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Module 1: Joining the SmartOffice Movement

Energy Directorate | Sustainable Energy Markets
March 2022

Making progress possible. Together.

Welcome and Introductions

- WHO WE ARE?
- WHO YOU ARE?
- YOUR ROLE?

Agenda

01 – WELCOME & INTRODUCTIONS

02 – PURPOSE OF TRAINING & ICEBREAKER

03 – CLIMATE CHANGE & IMPLICATIONS FOR FACILITY MANAGEMENT

04 – PRINCIPLES OF MANAGING SUSTAINABLE BUILDINGS

05 – ACTIVITY & DISCUSSION

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Net Zero Carbon & Building Energy Management Training for Facilities Managers

- Module 1: Join the SmartOffice Movement
- Module 2: Energy management in buildings
- Module 3: Energy Retrofits Site visit
- Module 4: SmartFacility and the value of building data
- Module 5: Learning from City Action on Building Energy Efficiency and Renewable Energy

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Purpose of the training

Module 1: Join the SmartOffice Movement	
Online Classroom **2 hours** **2 identical sessions offered in Q3, FY 2021/22** **Hosted by Sustainable Energy Markets**	We've all heard the terms 'sustainability' and 'climate change', but what have they got to do with facilities management? Join this introductory session to learn more about what it really means to manage a building more sustainably in line with SmartOffice principles and the important role facilities managers play in achieving the City's goal of Net Zero Carbon Municipal Buildings by 2030.
	On completion of this module, you should be able to: • Explain the link between climate change, energy management, and buildings • Understand the concept of Net Zero Carbon Buildings and why it is important • Identify the key ways facilities managers can implement actions for more energy efficient and climate-smart buildings

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What is Climate Change?

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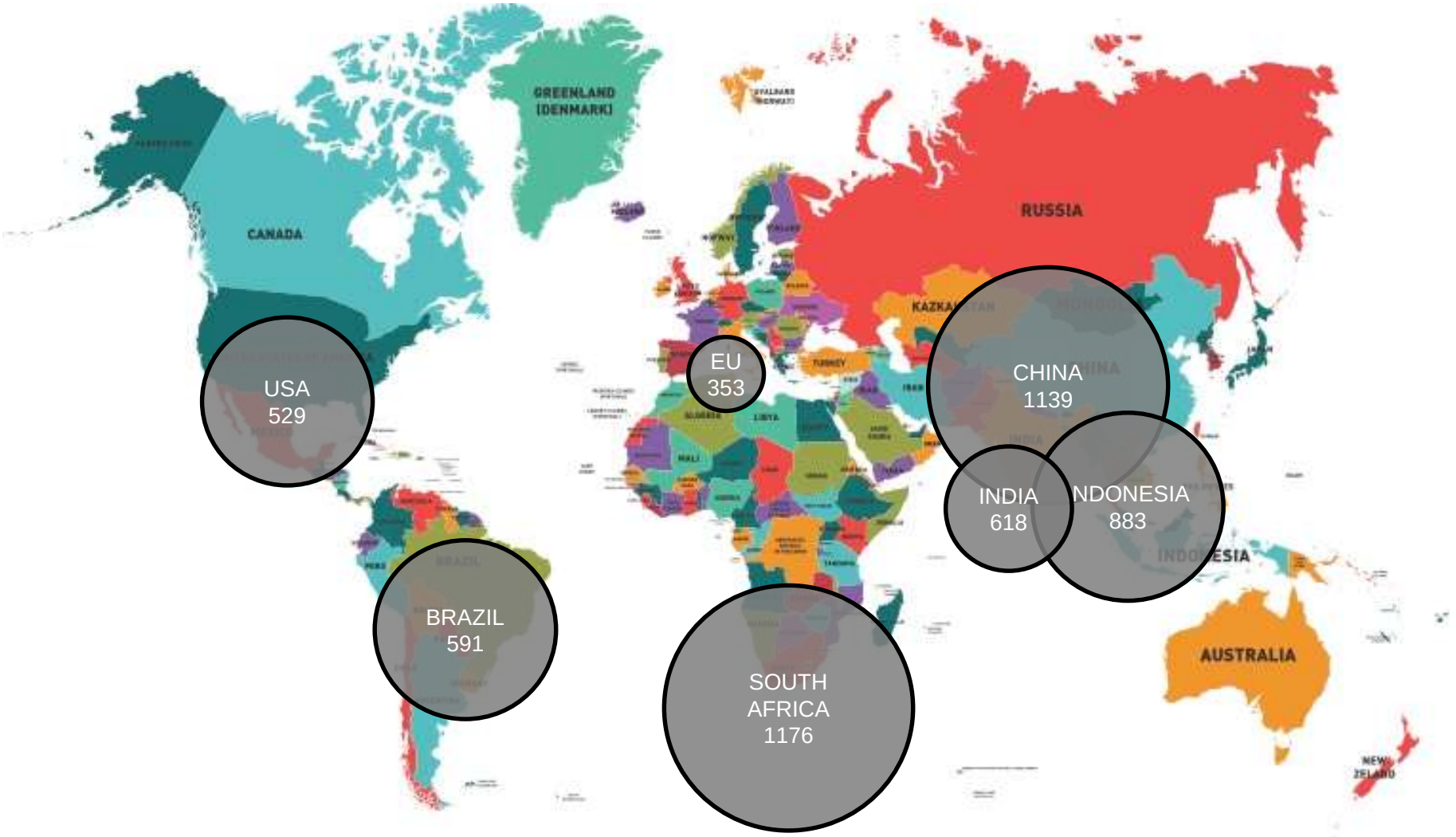
Carbon intensity per GDP



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http://environment.nationalgeographic.com/environment/energy/great-energy-challenge/global-footprints/

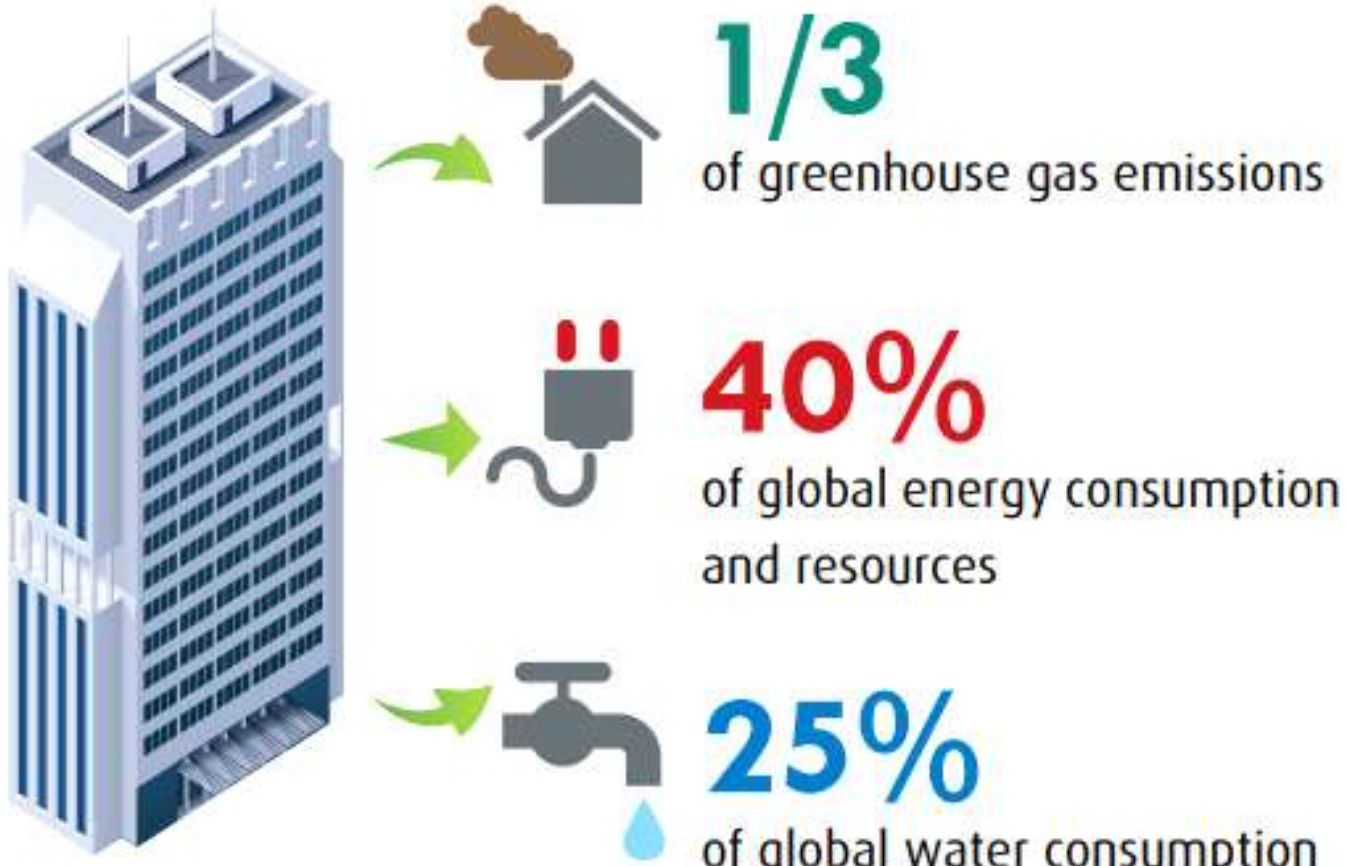

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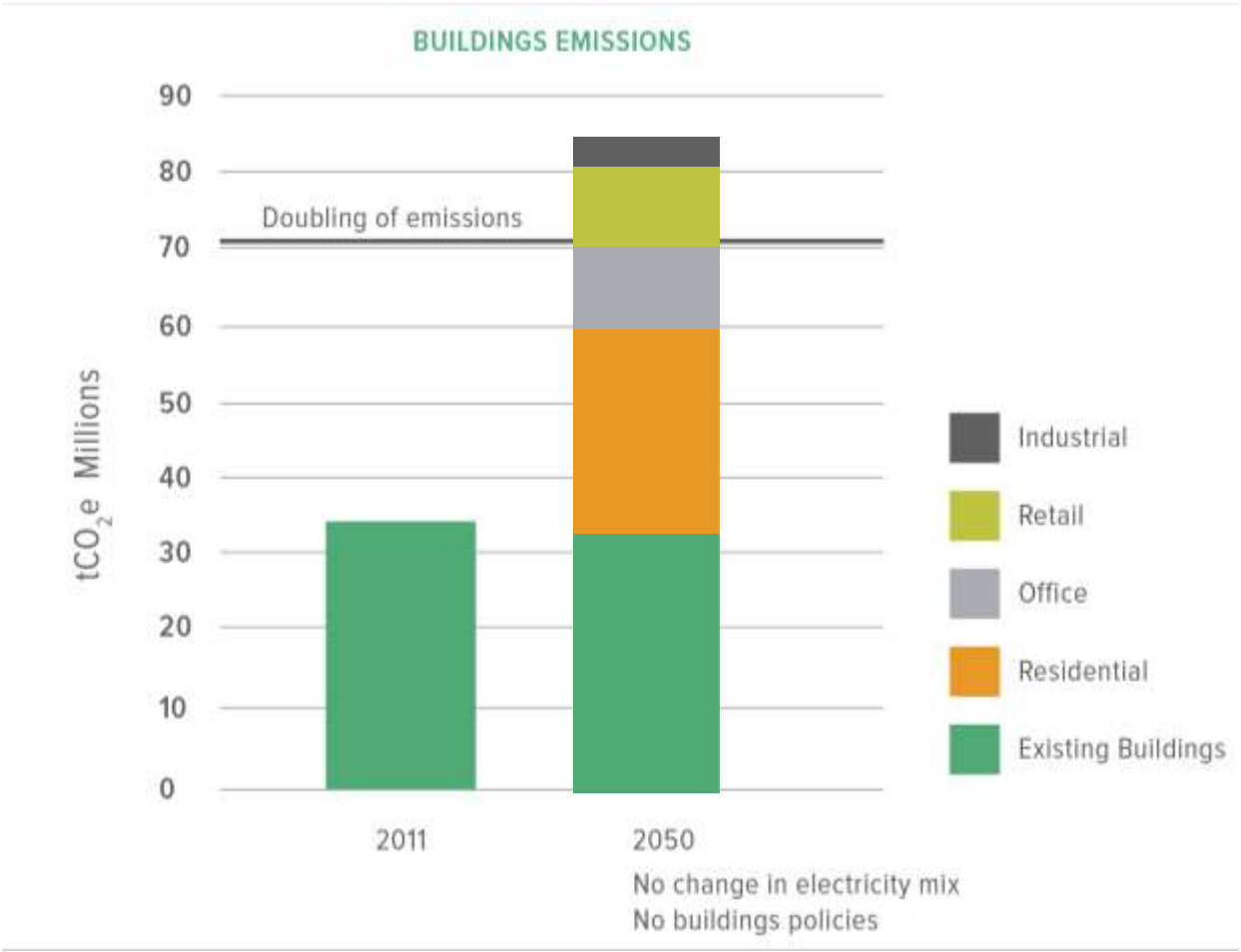
Image source

The cost of inaction



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The cost of inaction

DURBAN

COASTAL EROSION AND EXTREME STORMS DAMAGE THE ECONOMY.

TSHWANE

GETTING HOTTER TWICE AS FAST AS THE GLOBAL AVERAGE RATE.

CAPE TOWN

DROUGHT AND FIRE THREATEN HABITABILITY.

JOHANNESBURG

CLIMATE REFUGEES BOOST INFORMAL SETTLEMENT; VULNERABLE TO FLOODING AND DISEASE.

Overview of the climate commitments

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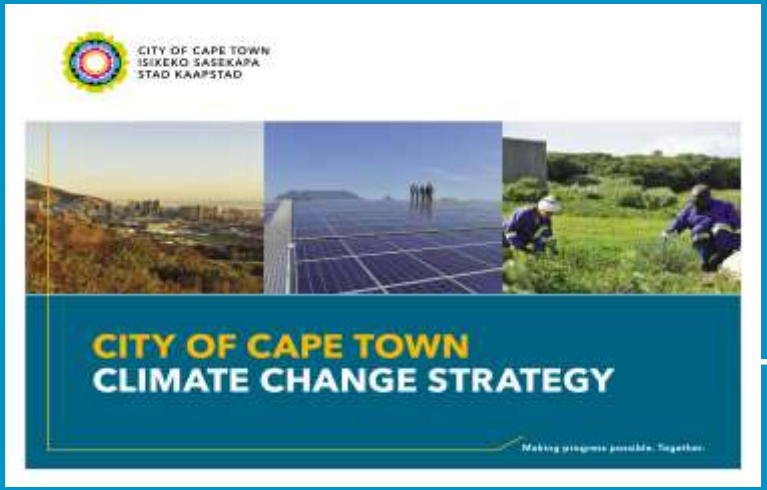
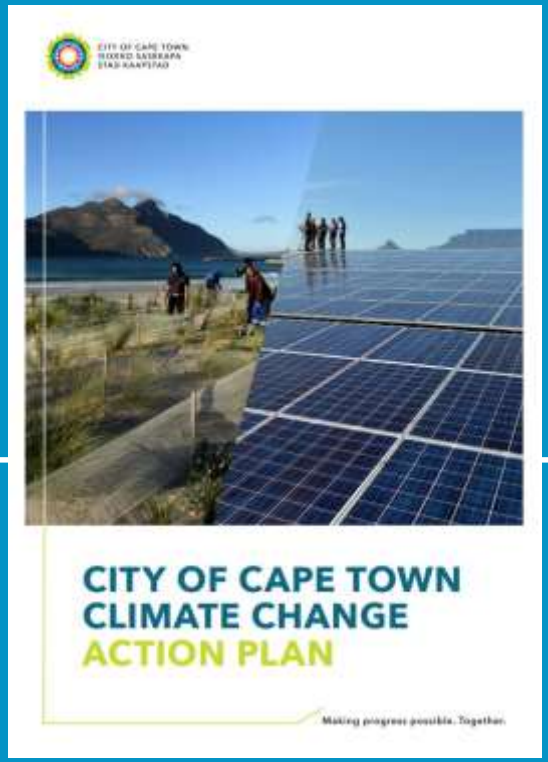
Overview of Climate Change Strategy and Action Plan



Approved by Council May 2021 (C 21/05/21)



Approved by City Manager (16th August 2021)

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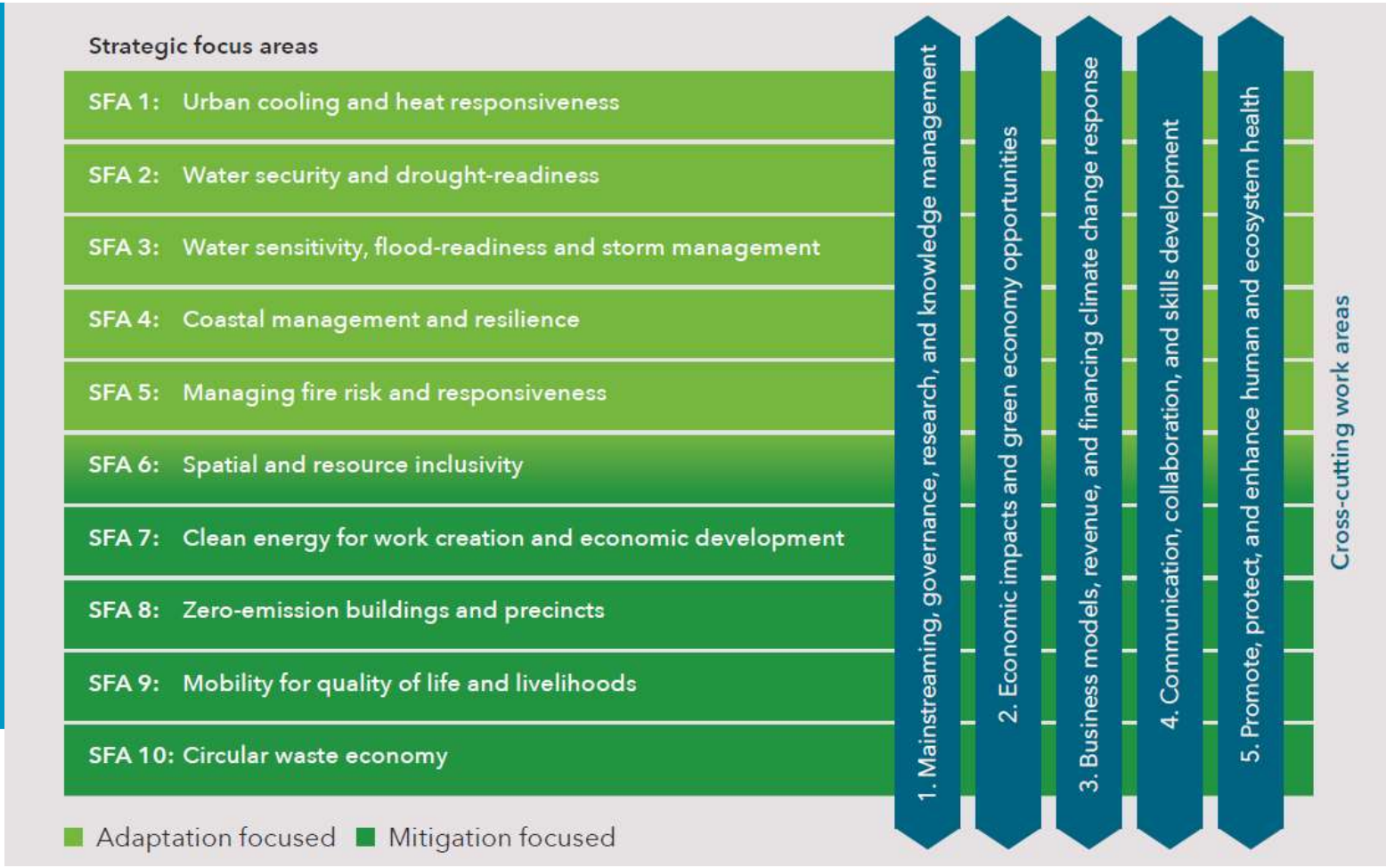
Vision & Overview of Strategic Focus Areas and Cross Cutting Work Areas

VISION:

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



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Buildings as a strategic focus area for climate change mitigation

01 **Goal 15:** All new buildings (residential, commercial) to be net zero carbon by 2030.

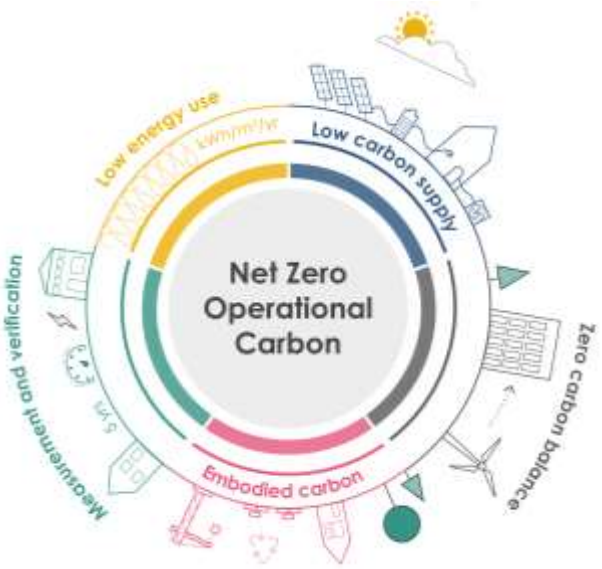
02 **Goal 17:** All new and existing municipal buildings (excluding industrial plants and utilities) to be net zero carbon by 2030

03 **Goal 16:** All existing residential and commercial buildings to be retrofitted with energy-efficient technologies to be net zero carbon in operation by 2050.

Municipal Buildings in the Climate Action

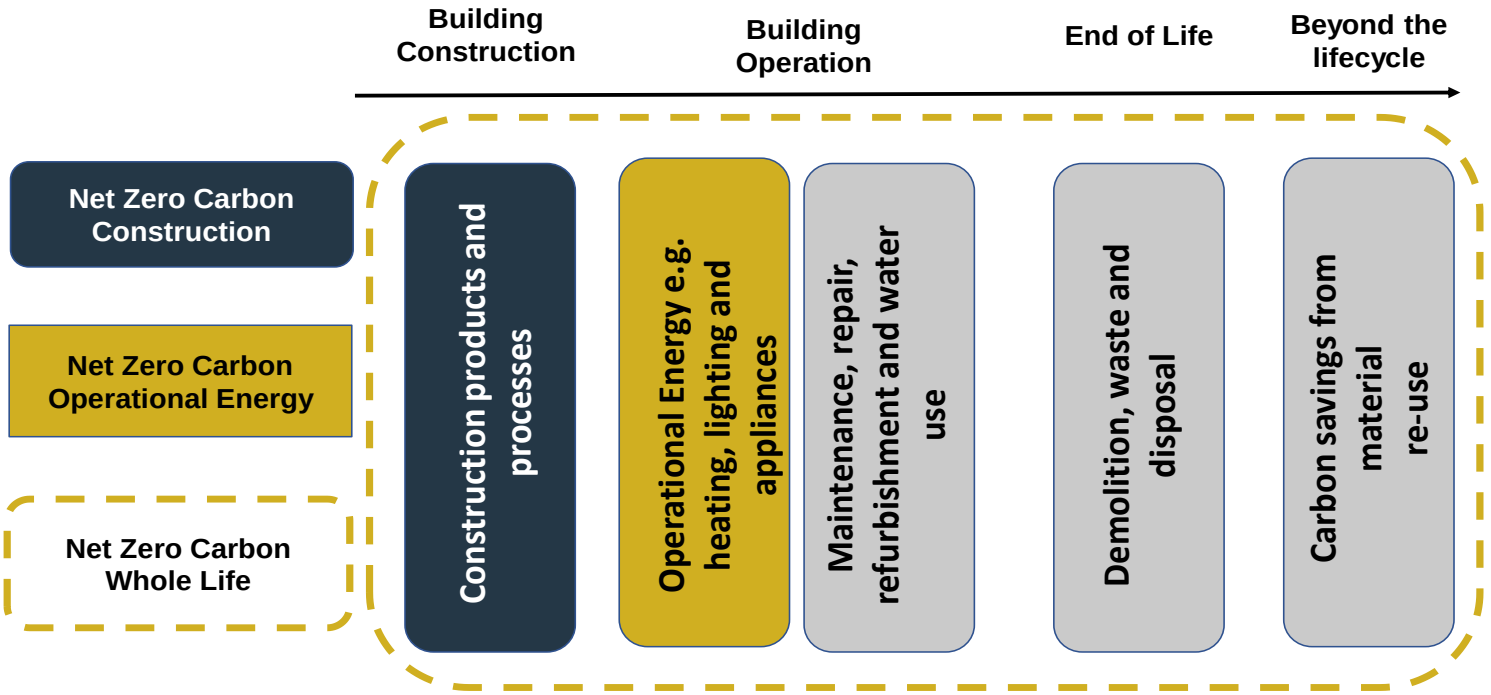
Goal 17: All new and existing municipal buildings (excluding industrial plants and utilities) to be net zero carbon by 2030

- **Action 17.1:** Continue with municipal operations energy efficiency retrofit, energy audit, and energy and water metering programmes aiming for to optimise energy demand and operational costs across municipal facilities by 2030.
- **Action 17.2:** Develop a programme plan to achieve net zero carbon for all new and existing municipal buildings by 2030.
- **Action 17.3:** Facilitate the uptake of the Energy Performance Certificates so that all relevant municipal buildings disclose their energy consumption data.



What is a Net Zero Carbon building?

A net zero carbon building is "a building that is highly energy-efficient, and the remaining energy use is from renewable energy, on-site but also off-site, so that there are zero net carbon emissions on an annual basis" .



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Creating Net Zero Carbon Buildings

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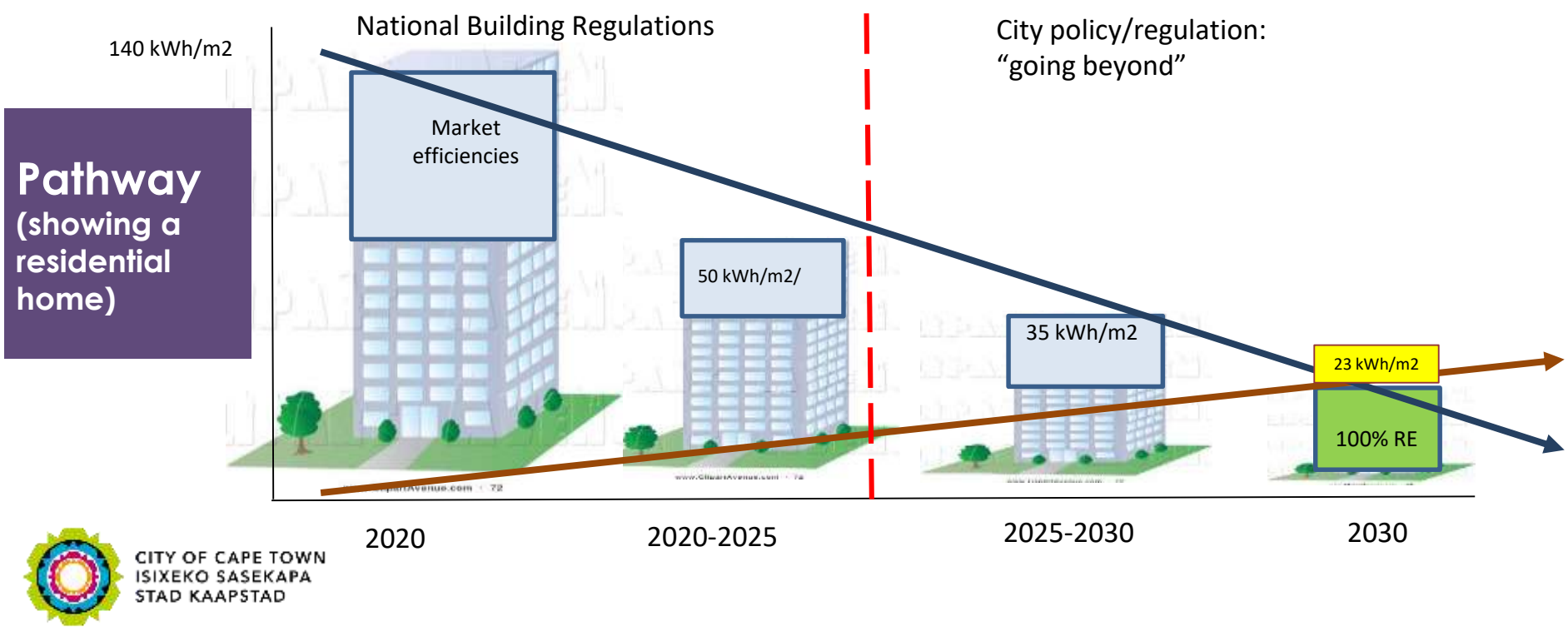
What is the City doing to create an enabling environment to meet the buildings commitments?

Designing and construction of new net zero carbon municipal buildings

1. Optimise building design
2. Efficient utilities & equipment measures
3. Ensure aligned behaviour of end user so as to ensure performance and reduce impact on peak load
4. Renewable energy from either on-site or off-site sources on an annual basis



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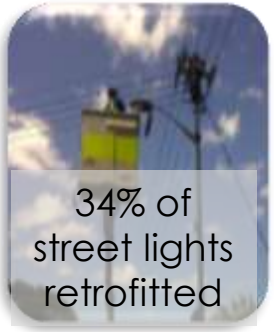
Energy Efficiency & City-Owned Rooftop PV

- The City consumes 4% of all electricity used in Cape Town. As such, it is committed to improving the management of energy use in all its municipal operations with the aim of improving resource efficiency, reducing its carbon footprint and saving money.
- **Between 2009/10 to 2019/20, this initiative saved over 231 GWh of electricity, which translates to avoided emissions of 229 035 tCO2e with a saving of R300 million.**
- Key achievements:



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Monitoring and Tracking Municipal Electricity and Water Consumption with SmartFacility

860 CCT facilities
1119 Elect smart meters
66%

All Facilities <u>should</u> have a mechanical water meter manually read & captured by Readers and loaded to SAP

10 Pilot smart water meters

Existing city systems (SAP, Scada) for data storage

±1300 facilities
27 093 buildings

SMART FACILITY

https://smartfacility.capetown.gov.za/Site/

Email: SmartFacility@capetown.gov.za

Launched Nov 2018

150 users trained
Public Dashboards
GIS enabled
Supports EPC certificates
Tracks EE savings
Email alerts
Reports for Facility Managers

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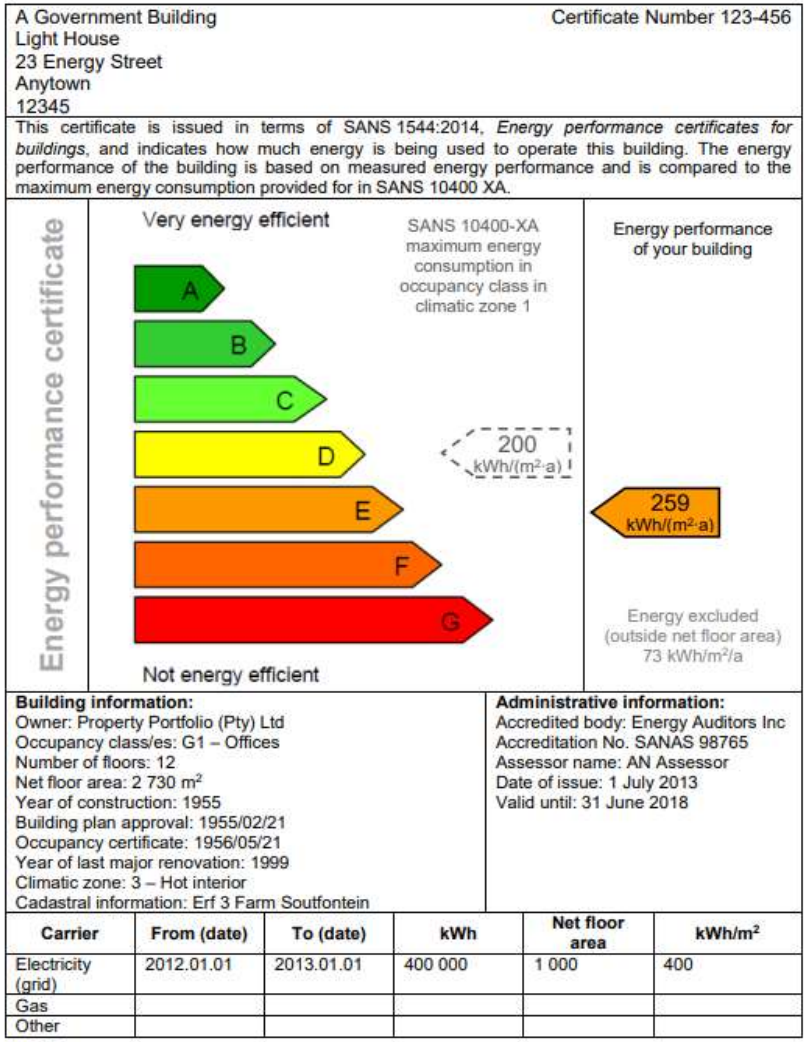
Energy Performance Certificate Compliance Initiative

- Required to publically display an EPC at the entrance of a building that is **owned, operated or occupied** by **7 December 2022**.
- Each certificate is valid for a period of **5 years.**
- **3 EPCs completed**
  - Bellville Civic Centre – Grade B
  - 44 Wale Street – Grade C
  - Omni Forum – Grade B



A Government Building
Light House
23 Energy Street
Anytown
12345

Certificate Number 123-456

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 the maximum energy consumption provided for in SANS 10400 XA.

Energy performance certificate

Very energy efficient

SANS 10400-XA maximum energy consumption in occupancy class in climatic zone 1

Energy performance of your building

A
B
C
D
E
F
G

200 kWh/(m²·a)

259 kWh/(m²·a)

Energy excluded (outside net floor area) 73 kWh/m²/a

Not energy efficient

Building information:
Owner: Property Portfolio (Pty) Ltd
Occupancy class/es: G1 – Offices
Number of floors: 12
Net floor area: 2 730 m²
Year of construction: 1955
Building plan approval: 1955/02/21
Occupancy certificate: 1956/05/21
Year of last major renovation: 1999
Climatic zone: 3 – Hot interior
Cadastral information: Erf 3 Farm Soutfontein

Administrative information:
Accredited body: Energy Auditors Inc
Accreditation No. SANAS 98765
Assessor name: AN Assessor
Date of issue: 1 July 2013
Valid until: 31 June 2018

Carrier	From (date)	To (date)	kWh	Net floor area	kWh/m²
Electricity (grid)	2012.01.01	2013.01.01	400 000	1 000	400
Gas					
Other					

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SSEG Municipal Facility Solar PV Programme & Own-Generation

https://www.triplepundit.com/story/2020/us-states-step-save-green-jobs-covid-19-recovery/87366

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Role of Facility Managers

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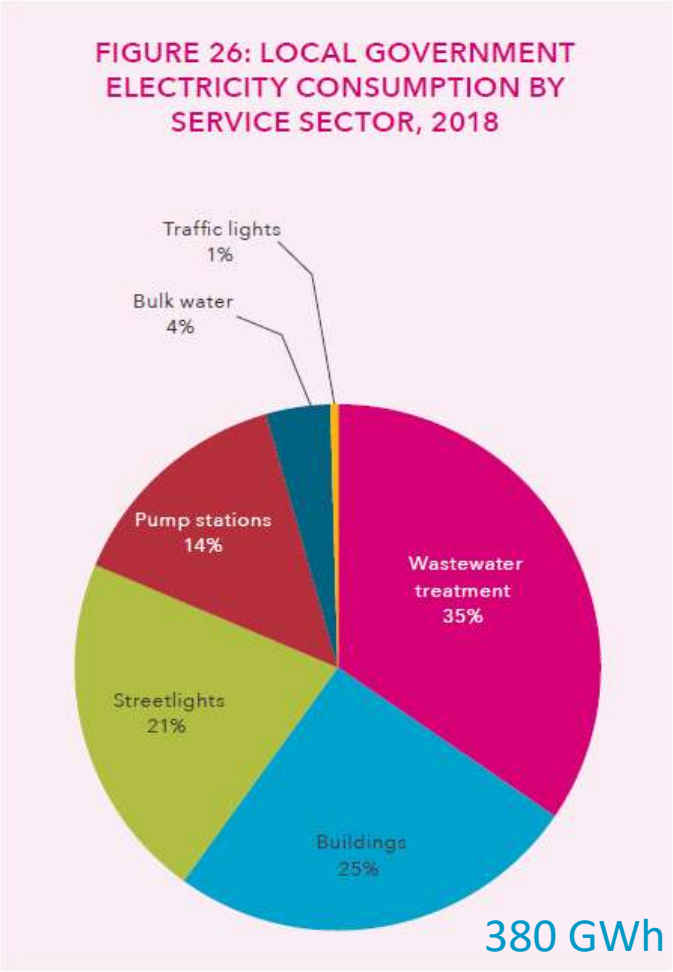
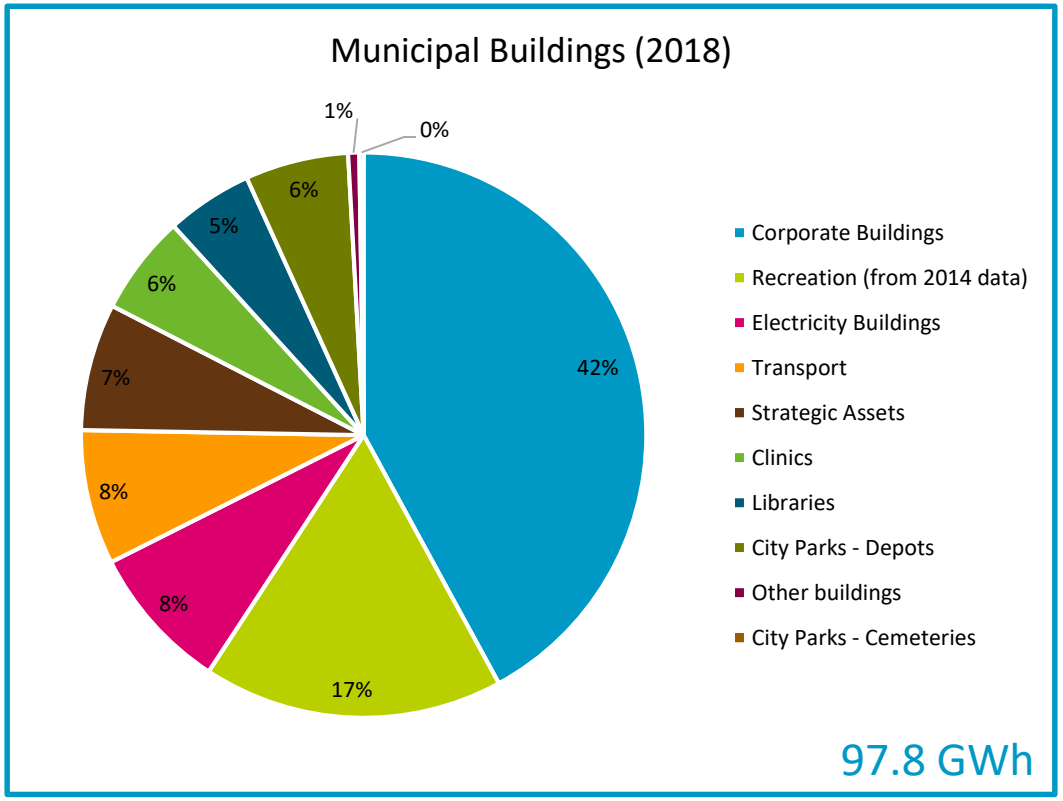
City operations status quo - energy





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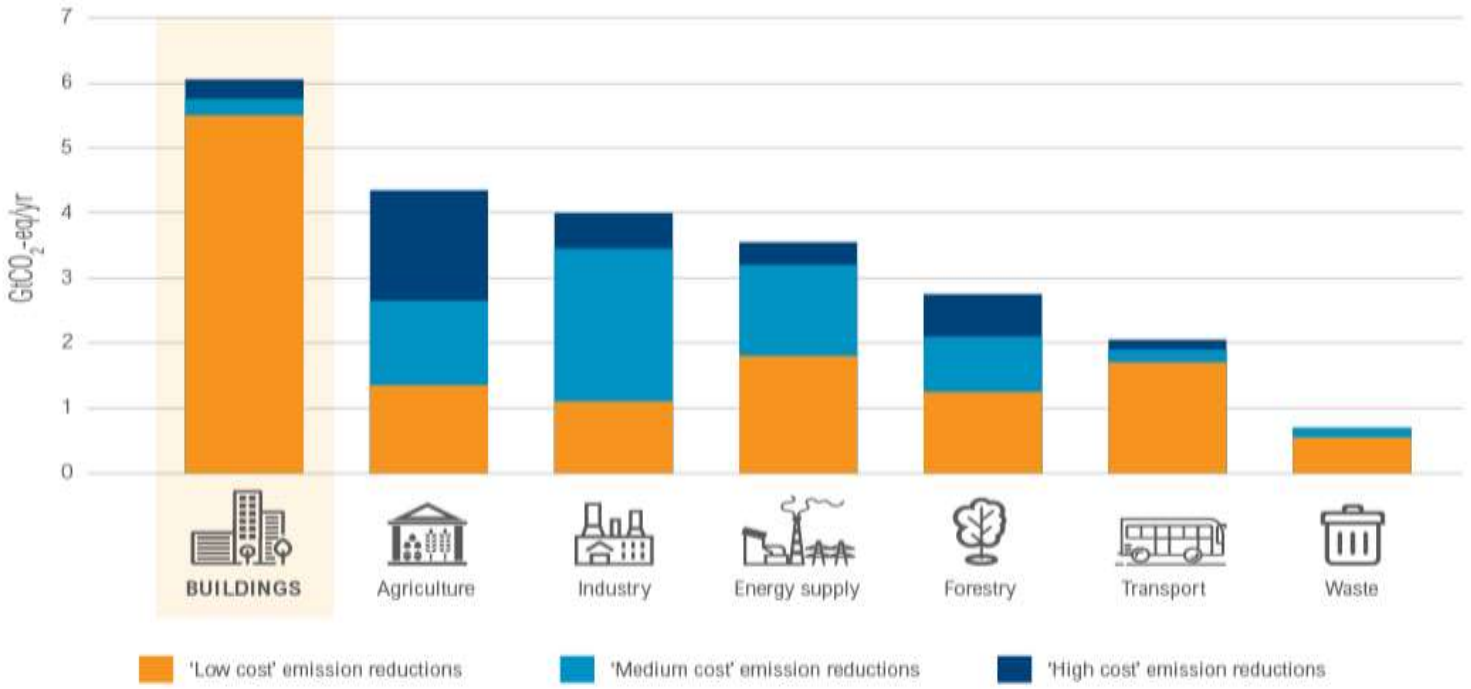
Source: Cape Town State of Energy and Carbon 2021 Report
https://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%20and%20review/CT_State_of%20Energy_and_Carbon_Report_2021.pdf

Building Efficiency is one of the most affordable ways to cut emissions



Note: 'Low cost' emission reductions = carbon price <20 US$/tCO$_2$-eq. 'Medium cost' emission reductions = carbon price <50 US$/tCO^2-eq.
'High cost' emission reductions = carbon price <100 US$/tCO$_2$-eq.
Source: IPCC. 2007. IPCC Fourth Assessment Report: Climate Change 2007: Synthesis Report. "4.3 Mitigation options." https://www.ipcc.ch/publications_and_data/ar4/syr/en/mains4-3.html

wri.org/buildingefficiency

WORLD RESOURCES INSTITUTE

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Role of FM to achieve climate change targets

- **Understand impacts of climate change** on facilities & reduce emissions
- **Identify and mitigate risks** (climate change, health, safety)

- **Integrate environmental considerations** into the delivery of services and the planning, design, construction, operation and maintenance of facilities.

- **Comply** with applicable legal requirements and align with City's climate change initiatives and programmes

- **Educate, train and motivate** occupants & visitors on the importance of sustainability measures, real time sustainability performance of the building & appropriate occupant behaviour

- **Prevent pollution, minimise waste** through source reduction and recycling, and conserve natural resources.

- **Encourage** the same level of environmental performance among business partners, suppliers, contractors and sub-contractors

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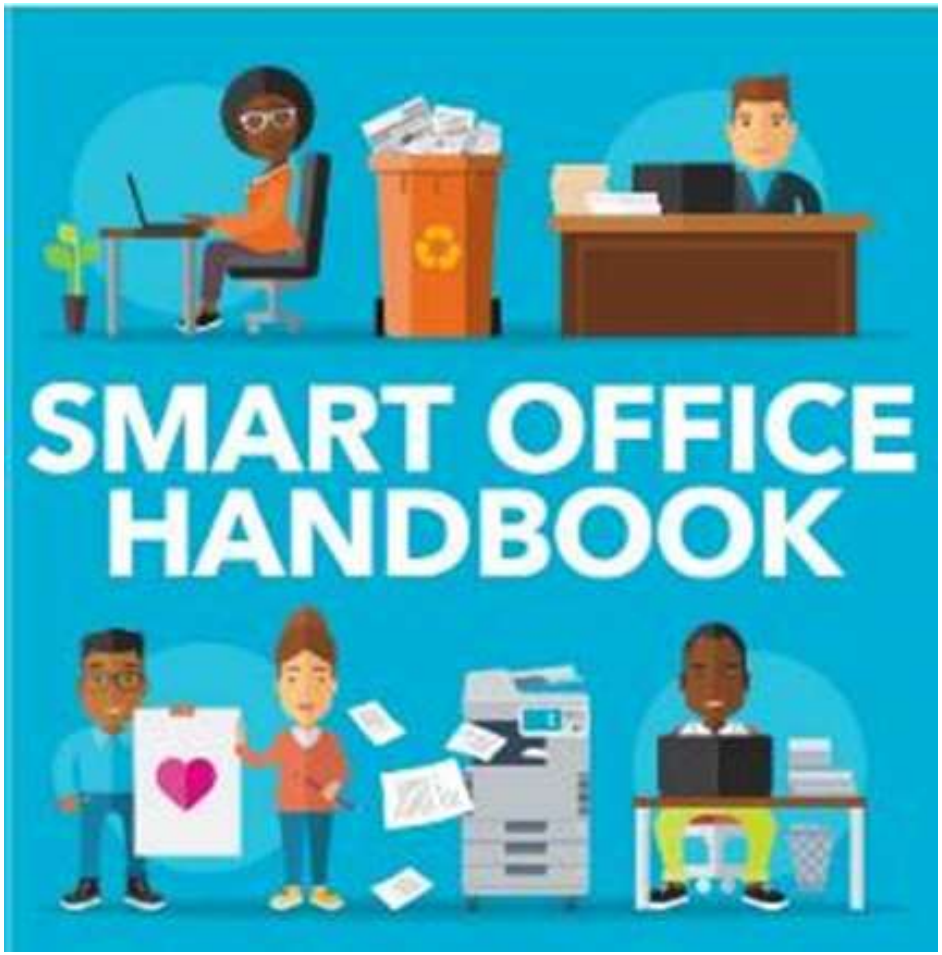
Principles of managing sustainable buildings

Smart Office Handbook

- Smart Office Handbook – tools for greening your office



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Basics of greening your office: Step by step guide to greening your office

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Step 1: Get Leadership Buy-in

- Achieve buy-in from across the organisation
- Align with legal requirements, City policies & strategies
- Highlight the benefits & advantages of a smart office:
  - Reduced operational costs
  - Achieve higher occupant satisfaction
  - Increased employee health & wellbeing
  - Increased staff productivity
  - Future-proof against increases in utility costs & potential energy and water supply issues
  - Demonstrate your facility's commitment to sustainability and occupant satisfaction

Step 2: Do an eco-audit

- Conduct an eco-audit
  - Establish baseline
  - Collect & Analyse Data (benchmarking)
    - Electricity consumption
    - Water consumption
    - Waste production & practices
  - Review of any current resource efficiency practice
  - Identify areas with biggest impact & where improvements are required
  - Identify priority areas
  - Set short and long term targets for achievement

Example - energy audit

Energy Audit Sheet					
Name of auditor			Date		
Address			Venue		
Appliance	Number of appliances	Power use (watt)	Hours per day	Ave kWh per day (watt x hours x no/1000)	Comment
Give a short description of the appliance or fixture	How many of these items are there?	What is the rating for this item?	How many hours is it used per day?	Calculate the kWh (60x4x7)/1000	Make any comments relating to the item.
e.g. Light - Incandescent	7 lights	60 W	4 hours	= 1,68 kWh / d	
Lights - CFLs					
Lights - incandescent					
Lights - down light					
Lights - fluorescent					
Lights - fluorescent					
HVAC - heating					
HVAC - ventilation					
HVAC – air condition					
Fridge - stand alone					
Fridge - walk in					
Deep freezer					
Hot Water Geyser					
Kettle / Urn					
Stove					
Microwave					
Toaster					
Ceiling fan					
Extractor fan					
Dishwasher					
Laundry - washing machine					

- Cheat sheet

Appliance	Power Use (Watt)	Average hours in use per day (h/d)
Lighting		
Incandescent bulb (“old”)	40 / 60 / 100	Varies on area of use
Compact fluorescent lights (CFL)	12 / 18 / 20	Varies on area of use
Fluorescent lights	18 / 36 / 38	Varies on area of use
Spot lights / down lights	20 / 50	Varies on area of use
Security – various types	120	0.3
Cooking		
Electric stove	3000	2
Frying pan	1250	0.4
Hotplate large	2400	0.3
Hotplate small	1275	0.2
Microwave oven	600 / 1200	0.8
Snackwich	1200	0.3
Kettle	1900	0.3
Toaster	800 / 1500	0.3
Coffee machine (4 cups)	670	0.5
Food processor	166	0.2
Refrigeration		
Freezer (chest)	105	0.4
Fridge with freezer	150	5
Fridge no freezer	250	0.2

Step 3: Develop an action plan and policy

Preparation:

- **Establishing a sustainability team**
  - Identify champions
  - Ensure diverse representation from all areas in office
  - Allocate roles and responsibilities
  - Meet regularly to brainstorm
- **Planning: Strategy, policy and action plan**
  - **Strategy**
    - Provides overall approach & vision
    - High level plan to achieve long term goals
  - **Policy**
    - Formal commitment
    - Provides the motivation for why you need to do it and sets out goals
  - **Action plan**
    - Specific activities required to meet the goal
  - **Monitoring & evaluation**
    - Measure progress & ensure ongoing improvement

Example of action plan

- Identify specific energy goals that you want to achieve, and ensure that they are linked to your action plan

Eco Living Centre Action Plan (example)

Responsible: Janine Last update done on 13 April 2012 done by Janine

The ECO LIVING CENTRE is committed to leading the environmental awareness through practical implementation of activities, as well as minimizing the impact of the centre on the environment.

Log Ref	Focus Area	Reason / motivation	Actions / Description	Due Date	Responsible Person	Status	Documentation/ Comment
1	Waste	Minimise waste by evaluating operations and ensuring they are as efficient as possible.	Do a waste audit and determine the type and location of waste	February	Jacob	Done	
2	Waste	Minimise waste by evaluating operations and ensuring they are as efficient as possible.	Implement more efficient operations based on waste audit feedback - provide monthly updates	Ongoing	Jacob	Ongoing	See worksheet for notes on all the specific interventions
3	Emissions	Minimise toxic emissions through the selection and use of our fleet and the source of our power requirement.	Review the fleet requirements and driving patterns. Make recommendations for more efficient driving options	February	William	Done	See fleet report dated 19 Feb for specific recommendations
4	Emissions	Minimise toxic emissions through the selection and use of our fleet and the source of our power requirement.	Do costing for change of fuel source and review accessiblility to biofuels for vehicles	March	William	In progress	
5	Emissions	Minimise toxic emissions through the selection and use of our fleet and the source of our power requirement.	Explore alternative fuel options for factory, such as gas and bio fuel	March	Peter	In progress	
6	Emissions	Minimise toxic emissions through the selection and use of our fleet and the source of our power requirement.	Do an energy audit to determine what energy savings could be implemented	April	Peter	In progress	
7	Emissions	Minimise toxic emissions through the selection and use of our fleet and the source of our power requirement.	Do a costing for procurement of RECs as alternative to coal based power source for factory	May	Peter	In progress	
8	Recycling	Actively promote recycling both internally and amongst our customers and suppliers.	Compile a recycling strategy based on waste audit	March	Jacob	Done	

Step 4: Make it happen

Communicate your strategy, policy and action plan both internally and externally

- **Communication**
  - Adequate, clear & engaging communication
  - Open communication channels
  - Ensure all staff understand why and how their office is implementing greening
  - Ensure staff understand their own environmental impact
  - Provide additional information
- **Training**
  - Develop an effective training strategy which focuses on
    - Understanding sustainability practices and principles
    - Expectations on staff & why it is important.
    - Interventions which can be implemented at home
- **Marketing strategy**
  - A tool to communicate and inform about environmental performance of facility
  - Promote activities being undertaken

Step 5: Monitoring and Reporting

- Ensure there is a monitoring system in place to provide feedback on the success of your action plan
- Continuously review of progress
- Monitor progress needs continuously
- Review action plan periodically
- Update and set new targets
- Continuously improve and strive for better results

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Greening practices for Facilities Management

Energy; Water, Waste, Materials

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Energy management

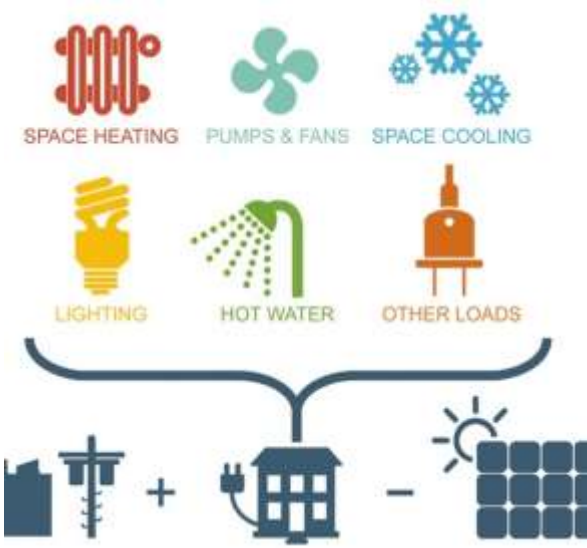
- **Conduct an energy audit**
  - Establish baseline
  - Identify major energy uses
  - Set energy goals and targets for reducing energy consumption

- **Reduce operational energy consumption**
  - **Lighting**
    - Install energy efficient or energy-saving lighting
    - Use task lighting
    - Install occupancy sensors & daylight sensors
    - zoning, automatic shut down after set unoccupied period
    - Switch off non-essential lighting
  - **Equipment & appliances**
    - Use energy efficient appliances & equipment
    - Switch off unused equipment
    - Natural ventilation where possible to reduce HVAC use
    - Regular maintenance of all HVAC systems

Energy management

- **Reduce operational energy consumption**
  - **Kitchen**
    - Regular maintenance of appliances
    - Consider replacement of urns with hydro-boiler
    - Only boil amount of water needed
    - Store excess hot water in a flask
    - Do not leave fridge door open
    - Switch off appliances not in use
  - **Bathrooms**
    - Consider faucet heaters which heat the water coming from the tap
    - Set the hot water cylinder to 60°C
    - Insulate hot water pipes & hot water cylinder

- **Ongoing monitoring & metering**
  - Monitor consumption through metering and utility bills
  - Establish benchmark & set targets for improvement
  - ***If you cant measure it, you can't manage it!***



Energy management

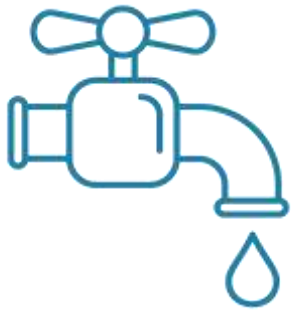
- **Awareness and advocacy**
  - Display energy consumption statistics
  - Benchmark your facility against similar facilities
  - Comparison of annual energy consumption
  - Track impact of changes in building management practices
  - Educate building users on energy conservation, how to save energy and what is expected of them

- **Procurement**
  - Ensure that energy efficiency is included in the procurement of goods and services as part of a long-term strategy
  - Get management buy-in for retrofit plans
    - Determine potential savings, return in investment & payback periods
    - Consider total lifecycle costs
  - Ensure budget is available to cover implementation of energy efficient measures
    - What gives the best value for money
    - Initial capital expenditure Vs payback period
    - Requirements and cost of maintenance

Water management

- **Conduct a water audit**
  - Establish baseline
  - Identify major water uses
  - Set targets for reducing potable water consumption

- **Reduce potable water consumption**
  - Install aerators, low flow fixtures and fittings
    - Recommended flow rates: Toilets: 3,6 ℓ/flush; Bathroom taps: 4 ℓ/min; Kitchen taps: 5 ℓ/min; Outside taps: 5 ℓ/min; Urinals: waterless or alternatively 1,9 ℓ/flush max
  - Reduce water pressure
  - Install water efficient appliances
    - Dishwashers: 0,93 ℓ/place setting; Laundry washing machine: 7,2 ℓ/kg (up to 10 kg) & 10 ℓ/kg (more than 10 kg)
  - Minimal irrigation, xeriscape landscaping
  - Use non-potable water for irrigation
  - Water before 09:00 or after 18:00 to reduce evaporation



Water management

- **Ongoing monitoring & metering**
  - Easily detect leaks & fix leaks timeously
  - Establish benchmark & set targets for improvement
  - Educate building users

- **Awareness and advocacy**
  - Display water consumption
  - Information on simple strategies for saving water
  - Information on any initiatives & measures implemented to minimise water use
  - Information on any water efficient appliances provided within the building and appropriate ways of using appliances

Waste management

- **Waste stream audit**
  - Establish baseline
  - Identify waste types & amounts
  - Identify opportunities for improved waste minimisation, recycling & waste diversion from landfill

- **Operational Waste Management Plan**
  - Aims at reducing operational waste and increasing recycling
  - Set targets for waste diversion from landfill and recycling

Waste management

- **Awareness and advocacy**
  - Provide information on recycling, including what can be recycled, waste storage areas
  - Provide information on any waste management processes present in the building
  - Set up a recycling system & have clearly marked bins for separating waste
  - Encourage staff to reduce waste
    - Set printer to print double-sided
    - Promote use of reusable items

Eco-procurement principles

- **Eco-procurement refers to economically, ecologically and socially responsible purchasing practices**

- **Guiding principles to be followed**
- Avoiding unnecessary consumption and managing demand.
    - Do you need it? Look at how needs could be met without new purchasing
  - Select manufacturer who can demonstrate good environmental management practices
  - Considering future need for re-configuration or deconstruction
  - Request proof of environmental certification (ISO 14000, FSC, Energy Star, relevant Ecolabel)
  - Use recycled materials & reuse existing materials
  - Buy goods that are:
    - produced with fewer resources
    - energy efficient
    - easily disassembled for reuse and recycling
    - produced locally
    - easily repaired or maintained
    - do not use or release toxic substances
    - durable & have a long anticipated life expectancy

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Case study

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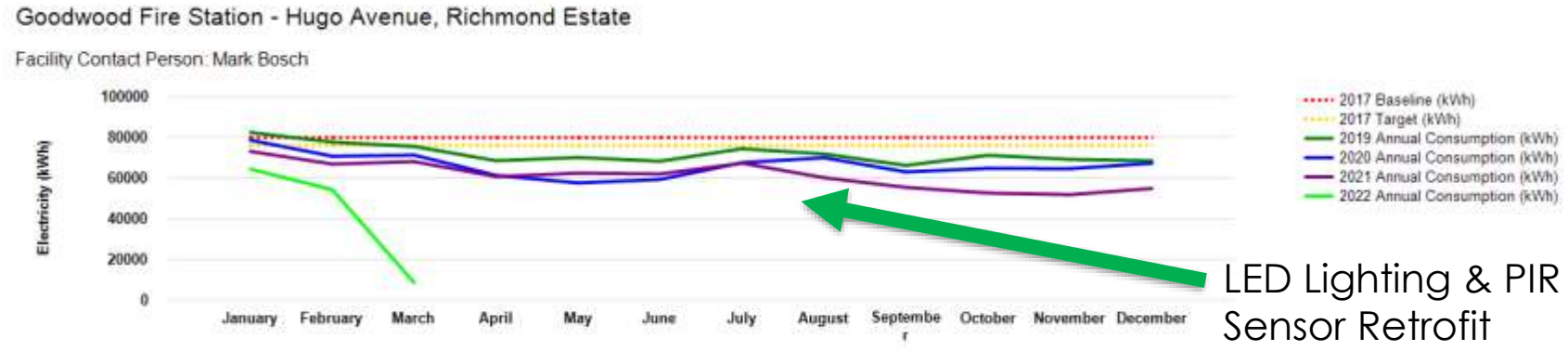
185Q/2020/21 LED Light & PIR Sensors Retrofit in 2021/22



		January	February	March	April	May	June	July	August	September	October	November	December	Total
2020	Actual Consumption (kWh)	78 924	71 030	71 593	61 590	57 891	59 605	67 859	70 284	63 309	65 072	64 906	67 583	**799 647**
2021	Actual Consumption (kWh)	78,924	71,030	71,593	61,590	57,891	59,605	67,859	70,284	55 692	52 932	52 105	55 184	**215 913**
	Actual Savings (kWh)									**7 617**	**12 140**	**12 801**	**12 399**	**44 958**

2022	2020 Baseline (kWh)	78 924	71 030	71 593	61 590	57 891	59 605	67 859	70 284					**538 776**
	Actual Consumption (kWh)	64 672	54 633		0	0	0	0	0	0	0	0	0	**119 305**
	Actual Savings (kWh)	**14 252**	**16 396**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**30 649**

Goodwood Fires Services and Traffic Department:
Savings 151 000 kWh/year (R275 000/year)

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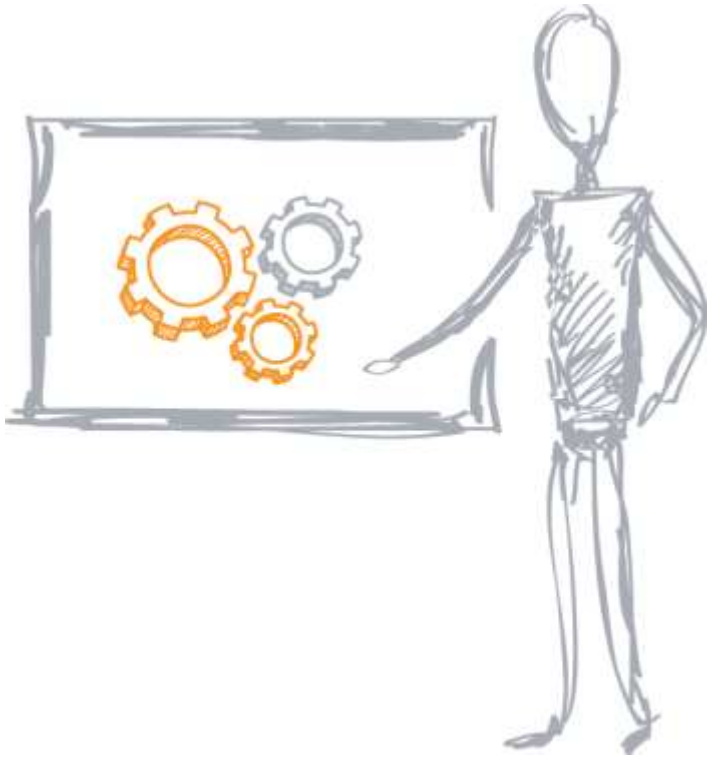
Activity 2

- Using Idea board https://ideaboardz.com/for/Activity%202/4385231 - answer the following questions:
  - As FM, which of the principles have you been using to manage your buildings?
  - What do you think you can do as FM to help the municipality reach the net zero carbon goal?



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What's next?

No.	Training Module	Format	Length	Q3, 2021/22	Q4, 2021/22	Q1, 2022/23	Q2, 2022/23
1	**Join the SmartOffice Movement**	Online Classroom	2 hours				
2	**Energy management in buildings**	Online Classroom	8 hours				
3	**Energy Retrofits Site visit**	In-person site visit	4 hours				
4	**SmartFacility and the value of building data**	Online/In-person Classroom	4 hours				
5	**Energy Retrofits and Refurbishments**	Online Classroom	2 hours				

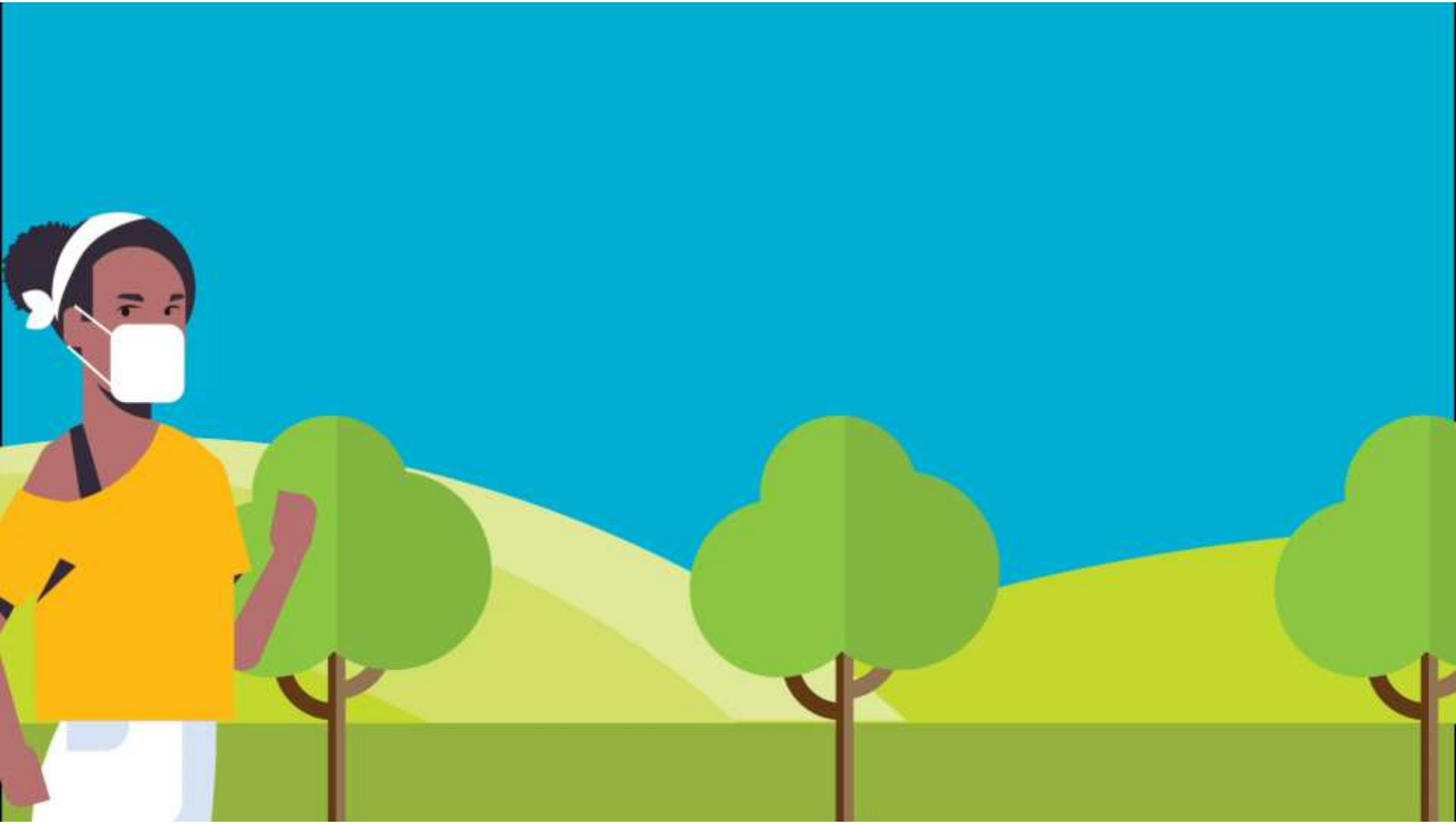
Resources

- Smart Office Handbook
- Make your office smarter resources
- Climate Change Strategy
- Climate Change Action Plan
- My Clean Green Home
- Smart Living guide for your home
- Energy audit sheet
- Example of action plan
- Energy reminder stickers

Rating tools in the market to benchmark progress

- Green Building Council of SA
- EDGE Buildings
- Living Building challenge

Let's ACT against climate change for a stronger Cape Town



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Thank You

Making progress possible. Together.