

2022 HEFMA Development Programme

ENERGY PERFORMANCE CERTIFICATE / ENERGY MANAGEMENT SYSTEM

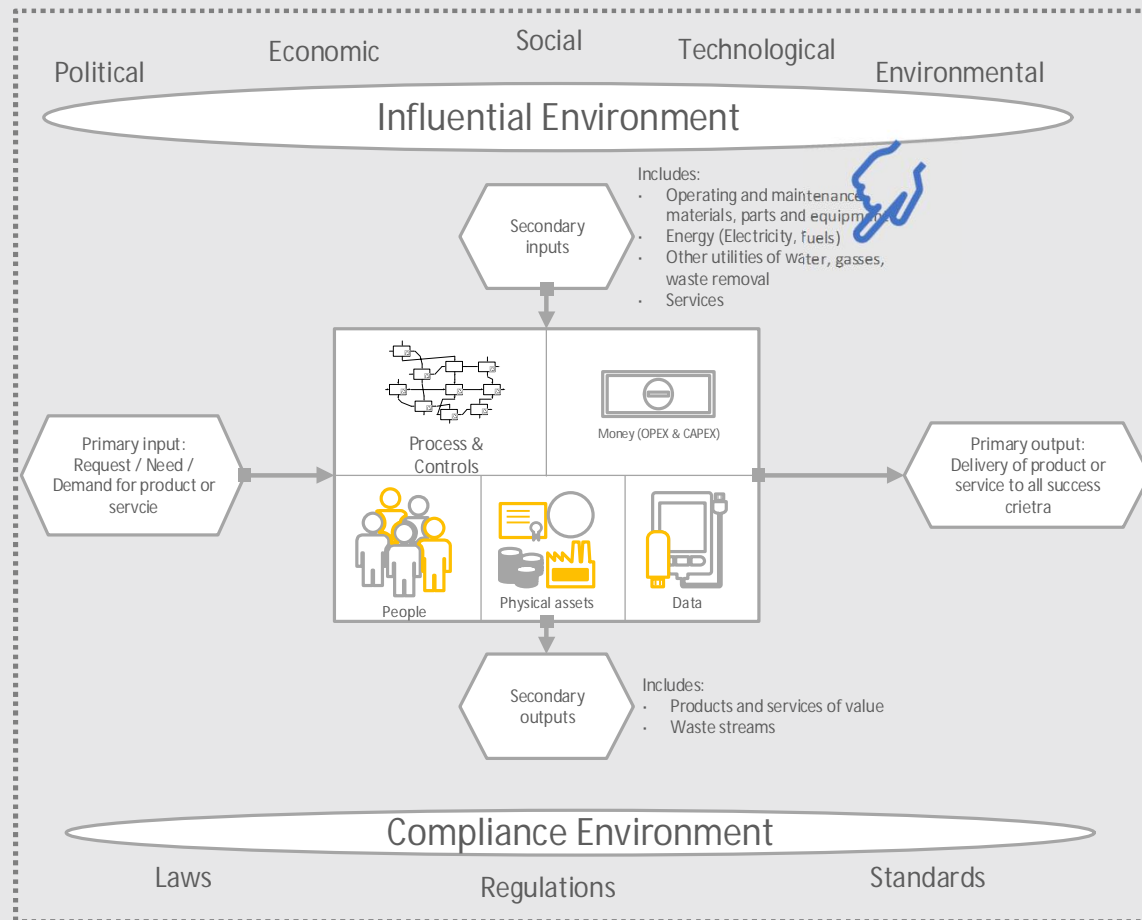
Presenter:
Craig Henry Pr Eng, AFP
CER Facility Management (Pty) Ltd

PROGRAMME

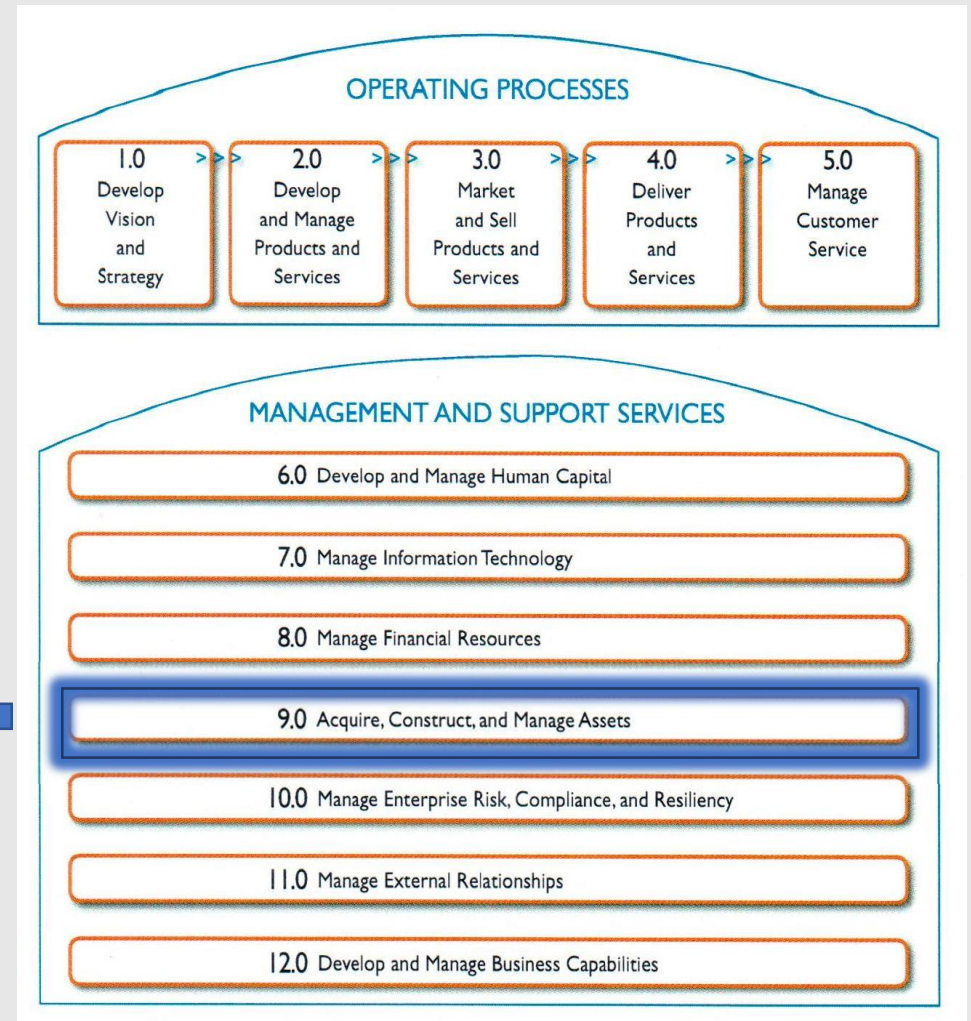
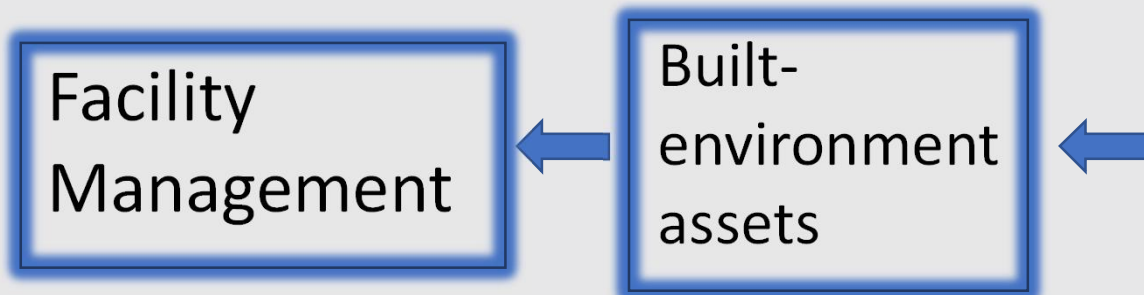
Welcome	09H00 – 09H15	Mzolo
Energy management within Integrated Facility management	09H15 – 09H45	Craig Henry
Energy Performance Certificate (EPC) – Legal requirement from Dec 2022	09H45 – 10H15	Craig Henry
Stellenbosch University - First building to be EPC certified	10H15 – 10H30	Stellenbosch University
Participation survey – To what extent are University's ready for EPCs	10H30 – 10H45	All HEFMA participants
Break	10H45 – 11H00	All
Energy Management System (ISO 50001: 2018) – EPC, a component thereof	11H00 – 11H30	Craig Henry
Green Buildings - Energy management, a component thereof	11H30 – 12H00	Craig Henry
Participation survey – University's that has achieved EMS certification or included in strategy/policy	12H00 – 12H15	All HEFMA participants
Corporate Sustainability Management (CSM) - Green buildings, a component thereof	12H15 – 12H30	Craig Henry
Global Sustainable Development Goals – CSM, a component thereof	12H30 – 12H45	Craig Henry
Closing	12H45 – 13H00	Mzolo

ENERGY MANAGEMENT WITHIN INTEGRATED FACILITY MANAGEMENT

BASIC BUSINESS OPERATING MODEL



ORGANISATION PROCESSES



APQC - American Productivity and Quality Centre's Process Classification Framework

WHAT IS A FACILITY?

- A FACILITY is a Built-Environment for Work (BE_fW), for Living (BE_fL) and/or for Service (BE_fS):
 - BE_fL include our residence and varied other places for non-work purpose, e.g. recreation, vacation and fitness
 - BE_fW is typically the place where you perform responsibilities related to your profession, skill or trade
 - BE_fS include all places where a service is provided to people or other organisations
- A FACILITY can be a BE_fL , BE_fW and BE_fS in one. As example, a local fitness centre, is both a place of work to the fitness instructor, a place of Living to the exercising person, and a place of service where health and wellbeing is provided as a holistic service

WHAT IS FACILITY MANAGEMENT (FM)?

- The international definition of Facility Management per ISO 41011:2017,; *“Organisational function which integrates people, place and process within the built-environment with the purpose of improving the quality of life of people and the productivity of the core business”.*
- FM includes the following:
 - Physical Asset Management (PAM)
 - Provision of several specialised Facility Services, also defined as logistical or business support services
 - The integrative management of activities related to PAM and Facility Services to create the desired Facility experience, being the totality of quantitative performance and qualitative experiences important to people

WHAT ARE FACILITY SERVICES?

- Individual services delivered with excellence, and all services managed to create a seamless experience:



Source and credit: Advanced Workplace Associates Limited, The Workplace Management Framework, Dr Graham Jervis and Andrew Mawson

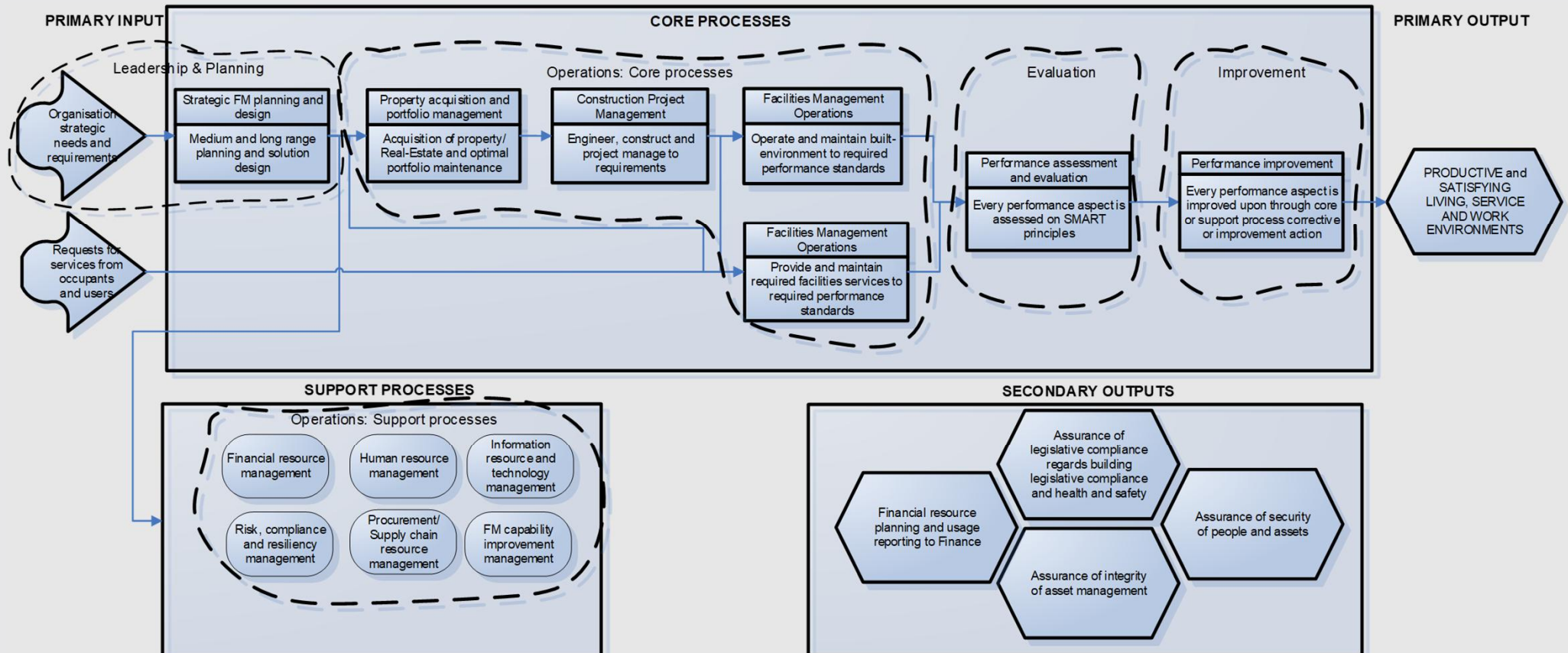
WHAT ARE FACILITY SERVICES?

- Assuring the health and safety of all facility users
- Securing the organisation's people and assets, services include:
 - Access control
 - Physical guarding
 - Intrusion detection and response
- Facilitating communications and information exchange, services include:
 - Visitor reception and facilitation
 - Telephonic contact facilitation
 - Meeting and conferencing facilitation
 - Reprographic services
 - Postal and courier services
 - Documentation storage, retrieval and disposal service
- Workplace productivity, services include:
 - Workplace design
 - Space planning and management
 - Provision of workplace furnishings and enablers
- Mobility enablement, services include:
 - Vehicle parking management
 - Vehicle fleet provision
 - Internal or inter office move or relocation management
 - Domestic and international travel and accommodation
- Workplace conveniences, services include:
 - Catering / food and beverage service;
 - Child-care services and
 - Personal care and medical services

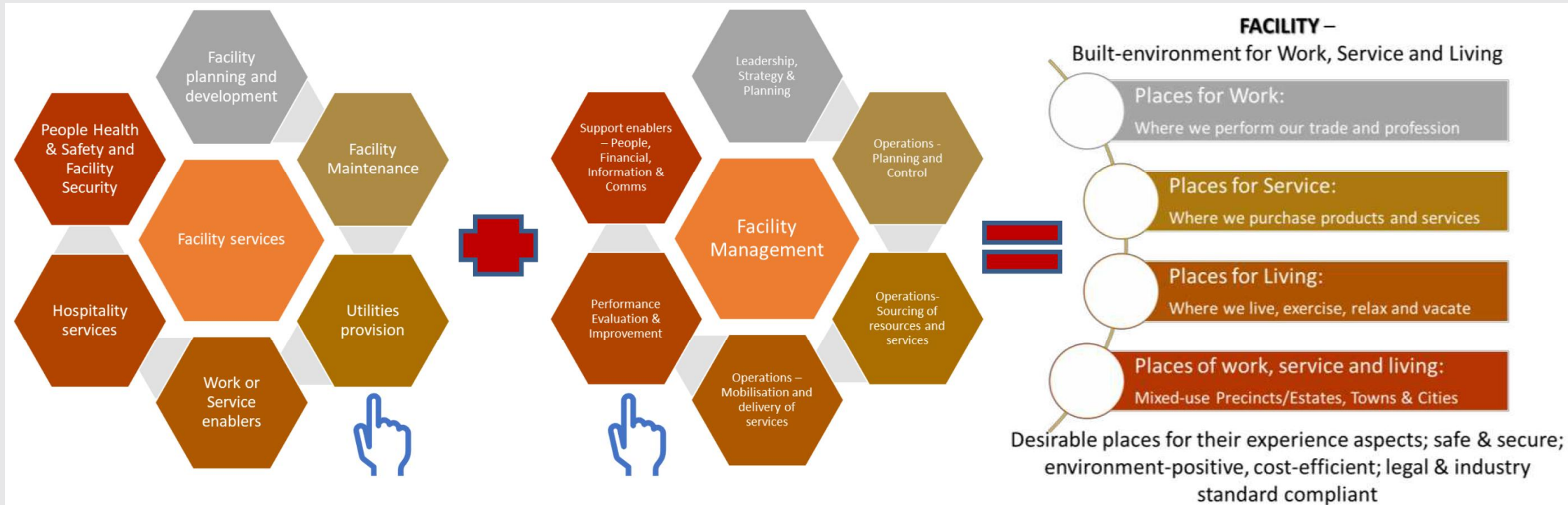
KEY PERFORMANCE AREAS & ENABLING PROCESSES



KEY PERFORMANCE AREAS & ENABLING PROCESSES



INTEGRATED FACILITY MANAGEMENT OVERVIEW



ENERGY PERFORMANCE CERTIFICATE

National Energy Act, 1998 – Regulation for the mandatory display and submission of energy performance certificates for buildings

APPLICATION - PUBLIC SECTOR

- Dominant occupancy classification in terms of Regulation A20 of the National Building Regulations as:
 - A1 (Entertainment and public assembly)
 - A2 (Theatrical and indoor sport)
 - A3 (Places of instruction)
 - G1 (Offices)
- Building has been in operation for a period of two years or longer
- Building has not been subject to a major renovation within the past two years of operation
- Building has a total net floor area of over 1000 m²

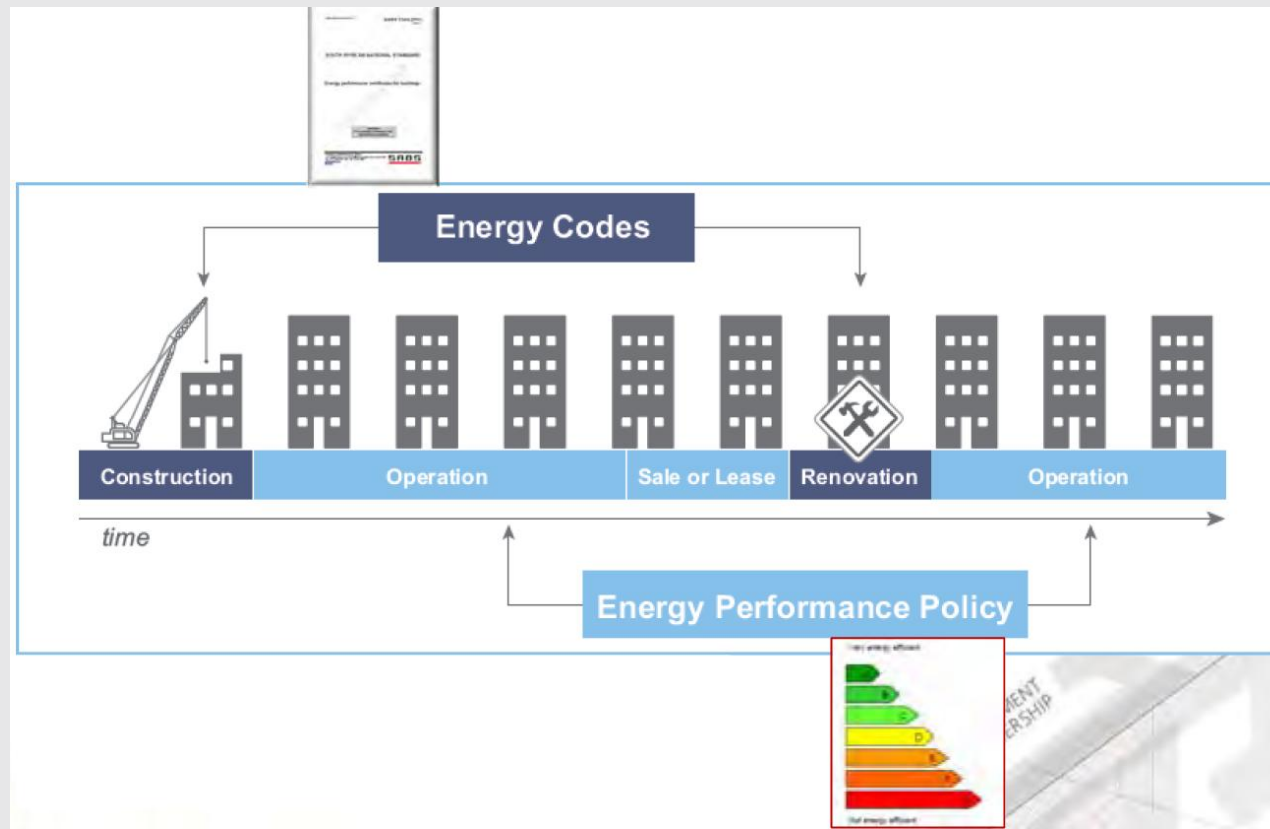
REQUIREMENTS

- Accounting Officer must comply with requirements of the Regulation within 2 years of its publication, being December 2022
- Must be valid for 5 years
- Must display certificate at entrance to building
- Must submit certificate to SANEDI within 3 months of issue

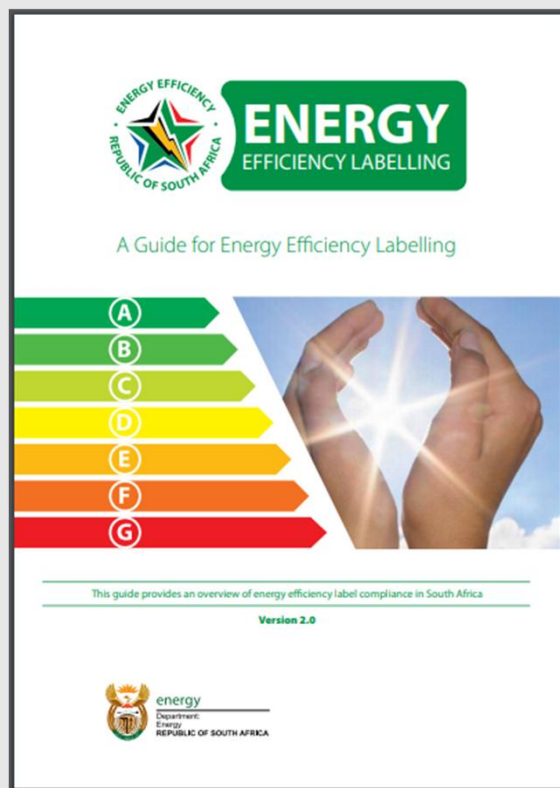
DEFINITIONS

- Energy Performance Certificate (EPC)
 - Certificate issued by an accredited Inspection Body
 - Certificate issued in accordance with the South African National Standard SANS 1544: 2014 Energy performance certificates for buildings
- Energy Performance:
 - Net energy consumed in kilowatt hours per square meter per year (kWh /m² /a)
 - Includes energy consumed for heating, hot water heating, cooling, ventilation and lighting
 - Excludes energy consumed by garages, car parks and storage areas; and outdoor services

LINKING ENERGY CODES FOR CONSTRUCTION TO PERFORMANCE DISCLOSURE IN OPERATIONS



SANS 10400XA – MAXIMUM ANNUAL CONSUMPTION



Classification of occupancy of building	Description of building	Maximum energy consumption kWh/m ²					
		Climatic zone ^a					
		1	2	3	4	5	6
A1	Entertainment and public assembly	420	400	440	390	400	420
A2	Theatrical and indoor sport	420	400	440	390	400	420
A3	Places of instruction	420	400	440	390	400	420
A4	Worship	120	115	125	110	115	120
F1	Large shop	240	245	260	240	260	255
G1	Offices	200	190	210	185	190	200
H1	Hotel	650	600	585	600	620	630

NOTE 1 The annual consumption per square metre shall be based on the sum of the monthly consumption of 12 consecutive months.

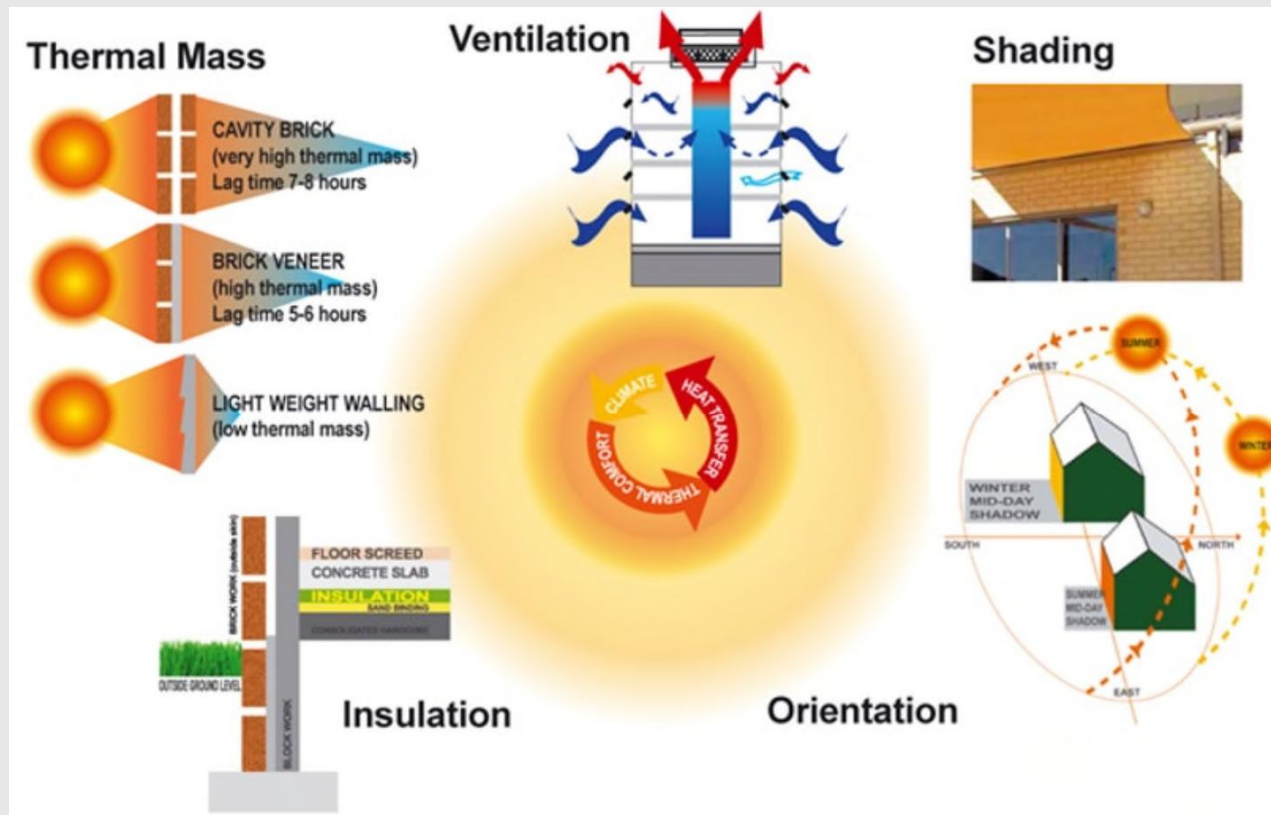
NOTE 2 Non-electrical consumption, such as fossil fuels, shall be accounted for on a non-renewable primary energy thermal equivalence basis by converting megajoules to kilowatt hours.

SANS 10400 XA PROMOTES FOLLOWING TOWARDS CLIMATE CHANGE MITIGATION

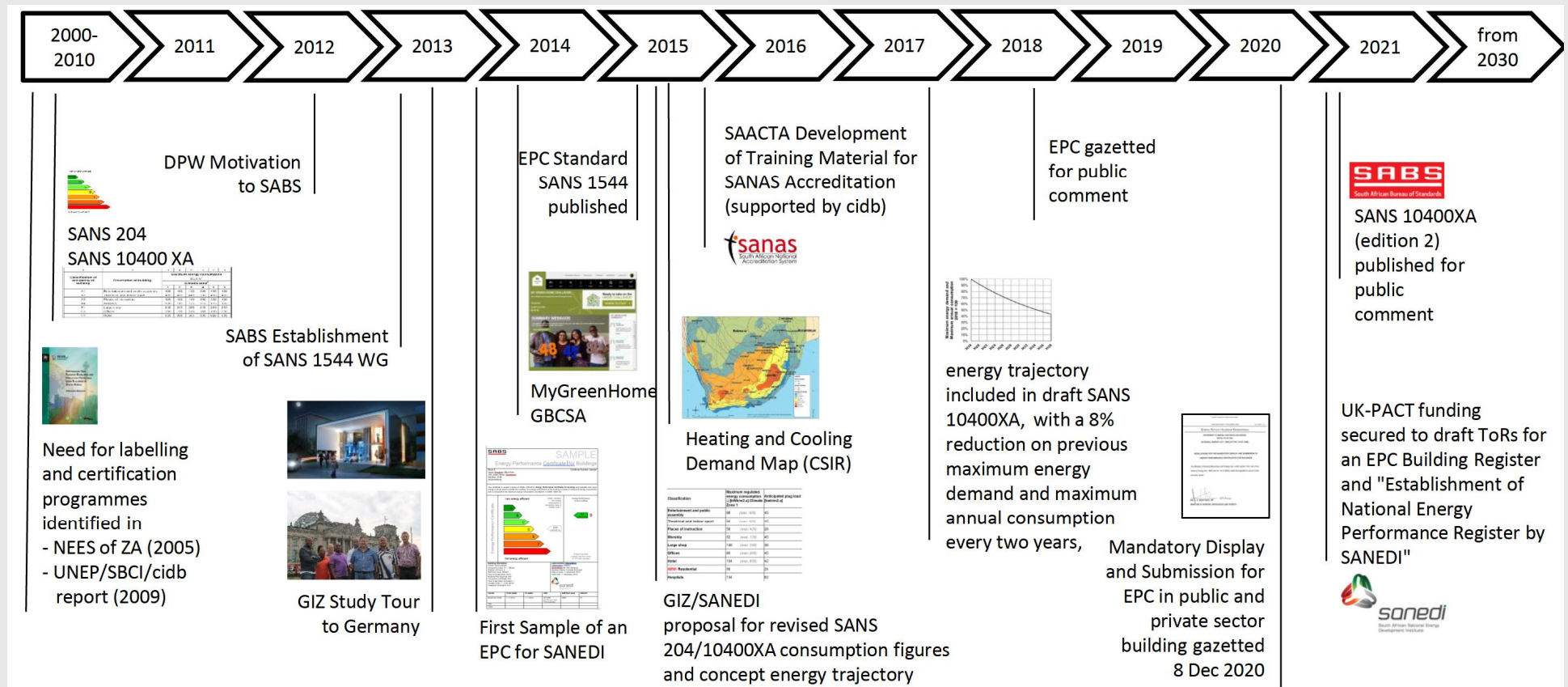
- Control comfort (heating and cooling) without consuming fuels
- Use the orientation of the building to control heat gain and heat loss
- Use the shape of the building (plan and section) to control air flow
- Use materials to control heat or cold
- Maximize the use of free solar energy for heating and lighting
- Maximize the use of free ventilation for cooling
- Use shade (natural or architectural) to control heat gains

“Correctly designing a building envelope, combined with energy saving techniques can reduce both energy losses and energy consumption by up to 78 percent”

PASSIVE DESIGN FOR IMPROVED ENERGY EFFICIENCY



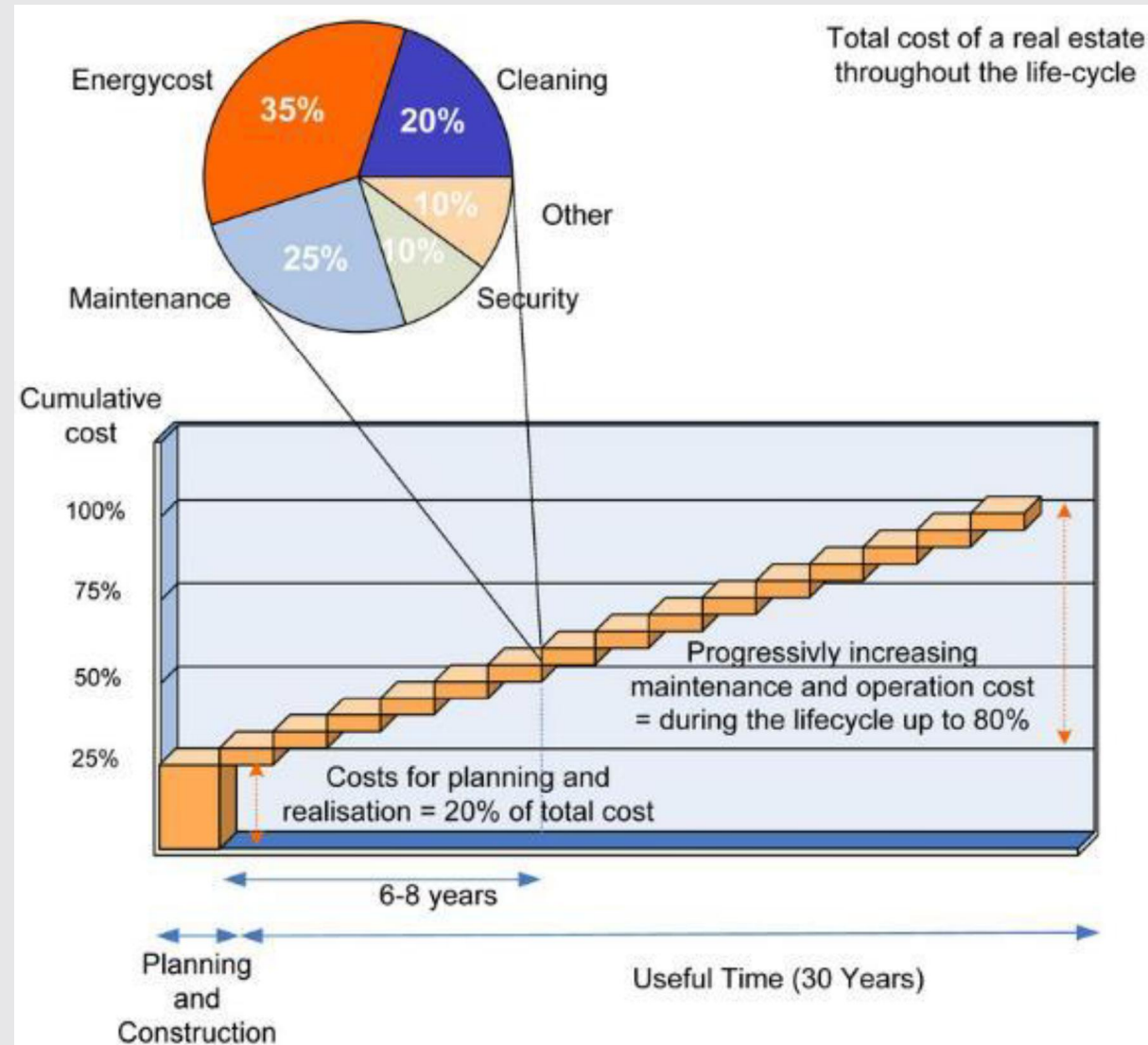
EPS DEVELOPMENT TIMELINE



EPC IN CONTEXT OF SA'S 2030 ENERGY EFFICIENCY TARGET

Sector	2030 Target, (based on 2015)	Examples of Actions
Economy-wide	29%	
Industry & Mining	16%	Energy management, Carbon Tax, 12L (incentive)
Residential	33%	Building Standards, Appliance Labelling
Public Buildings	50%	Building Standards, DPW Policy, Energy Performance Certificates
Commercial	37%	Building Standards, DPW Accord, Energy Performance Certificates
Agriculture	30%	Modernisation
Transport	39%	Vehicle Efficiency Standards, Carbon Tax
Municipal Services	20%	Energy Service Companies,
Power Sector-distribution non technical issues	8% 0.5%	Mandatory efficiency improvements, Cogeneration, Waste Heat Recovery

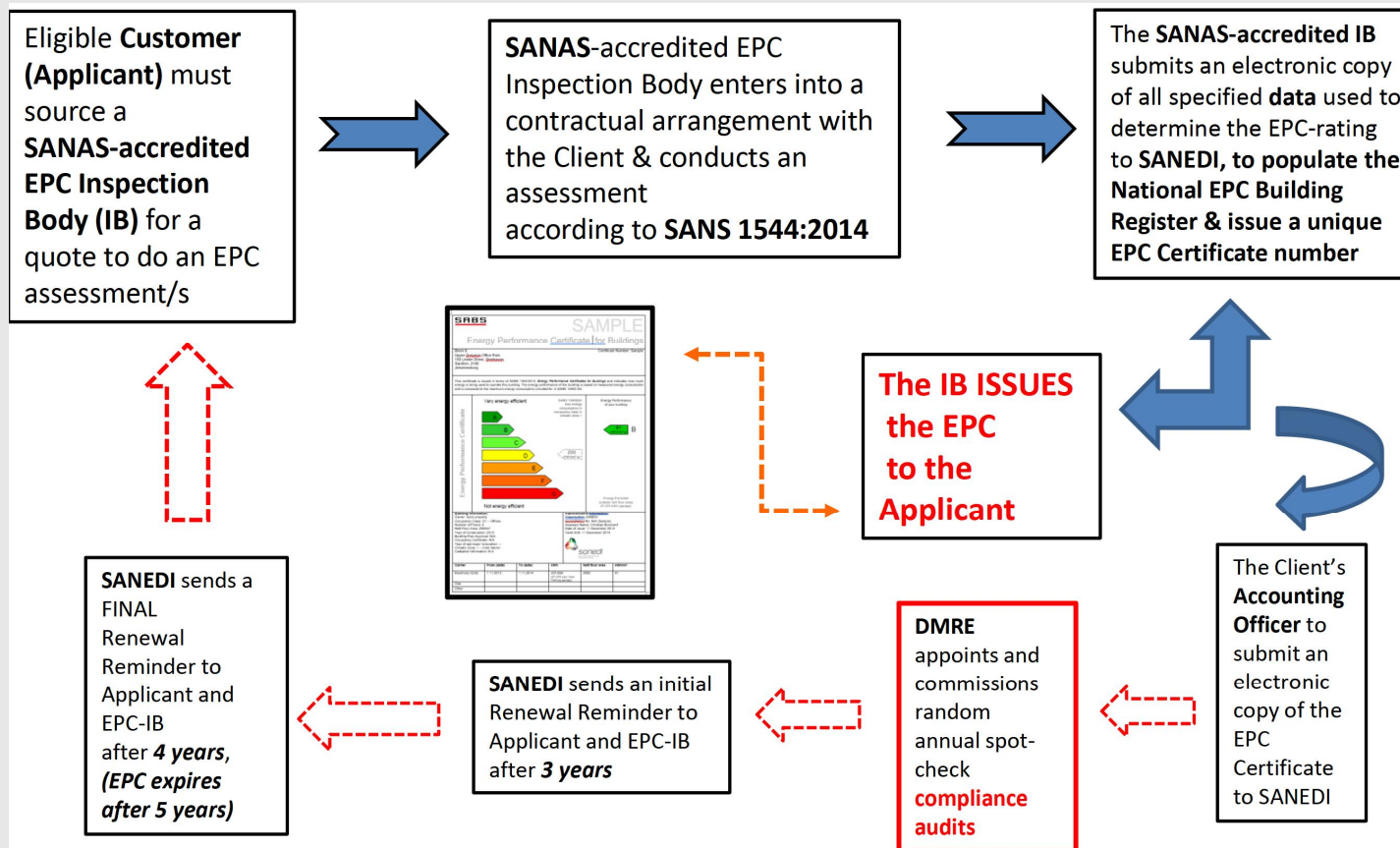
ENERGY COST COMPONENT WITHIN BUILDING LIFECYCLE COST



EPC MEASUREMENT STANDARD – SANS 1544:2014

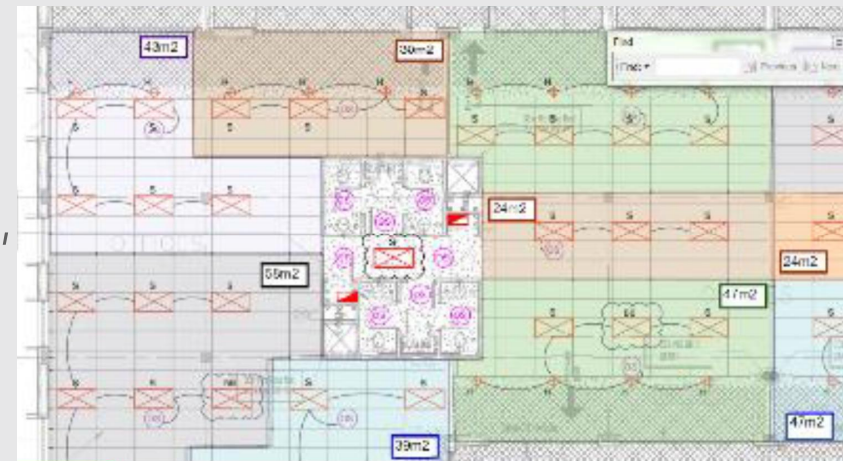


EPC APPLICATION PROCESS



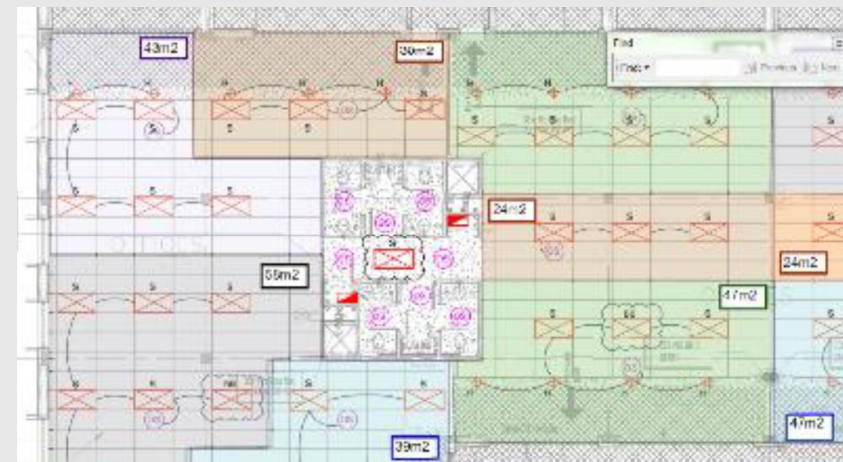
EPC MEASUREMENT STANDARD – SANS 1544:2014

- Energy performance of the building - measured annual net energy consumption ($kWh/m^2/pa$) of the net floor area
- All energy carriers, i.e. *not only electricity*
- Net energy consumption is gross/total energy consumption less for outside areas
- Occupied net floor area = *net floor area*, minus the unoccupied floor area.
- One year's energy consumption from recorded data, energy bills or **m**measurements



EPC MEASUREMENT STANDARD – SANS 1544:2014

- Mixed occupancy
 - Any occupancy with less than 10% of net floor area will be included in the dominant occupancy
 - Unless the energy consumption is greater than 10% of the total energy consumption
 - A pro-rated energy-consumption value will be calculated for occupancies greater than 10% of net floor area.



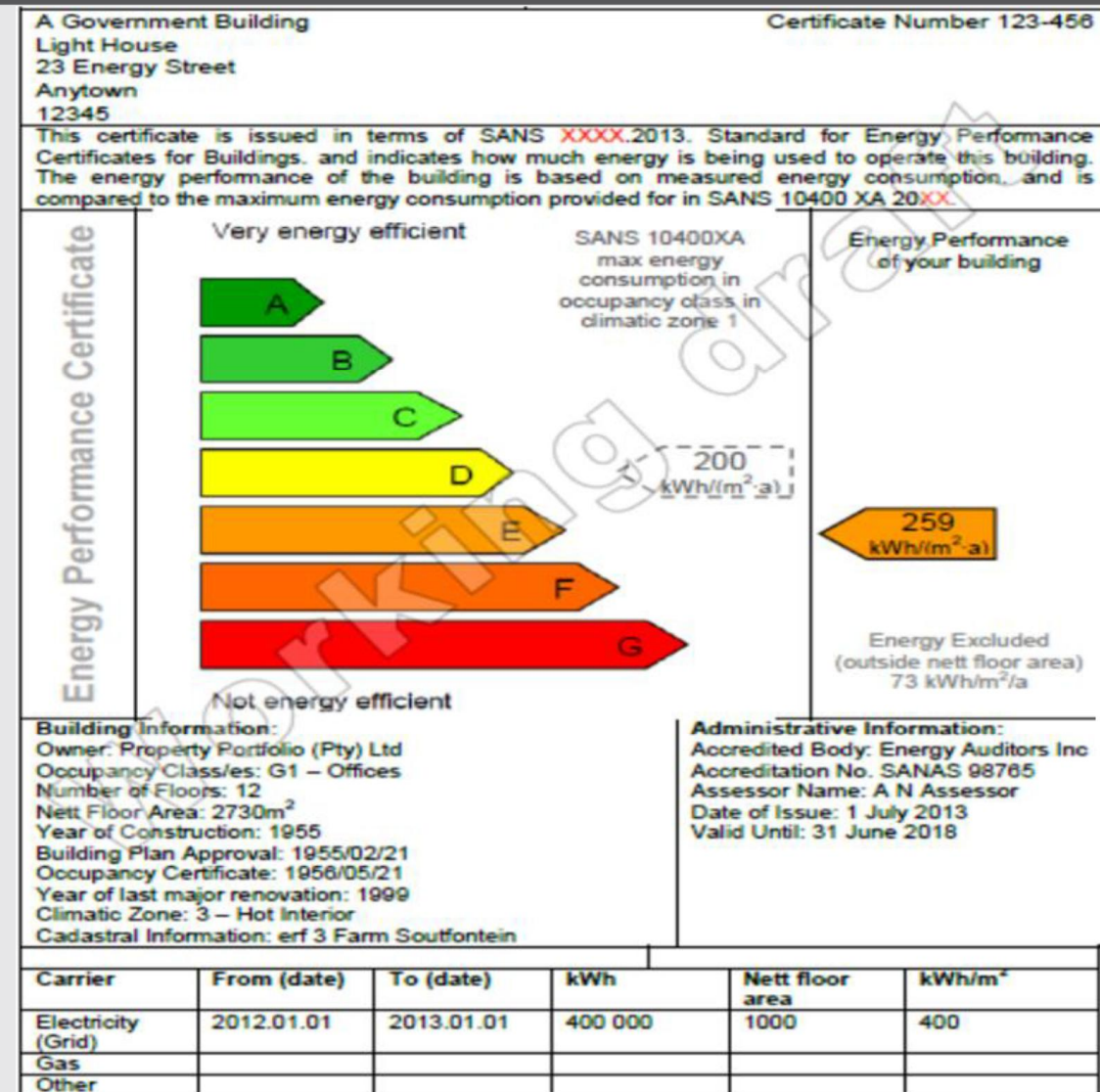
EPC DATA CAPTURE TEMPLATE - EXAMPLE

Name of building			A Government Building		
Occupancy class		Office (G1)		Climatic zone	1 (Cold interior)
Occupancy rate (in net floor area)				C (100 %)	
A - Energy used in entire building complex					
Energy used for	Heating	Cooling	Lighting	Electrical appliances	Outside net floor area (specify under B)
Please tick	x	x	x	x	x
Energy source		From (date)		To (date)	kWh used
Electricity		2011/01/01		2011/12/31	415,000
Gas		n/a		n/a	
Other		n/a		n/a	

B - Energy used outside net floor area					
Energy used for	Watts	N°	Time of use	Calculation	kWh used
Lights parking	58	25	24/7	0,058[kW]·25·24[h]·365[d]	12,702
Outside lights	100	120	8 h/d	0,1[kW]·120·8[h]·365[d]	35,040
Ventilation storage	45	1	24/7	0,045[kW]·25·24[h]·365[d]	9,855
Fridges storage	500	2	24/7	0,5[kW]·2·24[h]·365[d]	8,760
Total					91,761*
* Represents more of 10 % of total consumption [415,000 kWh] therefore displayed in EPC as excluded energy in kWh/(m²·a) [91,761/1,250]					73

C - Net floor area					1,250 m²	
Energy used in entire building complex in kWh		415,000		Consumption outside net floor area in kWh	91,761	
Energy consumption net floor area in kWh					323,239	
Energy consumption net floor area in kWh/(m²·a)					259	
Maximum energy consumption (SANS 10400-XA)		Occupancy class	G1-Office	Climatic zone	1	200
Variance kWh/(m²·a) [259-200]					59	
Multiple of reference value [259/200]					1,29	
Performance scale (see 5.1.3)					E	

EPC - EXAMPLE



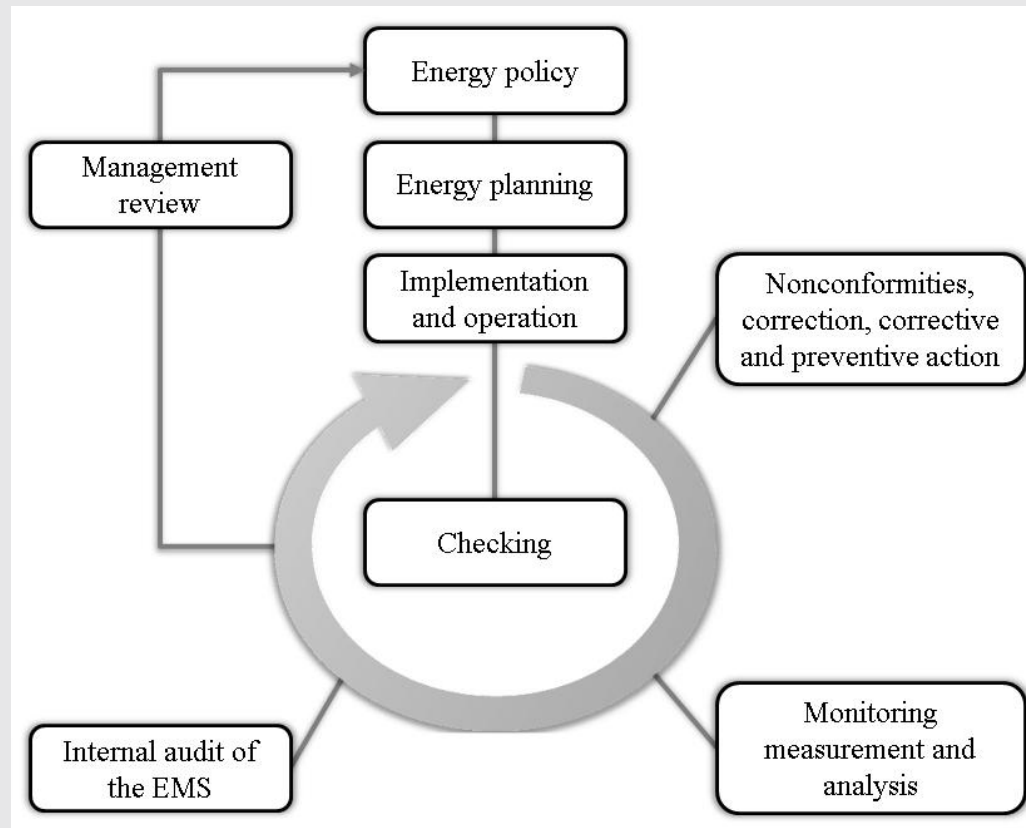
CREDIT TO STELLENBOSCH UNIVERSITY - FIRST EPC ISSUED

- On 18 February 2021, the Admin B building at Stellenbosch University, which houses the vice chancellor and executive team, received the first-ever EPC for a building in South Africa
- The EPC was issued by Energy Management and Verification Services (EMVS) who is the first inspection body accredited by the South African National Accreditation System (SANAS)

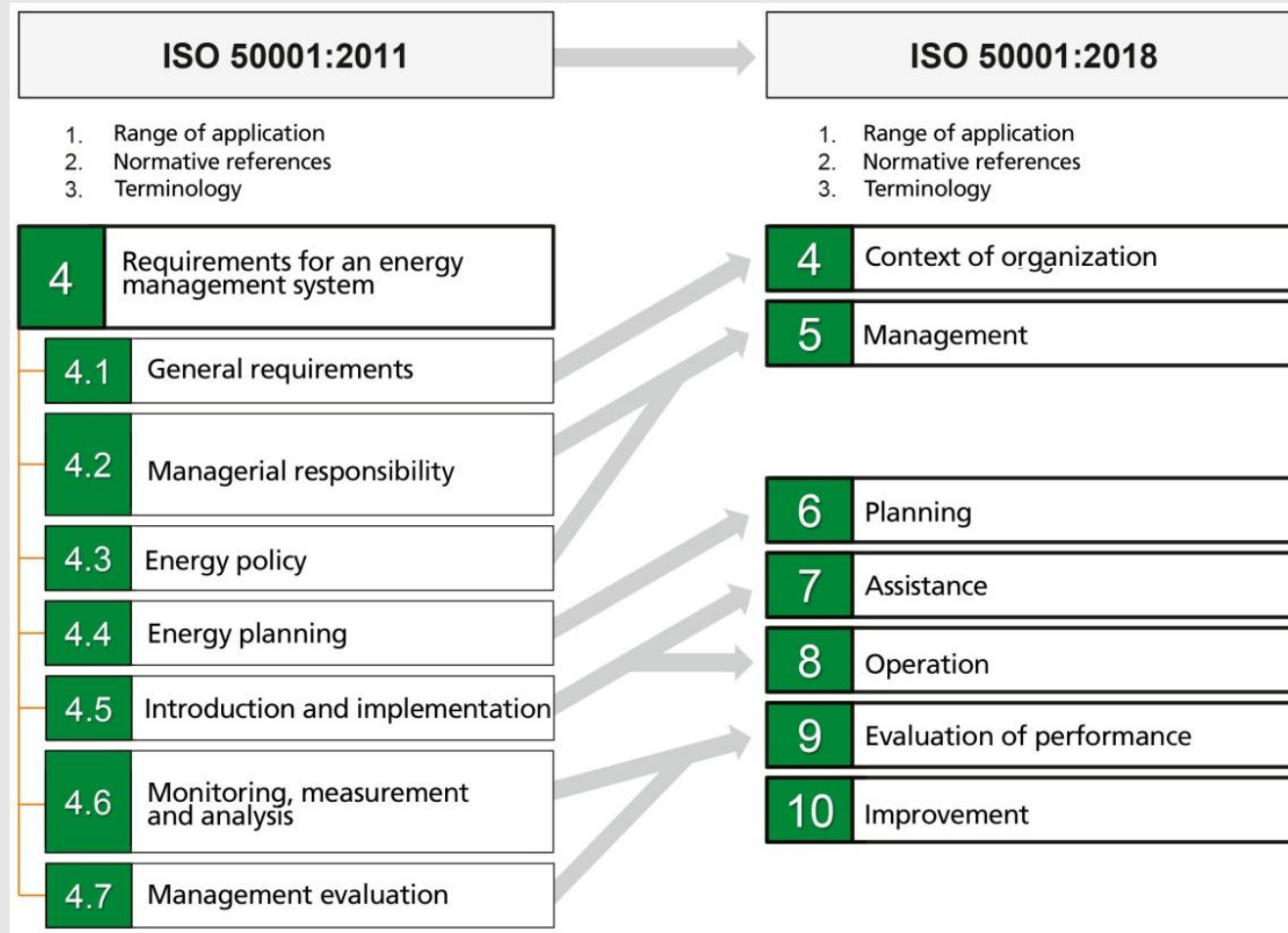


ENERGY MANAGEMENT SYSTEM STANDARD ISO 50001: 2018

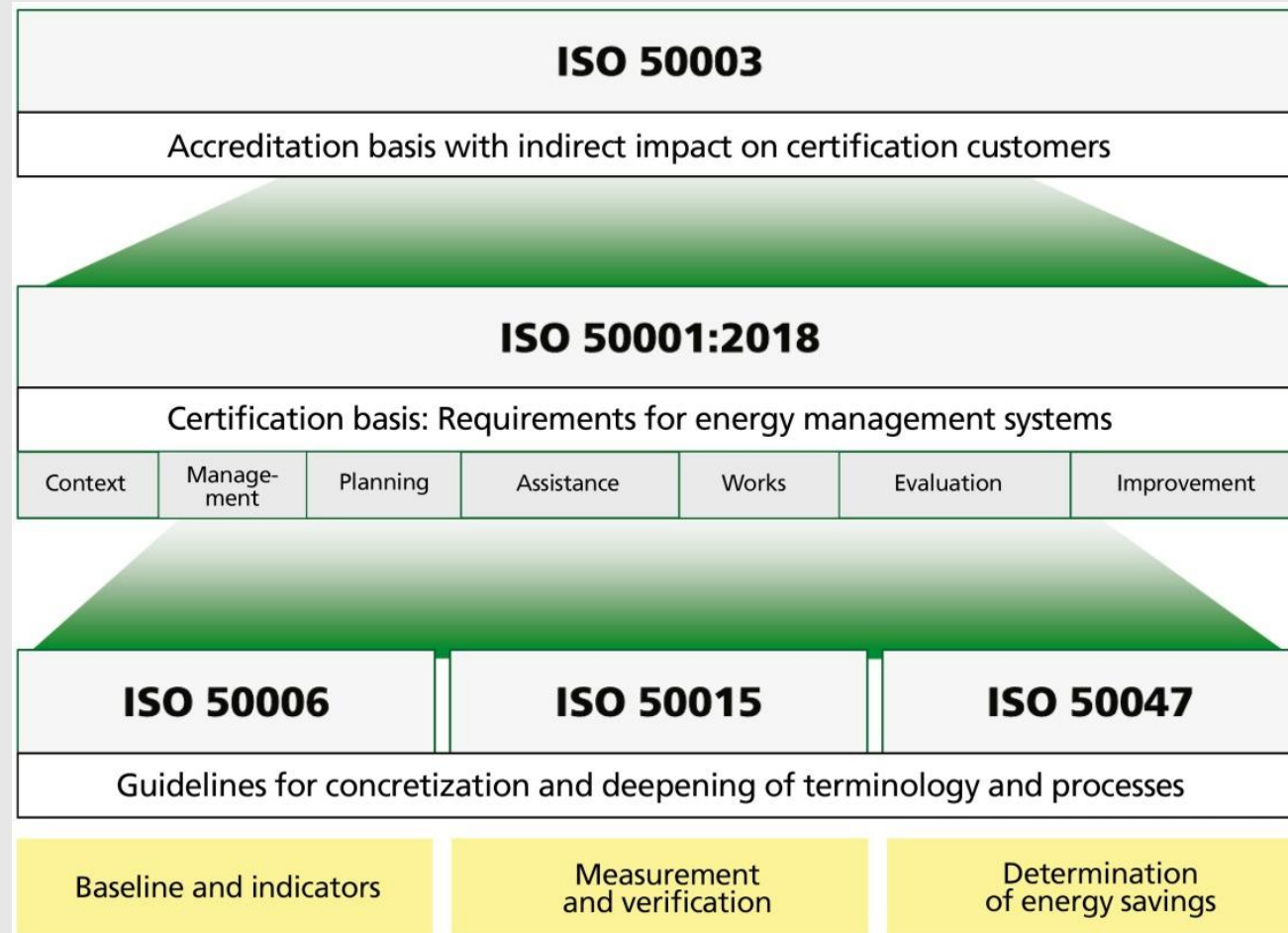
ISO 55001 BASIC OVERVIEW



ISO 55000 REVISION FROM 2011 TO 2018



ISO 50000 PORTFOLIO OF STANDARDS



ISO 50001 – REQUIREMENTS FOR ENERGY MANAGEMENT SYSTEM



ENERGY MANAGEMENT ... PART OF GREEN BUILDINGS

SOUTH AFRICAN GREEN BUILDING COUNCIL'S GREEN STAR SCHEME FOR NEW BUILDING DESIGN

Category	Criteria	Points Available
Management	Green Star SA Accredited Professional	2
	Commissioning Clauses	2
	Building Tuning	2
	Independent Commissioning Agent	1
	Building User Guide	1
	Environmental Management	2
	Waste Management	3
	Air tightness Testing	1
Indoor Environmental Quality	Ventilation Rates	3
	Air Change Effectiveness	2
	Carbon Dioxide Monitoring and Control	1
	Daylight	3
	Daylight Glare Control	1
	High Frequency Ballast	1
	Electric Lighting Levels	1
	External Views	2
	Thermal Comfort	2
	Individual Comfort Control	2
	Hazardous Materials	1
	Internal Noise Levels	2
	Volatile Organic Compounds	3
	Formaldehyde Minimization	1
	Mould Prevention	1
	Tenant Exhaust Riser	1
	Environmental Tobacco Smoke (ETS) Avoidance	1

SOUTH AFRICAN GREEN BUILDING COUNCIL'S GREEN STAR SCHEME FOR NEW BUILDING DESIGN

Category	Criteria	Points Available
Energy	Conditional Requirements	0
	Greenhouse Gas Emissions	
	Energy Sub-metering	2
	Lighting Power Density	
	Lighting Zoning	2
	Peak Energy Demand Reduction	
Transport	Provision of Car Parking	2
	Fuel-Efficient Transport	
	Cyclist Facilities	3
	Commuting Mass Transport	
	Local Connectivity	2
Water	Occupant Amenity Water	
	Water Meters	2
	Landscape Irrigation	
	Heat Rejection Water	4
	Fire Systems Water Consumptions	

SOUTH AFRICAN GREEN BUILDING COUNCIL'S GREEN STAR SCHEME FOR NEW BUILDING DESIGN

Category	Criteria	Points Available
Materials	Recycling Waste Storage	2
	Building Re-use	
	Re-used Materials	1
	Shell & Core or Integrated Fit-out	
	Concrete	3
	Steel	
	PVC Minimization	1
	Sustainable Timber	
	Design or Disassembly	1
	Dematerialization	
	Local Sourcing	2
Land Use & Ecology	Conditional Requirements	
	Topsoil	1
	Re-use of Land	
	Reclaimed Contaminated Land	2
	Change of Ecological Value	
Emissions	Refrigerant/ Gaseous ODP	1
	Refrigerant GWP	
	Refrigerant Leaks	2
	Insulant ODP	
	Watercourse Pollution	3
	Discharge to Sewer	5
	Light Pollution	1
	Legionella	1
	Boiler and Generator Emissions	1
Innovation	Innovative Strategies & Technologies	5
	Exceeding Green Star SA Benchmarks	5
	Environmental Design Initiatives	5

GREEN BUILDING RATING SCHEMES – COMMON ENERGY MANAGEMENT FOCUSES

Sub-category	Description / Purpose
Energy Consumption (Greenhouse gas emissions)	To encourage the reduction of greenhouse gas emissions associated with the use of energy in building operations.
Energy efficient equipment	<ul style="list-style-type: none">• Identification of the building's unregulated energy consuming loads which have a major impact on the total unregulated energy demand.• Demonstrate a meaningful reduction in the total unregulated energy demand of the building.
Energy efficient transport systems	<ul style="list-style-type: none">• An analysis of the transport demand and usage patterns is undertaken to determine the optimum number and size of lifts, escalators or moving walks.• Energy efficient installations are specified.
Energy monitoring	<ul style="list-style-type: none">• Energy metering systems are installed to enable energy consumption to be assigned to end uses.• Sub-meters are provided for high energy load and tenancy areas.• Specification of energy display devices.
External lighting	Specification of energy efficient light fittings for external areas of the development and controls to prevent use during daylight hours or when not needed.

GREEN BUILDING RATING SCHEMES – COMMON ENERGY MANAGEMENT FOCUSES

Sub-category	Description / Purpose
Low carbon design	<ul style="list-style-type: none">• Analysis of the proposed building design and development is undertaken to identify opportunities for and encourage the adoption of passive design solutions, including free cooling.• A feasibility study has been carried out to establish the most appropriate on-site or near-site low or zero carbon (LZC) energy sources for the building or development and is specified.
Peak Electricity Demand	To recognise operational practices that reduces peak demand on electricity supply infrastructure.
Reduction of energy use and carbon emissions	Recognise improvements in the energy performance of the building above national building regulations in relation to heating and cooling energy demand, primary energy consumption and carbon dioxide emissions.

GREEN BUILDING RATING SCHEMES – COMMON ENERGY MANAGEMENT FOCUSES

Key Focus Area	Objectives	New Buildings	Existing Buildings
Energy	Energy demand and consumption target setting, measurement, monitoring, controlling and reporting	X	X
	Energy waste elimination and demand and consumption efficiency maximisation	X	X
	Energy diversification to renewables and other low-carbon and/or GHG emission energy sources	X	

GREEN BUILDINGS ... PART OF CORPORATE SUSTAINABILITY MANAGEMENT

CORPORATE SUSTAINABILITY MANAGEMENT

- Triple bottom line: environmental, social, and economical
- Corporate culture guided to the economic, environmental, and social results.
- Sustainable production or service-delivery processes, through:
 - Reduced consumption of energy
 - Reduced consumption of non-renewable or toxic materials
 - Reduced emissions and waste

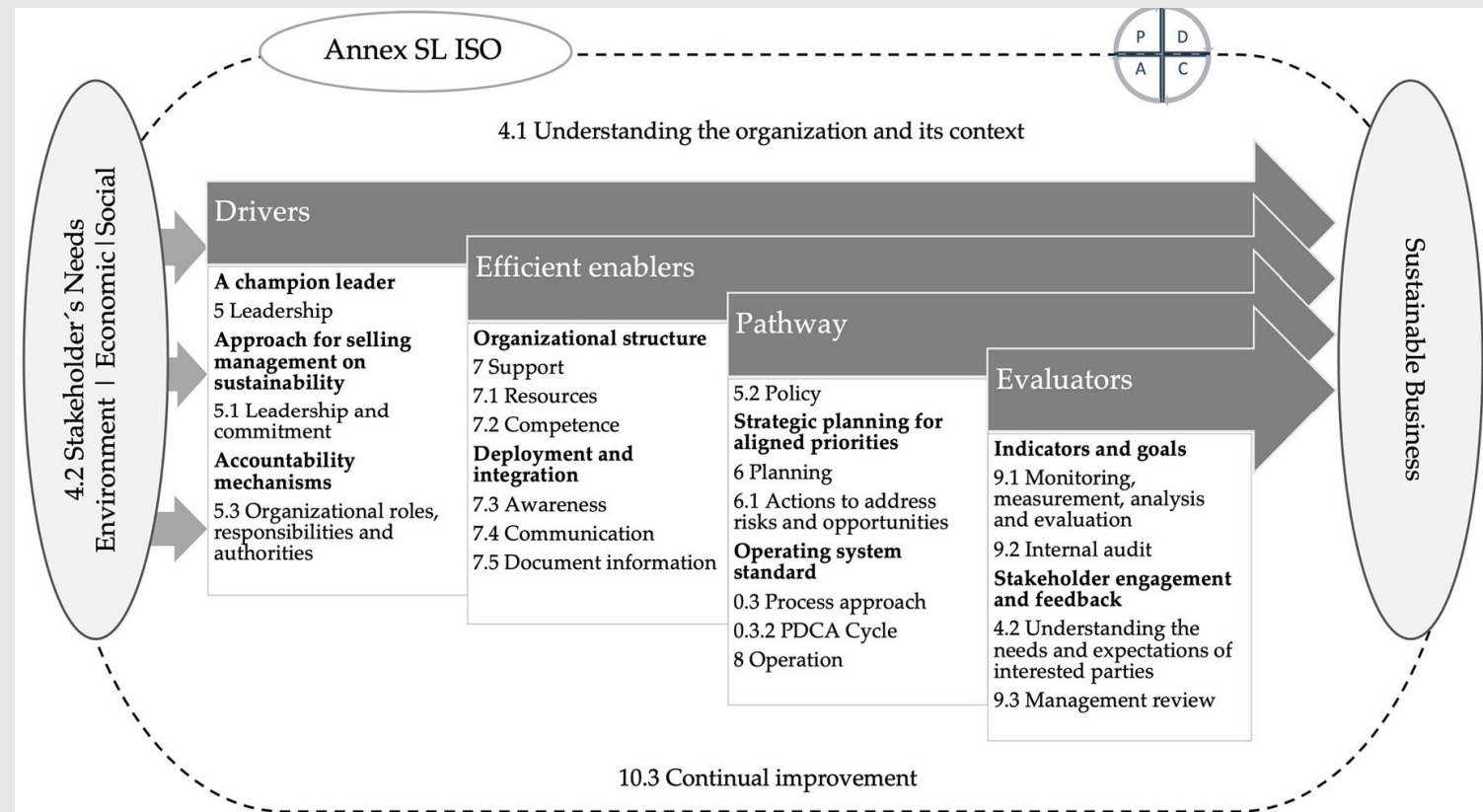
MANAGEMENT SYSTEMS STANDARDS (MSS)

Standard	Benefit
ISO 9001:2015 – Quality Management	Guarantee the quality of its products and services Boost the growth of the economic pillar, i.e. for-profit
ISO 14001:2015 – Environmental Management	Preservation of the environment, i.e. for-the-planet
OHSAS 18001:2007 – Health and Safety Management	Provide for the safety and health of employees, without neglecting social responsibility, ethical principles, and risk-based thinking

INTEGRATED MANAGEMENT SYSTEMS

Common for standards:

- Quality
- Environment
- Health and Safety



CORPORATE SUSTAINABILITY MANAGEMENT ... PART OF GLOBAL SUSTAINABILITY OBJECTIVES

UNITED NATIONS 17 SUSTAINABLE DEVELOPMENT GOALS



SDG 7 – AFFORDABLE AND CLEAN ENERGY

- Between 1990 and 2010, the number of people with access to electricity increased by 1.7 billion. That's progress to be proud of. And yet as the world's population continues to rise, still more people will need cheap energy to light their homes and streets, use phones and computers, and do their everyday business.
- How we get that energy is at issue; fossil fuels and greenhouse gas emissions are making drastic changes in the climate, leading to big problems on every continent.
- Instead, we can become more energy-efficient and invest in clean energy sources such as solar and wind. That way we'll meet electricity needs and protect the environment. How's that for a balancing act?

SDG 12 – SUSTAINABLE CONSUMPTION AND PRODUCTION

- Some people use a lot of stuff, and some people use very little—in fact, a big share of the world population is consuming too little to meet even their basic needs. Instead, we can have a world where everybody gets what they need to survive and thrive.
- And we can consume in a way that preserves our natural resources so that our children can enjoy them, and their children and their children after that.
- The hard part is how to achieve that goal. We can manage our natural resources more efficiently and dispose of toxic waste better.
- Cut per capita food waste in half globally.
- Get businesses and consumers to reduce and recycle waste.
- And help countries that have typically not consumed a lot to move towards more responsible consumption patterns.

SDG 13 – CLIMATE ACTION

- Every country in the world is seeing the drastic effects of climate change, some more than others. On average, the annual losses just from earthquakes, tsunamis, tropical cyclones and flooding count in the hundreds of billions of dollars.
- We can reduce the loss of life and property by helping more vulnerable regions—such as land-locked countries and island states—become more resilient.
- It is still possible, with the political will and technological measures, to limit the increase in global mean temperature to two degrees Celsius above pre-industrial levels— and thus avoid the worst effects of climate change.