BUSINESS CASE TEMPLATE FOR ENERGY EFFICIENCY PROJECTS FOR PUBLIC SECTOR INSTITUTIONS

BUSINESS CASE FOR [PROJECT TITLE] FOR [PUBLIC INSTITUTION NAME]

EXECUTIVE SUMMARY

This document outlines the business case of the proposed [energy efficiency intervention(s)] for [Public Institution]. The scope of the proposed intervention involves the following activities –

- Provide a short description of the facility and its usage type e.g., office.
- List the activities for the intervention.

The proposed savings are as follows –

- Annual total energy savings (kWh/a) -
- Annual cost saving (ZAR/a) -
- Annual GHG emissions reductions (t CO_2/a) -
- Total project cost (Rand) -
- Dynamic payback period (Years) -

The following table summarises consumption highlights for the baseline and expected scenario option after implementation -

Description	**Baseline (year)**	**Expected Post-Implementation (year)**
Net floor area (m^2) (*if applicable)		
Annual electrical energy consumption (kWh/a)		
Annual energy cost (ZAR/a)		
Annual CO_2e emissions (tCO_2/a)		
Energy intensity (kWh/m^2/a)		

The expected project implementation timeframe is estimated to take [period] from project approval to project sign off (**Annexure A: draft schedule of work for the envisaged project stage timelines**). The benefits of implementing the project include:

- The project will lower the baseline grid energy consumption from [xx kWh/a to xx kWh/a]. This translates to [xx % reduction].
- The energy savings interventions are estimated to deliver carbon emission reductions of [xx tons/ CO_2/a].
- The project will yield [xx] direct jobs and [xx] indirect jobs.
- The project will support growth of ESCOs.
- [Indicate any other proposed benefits that the project will achieved through the planned intervention, including quantitative and qualitative local, socio-economic benefits]

ACRONYMS AND ABBREVIATIONS

All acronyms and abbreviations used in the business case document to be included.

BBBEE	Broad-Based Black Economic Empowerment
DMRE	Department Mineral Resources and Energy
ECEEE	European Council for Energy Efficient Economy
EE	Energy Efficiency
EEPBIP	Energy Efficiency Public Buildings and Infrastructure Programme
EnPC	Energy Performance Contracting
EPC	Energy Performance Certificate
ESCO	Energy Services Company
GHG	Greenhouse Gas Emissions
HVAC	Heating, Ventilation and Air Conditioning
IRR	Internal Rate of Return
kVA	kilo Volt Amps (1 000 volt-amps)
kWh	kilowatt hour
kWh/a	kilowatt hour per annum
M&V	Measurement and Verification
MW	Megawatt
NPV	Net Present Value
SANS	South African National Standards
PV	Photovoltaic (Solar)

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Annexures:

Annexure A: Technology requirements and equipment specifications

Annexure B: Intervention(s) financing options.

Annexure C: Schedule of work.

Annexure D: Schedule of work (Gantt Chart).

Annexure E: Schedule legal and regulatory requirements

Annexure F: Technical specifications for Invitation to Tender

The purpose of this template is to assist public sector institutions with the preparation of comprehensive business ca ses for the development and implementation of large-scale energy efficiency and demand side energy management projects using an energy performance contracting model.

This template is intended to guide and support the institution's implementation team (i.e. officials, planners, engineers, supply chain, project managers & facility managers) and appointed service providers.

It is noted that:

- The preparation of the business case should be based on data obtained through comprehensive, accurate and up to date energy audits, in conjunction with site visits and extensive consultation with the institution's implementation team.
- The business case must comply and align with all relevant regulations, codes, policies, and acts, and applicable mandatory and/or best practise standards such as those of South African Bureau of Standards (SABS).
- This template is provided to guide the development of the business case and should not be limited to the structure and contents herein. Users of the template are free to amend as per the project specific and institutional requirements.

  This template includes several examples in terms of figures and tables to guide the author. These can be used or amended as required.

Note to users on text colours:

- Black text = Recommended text, to be amended as required
- Red text = User guidance notes. To be deleted

1. INTRODUCTION

1.1. Energy Efficiency in Public Buildings and Infrastructure Programme (EEPBIP)

The Energy Efficiency in Public Buildings and Infrastructure Programme (EEPBIP) has been developed by the Department of Mineral Resources and Energy (DMRE) to fast-track the large-scale rollout of energy efficiency interventions across public institutions. Under this initiative, public institutions are supported in the development and implementation of energy efficiency and demand side energy management projects using an Energy Service Company (ESCO) and Energy Performance Contracting (EnPC) model to leverage private sector finance.

This business case has been prepared [by/ on behalf of PUBLIC INSTITUTION] to assess and demonstrate the technical, institutional and financial viability and the bankability of developing an energy efficiency / demand side management intervention, to be implemented and privately financed through an open tendering procurement process by [PUBLIC INSTITUTION]. Projects will be implemented through a shared savings EnPC, whereby the ESCO will be required to provide some or all of the financing and will recoup their investment through the savings achieved.

ESCOs tendering for the project will be required to demonstrate the required technical skills to implement the project and the ability to secure the required debt and equity.

1.2. Project Summary

This section should provide a brief summary of the project in terms of technical interventions and technology/ies to be applied.

Key information shall include details of the facility (local government regional office of ….), the location and function of the site, occupancy etc

1.3. Project Objectives Overview

The section should provide a high-level overview of the project objectives, including alignment to the latest relevant strategic development plan (e.g. Integrated Development Plan (IDP) if a Municipality), National Development Plan 2030, Post-2015 National Energy Efficiency Strategy (NEES), etc.

A concise overview of the technical, financial, environmental, socio-economic, and any other drivers and benefits underpinning the business case of the planned intervention should be provided.

2. ASSESSMENT OF SITE AND ENERGY ACCOUNTS

2.1. Site Information

Details of the physical characteristics of the site, its location, size, usage type, notable features etc are to be provided in Table 1. The site layout (plans / google earth image) is to be provided in Figure 1. For business cases with multiple sites/ buildings, a summary table can be provided, with detailed information provided in an annex.

Table 1: Site information

Site/ Facility Name	
Address	
Municipality	
District	
Province	
Site Description/ Function	
Site Type **For buildings add SANS 10400 categories[1] (eg A1, A2 etc)**	☒
Net floor Area (m^2) (if applicable)	
Institution Department (if applicable)	
[Public Institution] Energy Champions	
Contact Details	

Figure 1: Site layout

Insert plans/ google earth images etc

2.2. Energy Supply Details

This section should provide details of the energy/fuel supplies for the facility (electricity, gas, diesel, solar etc), the supplier, number of accounts, tariff type of each account (if different), as well as any notable attributes associated with each tariff type e.g. maximum demand, reactive energy charge etc. Any ongoing billing issues should be included e.g. inaccurate metering, disputes, incorrect billing, internal record keeping etc, and the proposed measures to be taken to address

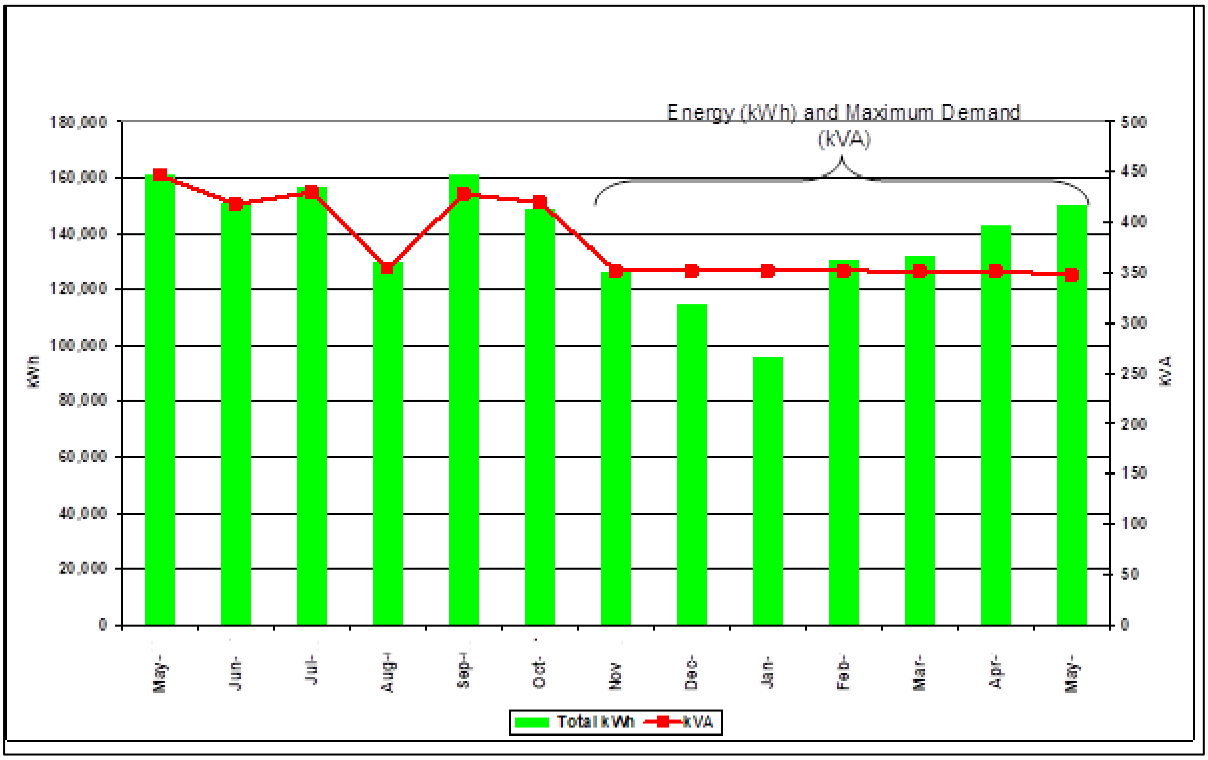
[1] https://www.sans10400.co.za/energy-usage/

them. Comprehensive details (including account numbers etc) can be provided in an Annex if required.

2.3. Facility Energy Usage

The most recent monthly electricity consumption of each account (and total) for one year should be presented (e.g. Figure 2) in addition to consumption data from other energy sources if applicable (petrol, diesel, gas, solar PV etc) and any energy storage equipment (e.g. batteries). Summary data tables and figures can be provided for business cases with multiple sites with details provided in an annex.

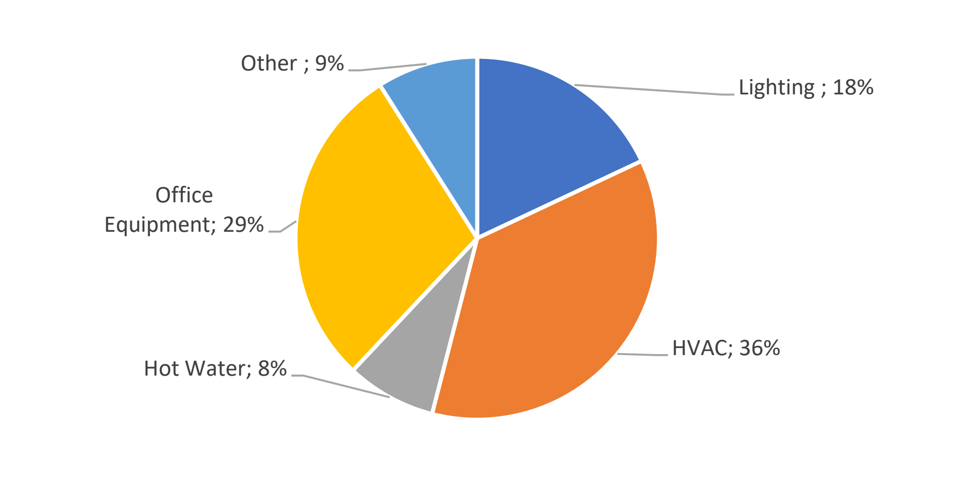
Figure 2: Summary of Account X



2.4. Load Profiles

The metering results from the energy audit should be summarised to illustrate how and where energy is utilized at the site/s.

Figure 3: Electricity Utilization of Site (kWh) [Example]



2.5. Energy Audit Summary

The section should provide a concise summary, (e.g. Table 3). The table below provides a guideline of what could be presented and should be expanded or adjusted as deemed necessary.

Table 2: Energy Audit Summary

Number of operating days per Year	
Average weekday max consumption (kWh)	
Average weekend max consumption (kWh)	
Site annual energy use (kWh/a)	
Maximum demand (kVA) -weekday	
Maximum demand (kVA) -weekend	
Baseline energy intensity (kWh/m^2/a)	
Metering	
Tariff type (e.g. small business rate)	
Billing authority	
Annual energy cost (ZAR/a)	
Average electricity price (ZAR/kWh) (year)	

3 REVIEW OF TECHNOLOGY CHOICES

3.1. Energy Efficient Technology

This section should provide a motivation and summary for the recommended energy efficiency/ demand side management interventions.

3.1.1. Technology 1

In line with the energy audit and the derived consumption baseline, [efficient lighting] (add/remove as required) has been identified as a financially viable intervention. A short explanation of the benefits of the technology is provided in

Figure 4 with the technical information in Table 3 - existing fittings, proposed fittings and the estimated savings.

Figure 4: Benefits of energy efficiency improvements (Lighting) **EXAMPLE ONLY**

Efficient Lamps (Re-lamping): Re-lamping involves replacing inefficient lamps with a new energy efficient lamp without changing the fitting. The following re-lamping options have been identified:

1. **Replace incandescent and CFL lamps with LED lamps:** All incandescent and CFL lamps should be replaced with Light emitting diode lamps (LED). A conventional incandescent lamp converts most of the power it consumes into heat and only small percentage to light. CFLs are more efficient but contain mercury and are less efficient than LED, which also last longer and are cost competitive.
2. **Replace Low Voltage Halogen Lamps with 4W, 240V (GU10) LED lamps:** The 50W low voltage lamps should be retrofitted with 4W 240-volt LED lamps. The LED lamps produce the equivalent light as the traditional 50W lamp and have a nine times longer life expectancy (45 000 hours vs. 5 000 hours).
3. **Replace Low Voltage Halogen Lamps (down lights) with 11W/240V CFL:** The 50W low voltage lamps should be retrofitted with 11W 240-volt mini CFL lamps. The CFL lamps produce the same light as the traditional 50W lamp and have a three times longer life expectancy (15 000 hours vs 5 000 hours).

Table 3: Summary of existing and proposed technology attributes (lighting) **EXAMPLE**

Replacement of inefficient lamps			Expected Savings		Cost			
Qty	**Existing**	**Proposed**	**kW**	**Annual kWh**	**Capital**	**Installation**	**O&M**	**Total**
325	36W T8	25W LED						
etc								

3.1.2. Technology 2…. etc

3.2. Post-Implementation Annual Consumption

The information from Section 3.1 has been consolidated to calculate the estimated financial benefits. The information should be derived from the energy audit and relevant sections should be attached as an annex and clearly referenced to ensure the reader can find the information with the required level of detail. Any figures used in the calculations, such as electricity tariff and grid emission factor, should be provided with source references and the author must ensure there is alignment with previous sections i.e consistency with tariffs used in previous sections. Metrics used can be added or left out based on the technology.

Table 4: Technical statistics of proposed project intervention **EXAMPLE**

Description	**Technology 1 (Lighting)**	**Technology 2 (HVAC)**	**Technology 3 (Solar Panels)**	**Total**
Baseline consumption (kWh/a)				
Energy savings (kWh/a)				
Energy savings (pre vs post)(%)				
1st year cost savings (ZAR/a)				
Annual CO_2 savings (tCO_2/a)				
Capital investment (ZAR)				

The expected post-implementation energy consumption of the facility is presented in Table 5. A reference (best practise) case has been included to benchmark the project. This should be broken down per individual building when multiple buildings are included.

Table 5: Benchmarking of Energy Consumption

Parameter	**Facility Baseline**	**Facility Post Implementation**	**CIBSE / EPC Reference/Benchmark (if applicable)**
Energy Usage (kWh/a)			
Energy Intensity (kWh/m²/a)			

CIBSE Chartered Institute of Building Services Engineers

3.3. Monitoring and Evaluation

Monitoring and Evaluation includes the Measurement and Verification (M&V) of energy savings and should also capture key data related to the development and implementation of the project, including capital costs, financing costs, public and private sector investments, maintenance costs, in addition to critical socio-economic data, for example job creation and local economic development.

This section builds on the metering and billing information provided in Section 2.2. Details of how energy usage and billing data is to be collected, stored and analysed to accurately measure the performance of the project investment should be provided. This could include the installation of smart meters, online energy data management systems etc.

4. FINANCIAL ANALYSIS AND MODELLING

The financial feasibility of each intervention is presented with a 10-year Internal Rate of Return (IRR) and Net Present Value (NPV) {amend as required} calculation based on the following costs and values - Table 6. {Values and assumptions used for the calculations must be disclosed with reasons as to why they are appropriate}. The results are presented in Table 7.

Table 6: Input values for financial analysis

Description	EE Technologies / Interventions	Notes
Equipment and labour • Technology 1 • Technology 2 • ……..		
Engineering fees		
Metering cost		
Finance changes		
M&V Fees		
Annual maintenance / servicing and repairs		
Equipment replacement		
Annual Tariff increases		

Table 7: Project feasibility indicators (per intervention)

Performance Indicator	Value
Investment cost (ZAR)	
Expected electricity saving (kWh/a)	
Current electricity cost (ZAR/kWh)	
Estimated annual tariff increase (%)	
Expected electricity savings (kWh/a)	
Operational cost savings	
Cost, timing and replacement cycle of proposed technology	
Percentage of maintenance cost (year 0 to 10)	
IRR (10 years)	
NPV (10 years)	
Dynamic payback period (years)	
Recommendation (Proceed/Do not proceed) – if proceed provide requirement (schedule of technology, quantities, minimum performance requirements etc as an Annexure)	

Based on the above analysis the following finance model(s) is / are deemed most appropriate (with reasons).

An options analysis of suitable project financing models (internal funding, loans, energy performance contracting, or combination thereof etc) with an analysis of the advantages and disadvantages of each, concluding with a recommendation for a preferred approach supported with reasoning.

5. RISK ANALYSIS

The following project risks have been identified and ranked.

A risk matrix ranking probability and impact from low, medium and high should be used. Mitigation strategies or approaches for each one is required. The risk analysis should consider financing approaches and the legislative framework governing public sector financing regulations and the conditions / requirements they place on government institutions.

The first table quantifies the risk according to probability and impact, and the second table identifies the risk and the actions taken to address it. This approach serves as a guideline and should be modified as required.

PROBABILITY

IMPACT

	LOW	**MEDIUM**	**HIGH**
HIGH		4	
MEDIUM			5
LOW	3; 6		1; 2

	Item	**Mitigation measure**
1	Reliable baseline / base data	One years of bills reviewed, and measurement meters installed for independent reading
2	Operation & maintenance	Contract includes O&M contract
3	Product performance and guarantees	Incorporated into EPC contract
4	Estimated cash flows not generated	Regular staff training on usage; & quarterly reporting
5	Budget for replacement costs	Incorporated in annual budget planning
6	Accurate and reliable M&V	Independent metering by service provider
	List others	

6. INSTITUTIONAL REQUIREMENTS

An analysis of the capacity within the [Public Institutions] in relation to the skills required of designing, procurement, contracting, implementation and operation and maintenance is required. The key departments that are key to the successful implementation of any intervention(s) in the Public Institution are engineering, financial, technical, supply chain, and legal. Approaches of building capacity within these departments where the skills gaps are required. The section should also make recommendations on a preferred methodology to be used by the transactional advisors to assist with capacity building within the Public Institutions i.e. nominated officials from the Public Institutions can shadow transactional advisors on every aspect of the project. An organogram to identify the roles of different departments, process ownership and their responsibility in relation to contracting and data provision should be included.

7. ECONOMIC DEVELOPMENT IMPACTS

The section details how the project intervention will positively impact the [Public Institution] and the local economy.

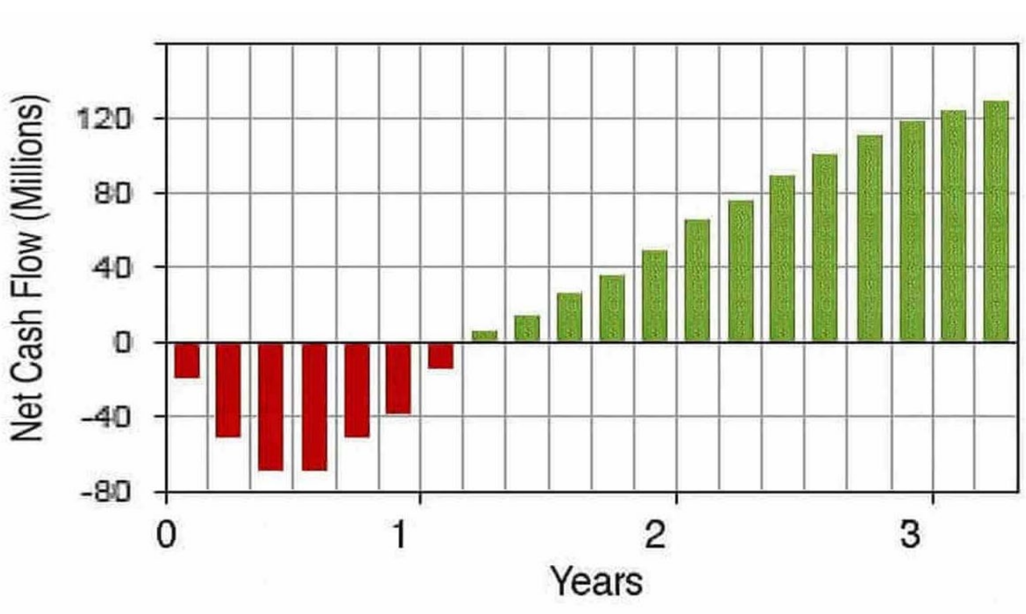
7.1. Financial Impacts

This financial impact of the selected interventions will deliver a positive cash flow that will be derived in Year ? as shown in Table 8 and Figure 4

Table 8: EEPBIP Public Sector Cash Flow (ZAR)

Years	1	2	3	….	10
Cash Flow (ZAR)					

Figure 4: Project cash flow stream



7.2. Potential for Job Creation

The following job benefits, where the local economy is prioritised, are expected during construction, implementation, and operations (Table 10)

Table 10: Potential jobs due to project interventions Lighting retrofit - EXAMPLE

Energy Efficiency and Demand Side Management		**Example of calculation**
Assumptions:		
Investment		R 8 175 331.00
Jobs per Investment Amount, saving trust report (ECEEE summer study proceedings, 2015)		1.4 m euro invested = 32.6 jobs
Euro - Rand Exchange Rate		R20.29
Total jobs		**(1.4m/32.6=42 944 Euro per job)** **(42 944 Euro*R20,29= 871 349 Rand per job)** **(R 8 175 331/R 871 349 = 9 jobs)**

7.3. Local Empowerment, Local Economic Development and Local Content

The section should provide detailed information about the empowerment especially of locals where the intervention will be implemented, and contributions to local content objectives. This empowerment objectives can be hardwired in the procurement document in relation to the procurement regulations by making subcontracting a prequalifying criterion. Care must be taken to align with local capacity and capability to ensure procurement conditions are realistic and achievable, such that they do not create extensive delays, add costs, or prevent implementation of the project. Concerns identified should be included in the risk matrix.

8. RECOMMENDATIONS AND WAYFORWARD

Based on the information presented in preceding sections, this section should provide a concise proposed way forward in relation to the implementation of planned intervention(s) and the requirement for appointment of transactional advisors and the period. It should summaries some of the key data substantiating why the intervention(s) makes business and developmental sense to [Public

Institution] and should be considered for funding and implementation. The following information (minimum) should be included:

- Estimated annual energy savings
- Estimated annual financial savings
- Estimated annual carbon emissions reduction
- Direct and indirect jobs (during and post implementation)
- Contribution to local economic development
- Support to the growth of ESCOs
- Skills transfer