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The Role of Facilities Management Practitioners in achieving Sustainable Development Goals

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Facility and Property Management

UNITED NATIONS SUSTAINABILITY DEVELOPMENT GOALS AND DESIGN FOR SUSTAINABILITY

United Nations Sustainable Development Goals

IN THE YEAR 2015, LEADERS FROM 193 COUNTRIES OF THE WORLD CAME TOGETHER TO FACE THE FUTURE.

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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.

17 Sustainable Development Goals

UNITED NATIONS ENVIRONMENTAL PROGRAMME – DESIGN FOR SUSTAINABILITY

UNEP's Design for Sustainability (D4), DS4 for developing economies and Life Cycle Management for business

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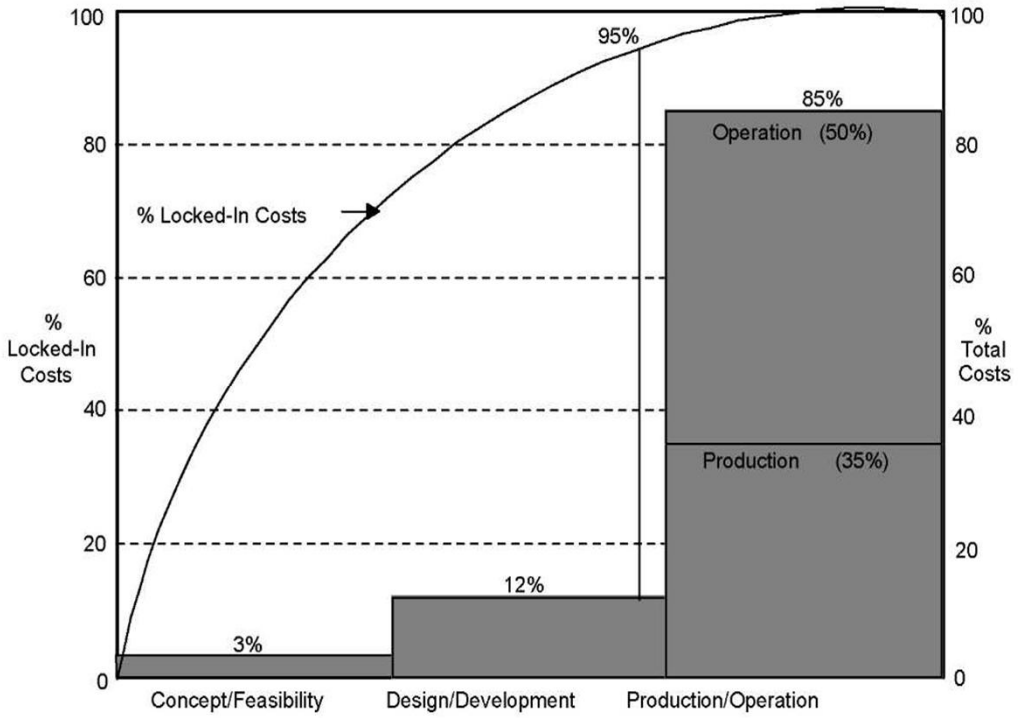
Introduction

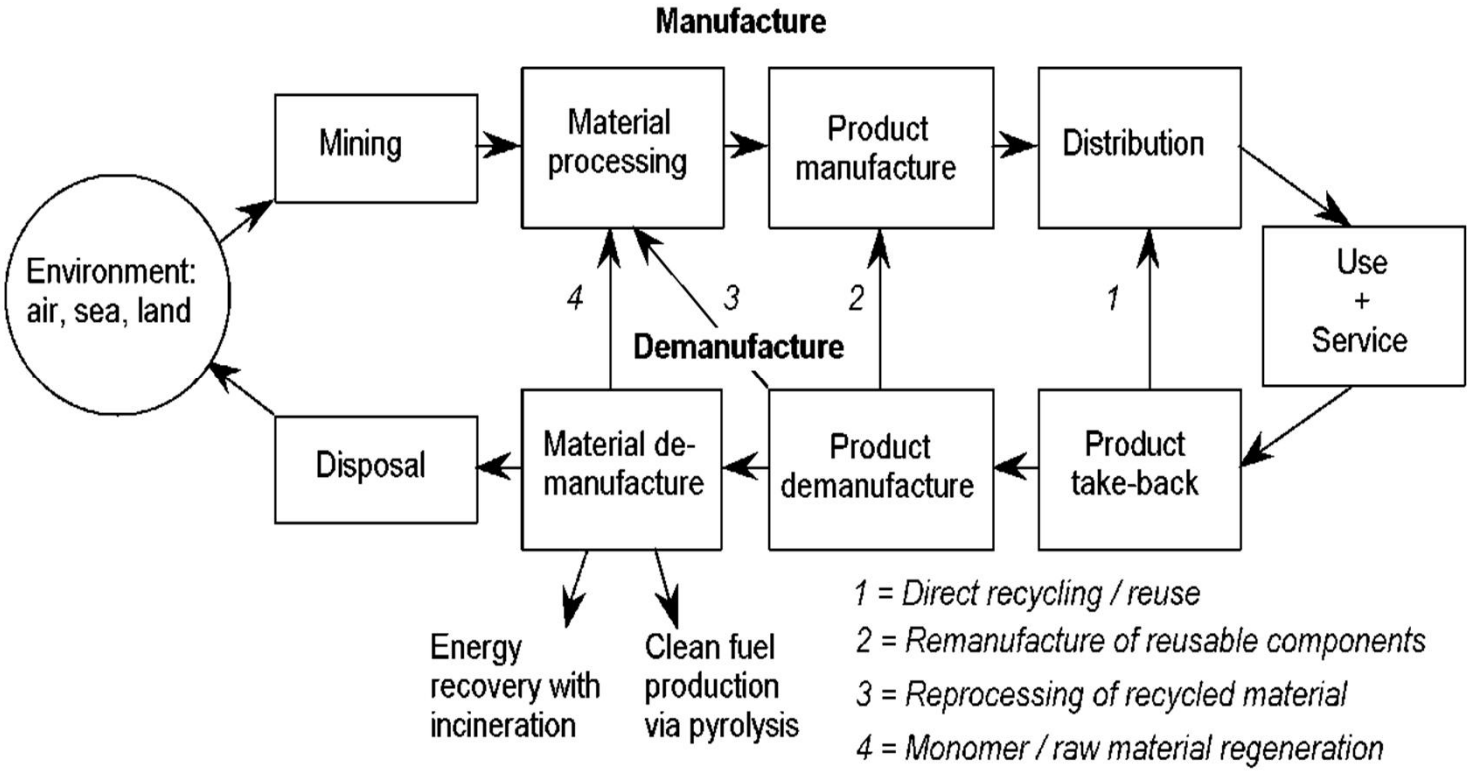
- Extracts from UNEP's Design for Sustainbility
  - "current economic growth and development patterns cannot be sustained"
  - "Decoupling economic growth from negative environmental and social impacts will require producers to rethink design, production and marketing paradigms"

Introduction – Why focus on product design?



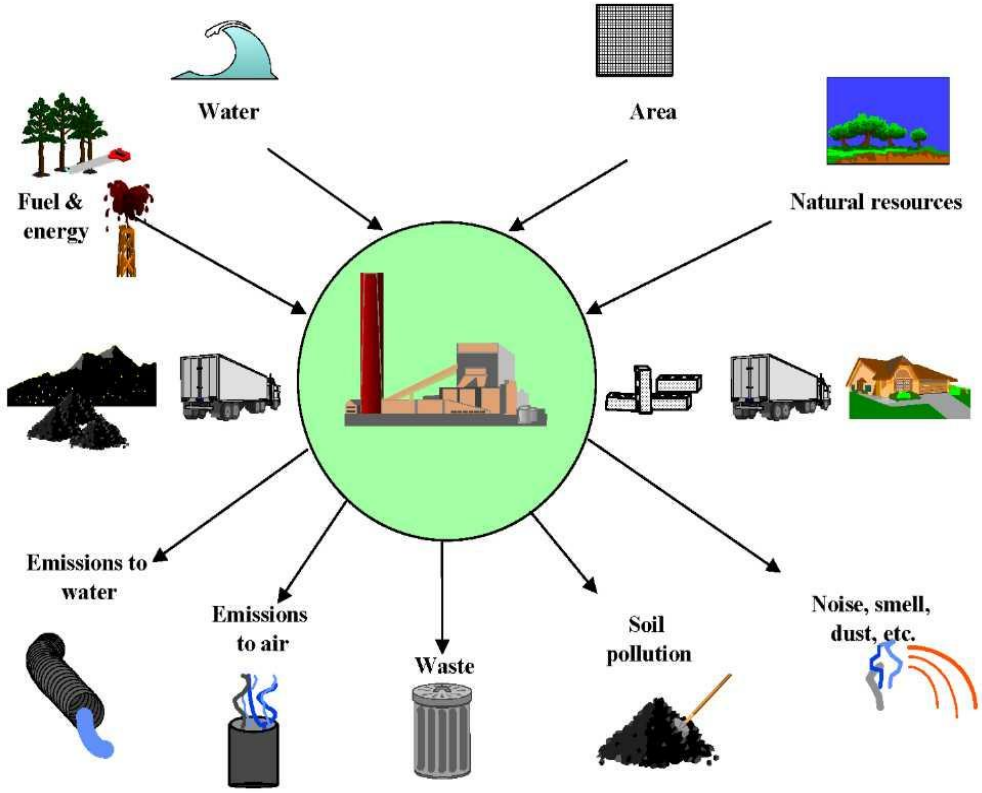
Source: Arsenault and Roberts, Reliability and Maintainability of Electronic Systems

Life Cycle Thinking / Approach



Dr Bras B, Incorporating Environmental Issues in Product Design and Realization, www.srl.gatech.edu/education/ME4171/UNEP-IE-paper.pdf

Life Cycle Thinking / Approach



Nyland C.A and Void M, Ecodesign - Why Is This Important And How Do We Put It Into Practice?, 2003

OVERVIEW OF GREEN BUILDING SYSTEMS AND RATING FRAMEWORKS AS GUIDE TOWARDS SUSTAINABILITY DEVELOPMENT

Definitions

- Green Building – Building design, construction and operations that is environmentally responsible and resource-efficient .

Green building rating schemes or frameworks

- South Africa Green Building Council's Green Star framework
- Leadership in Energy and Environmental Design (LEED) framework, applied globally but head-quartered in the United States of America
- Building Research Establishment's Building Research Establishment Environmental Assessment Method (BREEAM) framework, applied globally but head-quartered in the England
- Australian (AUS) Green Star framework

GBCSA's Green Star Rating System

- Green Star SA is an environmental rating system for buildings, developed and managed by the Green Building Council of South Africa.
- Green Star SA is based on the Green Building Council of Australia's Green Star rating system, under license and with full support of the Australian Council.
- All credits in the rating tools are researched and reviewed for the South African context by a group of local industry experts.
- The Construction Industry Development Board (cidb) has endorsed the Green Star SA certification of the Green Building Council of South Africa (GBCSA) as a best practice for public and private sector buildings.

Objectives of SA's green building rating system

- Reduce the environmental impact of development
- The property sector is responsible for a large portion of the world's resource use and waste generation and is the largest contributor of greenhouse gas emissions. Huge opportunities exist to improve performance within this sector,
- Establish a common language for green building
- Green star SA provides a way for people to communicate about what does and does not constitute a green building and what effective green building design strategies are.
- Set benchmarks and standards of measurement
- A method of measuring performance and defining best practice as to what levels of performance

GBCSA's Green Star Rating

Rating	Score	Represents	
One Star	10	Minimum practice	★
Two Star	20	Average practice	★ ★
Three Star	30	Good practice	★ ★ ★
Four Star	45	Best practice	★ ★ ★ ★
Five Star	60	South Africa Excellence	★ ★ ★ ★ ★
Six Star	75	World Leadership	★ ★ ★ ★ ★ ★

Green building rating schemes – Common scoring categories

Scoring categories	AUS Green Star	BREEAM	LEED	SA Greenstar	Grand Total
Energy	32	262	71	31	396
Indoor Environmental Quality; Health and Wellbeing	27	179	33	44	283
Materials and Resources	10	138	21	21	190
Water	12	133	23	18	186
Management	31	113		35	179
Transport	7	109	31	11	158
Pollution; including Emissions	6	124		19	149
Waste		91			91
Land use and ecology; Sustainable sites	6	29	20	8	63
Innovation	10	10	12	15	47
Grand Total	141	1188	211	201	1741

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

Green building focus areas and assessment criteria

Focus area	Assessment criteria
Indoor Environmental Quality	Air Quality
	Visual comfort (illumination and outdoor view)
	Health hazards protection and control
	Thermal Comfort
	Acoustic Comfort
	Overall occupant satisfaction
Water	Water demand and consumption target setting, measurement, monitoring, controlling and reporting
	Water waste elimination; and demand and consumption efficiency maximisation
	All water sources recovery and recycling (Drinking water, waste-water, rainwater and ground water)
Solid waste	Solid waste streams quantified, reduction targets set, monitoring, controlling and reporting
	Solid waste minimisation through lifecycle consideration of initial materials and services selection
	Solid waste recycling maximised and diversion from landfill

APPROACH OVERVIEW TO ENERGY, WATER AND WASTE MANAGEMENT

Green building rating schemes – Common energy management focuses

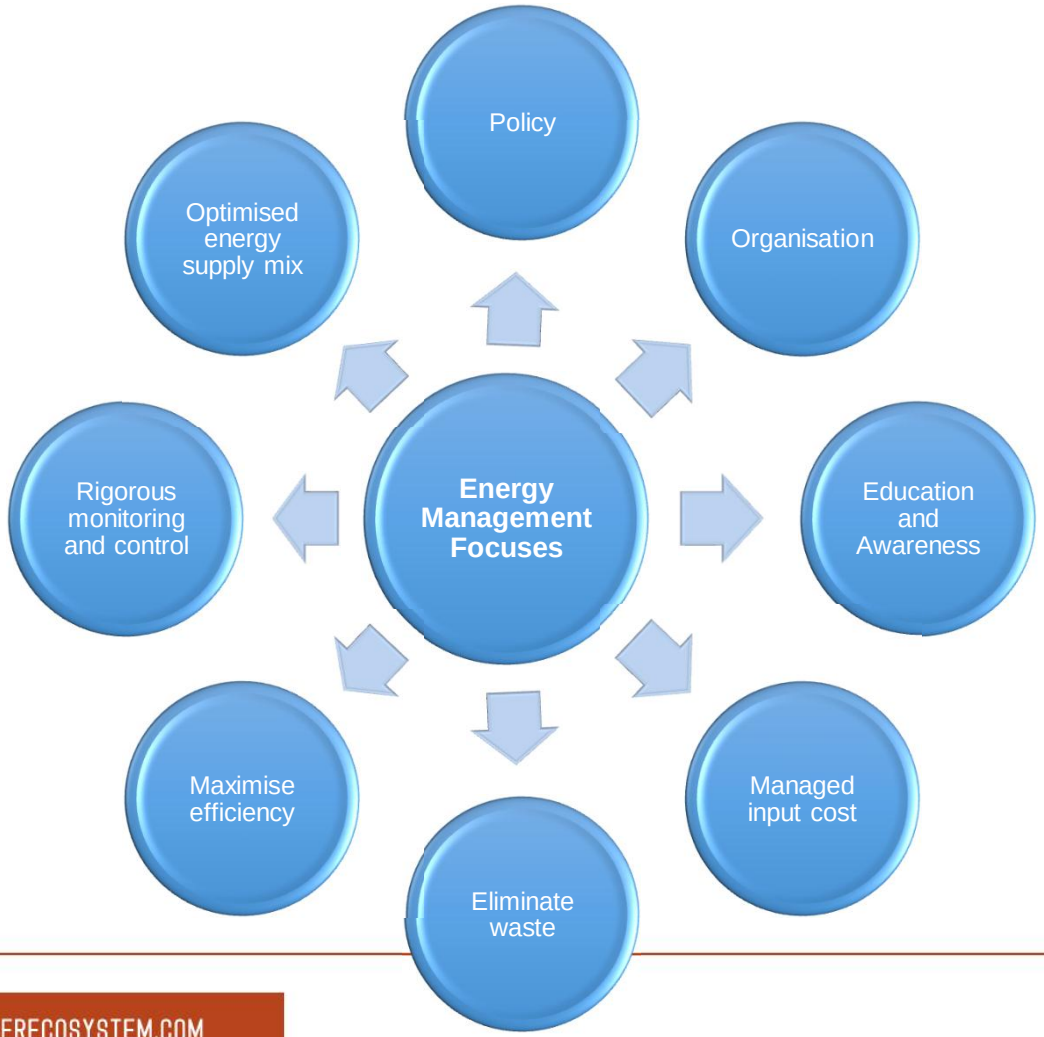
Sub-category	Description / Purpose
Energy Consumption (Greenhouse gas emissions)	To encourage the reduction of greenhouse gas emissions associated with the use of energy in building operations.
Energy efficient equipment	· Identification of the building's unregulated energy consuming loads which have 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	· 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	· 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	· 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	


Policy
Organisation
Education and Awareness
Managed input cost
Eliminate waste
Maximise efficiency
Rigorous monitoring and control
Optimised energy supply mix
Energy Management Focuses

Energy management – An approach

Phase	Scope of Work
Policy	To propose policy for approval that will direct and govern energy, water and waste management interventions.
Organisation	To propose organisation where leadership accountability, management responsibility and implementation or execution responsibility is assigned.
Procurement policy	To propose procurement policy and procedures that assures energy, water and waste management considerations are incorporated into product and services procurement
Controlling and reporting	Establish a management system which defines the objectives, actions, and progress reporting on all interventions

Energy management – An approach

Phase	Scope of Work
Assess and document the current status and management practices	Document a comprehensive inventory of all energy consuming equipment including without being exhaustive: · Lighting · Heating, ventilation, air-conditioning and refrigeration · Hot water heating · Office, kitchen/canteen, boardroom, security and other equipment.
	Document each item's specifications for purposes of quantifying its energy demand; and to enable assessment of alternative or substitute technologies that are more energy efficient.
	Assess and document the sources of energy and its technical specifications, including without being exhaustive: · Eskom/Municipal supply · Solar generated · Wind generated · Emergency generation including uninterruptable power supplies and diesel-engine driven generators

Energy management – An approach

Phase	Scope of Work
Assess and document the current status and management practices	Assess and document the building configuration notably its passive design features, related technical features and specifications for option analysis to improve passive design feature for improved energy efficiency
	Assess and document installed automated energy usage control through the following, without being exhaustive: · Real-time metering and monitoring systems · Building automation and control systems · Illumination measurement sensors and devices · Movement/presence sensors and devices
	Assess and document the nature of operations over a typical 24-hour cycle to determine the energy demand and consumption operations drivers, examples include: · Business days and hours of operation · Exceptional activity during or after business hours

Energy management – An approach

Phase	Scope of Work
Establish 24-hour operating and non-operation baseline	a) Install required measurement and monitoring systems to establish a baseline conforming with measurement and verification standards. b) Establish minimum of 30-day baseline.
Evaluate and recommend options for Energy, Water and Waste elimination, efficiency maximisation and diversification	Recommend improvement options as prospective investment projects and that are defined and quantified in accordance with investment decision analysis methodologies; project options are structured in the following categories: a) Energy waste elimination b) Energy efficiency maximisation c) Energy diversification to renewables and lower greenhouse gas emission sources
Project management of approved projects	Project management the specification, procurement and implementation and commissioning of all initiatives, including: a) Documenting procurement specifications b) Procurement support to point of procurement awards and contracting c) Implementation project management d) Acceptance testing and final commissioning to assure objectives are achieved and its sustainable performance

Water management – Current state assessment

Phase	Scope of Work
Document a comprehensive inventory of all water consuming equipment including without being exhaustive	• Ablutions including toilets, washrooms and changeroom • Catering/canteen facilities • Staff rest rooms and kitchen facilities • Indoor and outdoor manual or automated irrigation systems
Each item's specifications will be recorded for purposes of quantifying its water consumption; and to enable assessment of alternative or substitute technologies that are more energy efficient	
Assess and document the sources of water and its technical specifications	• Municipal supply • Underground/Borehole water • Rainwater harvesting, storage and use • Grey water storage, reuse and/or recycling • Black water storage, reuse and/or recycling
Assess and document the building configuration notably its passive design features, related technical features and specifications for option analysis to improve passive design features for improved water efficiency	
Assess and document installed water usage control technology	Real-time metering and monitoring systems Pressure control systems Leak detection Movement/presence sensors and devices
Assess and document the nature of operations over a typical 24-hour cycle to determine the water demand and consumption operations drivers, examples include	Business days and hours of operation Exceptional activity during or after business hours

Waste management – Current state assessment

Phase	Scope of Work
Document a comprehensive inventory of solid waste generating activities, the type and volume of waste generated in accordance with the *Waste Classification and Management Regulation of the National Environmental Management – Waste Act No 59 of 2008*	• Domestic recyclable and non-recyclable waste • Information technology waste • Printing cartridge and other associated waste • Hazardous waste • Food and other biological waste • manual or automated irrigation systems
Assess and document the current waste collection, storage, separation, treatment, recycling and disposal processes for each waste stream. The assessment must be performed with due consideration to *National Waste Management Strategy and Domestic Waste Collection Standard of the National Environmental Management: Waste Act No 59 of 2008.*	
Assess and document the nature of operations over a typical 24-hour cycle to determine the waste generation operations drivers, examples include	• Business days and hours of operation • Exceptional activity during or after-hours

Indoor environment quality - Current state assessment

Phase	Scope of Work
Ventilation	• Air breathed by employees does not endanger their safety. • Time-weighted average concentration of carbon dioxide taken over an eight-hour period. The concentration should not exceed one half per cent by volume of air and the carbon dioxide content should not exceed three per cent by volume of air. • Concentration of airborne substances. • Concentration of any explosive or flammable gas, vapour or dust. • Air changes per hour and litres per second person per occupancy category.
Lighting	• Minimum average values of maintained illuminance. • Average illuminance at any floor level in a workplace within five meters of a task is not less than one fifth of the average illuminance on that task. • Glare in any workplace is reduced to a level that does not impair vision. • Luminaires and lamps are kept clean and, when defective, are replaced.
Windows	• Total glazed area of such windows is not less than three fifths of the square root of the floor area of the room. • The window sills are not higher and the window heads are not lower than one and a half meters above the floor level of the room. • Windows are glazed with transparent material.
Thermal Comfort	• Workplace policy has been set for temperature and humidity. • Workplace temperature and humidity routinely measured and controlled.
Noise and hearing conservation	• Equivalent noise level, which should not exceed 85dB(A).
Overall occupant satisfaction	• Conduct an occupant satisfaction surveys to assess the employee's satisfaction with workplace environment.

An approach towards conformance with green building criteria: Options evaluation and implementation

Phase	Scope of Work
Water	• Water waste elimination • Grey water recycling • Rainwater harvesting • Water use efficiency maximisation • Water supply diversification
Solid waste	• Solid waste reduction through review of materials and waste-generating services • Waste recycling with zero waste to landfill • Technology waste (e-waste) recycling • Elimination of hazardous waste
Indoor environment quality	• Corrective measures where current conditions are non-conforming. • Recommend improvement measures where current conditions conform with the Act, but environment can be further enhanced to improve employee wellbeing and productivity.

END

Thank you

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