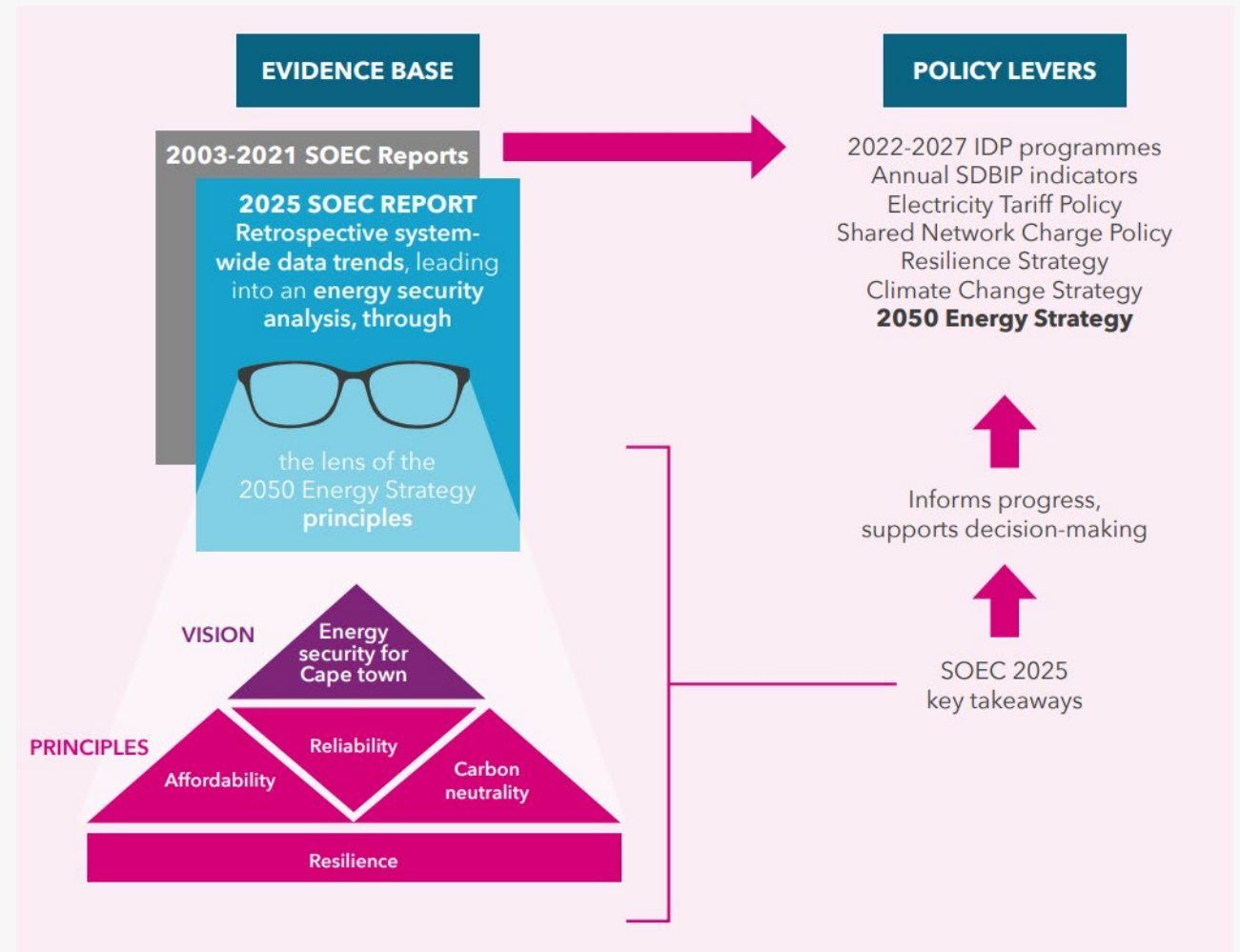
SOEC can inform these debates and others!

NUMBER OF MEDIA STORIES (2023 to 2025)



About the Reports

- SOEC 2025 covers Cape Town's **energy supply, energy demand & carbon emissions** (2014-2023)
- Uses best available data to support evidence-based planning
- 2025 SOEC = **Main Report** + **Supplemental Report**
 - **Main**: full technical detail
 - **Supplemental**: trends & energy security + baseline assessment for the 2050 Energy Strategy
- Data & methods: City **Open Data Portal** (odp-cctegis.opendata.arcgis.com)





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CONTENTS

CORE INSIGHTS

1 Key System Trends >

2 Cape Town's Energy System >

3 Highlights of the Carbon Accounting >

4 Summary of Key Takeaways >



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CORE INSIGHTS:

KEY SYSTEM TRENDS



Five Key System Trends

Overview (2014 to 2023)

- The SOEC identifies **five interconnected trends** that materially shape system-wide outcomes in Cape Town's energy system.
- These trends must be read in the context of Cape Town and the country's rapidly urbanising, **low-growth economic environment**, in which weak expansion suppresses demand while constraining investment.
- The overall energy intensity of the economy has declined over the reporting period, but the causes are complex and include structural shifts toward the tertiary sector (**de-industrialisation**).

1. Demand volatility from repeated shocks

2. Uneven decentralised transition

3. Transport dominates energy use

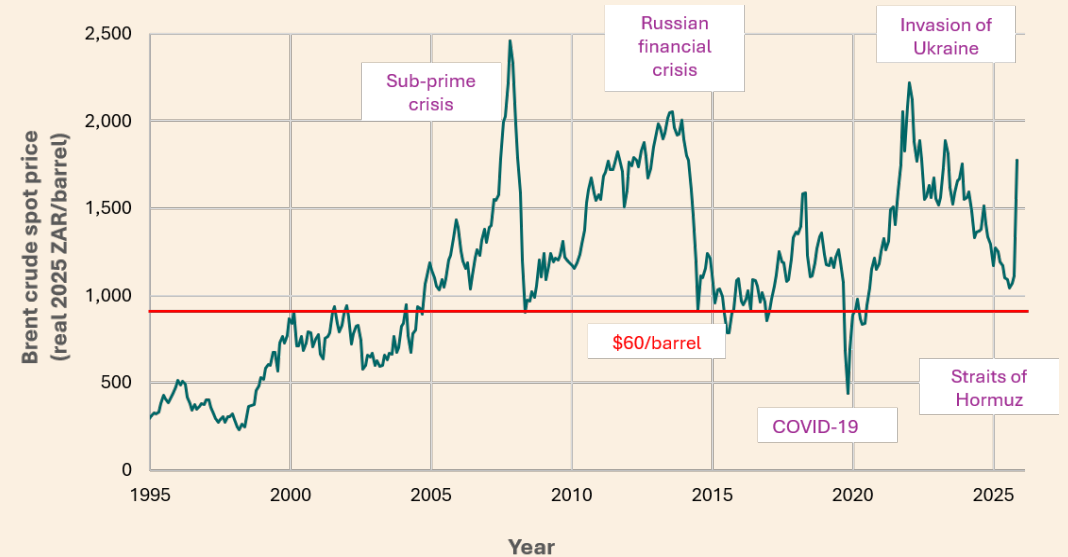
4. System stress & fuel-electricity interdependence

5. Decarbonisation is shaped by economic structure, stagnation and transition

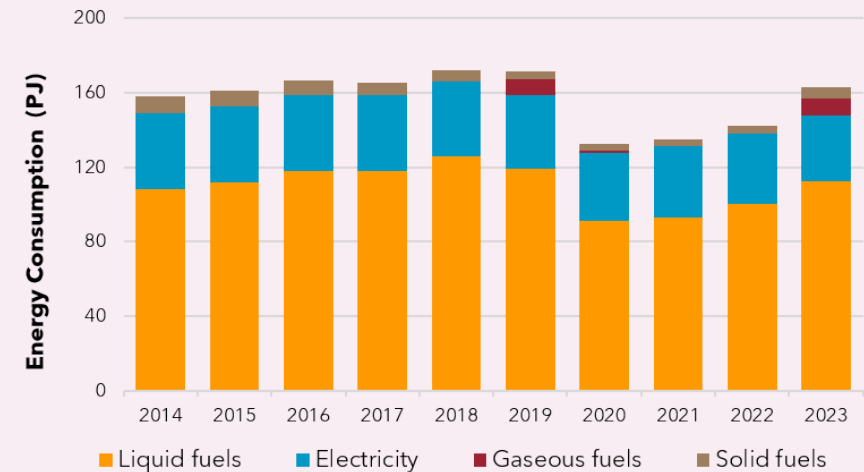
TREND 1

Turbulent Disruption Changed Demand Patterns

- **18 years of shocks:** oil crises, 2008 financial crisis, COVID-19 pandemic, load-shedding, Straits of Hormuz, all of which have reshaped energy use
- **Total energy consumption declined** from 171 PJ in 2019 to 163 PJ in 2023
- **Liquid fuels fell** harder than electricity during Covid, then rebounded faster



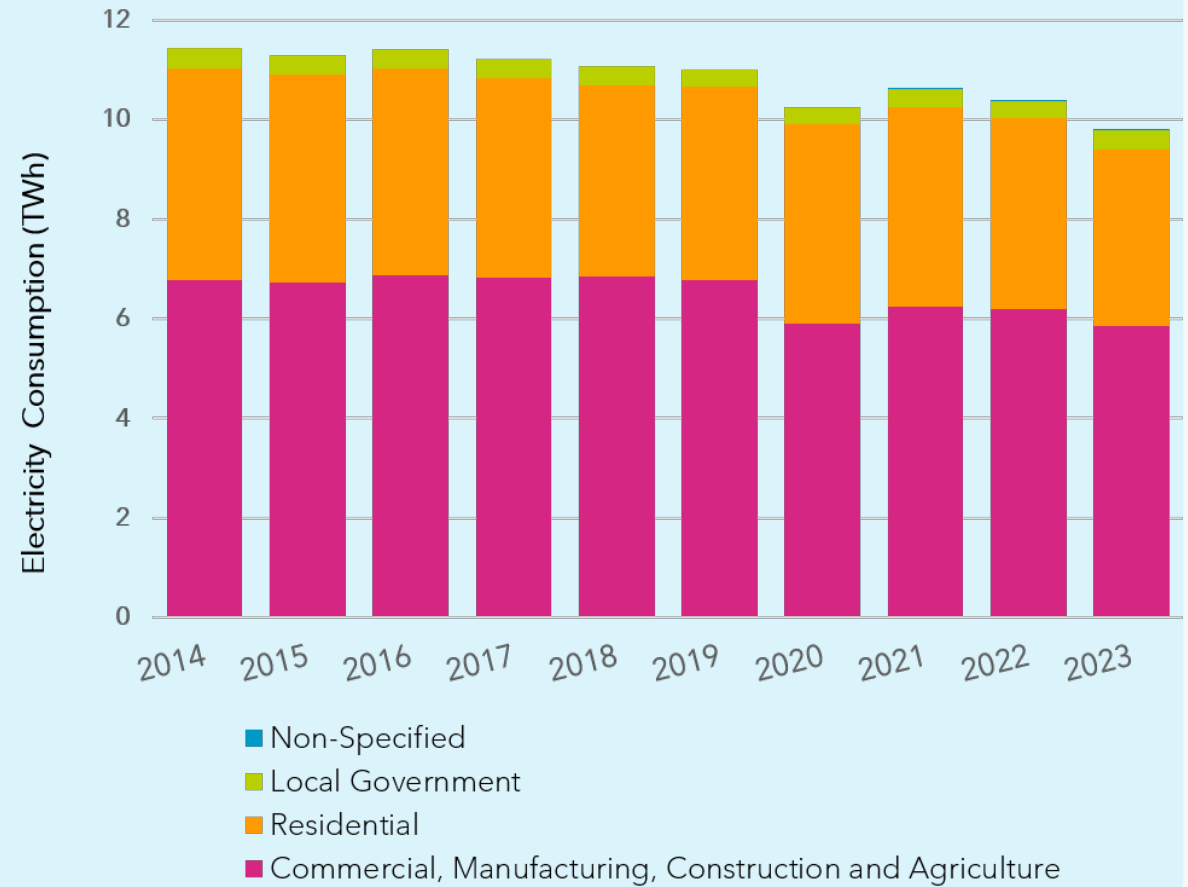
OVERALL ENERGY CONSUMPTION IN CAPE TOWN ACROSS FUEL TYPE



TREND 1 continued

Electricity Trends: 2014 - 2023

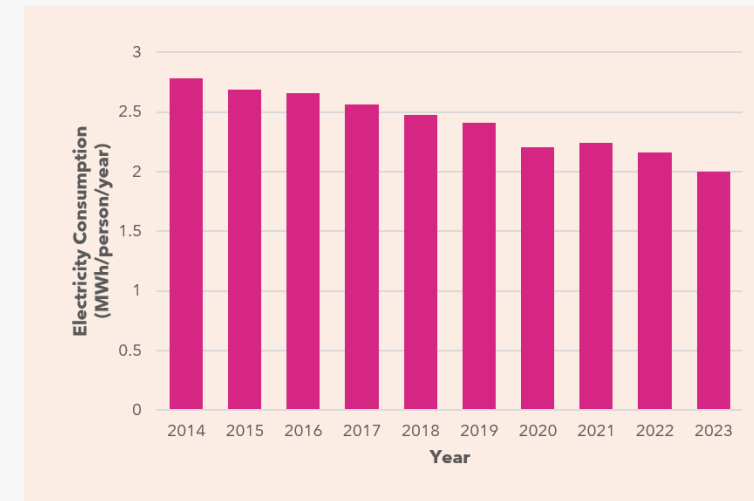
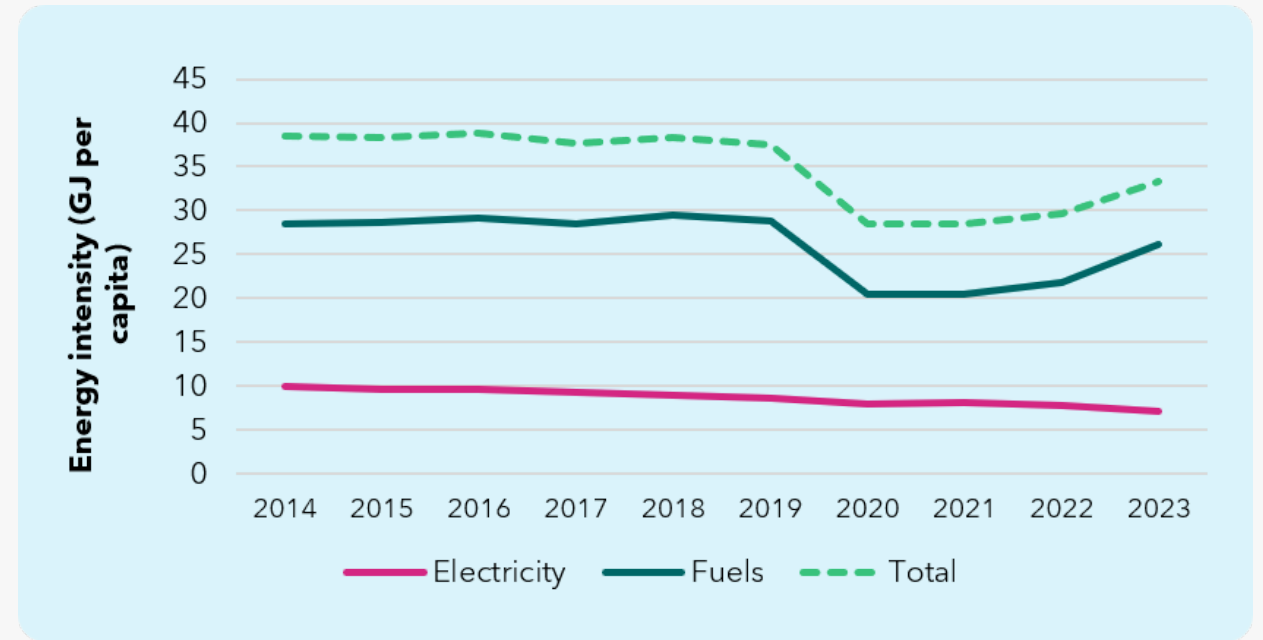
- Total grid electricity (2023; Eskom and City) **down** 14%: 11.4 TWh (2014) → 9.8 TWh (2023)
- The decline reflects **economic stagnation**, increased **price**, the impact of **Covid-19**, and **load-shedding**, all suppressing demand.



TREND 1 continued

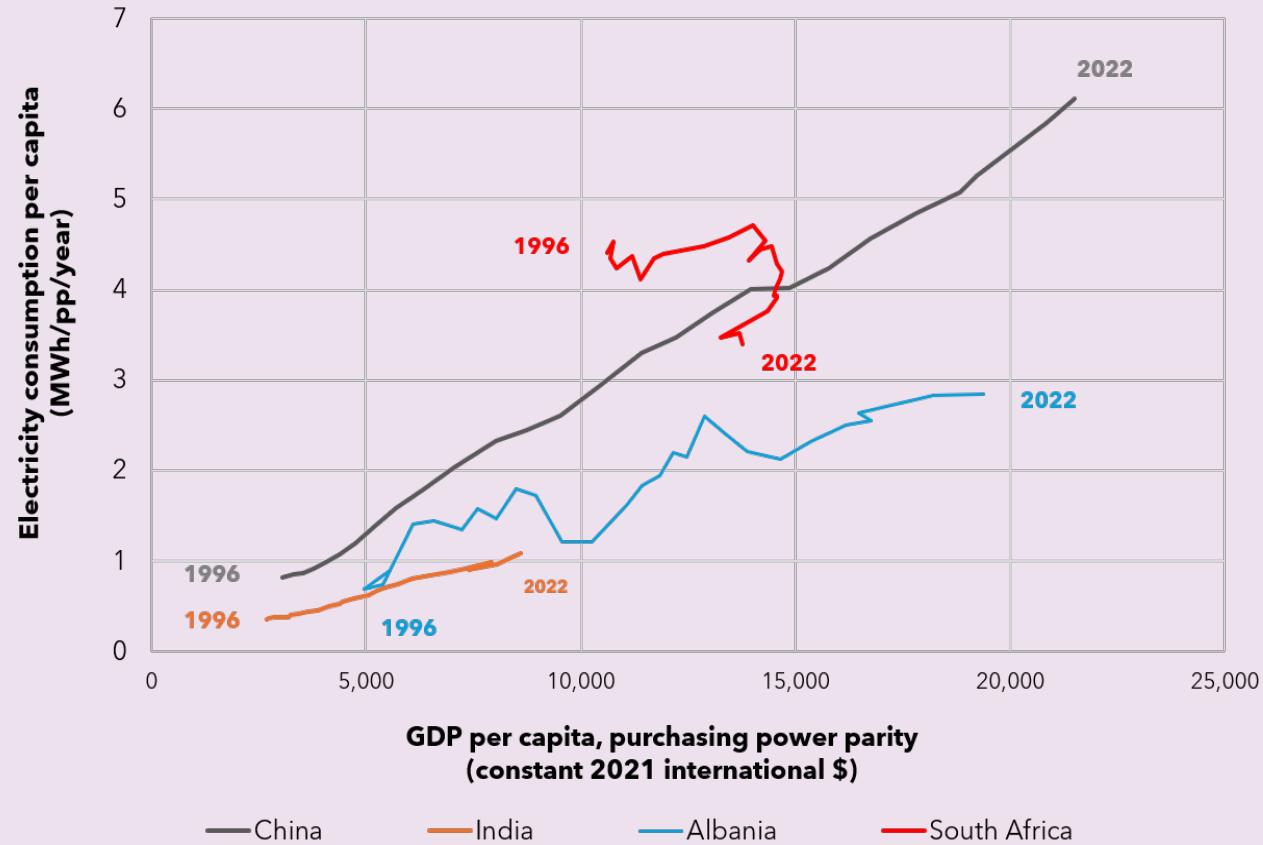
Per capita energy consumption

- Cape Town's **population increased** from about 4 million to about 5 million over the 10-year period
- **Energy consumption per capita declined** from around 37 GJ per capita in 2014 to 33 GJ per capita in 2023 (c.f. Chicago 99 GJ/capita)
- Liquid Fuels: **per capita fuel liquid use down** by 24% since 2017, driven by vehicle fuel efficiency gains, higher fuel prices, and Covid-era travel shifts
- **Trends** reflect overlapping, compounding **disruptions, de-industrialisation** and reduced **affordability**



TREND 1 continued

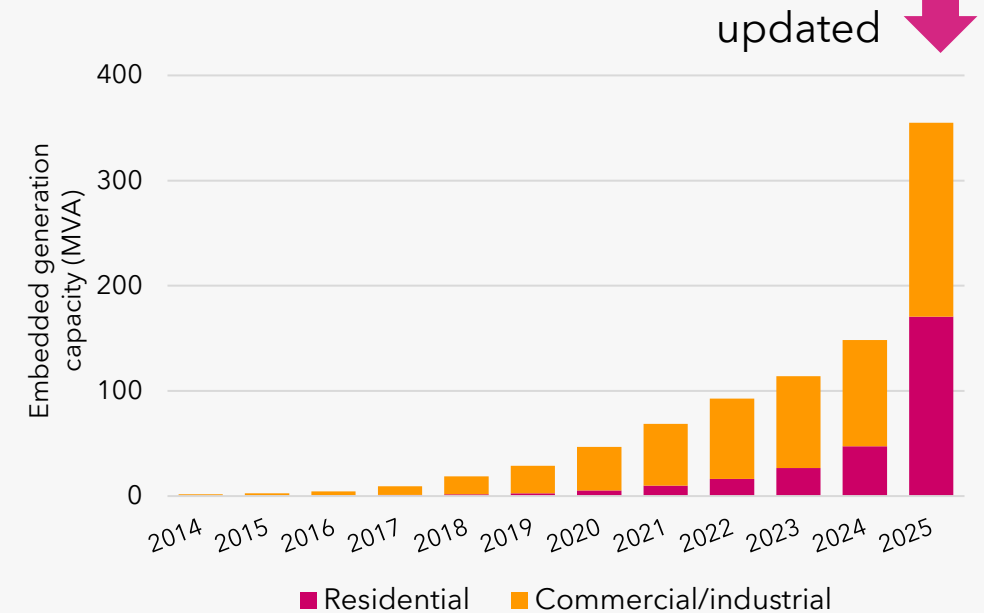
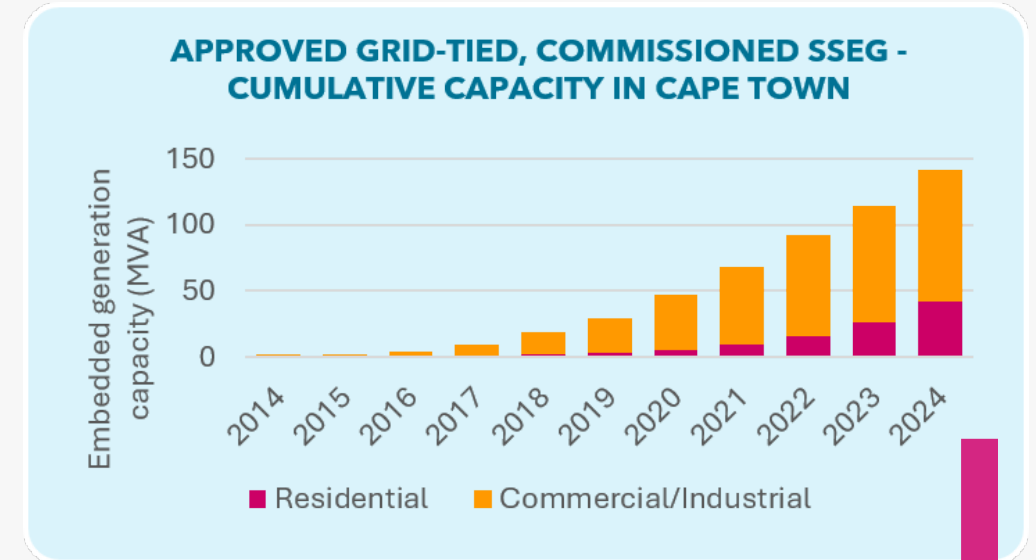
Per capita energy consumption



TREND 2

Decentralised Energy Responses Are Reshaping Energy Services — But Unevenly

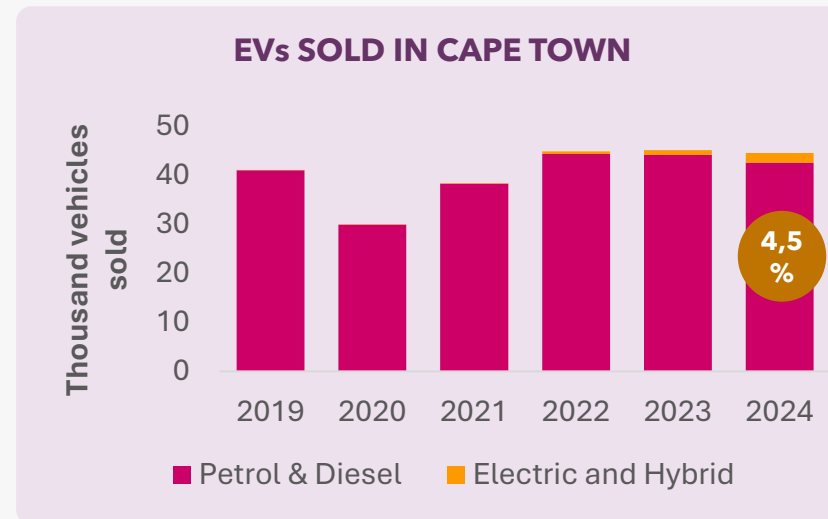
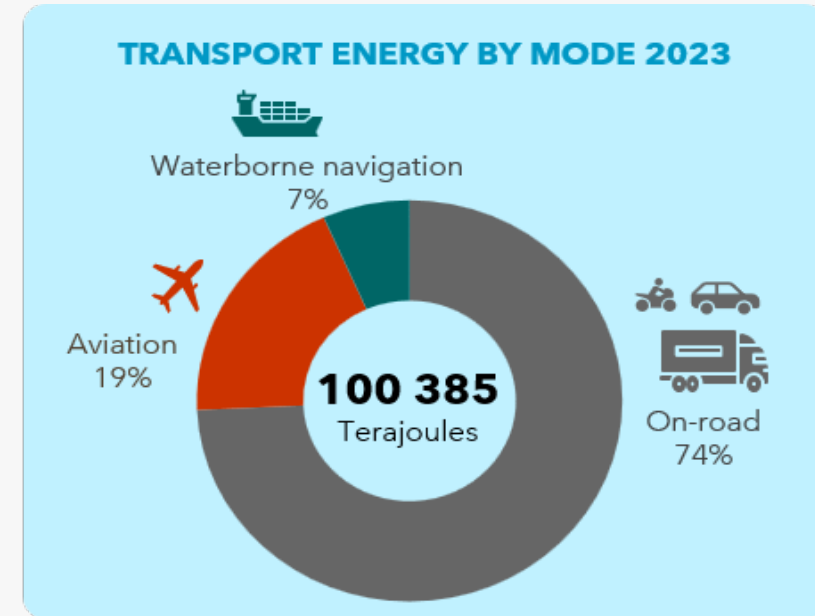
- **Decentralised energy** – especially rooftop solar PV (SSEG) – is rapidly reshaping electricity supply
- By May 2026: 1,218 commercial/industrial (C&I) customers (210 MW); 13,658+ residential (188 MW) – plus significant unregistered capacity
- Residential capacity is catching up to C&I
- **Higher-income users** adopted SSEG, improving reliability and reducing grid reliance
- **Lower-income households** faced severe load-shedding (2022–2023) with limited alternatives
- Transition is **uneven**



TREND 3

Although Fuels Supply Diverse Niches - Transport Is a Giant Demand

- **Transport dominates** liquid fuel energy demand: **62%** (100,385 TJ in 2023)
- **EV uptake is rising**, albeit slowly: 4.5% of new sales in 2024 (↑2× from 2023), supported by lower-cost Chinese entrants

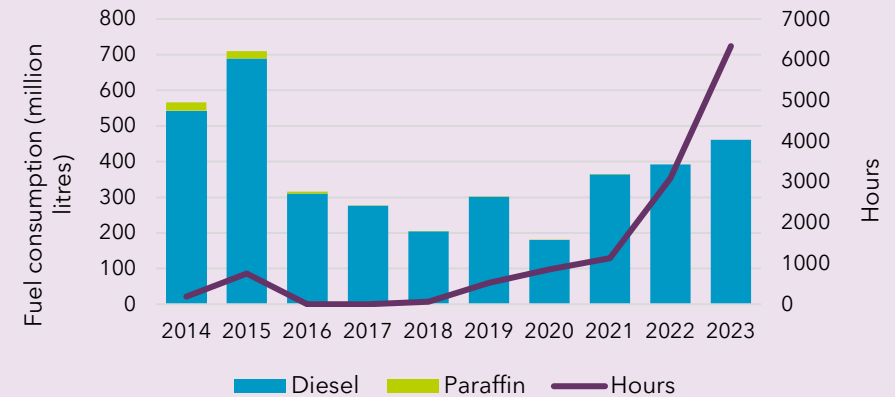


TREND 4

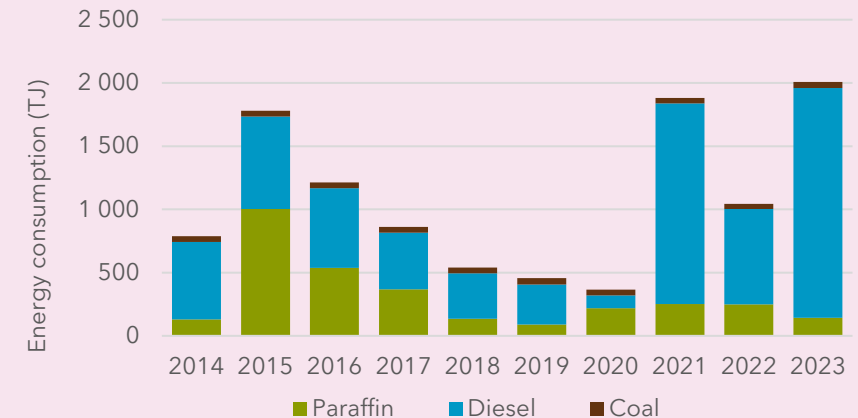
Fuel-Electricity Interactions

- Load-shedding intensified reliance on widespread fuel-based buffering
- Eskom OCGTs (Ankerlig & Acacia) used 461 million litres of diesel in 2023 (+76% vs 2017) – **largest stationary fuel** user in the city
- **System-wide patterns:** utilities, businesses, households all rely on fuel buffering under grid stress
- **Businesses:** diesel use tracks electricity disruptions: peaks in 2015, surges in 2022-2023
- **Households:** LPG is used as a cooking fuel by 21-34%; fuel-stacking common in lower-income groups

DIESEL AND PARAFFIN USED FOR ELECTRICITY GENERATION AT ANKERLIG AND ACACIA GAS TURBINES



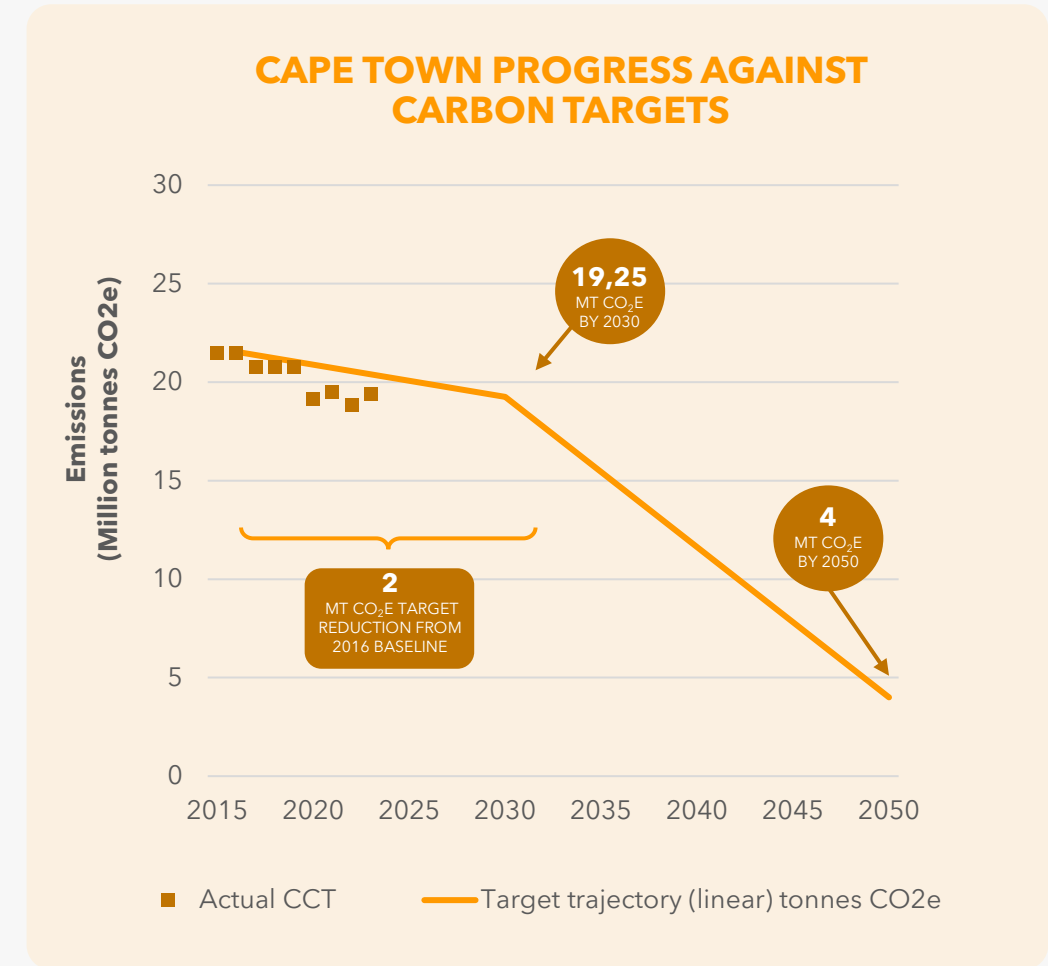
COMMERCIAL FUEL USE FOR STATIONARY ENERGY



TREND 5

Decarbonisation against targets is shaped by economic structure, stagnation and transition

- **Targets:** -9.4% by 2030 (vs 2016); -81% by 2050 in line with carbon neutrality commitment
- **Progress:** 21 → 19.39 MtCO₂e (2016-2023) – tracking close to the voluntary target trajectory.
- **Caution:** declining per-capita incomes have limited economic activity, causing emissions to stagnate as well as decline due to genuine mitigation
- **Opportunity:** pragmatic technology change could enable green growth and City's Energy and Climate Change Strategies are premised on taking these opportunities as they arise



Note: BASIC emissions only are included



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CORE INSIGHTS:

CAPE TOWN'S ENERGY SYSTEM

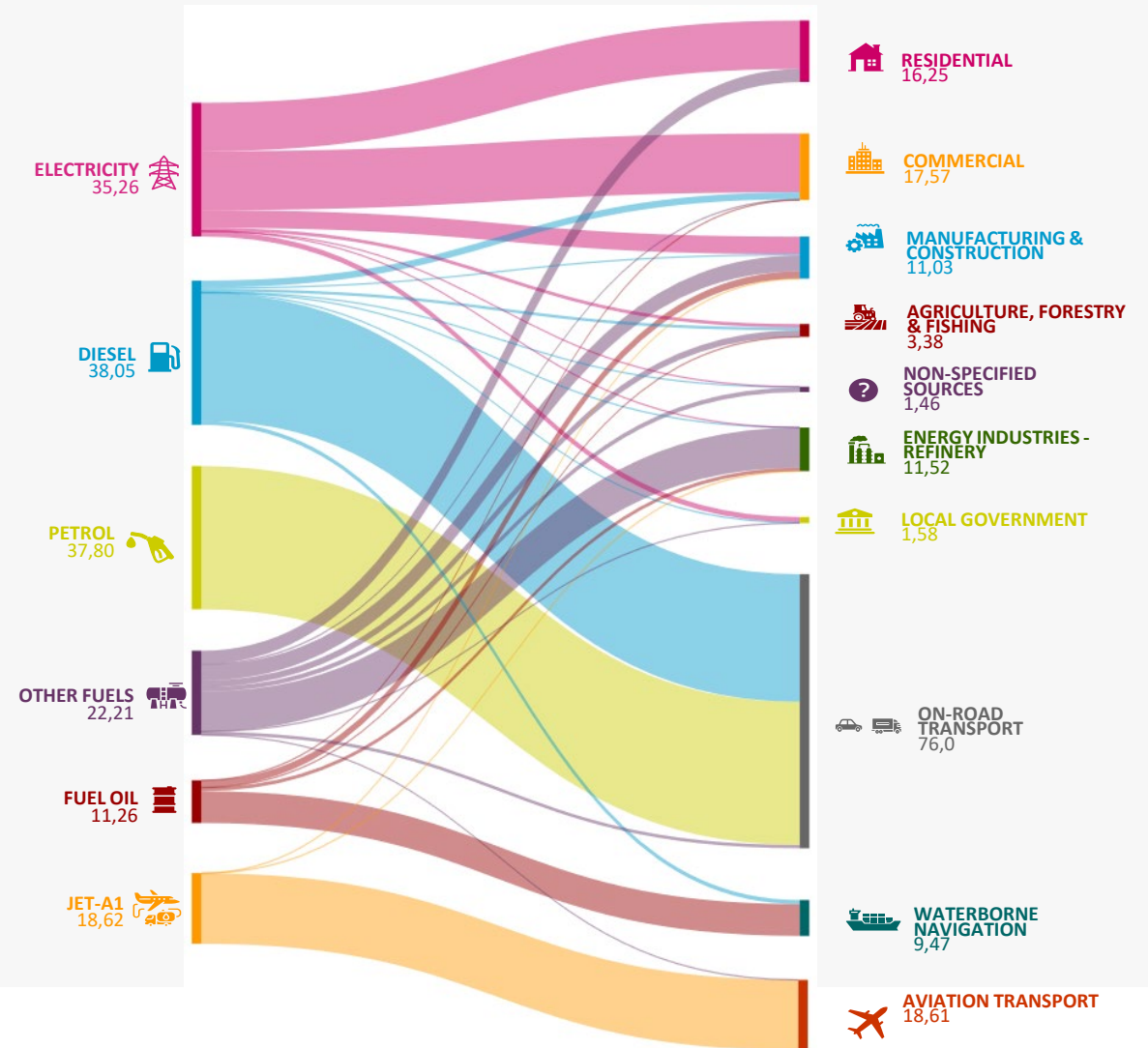


CAPE TOWN'S ENERGY SYSTEM AT A GLANCE

Cape Town's Energy System in 2023

- Grid **electricity** accounts for 22% of total energy demand. Commercial activity is the largest electricity user (44%), followed by households (36%).
- Solid, liquid and gaseous fuels account for 78% of Cape Town's total energy demand – over 99% of this is **fossil fuels**.
- **Transport** is the single largest consuming sector at 62% of total energy demand, almost entirely powered by petrol and diesel.
- Aviation fuel goes to aviation transport (!) and fuel oil to ships

OVERALL ENERGY SANKEY FOR CAPE TOWN (PJ)



The Strategic Lens

CCT 2023 Energy Strategy

VISION

Energy security for a prosperous Cape Town. Together, we can build a resilient energy system where all residents and businesses have access to reliable, affordable, and carbon-neutral energy.

PRINCIPLES

Reliability: Energy is available when it is needed

Affordability: Ability to pay without compromising other needs

Carbon neutrality: Limiting greenhouse gas emissions

Resilience: The capability to adapt to change and disruption

COMMITMENTS

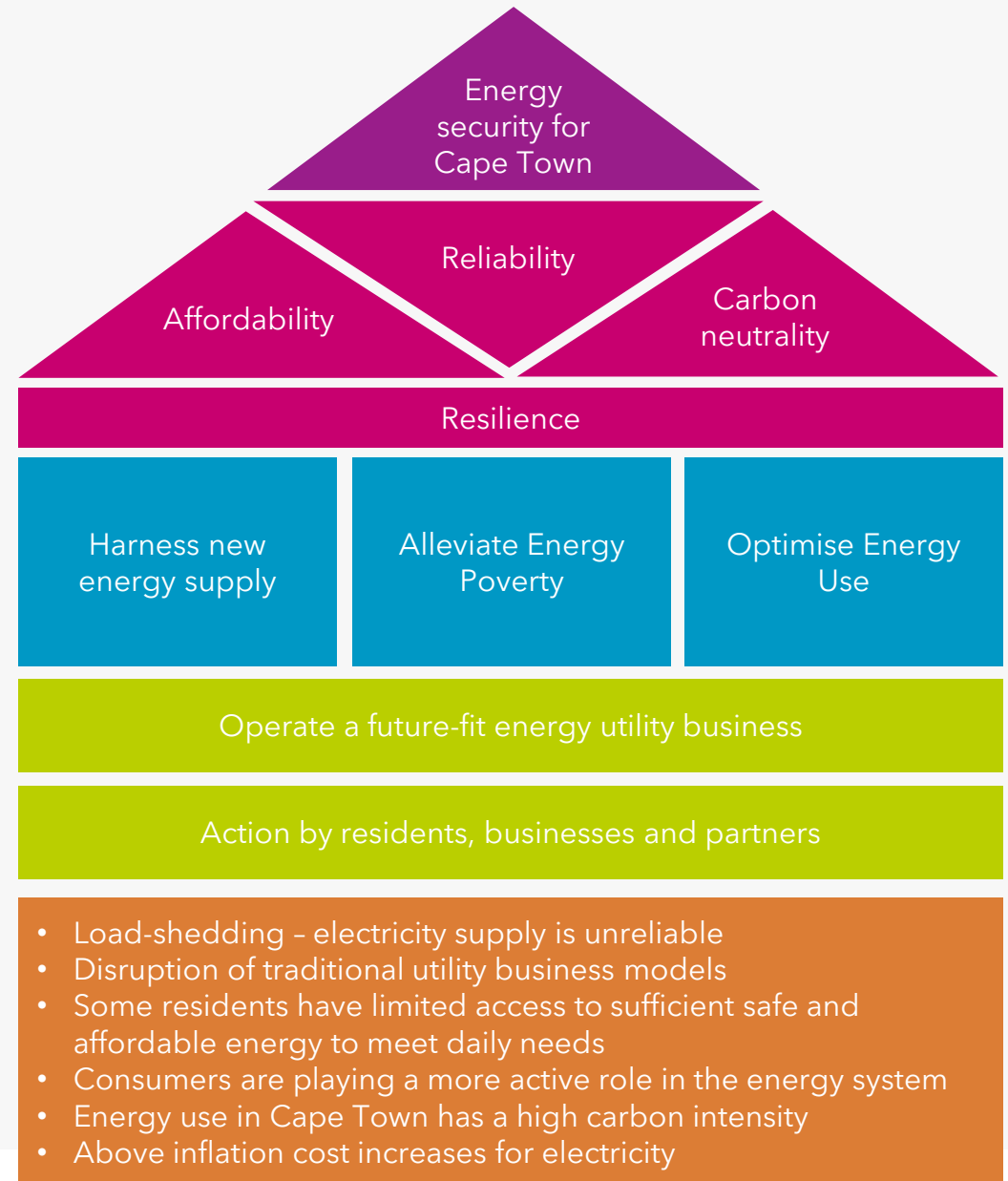
The City's commitments to deliver, enable and partner with stakeholders to build a resilient energy system to support social and economic development

ENABLERS

The ability to succeed in these commitments will depend on the actions by many people and corresponding changes made in how the energy utility operates

SHIFTS AND STRESSES

The energy sector is changing at a rapid pace and scale with a number of key shifts and stresses affecting every aspect of Cape Town's energy system.

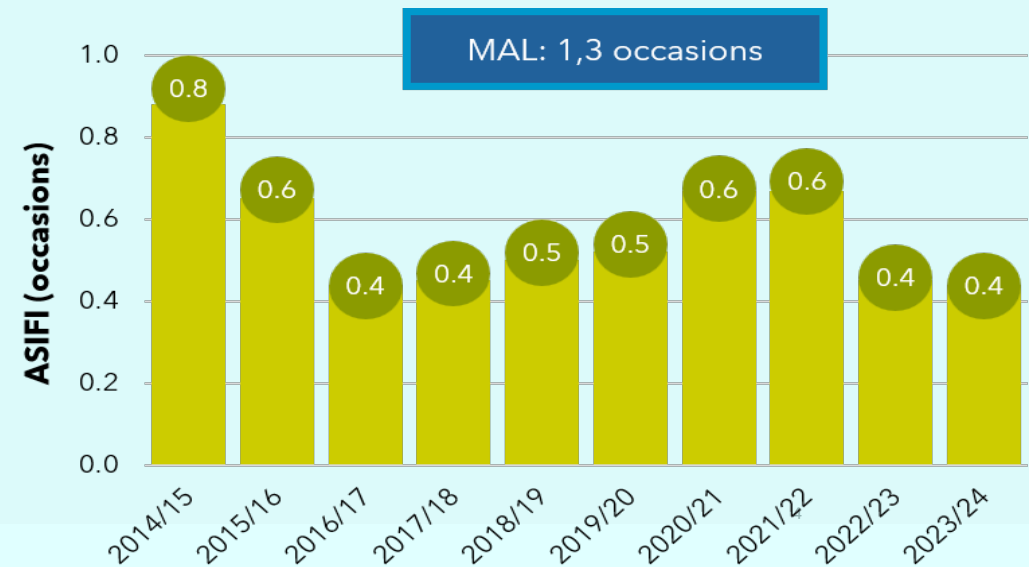
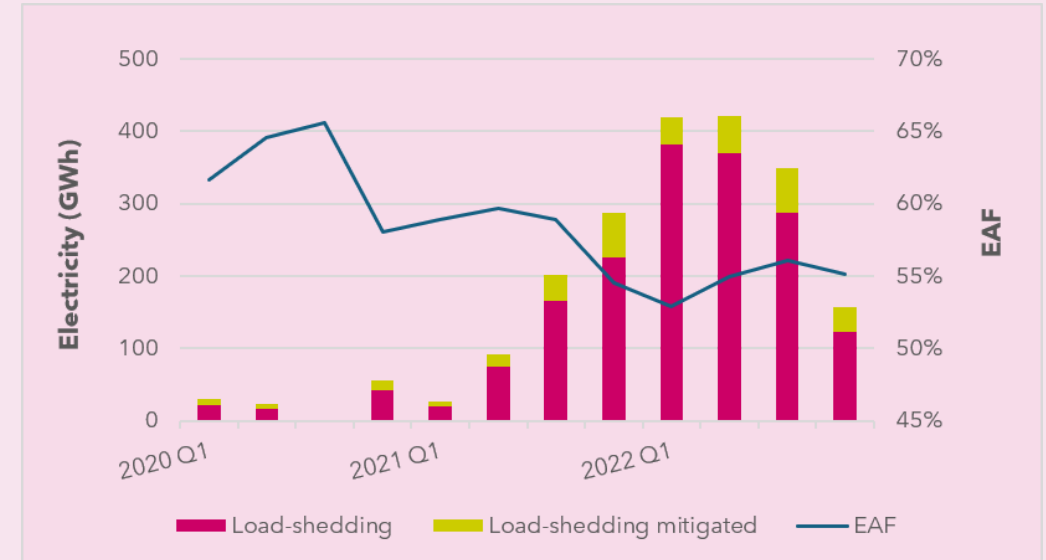


Pillar 1 : RELIABILITY

- **Load-shedding** in 2022-2023 was unprecedented – in 2023, load-shedding occurred over 75% of the time at some level and stage 6 (30% of load disconnected) occurred for nearly one hour in every eight.
- The City **mitigated load-shedding** partly through strategic deployment of Steenbras Pumped Storage, allowing reduction by up to **two stages**.
- Cape Town's local systems performed **reliably** during the reporting period
- The City's distribution network remained stable: the **ASIFI** indicator stayed below the allowable limit of 1.3 since 2014.

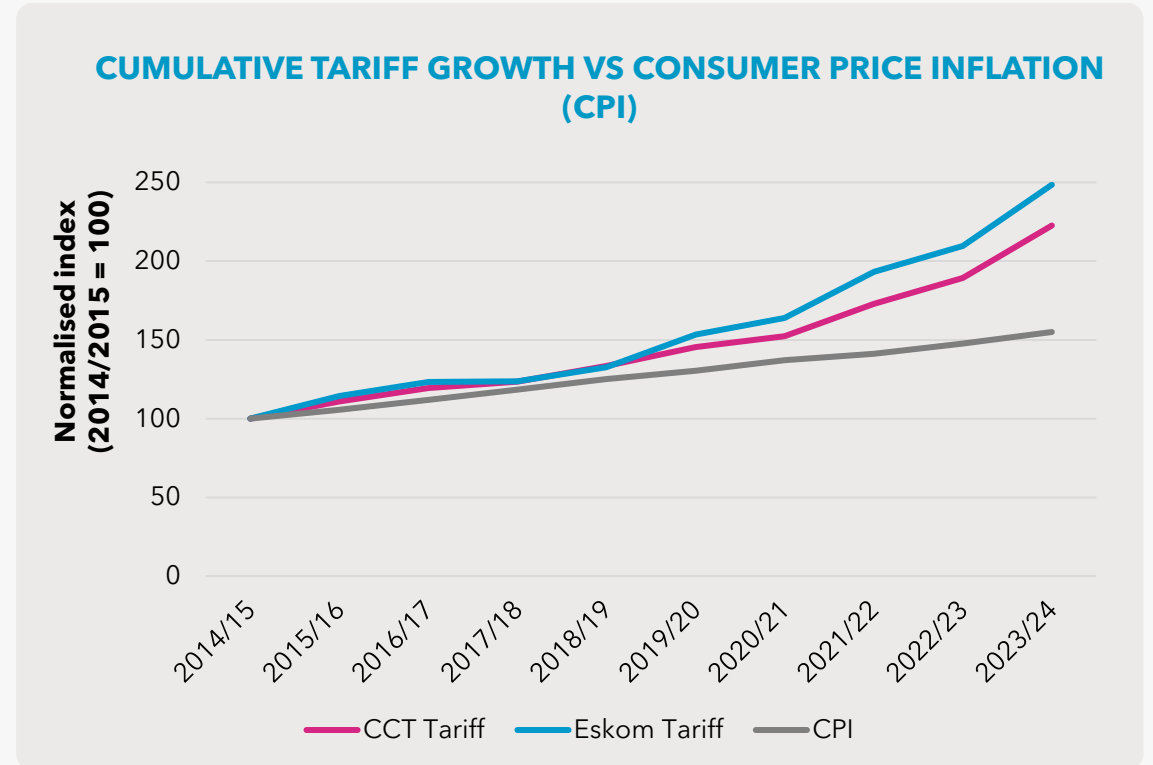
Average System Interruption Frequency Index (ASIFI): Indicates the average frequency of system interruption over a defined period.

ENERGY AVAILABILITY FACTOR (EAF), LOAD-SHEDDING & MITIGATION IN CAPE TOWN SUPPLY AREAS



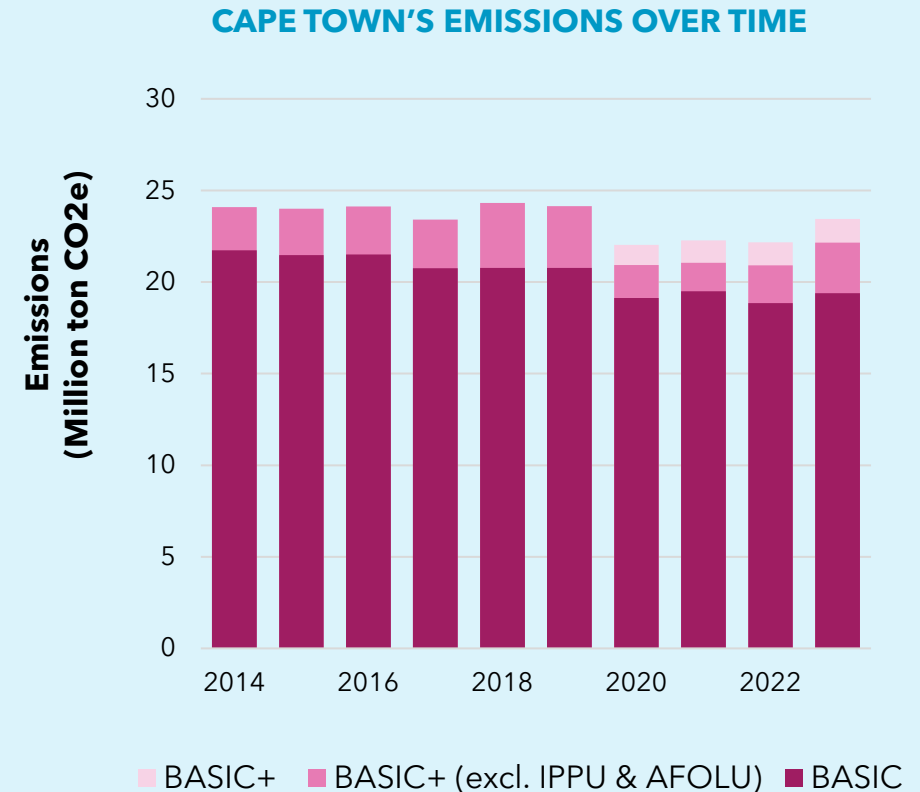
Pillar 2 : AFFORDABILITY

- Energy affordability **declining**: driven by above-inflation electricity tariff increases, global fuel price volatility, and stagnant household incomes.
 - Since 2014/15, electricity prices have risen at more than double the rate of general inflation, (Eskom ~+250%; City ~+225%)
- **Petrol, diesel and LPG prices** driven by global oil markets and national tax structures → limited municipal control
 - Long-term oil price trends: **CPI**+3%/year in dollar terms, and **CPI**+4%/year in rand terms once currency depreciation is included.
- **High-income** households are increasingly insulated through efficiency and self-generation; **lower-income** households remain exposed with limited options to manage costs.



Pillar 3 : CARBON NEUTRALITY

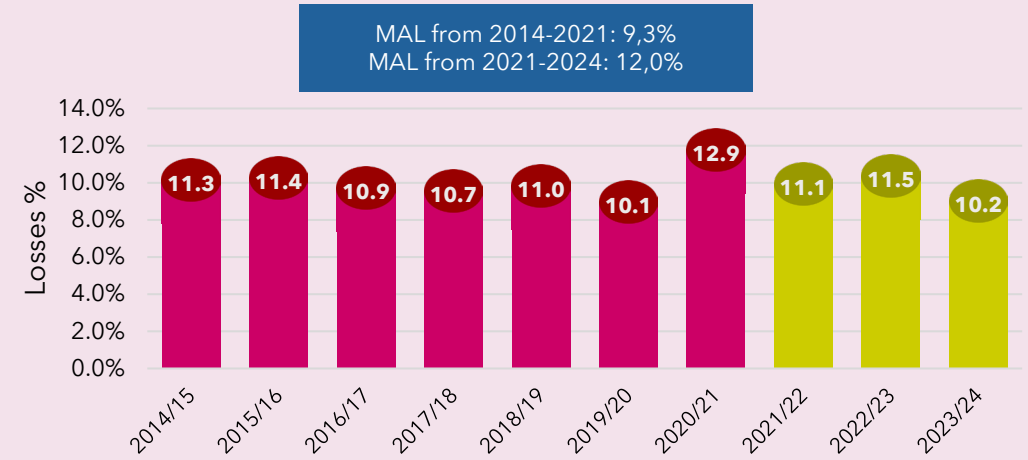
- See later!
- **Total Cape Town GHG** emissions approx. 23.4 MtCO₂ in 2023 under the BASIC+ framework – approximately 6% of South Africa's total emissions.
- **Per capita GHG emissions** declined from over 5 tCO₂e per person in 2014 to around 4 tCO₂e per person in 2023. This reflects lower electricity intensity, a gradually improving grid emissions factor, demographic change and suppressed demand.



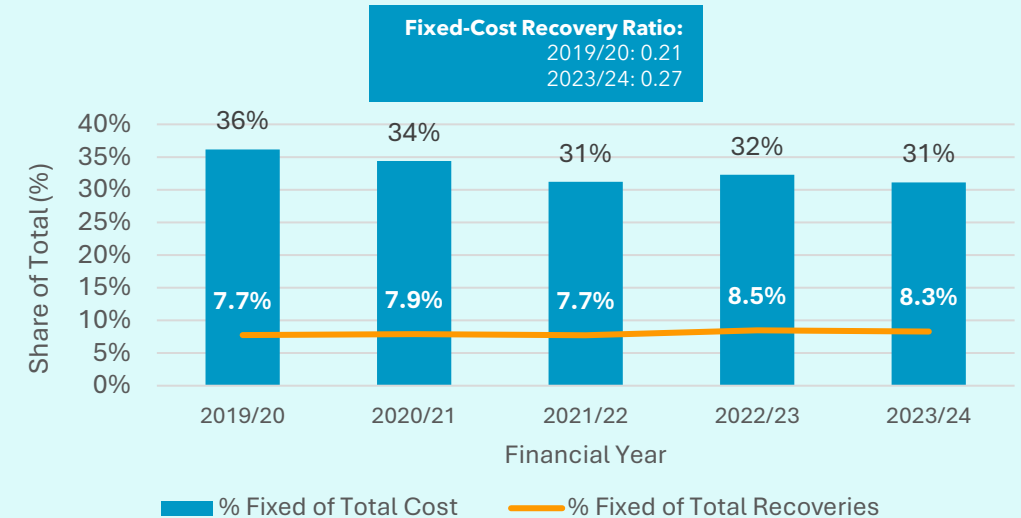
Pillar 4 : RESILIENCE

- **Functionality** was maintained despite outages, fuel shocks, and financial strain. Electricity losses declined from a peak of ~13% to 10.2% in 2023/24, below the City's 12% target. ASIFI and ASIDI stayed below target thresholds.
- **Resilience** achieved by shifting, not removing, risk across energy carriers.
- **Fixed costs** account for roughly 1/3 of the electricity utility's total expenditure, while only around 7-8% of revenue is recovered through fixed charges. Declining consumption has increased financial vulnerability, highlighting the need for cost-reflective tariffs.
- Despite the Astron Refinery shutdown and Covid-19 disruptions, Cape Town **avoided** significant **fuel shortages** due to storage capacity and diversification of supply routes.

PERCENTAGE OF TECHNICAL AND NON-TECHNICAL LOSSES



FINANCIAL RESILIENCE: COMPARISON OF FIXED COSTS AND FIXED REVENUE SHARES





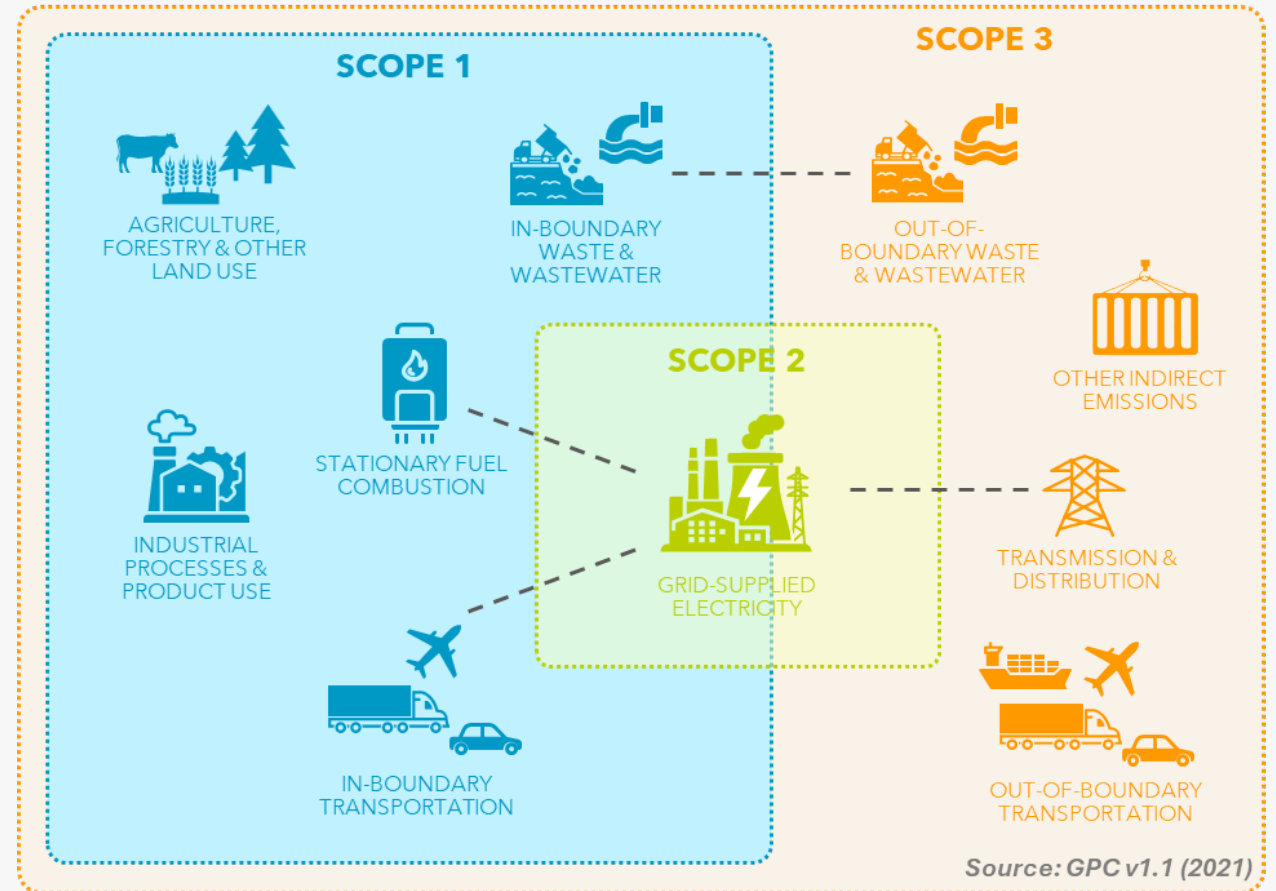
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STATE OF CARBON



GHG Accounting Framework

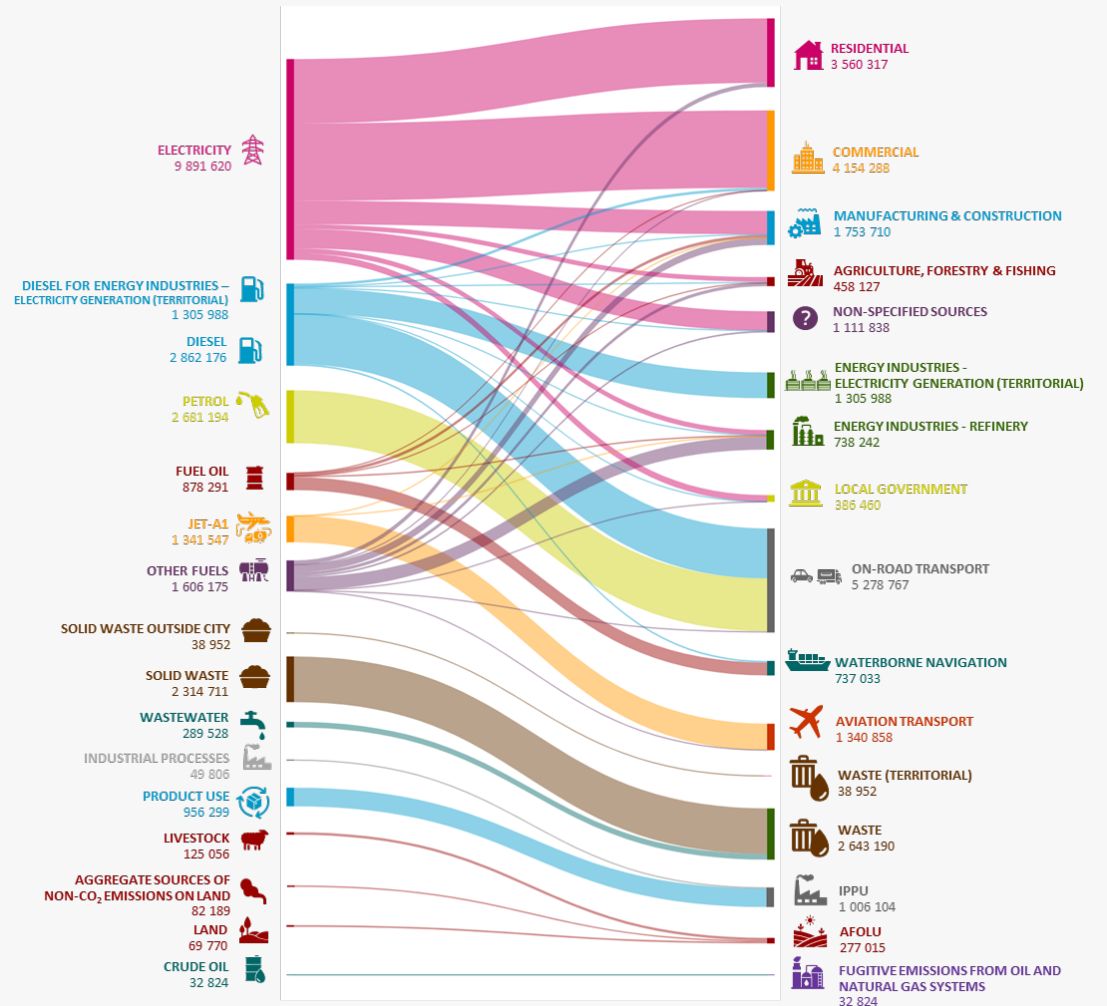
- Cape Town's GHG inventory uses the **Global Protocol for Community-scale GHG Inventories** (GPC).
- Emissions are attributed across three scopes:
 - **Scope 1** (46% of total)
 - **Scope 2** (42% of total)
 - **Scope 3** (12% of total)
- **Territorial** Scope 1 allows multiple city inventories to be aggregated as a national or regional total
- The 2025 SOEC is the **first time BASIC+ IPPU and AFOLU** emissions have been systematically collected, analysed and reported at city scale for Cape Town
 - In this way the project continued the wider team's approach of steady continuous improvement in reporting quality



Cape Town's Overall GHG Emissions: 2023

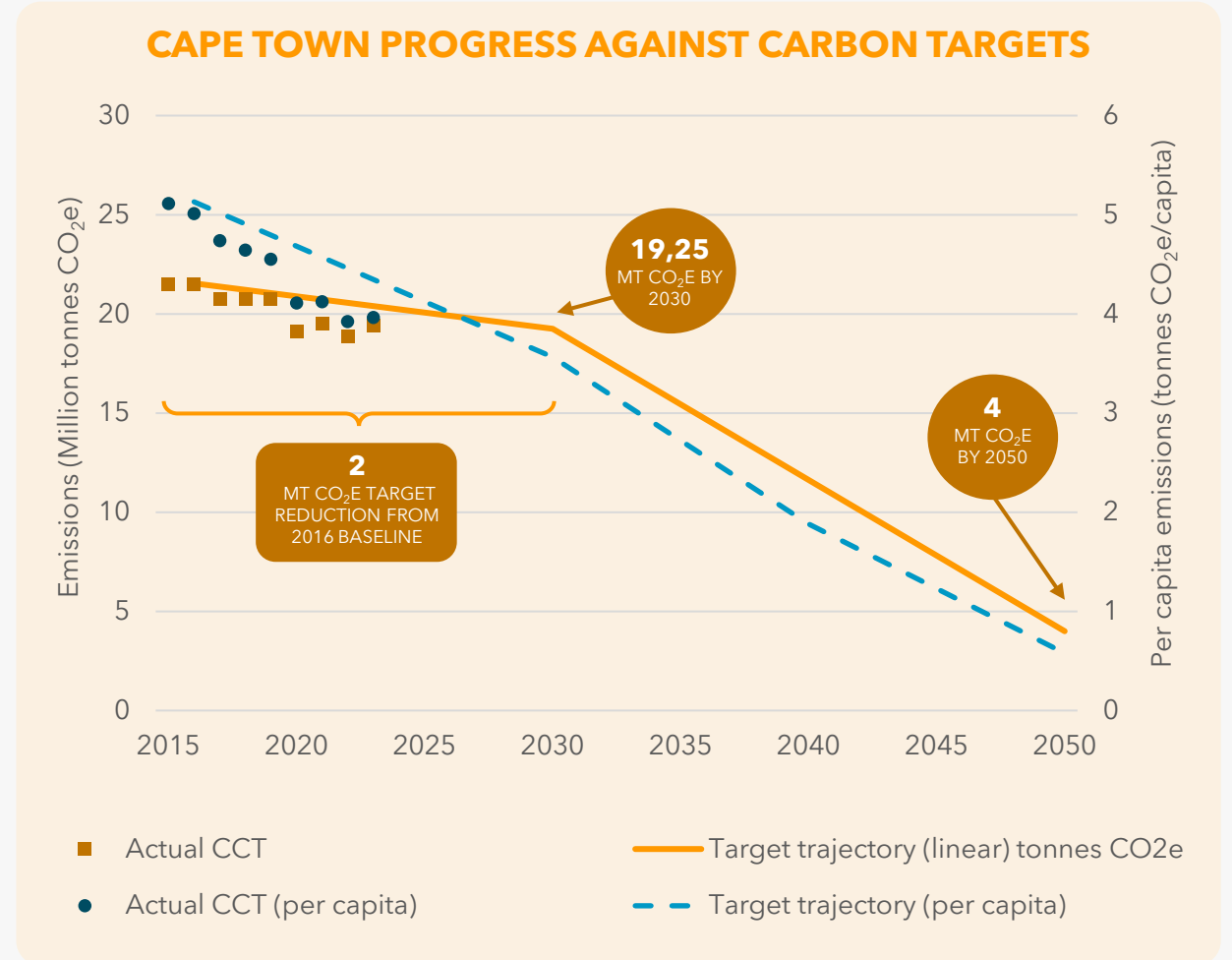
OVERALL CARBON FOOTPRINT SNAPSHOT 2023

- Total GHG emissions were estimated at **23.4 MtCO₂e** in 2023 under the BASIC+ framework – approximately 6% of South Africa's total emissions.
- **Scope 1** (46%):
 - Direct fuel combustion: 4.9 MtCO₂e
 - Solid waste and wastewater: 2.6 MtCO₂e
 - IPPU: 1.0 MtCO₂e
 - AFOLU: 0.2 MtCO₂e
- **Scope 2** (42%):
 - Emissions from electricity use: 9.9 MtCO₂e
- **Scope 3** (12%):
 - Transmission and distribution losses
 - Transportation activities beyond city boundaries
- GHG emissions have **remained stable** over the past decade between 22 and 24 MtCO₂e per year but per capita emissions have dropped by 20%



City of Cape Town Progress

- One of only 122 cities globally (16% of submissions) with CDP Cities **A List rating**
- **First year of BASIC+** reporting, which is only reported by 15% of C40 Cities
- The City of Cape Town has committed to an absolute emissions reduction of **9.4% by 2030** and **81% by 2050**, aligned with its carbon neutrality commitment.
- BASIC emissions declined from approximately 21 MtCO₂e in 2016 to 19.39 MtCO₂e in 2023, **tracking close to the voluntary target trajectory**
- The apparently modest absolute decline to 2030 is projected to require a large **30% per capita drop** because of population growth





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CORE INSIGHTS:

KEY TAKEAWAYS

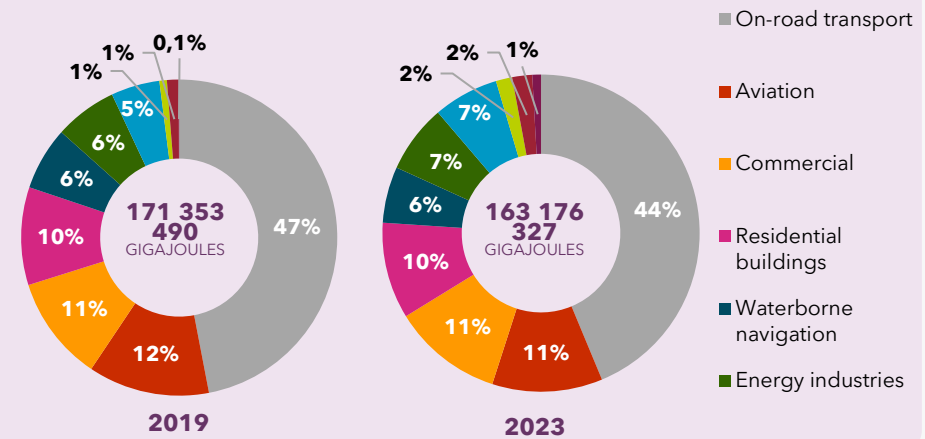


Key Takeaways : State of Energy

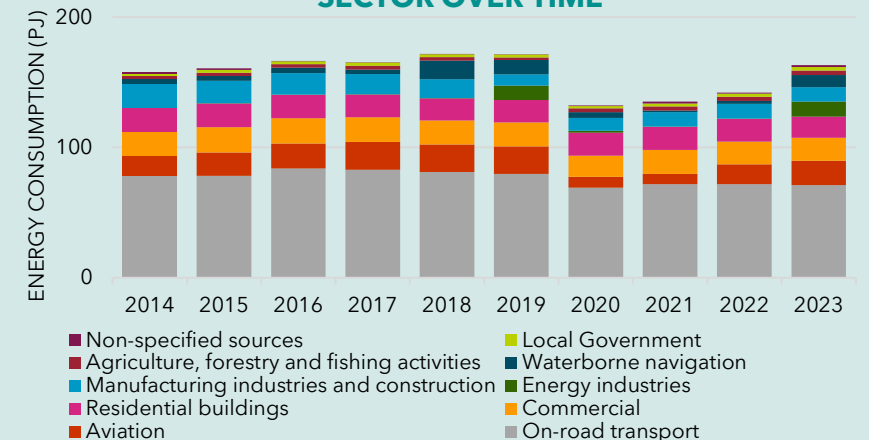
Declining Per Capita — Uneven Across Sectors

- **Petroleum fuels dominate:** 78% of energy from direct combustion indicating high fossil fuel dependence
- Fuel supply resilient to shocks but **affordability** remains a constraint
- **Energy demand:** not growing, but increasingly volatile despite population growth
- **Load-shedding:** structurally reshaped demand, economy, and behavior
- **Uneven electricity access:** high-income → SSEG; low-income → grid reliance
- **City utility pressure:** growing financial and system complexity as declining sales strain cost recovery and Eskom prices continue to rise in real terms

ENERGY CONSUMPTION BY SECTOR

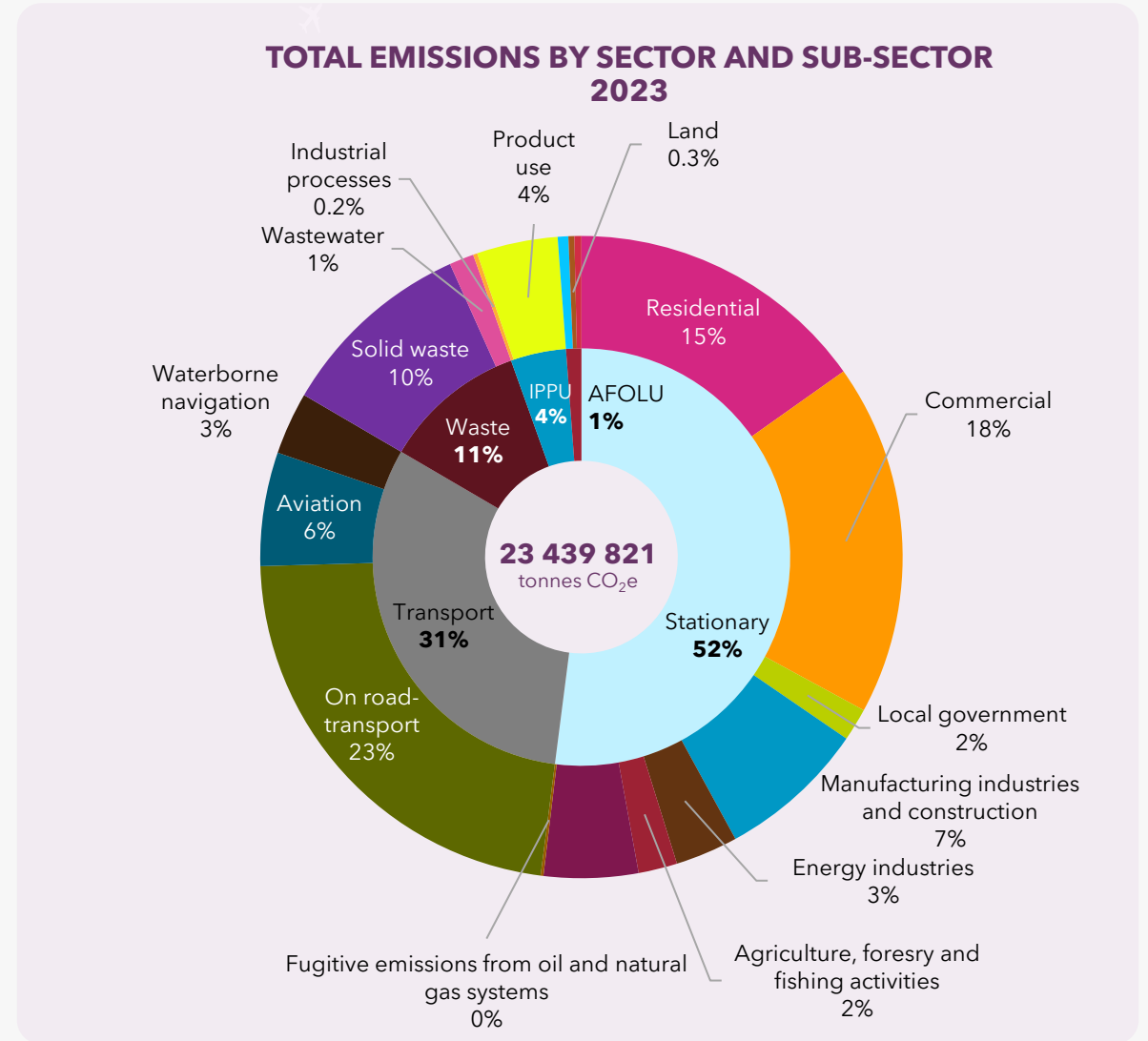


ENERGY CONSUMPTION BREAKDOWN BY SECTOR OVER TIME



Key Takeaways : State of Carbon

- New reporting: IPPU & AFOLU included (~5% of total)
- Cape Town's total BASIC+ GHG emissions were estimated at 23.4 MtCO₂e in 2023.
- Overall **emissions have declined** along the voluntary target line
- **Meeting future targets more challenging**: the target trajectory drops much faster after 2030. Progress to date is partly attributable to economic stagnation rather than genuine decarbonisation.



Relevance and Importance

- The key challenges of the day are **interconnected**:
 - **Energy insecurity** affects transport systems and economic growth
 - **Infrastructure failures** shape public trust
 - **Affordability concerns** are linked to tariffs, housing, and transport costs
- This highlights **importance of SOEC** to provide an **integrated picture** of the interconnections between:
 - Energy use, emissions, infrastructure dependency, and urban resilience
- The energy and carbon transition is **broader** than an environmental issue, but closely linked to our everyday concerns and with how our city functions for its residents





Questions and discussion

Adrian Stone

Manager: Energy Systems Planning and Analysis • CCT



Thanks, and closing

Kadri Nassiep

Executive Director: Energy • CCT



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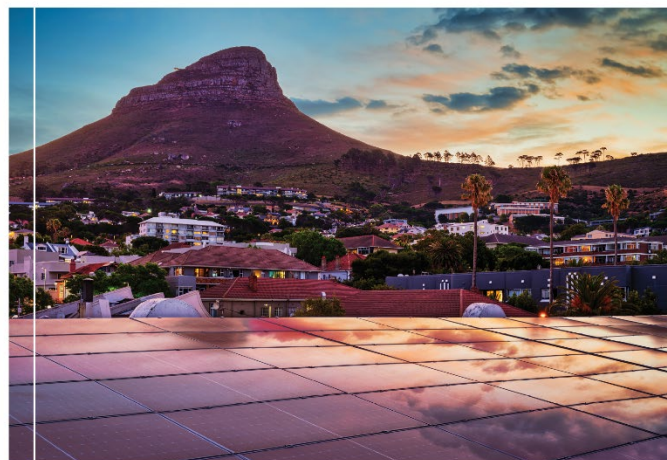
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CAPE TOWN STATE OF ENERGY AND CARBON 2025

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SOEC 2025 – main report



SOEC website



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SOEC 2025 data



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