



# 68<sup>TH</sup> AMEU CONVENTION 2022

Durban International Convention Centre

2 – 5 October 2022

A JUST ENERGY TRANSITION (“JET”) FOR SOUTH AFRICA

## Harnessing Data for High Performance Buildings: Overview of the City of Cape Town’s EPC Compliance Initiative

Presented by Mary Haw, Manager: Sustainable Energy Facilitation

Co-author: Avuyile Kewana, APO Net Zero Carbon Buildings

City of Cape Town

*Hosted by*



# Overview

- The impact of buildings
- About EPCs
- Cape Town's EPC compliance initiative
- Enablers for EPCs
- Lessons learned

Cape Town leading the way...

On track to be fully compliant by December 2022

**ENERGY EFFICIENCY**  
REPUBLIC OF SOUTH AFRICA

**Energy Performance Certificate for Buildings**

Certificate Number: EPC-SA 0012-2021

Omni Forum Municipal Building  
04 Van Riebeeck Road  
Kullis River  
Cape Town  
7580

This certificate is issued in terms of SANS 1544-2014, Energy performance certificates for buildings, and indicates how much energy is being used to operate this building. The energy performance of the building is based on measured energy performance and is compared to maximum energy consumption provided in SANS 10400 XA.

**Energy Performance Certificate**

SANS 10400-XA:2011 maximum energy consumption in occupancy class in Climatic Zone 4

Energy performance of your building: 62 kWh(m<sup>2</sup>.a)

185 kWh(m<sup>2</sup>.a)

Very energy efficient (A-G) / Not energy efficient

**Building Information:**  
Owner: City of Cape Town  
Occupancy Classes: G1- Offices  
Number of Floors: 4  
Net Floor area: 2711 m<sup>2</sup>  
Year of construction: 1975  
Building plan approval: Not available  
Occupancy certificate: Not available  
Year of last major renovation: Not applicable  
Climatic zone: 4 - Temperate coastal  
Cadastral information: Erf 1158

**Administration information:**  
Accredited body: Energy Management and Validation Services (Pty) Ltd  
Assessor name: A. Jakoeff  
Date of issue: 06 September 2021  
Valid until: 05 September 2026  
Record nr: 701R0815 - 1.1

Carrier	From (date)	To (date)	Energy [kWh]	Net Floor Area	Performance [kWh/m <sup>2</sup> ]	Exclusions Performance [kWh/m <sup>2</sup> ]
Electricity (grid)	2019/01/01	2019/12/31	101 109	2 711	37	1
Gas	N/A	N/A	N/A	N/A	N/A	N/A
Solid Fuel	N/A	N/A	N/A	N/A	N/A	N/A
Liquid Fuel	N/A	N/A	N/A	N/A	N/A	N/A
Electricity (PV)	2019/01/01	2019/12/31	68 209	2 711	25	0

**EM3 EMVS**  
Energy Management and Validation Services (Pty) Ltd  
(011) 12228587

Technical Signatory  
Digitally signed by Adiel Jakoeff  
Date: 2021.09.06 13:24:56 +02'00'

**sanas**  
Accredited Body  
EP0001

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## National Australian Built Environment Rating System

- 14 years,
- Rated offices: average energy savings of 42%
- Reduced greenhouse gas emissions intensity by 53%.
- AU\$1 Billion in savings

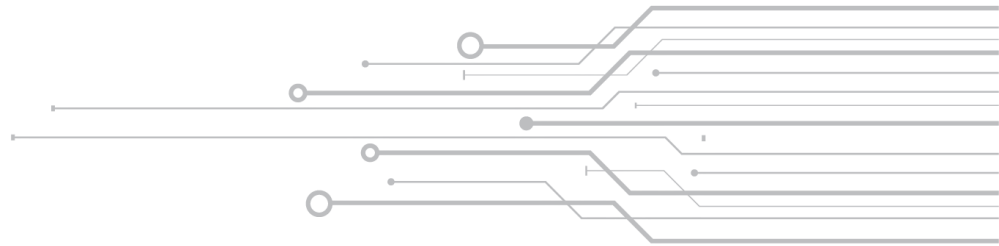
This is one of the fastest widescale building transformations recorded anywhere in the world.

South Africa vs Australia  
September 3, 2022  
Sydney  
eben Etzebeth  
104 Test

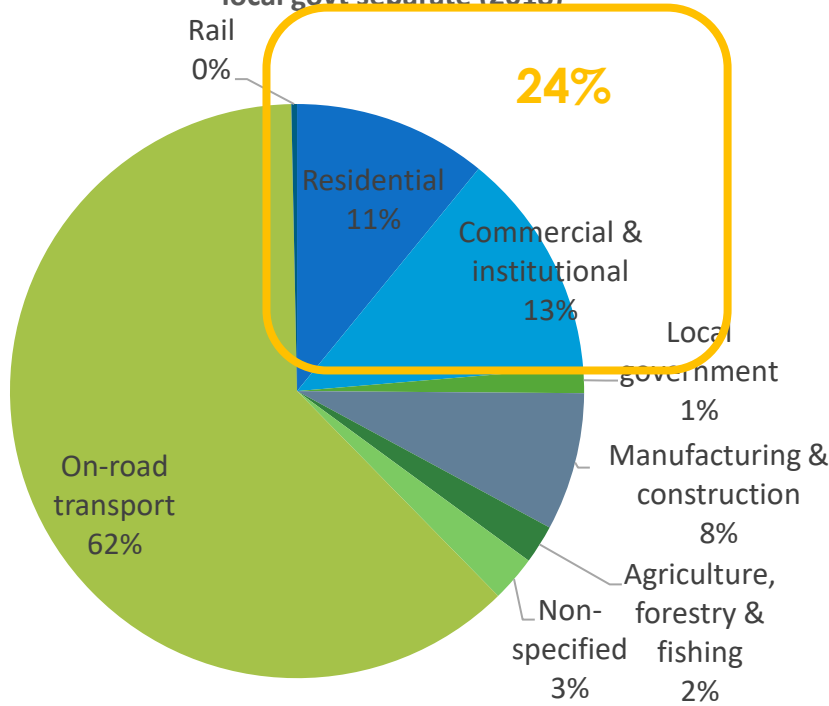
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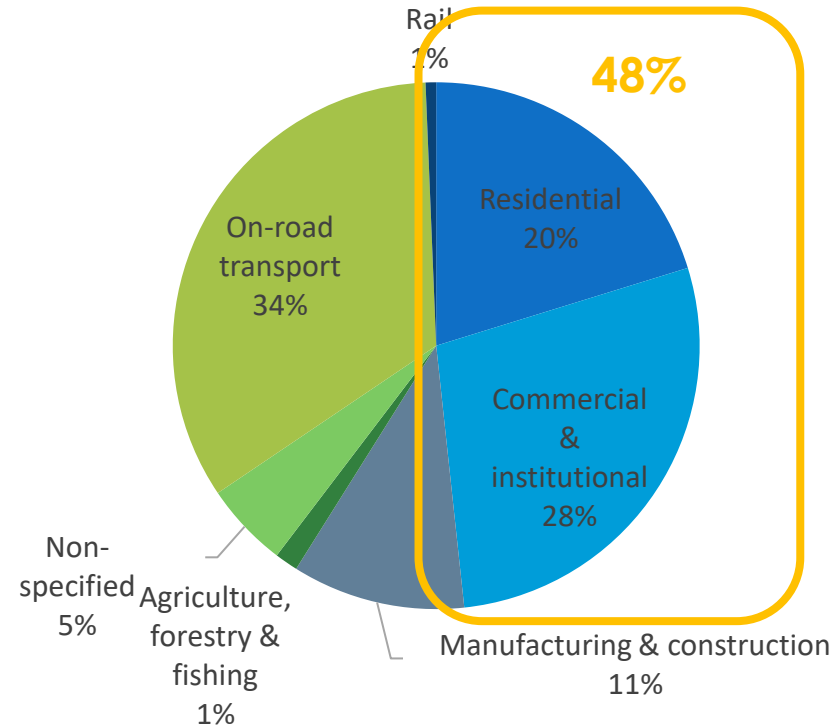
# Impact of buildings



Energy consumption by sector, excl. aviation & marine, local govt separate (2018)



Emissions by sector, excl. aviation & marine (2018)



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# About Energy Performance Certificates (EPCs)



## What are EPCs

- 2020: The Mandatory Display and Submission of Energy Performance Certificates for Buildings (The National Energy Act)
- Benchmarked against SANS 10400 XA
- Required to publically display an EPC at the entrance of a building 7 December 2022.
- Certificate issued by SANEDI
- Indicates the **energy performance** of that building
- Each certificate is valid for a period of 5 years.



## Building criteria for EPCs

- Building types:
  - A1 (Entertainment and public assembly)
  - A2 (Theatrical and indoor sport)
  - A3 (Places of instruction)
  - G1 (Offices)
- Operational for min 2 years with no major renovation within the last two years
- Has a net floor area greater than 1000m<sup>2</sup> for government or 2000m<sup>2</sup> for private buildings



## Measuring energy

- Net energy consumed in kilowatt hours per square meter per year (**kWh /m<sup>2</sup> /a**)
- Include space heating, water heating, cooling, ventilation, lighting [also includes lifts, water pumping, etc]
- Excludes:
  - energy consumed by garages, car parks and storage areas
  - energy consumed by outdoor services
  - energy generated by the building, but used elsewhere (energy exported to the grid)

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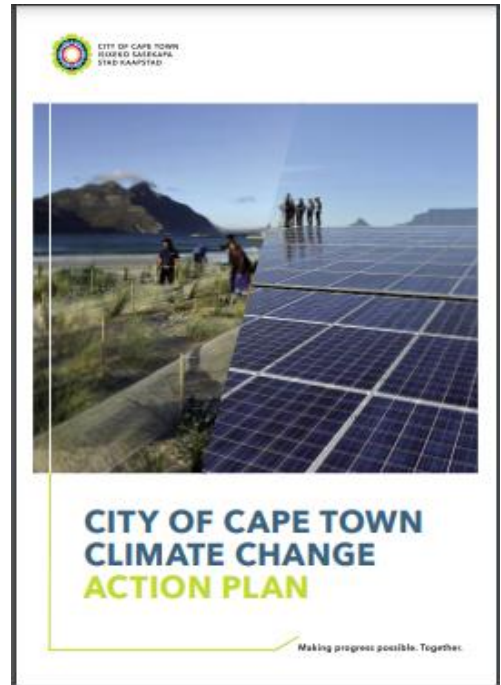
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# EPCs - a step towards NZC buildings



**VISION:**  
To become a climate-resilient, resource-efficient, and carbon-neutral city that enables inclusive economic development and healthy, thriving communities and ecosystems



## Goals:

- All new buildings (residential, commercial) to be net zero carbon by 2030.
- All new and existing municipal buildings (excluding industrial plants and utilities) to be net zero carbon by 2030
- All existing residential and commercial buildings to be retrofitted with energy-efficient technologies to be net zero carbon in operation by 2050.

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## EPCs - a step towards NZC buildings

- **Baselines & Benchmarking:** EPCs provide a benchmark performance and provide a standard where buildings can be compared and tracked against NZC targets
- **Strategic improvements:** Ranking building performance allows the City to prioritise scarce resources for efficiency improvements
- **Involve occupants:** more aware of energy usage and efficiency programmes
- Target every municipal building achieves a Grade B on their EPC by 2027 (between 30% - 60% of energy performance reference value)



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# EPC Pilot Study

## 3 EPCs completed

- Bellville Civic Centre – Grade B
- 44 Wale Street – Grade C
- Omni Forum – Grade B

## 1 Assessment Report

Captures the methodology for all three EPCs, the assumptions and verification of data, and any challenges with data

## 1 Learning Report

Captures the key points of learning from conducting the EPCs: data collection, verification requirements and processes, etc.



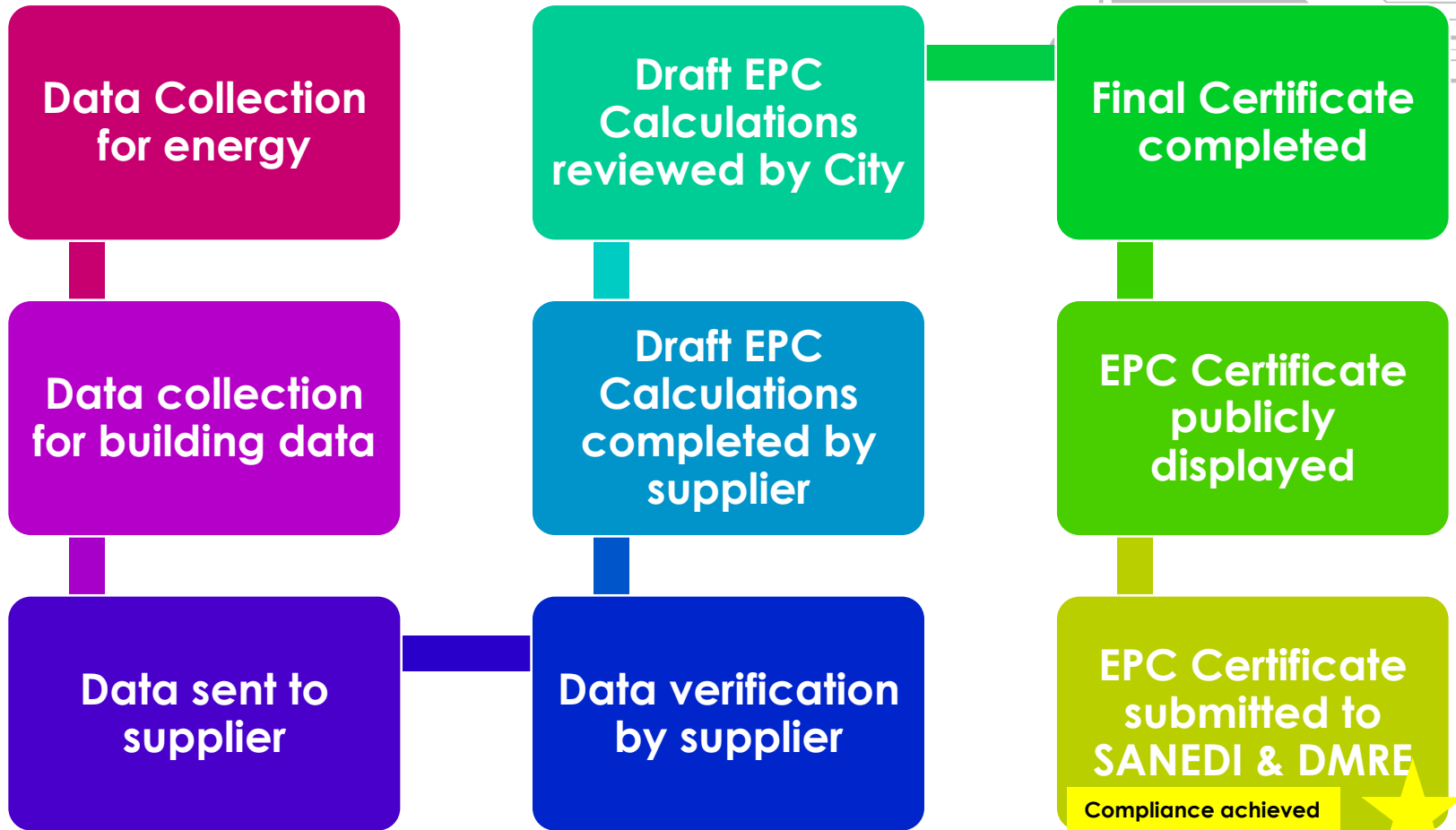
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# EPC Compliance Initiative Process

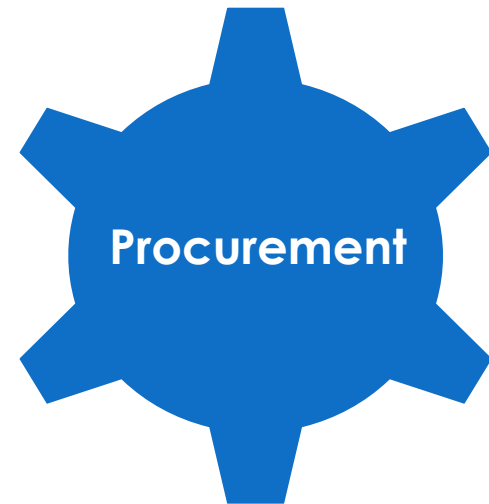
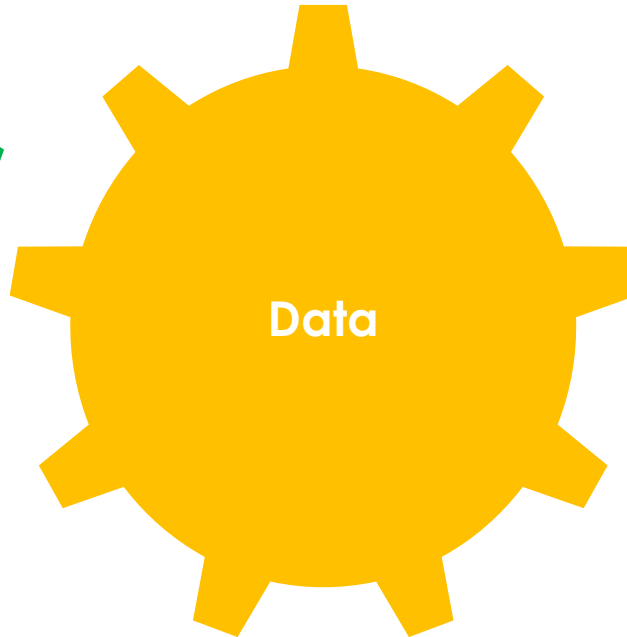


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# Key enablers for EPCs



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# Coordinated approach and stakeholder engagement

EPC Initiative was designed to :

- enhance collaboration
- reduce the time and cost associated with compliance and
- ensure a cohesive and cost effective approach across all departments impacted by the regulations

EPC task team was established for ongoing communication, knowledge sharing, and coordination of work to achieve compliance.

Department	Role
<ul style="list-style-type: none"><li>• Facilities Management</li><li>• Water Department</li><li>• Recreation and Parks Department</li><li>• Energy Generation &amp; Distribution</li><li>• Strategic Assets</li></ul>	<ul style="list-style-type: none"><li>• Provide requested data</li><li>• Member of EPC Task Team</li><li>• Ensure compliance with regulations of all owned buildings</li><li>• Source budget for own buildings</li><li>• Transversal Use Application</li><li>• Payment of service provider</li></ul>
Sustainable Energy Markets	<ul style="list-style-type: none"><li>• Provide technical assistance and strategic support to line department</li><li>• Lead of transversal tender process</li><li>• Chair of EPC Task Team</li><li>• Engage with external stakeholders</li><li>• Quality Control of outputs</li></ul>
Supply Chain Management	<ul style="list-style-type: none"><li>• Support on transversal tender process</li></ul>

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## Buildings Data

- Building plans are critical to determine the Net Floor Area (NFA)
- Building plans were mainly obtained from City district offices and building owner departments
- 2 options followed for old buildings with no building plans
  - To physically measure the buildings NFA to determine whether the building was above 1000m<sup>2</sup> or;
  - Have the appointed contractor go on site and physically measure the NFA.



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# Energy Data



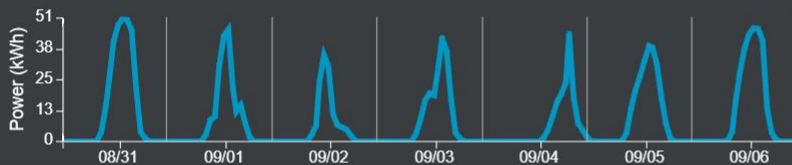
CITY OF CAPE TOWN  
ISIXEKO SASEKAPA  
STAD KAAPSTAD

## GETTING OUR PIECE OF THE SUN RENEWABLE ENERGY IN THE PUBLIC SERVICE

### Solar PV Production Dashboard

Omni Forum Municipal Building: 60 kWp system

#### Last 7 Days:



#### Monthly solar generation:



**ENERGY SAVING SINCE LAST MONTH:** R 7,051 (5,876 kWh)  
**ENERGY SAVING SINCE INSTALL (2019):** R 405,792 (338 MWh)



**RENEWABLE ENERGY  
GENERATED BY ALL OUR  
SOLAR SYSTEMS LAST YEAR  
WAS ENOUGH TO POWER**



**50 CLINICS FOR 4 YEARS**



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## Energy Data

- Electricity consumption
  - SmartFacility® used for buildings metered & connected to the platform
  - Billing data from City's SAP portal used for buildings with no smart meters
- Energy generated & exported by solar PV
  - SmartFacility® used
- Liquid fuel
  - generator fuel purchases or top-ups
  - obtaining this data proved to be challenging
  - load shedding schedules, and the 30 minute energy data profile provided by SmartFacility® was used to estimate generator run hours.



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# Procurement



RFQ



Transversal tender



Pricing schedule

- Pilot study: understand the process
- Helped determine:
  - biggest cost factors
  - data gaps from SmartFacility®,
  - recommendations to improve data collection
- Three EPCs issued

- Transversal tender for broader initiative
- All departments could make use
- Structured with a balance between:
  - Specifications;
  - pricing schedule;
  - eligibility and;
  - functionality criteria

- Determined data availability and allow for maximum flexibility
- Learnt from similar work, e.g. previous tenders on EE – energy audits
- Determined what the biggest pricing/cost factors would be

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## Lessons Learned



### Coordinated approach

- Inter-departmental relationship building can be a challenge, but is essential for the success of the project
- Delays are inevitable when many people are involved
- City's data management tools put us in good stead
- Significant differences between estimated NFA and the actual NFA
- Create capacity to determine NFA estimates
- Verification of the data is required, however, access to the correct documents for data verification is time consuming
- Sub-metering is critical to determine accurate consumption
- EPC methodology in its early phase of development: discrepancies between a modelled outcome versus the EPC
- 8 SANAS accredited service providers in the market
- Tender pricing schedule to include buildings <1000m<sup>2</sup> NFA
- Work closely with Supply Chain Management practitioners and building owners; Start early!



### Data



### Procurement

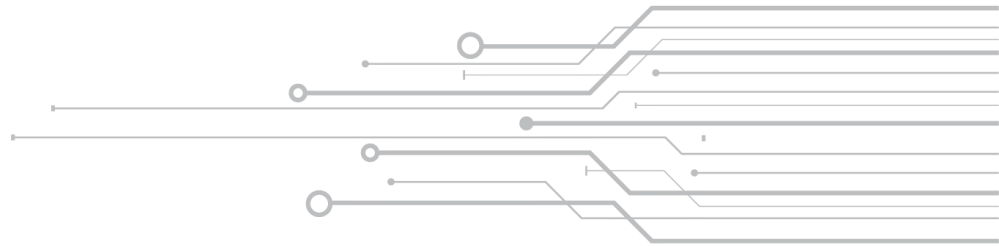
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# Case Study: Observatory Metro Police Academy





Energy Performance Certificate for Buildings

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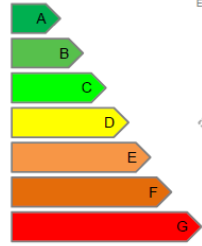
Observatory Metro Police Academy  
Rawson Street  
Observatory  
Cape Town  
7825

Certificate Number: EPC-SA 0098-2022

This certificate is issued in terms of SANS 1544:2014. Energy performance certificates for buildings, and indicates how much energy is being used to operate this building. The energy performance of the building is based on measured energy performance and is compared to maximum energy consumption provided in SANS 10400 XA:2021.

**Energy Performance Certificate**

**Very energy efficient**



**Not energy efficient**

SANS 10400-XA:2021 maximum energy consumption in occupancy class in Energy Zone 4

**Energy performance of your building**


46 kWh/(m<sup>2</sup>.a)

141 kWh/(m<sup>2</sup>.a)

**Building Information:**  
 Owner: City of Cape Town  
 Occupancy Classes/es: G1- Offices, A3- Places of instruction  
 Number of Floors: 2  
 Net Floor area: 1 136 m<sup>2</sup>  
 Year of construction: Not available  
 Building plan approval: Not available  
 Occupancy certificate: Not available  
 Year of last major renovation: Not available  
 Climatic zone: 4 - Low, Low  
 Cadastral information: Erf 27702

**Administration information:**  
 Accredited body: Energy Management and Validation Services (Pty) Ltd  
 Assessor name: G Botha  
 Date of Issue: 08 July 2022  
 Valid until: 07 July 2027  
 Record nr: 701R0047 - 3.1


Carrier	From (date)	To (date)	Energy [kWh]	Net Floor Area	Performance [kWh/m <sup>2</sup> ]	Exclusions Performance [kWh/m <sup>2</sup> ]
Electricity (grid)	2016/01/01	2016/12/31	51 847	1 136	46	2
Gas	N/A	N/A	N/A	N/A	N/A	N/A
Solid Fuel	N/A	N/A	N/A	N/A	N/A	N/A
Liquid Fuel	N/A	N/A	N/A	N/A	N/A	N/A
Other	N/A	N/A	N/A	N/A	N/A	N/A



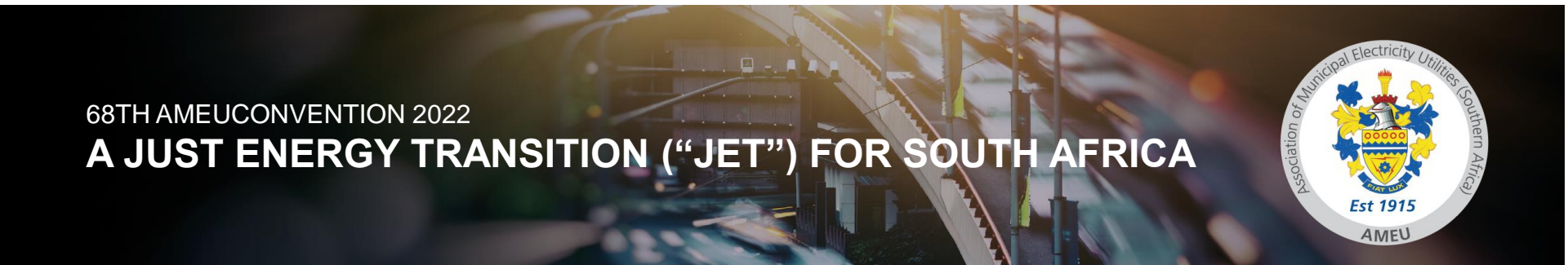
Energy Management and Validation Services (Pty) Ltd  
1201212225977

**Technical Signatory**

Signed by: G Botha  
 Registered as a Professional Engineer  
 (Professional Registration No. 1201212225977)



Inspection Body  
EPC/2022



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# 25 EPCs – Largest public or private portfolio On track for compliance for December 2022



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**Thank you**

