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Technical Assistance Unit

# ENERGY EFFICIENCY GUIDELINES

**Project No. 662**

***GUIDE FOR MUNICIPAL OFFICIALS***

***IN SOUTH AFRICA***

South Africa

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# Acronyms and Abbreviations

| | |
|---|---|
| BAU | Business as Usual |
| CAPEX | Capital Expenditure |
| CFL | Compact Fluorescent Lamps |
| CCR | Climate Change Response |
| CoCT | City of Cape Town |
| CoGTA | Cooperative Governance and Traditional Affairs |
| CSIR | Council for Scientific and Industrial Research |
| EE | Energy Efficiency |
| EEDSM | Energy Efficiency Demand Side Management |
| EM&V | Evaluation, Measurement and Verification |
| ESA | Efficiency Services Agreement |
| ESPC | Efficiency Services Performance Contract |
| ESCO | Energy Service Company |
| ESKOM | Electricity Supply Committee of South Africa |
| HVACS | Heating, Ventilation and Air-conditioning |
| ICLEI | Local Governments for Sustainability |
| IDP | Integrated Development Plan |
| IGA | Investment Grade Audit |
| IMMVP | International Performance Measurement and Verification Protocol |
| IRR | Internal Rate of Return |
| JESSICA | Joint European Support for Sustainable Investment in City Areas |
| Mayco | Mayoral Committee |
| MFMA | Municipal Financial Management Act |
| NEES | National Energy Efficiency Strategy |
| NPV | Net Present Value |

| | |
|---|---|
| ODA | Official Development Assistance |
| OPEX | Operational Expenditure |
| PFMA | Provincial Financial Management Act |
| PPP | Public Private Participation Process |
| PPPFA | Preferential Procurement Policy Framework Act |
| ROI | Return on Investment |
| SALGA | South African Local Government Association |
| SCM | Supply Change Management |
| SDBIP | Service Delivery and Budget Implementation Plan |
| TAU | Treasury Advisory Unit |
| ToR | Term of Reference |
| UNFCCC | United Nations Framework Convention on Climate Change |
| UNIDO | United Nations Industrial Development Organization |

# 1. PREAMBLE

This guideline is an output of a study[1] that investigated the barriers facing officials who implemented climate change related (CCR) projects at the local government level and the innovative practices they developed to overcome these barriers.

When officials implemented CCR projects they encountered technical[2], economic[3], budgetary[4] and institutional[5] challenges. The innovative practices they used to address these four challenges informed the content of the guidelines, which is primarily based on five in-depth case studies[6] (refer to the Finance Framework Report for additional information). In addition, the authors also explored the reasons that caused CCR projects to lose momentum at the local government level and lessons from these projects are also reflected in the guideline.

The guideline explains a set of steps generics that local government officials can follow to plan, design and implement an energy efficiency (EE) retrofit project, focusing on assisting officials to navigate through local government decision-making processes. Hence the guideline is designed to help officials overcome challenges associated with designing, planning and implementing an EE retrofit project.

[1] This study was undertaken for the Western Cape Government: Department of Environmental Affairs and Development Planning and TAU to examine and understand the regulatory barriers (perceived or real) in the MFMA and PFMA, and identify innovative models that enable the implementation of financially viable climate change related projects.
[2] Technical challenge involves convincing people that novel CCR technologies will deliver services at the required standard and hence these technologies are a viable alternative to traditional technologies. In other words, project champions must prove to SCM that installing energy efficiency technologies, methods and services in buildings will reduce energy consumption and lower emissions.
[3] Economic challenge arises when officials must demonstrate that EE solutions are cost effective compared to traditional technologies.
[4] Budget challenge concerns the difficulties that public entities face when they raise finance for investments. CCR projects are considered to be more risky than traditional projects, as they have greater upfront capital costs and use newer, untested technologies. Hence local government is reluctant to finance the CCR project directly from public funding and the capacity of local government to raise debt is limited.
[5] Institutional challenges are linked to legal, regulatory and statuary frameworks. For example, subsidised energy tariff lower the incentive to reduce energy consumptions, budgeting frameworks make it difficult for a department to benefit from energy savings, and complicated SCM procedures delay implementation.
[6] Successfully implemented CCR projects include Polowkane Energy Efficiency, Eden Catchment Management, Kuyasa Solar Water Heaters, eThekweni, Waste-to-Energy and eThekwini, Reforestation.

The guideline is an action orientated guide that maps out the sequential steps covering retrofitting traffic lights and other compact fluorescent lamps (CFL) lighting systems with light-emitting diodes (LED) and heating & cooling systems (i.e. ventilating fans) with more energy efficient systems. In other words the guideline creates a "roadmap" by summarising the generic steps and listing actions to implement an EE retrofit project. These generic steps are based on international best practices[7] that have been adapted to consider the local government decision-making processes in South Africa. Furthermore, a best practice review of EE project implementation models shows that a standard implementation model does not exist. However, the research uncovered that the Energy Service Company- Performance Contracting Model implementation model[8] is steadily gaining ground international in government circles. As a consequence the guideline explains the aforementioned model in greater depth than the in-house implementation model.

As the project[9] progressed it became apparent that municipalities / provincial governments are not monolithic entities. Therefore the generic steps were unpacked to highlight the different types of actions that officials can take to implement an EE retrofit project, depending on their level of resources and appetite for taking calculated risks. Hence the guideline creates awareness that there are different options possible to move through the generic steps.

In summary the guideline has two purposes, depending on the vantage point of the user. As the guideline outlines generic steps, it can be used by an official as a strategic tool to 'get the big picture' and identify tools to initiate an EE retrofit

[7] Common features of an EE retrofit project are to identify buildings with potential efficiency opportunities; conduct energy audits to identify potential efficiency measures; complete a financial analysis of potential efficiency measures; secure financing to implement the efficiency measures; implement efficiency measures; monitor effect of EE retrofits on energy consumption; and operate and maintain the building systems

[8] Under a performance contract the cost and financing of implementing the EE project can be paid from energy savings, which reduces the R value of upfront capital needed to initiate the EE project. Also performance contracts can be designed to best suit the needs of contracting parties. Also, using an ESCO allows the local government entity to tap into skills and resources that might not be available internally, especial scarce Technical, turn-key project implementation, and financial project financing skills.

[9] Titled 'Removing financial barriers and financial innovation in implementing climate change related projects within government'.

project. In addition, showing that an outcome can be achieved through different implementing models can be used to stimulate debate and encourage officials to take a deeper look at how they can implement projects using different combinations of resources[10].

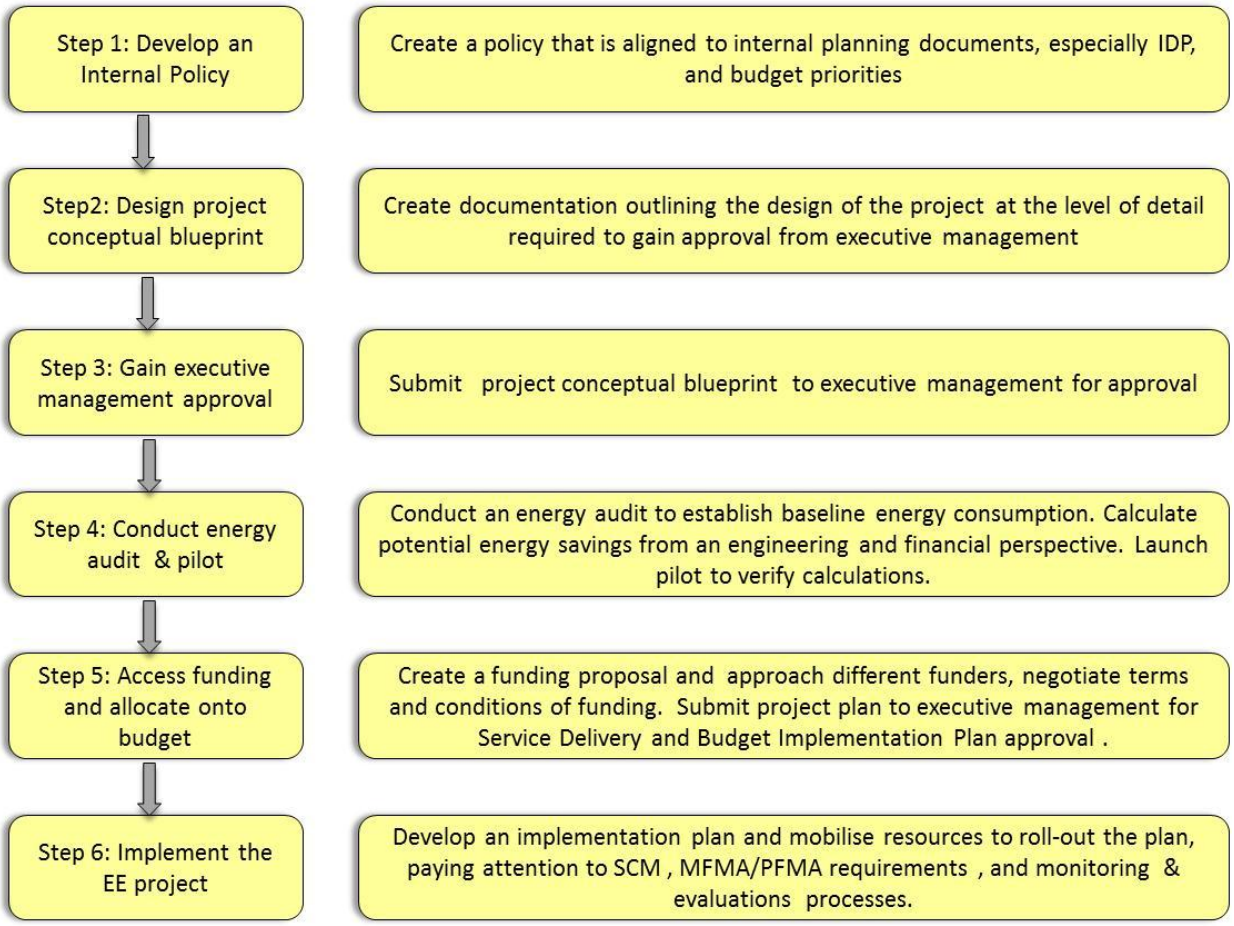
The audience for the guideline is officials working at the municipal and provincial government level, who need a working knowledge of the end-to-end process involved in implementing an EE retrofit profit, from a strategic perspective. For example, he/she needs to have an understanding of the critical success factors involved in implementing an EE retrofit project, the relationship between these factors, and sequence of decisions that need to be made at different points to ensure critical success factors are achieved. As the guideline adopts a strategic perspective, it is primarily written for an official who will manage the implementation of the EE Project, be a member of the multidisciplinary EE Project team, or be the sponsor of EE project.

The guideline is pitched at an intermediate level of knowledge and as a result assumes that the official (a) has read introductory material on project management techniques, (b) has a working knowledge of procurement, budgeting and legislation governing the management of finances at the local government level and (c) is aware of energy efficiency (EE) measures and technologies. Hence readers are encouraged to review the other two papers in the series of three papers that were commissioned as part of this CCR research project. In addition, an in-depth technical discussion of topics is beyond the scope of guidelines, but the authors realise that successful project implementation is about getting on top of the details. To bridge the information gap, the authors have included a list of further reading models or free online tools to complement the guidelines.

[10] In other words the Practice Note can be used to stimulate conversations about doing things differently. Supporting innovation can play an important role in keeping the TAU Learning Network alive

The guideline has eight sections, six of which cover the steps outlined in Figure 1 below. The guideline focuses on key actions per stage. Examples include using an energy service company (ESCO) or implementing the project using in-house-resources, selecting baseline survey methods, choosing funding models, entering into performance contracts with an ESCO, and the design of measurement, monitoring and valuation systems. Critical issues per stage are highlighted and discussed in case studies.

**Figure 1 Overview of the six steps in the guidelines to implement an EE project**[11]




[11] The decision making process outlined provides a generic flow, to allow municipal officials to guide projects through the decision making process. Based on the structure of the municipalities, the committees that have been established and the delegations, the decision making process may vary slightly. Some municipalities may have established advisory committees (Section 80 Committees) to advise the MAYCO. The processes outlined reflect the minimum level of approval required, and where municipalities do not have MAYCOs the delegated structures or full council should be utilised.

# 2. INTRODUCTION

The guideline is based on a review of international best practices and select case studies across South Africa where the implementation of energy efficiency retrofit projects was successful. The purpose of the guideline is to assist officials to plan, finance and implement EE retrofit projects in municipal and provincial government buildings. Hence the guideline provides step-by-step advice for officials at municipalities and provincial government to develop:

- policies that municipalities can adapt for EE in the South African context,
- programmes and plans that can be integrated into the municipal Integrated Development Plans (IDP),
- tools to prepare pre-feasibility plans,
- proposal guidelines and resources to assist with raising funding,
- useful ideas to implement pilots and generate baseline data,
- project management guides to assist with the implementation of EE projects, and
- a toolbox for monitoring and verification.

The authors acknowledge that each local government authority has unique circumstances and decision-making processes. As a consequence the guidelines should be viewed by officials as reference material and should be used in conjunction with resources provided by the Department of Energy, CoGTA, SALGA and certain provincial governments.

# 3. POLICY CONTEXT OF ENERGY EFFICIENCY

South Africa is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC). Under the convention the government has committed to reduce the country's carbon emissions by 34% and 42% below the business as usual (BAU) baseline by 2020 and 2025, respectively, provided the country receives technical and financial support. The National Climate Change Response Policy identifies energy efficiency programmes as an important contributing factor to reduce (high carbon) energy consumption[12].

In 2005 the government introduced the National Energy Efficiency Strategy (NEES), which was revised in 2008 and again in 2012. The NEES outlines strategies for various sectors to consider, and has set aspirational targets for improving the energy efficiency of all sectors by 12% over the next three years until 2015.

As part of the sector strategies, municipalities have a critical role in directly reducing their own energy consumption by 15%. Proposed initiatives include increasing the energy efficiency of municipal owned facilities and equipment, and facilitating improved energy efficiency usage at the household level by 10%. The national policy environment is, in other words, designed to support municipalities to implement energy efficiency programmes.

[12] The World Bank Development Report 2010 on climate change suggests that energy efficiency is an important element of global efforts to limit the global temperature increase to 2 degrees. This global limit has been - identified by scientists and the Copenhagen agreement as the limit that should not be exceeded in order to avoid catastrophic consequences.

# 4. BENEFIT OF ENERGY EFFICIENCY PROJECTS

Investing in EE technologies creates long and short term benefits for officials, the local government entity and a region's socio-economic development. Owners of buildings can reduce their energy consumption, lowering their operating costs. Occupants have a healthier work environment as buildings are lighter and well ventilated, which contributes to improving their productivity. Society benefits from a smarter use of resources, which increases energy security, improves the quality of natural systems and stimulates innovation among firms resulting in the creation of a market for EE technologies. Hence EE projects and the retrofitting of building can potentially address some of the economic and environmental challenges facing cities.

The Institute for Building Efficiency argues that EE projects can affect the development trajectory of an economy by ''changing policy approaches and decision-making, prioritising life-cycle and performance metrics, and engaging in more integrated planning processes, the design, construction and renovation of buildings can contribute to broader national and urban sustainability goals" (R20, 2013:10). This section explores the four principal benefits of EE projects, touching on the issues mentioned above.

**REDUCING MUNICIPAL ELECTRICTY COSTS:** Installing energy efficiency technologies lowers reduces energy consumption in buildings, which is reflected in lower energy bills. For an average office building, energy represents 30% of the variable costs and constitutes the single largest controllable operating cost (National Action Plan for Energy Efficiency, 2008 cited in EPA, 2011) and hence potential cost savings can be significant. An average "office building can reduce energy costs between 10-30% through low-cost energy efficiency measures and operational adjustments" (EPA, 2011: 3). Whereas "buildings that have achieved the ENERGY STAR label for superior energy efficiency use 40% less energy than average buildings"(EPA, 2011: 3)

**ECONOMIC BENEFITS**: Investing in energy efficiency can stimulate the local economy and encourage development of energy efficiency service markets. Increasing the demand for new EE technologies allows producers to benefit from scale economies, lowering the unit costs of production. Cheaper EE technologies can compete against traditional technologies, encouraging investment in n EE technologies. As EE technologies are labour intensive, greater demand for these technologies can stimulate employment. According to the Department of Energy (DOE), approximately 60% of the value of EE investments is attributed to labour costs (EPA, 2011: 3).

From a micro, industrial economics lens, firms that invest in EE technologies tend to be more innovative and competitive. In lieu of increasing energy demands linked to economic growth, improving energy efficiency will increase the energy available for other local economic activities and increase the stability of the energy supply to businesses. In addition, cost savings made by businesses through improving their energy efficiency can be redirected elsewhere and can improve their competitiveness.

A study based on a large sample of firms from 29 developing countries found that there is a significant positive relationship between energy efficiency and profitability in 13 out of 29 developing countries and for 9 out of 15 sectors (Industrial Development Report, 2011[13]). In terms of productivity, the study found a strong positive relationship between energy efficiency and productivity in 23 out of 24 developing countries, suggesting that energy efficiency is accompanied by innovation and efficient management of other inputs. The most profitable projects are those requiring small investments, involving process reorganization and housekeeping measures and using existing infrastructure. Micro, small and medium size manufacturing firms tend to be less energy efficient than large companies and show the highest untapped potential for energy efficiency improvements.

[13] UNIDO, Industrial Development Report 2011, "Industrial energy efficiency for sustainable wealth creation - Capturing environmental, economic and social dividends." Vienna.

**ENVIRONMENTAL BENEFITS**: South Africa is dependent on coal-fired generation plants for its electricity. Furthermore, the type of technology and coal used by ESKOM to generate electricity has made South Africa one of the most carbon intensive economy's in the world. Carbon dioxide emissions, sulphur dioxide and nitrogen oxide from electricity generation have been linked to the build-up of smog, acid rain, and trace amounts of airborne particulate matter that can cause respiratory problems for many people. Hence the installation of EE technologies on a large-scale basis can significantly reduce GHG emissions and criteria air pollutants by decreasing consumption of fossil fuel-based energy. Municipalities and local government can play a catalytic role in increasing the diffusion of EE technologies by leading by example by improving energy efficiency in their facilities and operations. In addition, investing in "energy efficiency epitomizes responsible government stewardship of [tax payers'] money" (EPA, 2011:3).

**HEALTH BENEFITS**: Installing EE technologies in buildings, especially recovery ventilation equipment, reduces the infiltration of air contaminants from outdoors and simultaneously lowers heating, ventilation, and air conditioning (HVAC) energy loads (EPA, 2011). Hence EE buildings can be linked to creating a healthier work environment which enhances productivity. A Carnegie Mellon study found that in healthy buildings fitted with EE infiltration technologies, employee absenteeism because of illness dropped by roughly 40% (EPA, 2011).

# 5.Step 1: DEVELOP INTERNAL EE POLICY

> "There are risks and costs to a programme of action, but they are far less than long-range risks and costs of comfortable inaction"
>
> **John Fitzgerald Kennedy**

Policy-making is often undervalued, difficult and prone to generate tension, however our constitution describes this as a central role of municipal councils. Policies provide an execution framework for municipalities to deliver services to their residents. Policies prescribe the type and level of services, role and responsibilities of stakeholders, how these services are delivered in a sustainable manner, and how the costs of these services are recovered. The process of approving policy is a participative and transparent one. Once approved, policy is a powerful instrument to align the organisational behaviour, incentives and resources to deliver against specific targets and commitments.

Case studies show that developing an EE policy made it easier for municipalities to gain support from stakeholders to implement their EE project. Developing an EE policy is an important part of project implementation, as the process of creating a policy formalises local government's commitment to improve energy efficiency. When a policy is developed local government must clearly state its objectives, which can be used to rally support from elected officials and buy-in from local government agencies. In turn the process of creating achievable objectives that strike a balance between being realistic but still being visionary, sensitises officials to EE issues and

highlights the importance of accurate and useful tracking of the potential benefits of EE programmes.

The EE policies of the City of Cape Town, EThekwini Municipality and Polokwane Municipality provide a useful template to develop an EE policy (refer to appendix one for greater detail). A scan of these policies shows that they share common features, which are outlined below:

- **Use a team** approach to develop the EE policy, focusing on involving colleagues outside the environmental departments.

- Specify **key definitions and the scope** of the policy.

- State the **reasons why Energy Efficiency is important and link arguments to the Integrated Development Plan** (IDP) and sustainable service delivery stipulated in legislation[14].

- Describe **benefits of EE initiatives**, including the broader environmental and socio-economic (i.e. creating a more resilient economy) and also the potential to improve cash flow management (i.e. reducing recurrent costs).

- Explain the **legal and legislative context** within which municipalities / provincial government's activities must comply[15]:

[14] The national and provincial policy context should include the enabling policy environment, and policy instruments available to municipalities. Refer to the Polokwane Municipality IDP, accessed at www.polokwane.gov.za/nico/FINAL%20IDP29May2012vic.pdf and / or eThekwini Municipality Internal Energy Management Policy accessed at https://www.capetown.gov.za/EN/ENVIRONMENTALRESOURCEMANAGEMENT/ENERGYEFFICIENCY/Pages/PolicyandStrategyDocuments.aspx

[15] This is not an exhaustive list, and should be updated as legislation changes. For examples refer to Refer:

- http://www.info.gov.za/view/DownloadFileAction?id=179403
- http://eneken.ieej.or.jp/data/4537.pdf
- http://www.energy.gov.za/files/policies/Standard_Offer_Policy.pdf
- http://unfccc.int/files/meetings/seminar/application/pdf/sem_sup2_south_africa.pdf

- ✓ Legislation that municipalities / provincial government provide services in a sustainable manner, such as Section 152 of the Constitution
- ✓ White papers and regulatory frameworks concerning local government, environment and energy, such as the Local Government White Paper and the National Climate Change Response Policy, etc.
- ✓ MFMA when entering into partnerships and long-term commitments.
- ✓ Importance of managing the municipality in an efficient manner, particularly with reducing costs.

- Highlight the **principles and commitments** of the municipality/local government to reduce energy consumption and specify policy targets. Examples of policy targets include 'reducing energy consumption in facilities by a specific percentage portfolio-wide' and using life-cycle[16] costing to evaluate the benefits of EE projects (EPA: 2011:9).

- Clarify **roles and responsibilities** of council, executive management and the administration (Annexure One for the eThekwini case study).

- Unpack **key risks of maintaining the status quo**, which are listed below, such as
  - ✓ managing increasing energy costs

[16] The life-cycle cost of a product or service is the sum of the present values of the costs of investment, capital, installation, energy, operation, maintenance, and disposal over the life of the product (U.S. DOE, 2003 cited in EPA, 2011:9)

- ✓ managing disruption to economic activity because of interrupted electricity supply
- ✓ inefficient use of resources to maintain obsolete technology
- ✓ Steadily increasing emissions of pollutants and greenhouse gases that cause the deterioration of air quality. Poor air quality negatively affects the health of residents, reducing their productivity, which has negative socio-economic consequences.
- ✓ Greater portion of the municipal and provincial budget allocated to energy and waste management services to cope with the extreme weather conditions associated with climate change, such as more floods, extreme heat, etc.

**Details of Online Resources:** [17]

Cape Town EE Policy: https://www.capetown.gov.za/EN/ENVIRONMENTALRESOURCEMANAGEMENT/ENERGYEFFICIENCY/Pages/PolicyandStrategyDocuments.aspx

EThekwini EE Policy: http://www.kznenergy.org.za/ethekwini-energy-efficiency-demand-side-management-program/

European Commission. Energy-Efficient Buildings PPPs: Multi-Annual Roadmap for a Long Term Strategy. http://www.ectp.org/cws/params/ectp/download_files/36D1191v1_EeB_Roadmap.pdf

[17] Information for all the 'Online sources' in the report was gathered from the Project Team's research and the following documents EPEC (2012), R20 (2013) and EPA (2011).

Energy Efficiency in the Public Sector, Energy Charter Secretariat (April 2008) Pages 23-26 present an international review of the barriers to energy efficiency in the public sector.
http://www.encharter.org/fileadmin/user_upload/document/Public_Sector_EE_2008_ENG.pdf

Institute for Building Efficiency offers a Policy Assessment Tool (an Excel document) that can help government officials set policy priorities with input from stakeholders
http://www.institutebe.com/energypolicy/IBEbriefsWorldBankonTransformativeEnergyEff.aspx

DEA SALGA and CoGTA with the support of GiZ have developed a toolkit titled 'Lets Respond – integrating climate change risks and opportunities into municipal planning' (April 2012).
https://www.environment.gov.za/sites/default/files/docs/lets_respond_toolkit_nccrp_workshop.pdf

EPA has developed savings calculators that local governments can use to assess the life-cycle and annual costs and savings of a variety of ENERGY STAR labeled products, which are available at
http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing

# 6.Step 2: DESIGN CONCEPTUAL BLUEPRINT

The purpose of the conceptual design phase is providing executive[18] management with the information that they need to approve an EE project and thus facilitate EE policy implementation (outlined in step 1). Although the primary purpose of step 2 is assessing the feasibility of the EE Project by gathering and analysing information, these activities can also be used to build stakeholder support. It is advisable that the Project Manager for the EE project is brought on broad at the beginning of Step 2. Being instrumental in designing the blueprint gives the project manager a richer understanding, increasing the likelihood that he/she takes ownership of the project.

At the end of Step 2, a core set of documents will be produced, typically in a business plan format, that answers three main questions: what will be accomplished?, what are the risk-adjusted benefits?, and how will the project be implemented? The steps below describe the actions and decisions that the Project Manager will take to answer the above three questions.

- Prepare a **vision statement** for the project
  - ✓ Ensure the vision statement is aligned with the goals of the municipality's integrated development Plan (IDP) and climate change initiatives of national and provincial Government (especially initiatives that are targeted towards municipalities).
  - ✓ Use the EE policy, explained in Step 2 of the guidelines, as the basis to develop the motivation supporting the importance of the EE project as a measure to reduce the impact of climate change.

[18] The Executive in a municipality is the Mayoral Committee (MAYCO) or alternately the delegated authority responsible for making executive decisions on behalf of the municipality.

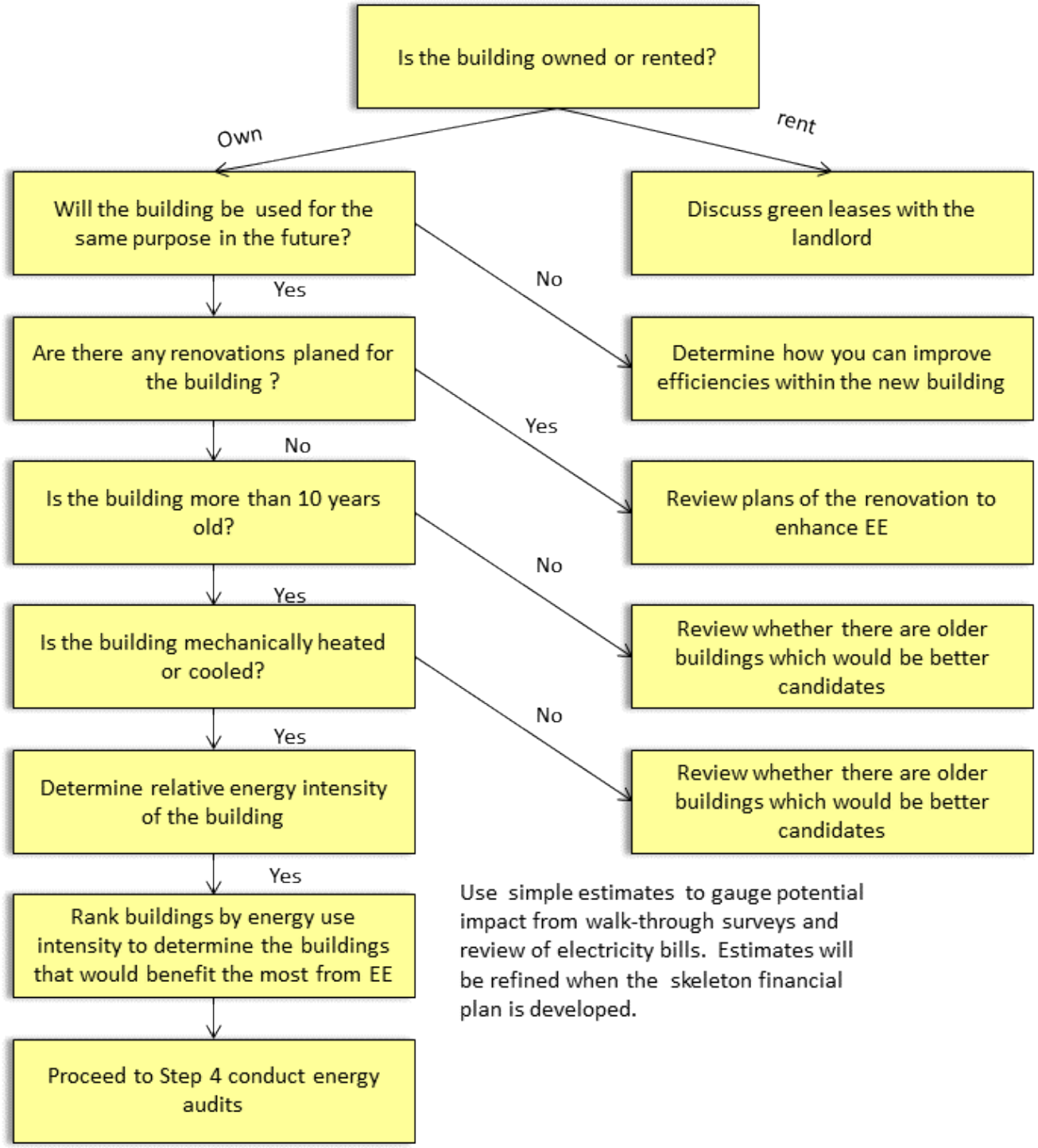
- State the long, medium, and short term **objectives** of the EE project.
  - ✓ Long-term objectives have a more macro lens and are targeted towards influencing the development trajectory of a system. They include reducing GHG, improving air quality, improving the quality and natural systems and the goods and services they produce, and creating a thriving market for EE technologies.
  - ✓ Medium term objectives generally cover a 3-5 year period and include the total reduction in a municipality's energy consumption from initiating multiple EE projects, increase in the number of new entrants supplying EE technologies, etc.
  - ✓ Short-term objectives are project specific and can be realised within between 1-2 year timeframe, such reduction in energy consumption, reduction in energy costs, etc.

- Define the scope of the project by listing interventions. In other words itemise buildings, facilities and streetlights targeted for retrofitting and describe proposed technologies.
  - ✓ Apply tools to identify assets, especially buildings, that would potentially benefit the most from being part of the EE project. The most popular tools used by local governments are automated benchmarking tools and a simple screening process.

- If clean data is available consider using the EPA's online Energy Star Portfolio Manager software tool[19] at to compare buildings energy/ water usage to average comparable buildings. Although data on buildings is drawn from developed countries, and hence building comparisons might not be indicative of local buildings, the US benchmark will provide an accurate baseline to measure the performance of buildings against (R20, 2013: 18). Buildings that achieve the lowest rankings will potentially benefit the most of the EE project (R20, 2013: 18).
- If energy data is not tracked and managed on a regular basis and the municipality / provincial government owns a large number of buildings, use a simple a screening process to identify the best buildings for the EE project. The R20 prioritisation tool (refer to figure 2) provides a reference point to develop a non-technical screening process that a building manager can use to get a rough-idea of buildings that should be included in the EE project.

[19] (http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager)

**Figure 2 Building prioritisation tool to identify the buildings that have the best potential for EE technologies**




Source: Adapted from R20 Building Efficiency Guide, 2013, p. 20

**In-depth Case Study One**

**Drafting a project's scope: eThekwini Municipality's Office Building Retrofit (2010-2011)**

The scope of the project was retrofitting light systems in 10 office building lights, which are listed below

- Durban Market
- City Hall
- Liberty Towers
- City Engineers
- Metro Police
- Electricity Building
- Rennies House
- Florence Mkhize Building
- Shell House
- 75 Winder Street

***Technology: T5 Lamps***

T5 lamps are a type of fluorescent lamp which are 16mm in diameter and have become the fluorescent lamp of choice in recent years in favour of the first generation T12 (38mm) lamp and; the second generation T8 lamps (26mm). Third generation.

The luminous efficacy of T5 lamps is about 100 lm/W which compares favourably to T8 lamps (80 lm/W) and; T12 lamps (70 lm/W). Although T5 lamp technology has been around for over three decades, their application has been limited to signage, furniture and table lighting. They have only recently been used for large scale application in office buildings. T5 lamps are operated exclusively with high frequency electronic ballasts and because of their slim design they require less material for casing which decreases the costs originally needed for T8 lamp casing.

***Technology: Installation of Occupancy Sensors***

Occupancy sensors to be installed in a number of office buildings and lighting to be utilised only when required in office conditions. Lights are automatically switched on or off when the motion/occupancy sensor detects movement in a particular location within the building, and is switched off when no motion is detected after a period.

***Technology: Installation of Individual Switching***

Individual switching is a type of lighting technology that allows an individual ballast to run two separate lights - one at a time - by switching back and forth between each light, at a user-specified interval. This can save a significant amount of energy.

***Expected Impacts***

As with the other Energy Efficiency demand side management (EEDSM) interventions, the main expected impacts are the energy savings that can be achieved. The new lighting fixtures will improve the brightness of several office buildings in the municipality. The programme will also create energy efficiency awareness among staff.

Source: EThekwini Municipality

- Prepare an **indicative skeleton financial plan** that provides a high-level estimate of the EE project's cost and expected benefits.
    - ✓ Provide a **financial calculation of the cost of conducting a baseline study** that measures pre-implementation energy consumption of targeted municipal buildings, facilities and streets. The calculation will be used to decide if the baseline survey can be funded using the budget or if donor funding is required.
    - ✓ Provide **estimates of the upfront capital cost required** to retrofit or change technology lighting and HVAC systems in proposed buildings, facilities and streets, based on proposed technology costs. It is useful to break this down to the costs of sub-projects to provide different implementation / retrofit options.
    - ✓ Provide a **comparison of the energy costs of existing technology**, based on the current cost of bulk energy and maintenance costs, per building or per watt utilised, against future costs using the consumption, output and lumen data of the proposed new technology. These costs should include estimates for on-going maintenance, over a period of ten years.
    - ✓ Provide a **high-level cost and benefit analysis of the EE project** , using estimated savings.

## Table 1 Example of a skeleton indicative Financial Plan

| List Key Energy Efficiency Measures<br>• Lighting systems redesigns and retrofits<br>• Comprehensive HVAC improvements and replacements<br>• 10 Buildings | | |
|---|---|---|
| Description | Before Retrofit | After Retrofit |
| Number of lights | 2000 | 2000 |
| Lifetime (hours) | X | X |
| Operational & Maintenance Cost (ZAR) | X | X |
| Operational use (hr. per yr.) | X | X |
| Electricity Consumption (Kwh/ year) | X | X |
| Electricity Cost (ZAR) | X | X |
| Energy cost intensity per square metre | | |
| | | |
| Financial Cost Benefits of EE Project | | |
| Total Installation Cost | | |
| Total Monitoring and Verification Cost | | |
| Incentives (i.e. Eskom) | | |
| Actual Project Cost | | |
| Energy Savings (ZAR) | | |
| Energy Savings (compared BAU)) | | |
| Operations & Maintenance Savings (ZAR) | | |
| Total Annual Savings | | |
| Payback (years) | | |

Source: adapted from RSEFF, 2011:5 and EERE, 2013:23

**In-depth Case Study Two**

**Preparing a Skeleton Financial Plan: Estimating Costs and Saving from Retrofitting**

**City of Cape Town: Retrofitting the Civic Centre**

Estimates of costs and savings of energy efficiency retrofitting in the City of Cape Town's civic centre building

| o | Description | Cost | Energy Savings/annum (MWh) | % Saving | Savings/annum (R) | Life Cycle Cost/annum (R) | Net Savings/annum (R initial) | Payback Years |
|---|---|---|---|---|---|---|---|---|
| 1 | Lighting | R36m | 3 800 | 16% | R3m | R13k | R3m | 6 |
| 2 | Main Chiller Replacement | R11m | 2 550 | 11% | R2m | - | R2m | 4 |
| 3 | Window blinds | R20m | 1 800 | 8% | R1.44m | R40k | R1.4m | 8 – 9 |
| 4 | HVAC Main Fan VSD's | R1m | 900 | 3.7% | R720k | R20k | R700k | 1.5 |
| 5 | Sub-metering | R1m | 200 | 1% | R160k | 0 | R80 000 | 6 |
| 6 | HVAC Maintenance | 0 | 200 | 0.9% | R160k | 0 | R160 000 | 0 |
| 7 | Workstation Monitors | R2m | 150 | 0.6% | R120k | R150k | - | - |
| 8 | Lift Drive System | R1m | 140 | 0.5% | R112k | - | R112 000 | 6 |

Source: Sustainable Energy Africa for GIZ, February 2012 report

*Estimates in the table below were presented* by Hilton Trollip, a principal engineer in the Energy and Climate Change Unit at the CoCT, at the South African Economic Regulation Conference. These estimates could be used to provide desk-top estimates of savings from retrofitting lighting systems. The number of units that will be changed will provide the total savings in Kilowatt hours that can then be converted to the rand amount based on the average energy costs paid to Eskom.

| Municipality | No of units | Old technology | New technology | Energy saving per lamp (W) | Projected energy saving per year (KWh) |
|---|---|---|---|---|---|
| Cape Town | 42333 lamps | 75W/55W Halogen | 8W LED | 67 and 45 | 6,238,028 |
| Ekurhuleni | 288 signals | 75W/50W Halogen | 8-5W LED | 67 and 45 | 129,157 |
| eThekwini | 455 intersections | 75W Halogen | 10W LED | 65 | 813,103 |

- Draft a **high-level implementation plan** that identifies internal and external processes that will be used to implement the project (i.e. Supply Chain Management, Budgeting Cycle, etc,) and internal and external stakeholders who have the specialist skills needed to implement the project.
    - ✓ Identify a **multi-disciplinary Project Team** with skills from different departments (including Finance).
    - ✓ Identify a **technical EE expert**, preferably with project management experience, to lead the team, as he /she will need to help structure the project, define technical performance indicators and develop the technical part of the tender. If a team leader with technical skills and project management experience is not employed by the Council, an external resource needs to be approached.
    - ✓ Identify a **financial EE expert** to support the Project Team, who has an understanding of financing through the PPP mechanism, financial risk assessment, risk allocation, knowledge of EE transactions, their related cash flows and budget implications.
    - ✓ Consider the **two implementation models**, either an in-house team or an Energy Services Company (ESCO) (see case study 3 below), and explore the implication and risks of these respective models on the type of resources needed to mobilise and maintain the project (i.e. management, system and staffing requirements).

- ✓ Identify the **inputs needed to implement the project**, such as materials, equipment, technologies, skills, outsourced technical services, management systems, and procurement processes, taking into consideration if an in-house or ESCO implementation model was selected.
- ✓ Provide an **overview of monitoring and verification requirements**, including the baseline analysis and its verification (the cost of the baseline study should be separated and financed by the municipality).
- ✓ Identify key **on-going maintenance requirements**, as retrofitting of new generation lighting and equipment is likely have different maintenance requirements, which will increase the interval frequency to replace the equipment, and may require training for maintenance staff.
- ✓ **Calculate project implementation costs** on a high-level basis, including preparing a cost-benefit analysis and comparing long-term life cycle costs against existing costs of the traditional technology.
- ✓ Conduct a **high-level feasibility analysis.**[20] which is based on the cost-benefit analysis of proposed EE measures prepared when

[20] The feasibility study is done to verify the viability of the project, that is, decide if it should be implemented or not. It should include analysis of the market, the economic situation, technical issues, financial efficiency, sensitivity analysis and a risk analysis (IFC, 2008)

the skeleton financial plan was drafted, also include a section that explains the costs of managing the project, identified project risks and associated mitigating factors. If an official is considering using external consultants a scoping exercise of the range of provide partners and their credibility in the market should be conducted.

- ✓ Create **a high-level project plan**, typically a Gantt chart, breaking down the project into 10-20 strategic goals. Each goal should be briefly explained (i.e. retrofitting the lighting system in building A and B) and a start and end dates should be provided (i.e. January 2014-December 2014) and the project champion responsible.

All the points discussed above are important, but the most important decision made during the conceptual phase of the EE project is whether the implementation agent will be an Energy Service Company[21] (ESCO[22]), in-house team or a combination of the aforementioned options, as this decision will affect the manner in which the generic steps in the Practice Note are implemented.

[21] Different forms of ESCOs exist and thus they can be viewed as a contract vehicle that can add flexibility to a project, especially financial flexibility for municipalities / provincial governments that may not have access to upfront funding through traditional contracting vehicles.

[22] Appointing an ESCO to implement a EE project is permitted under the PFMA and MFMA. The City of Cape Town and EThekwini have used this approach to implement their EE projects.

**In-depth Case Study Three**

**What is an ESCO?**

An ESCO is defined as "a natural or legal entity that delivers energy services and/or other EE improvement measures in a user's facility or premises, and which accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of EE improvements and on the meeting of the other agreed performance criteria" (EPEC; 5: 2012).

When a municipality / provincial government enters into an agreement with a ESCO it is referred to as an energy performance contract (EPC), which is defined as *"a contractual arrangement between the public partner and the provider (normally an ESCO) of an EE improvement measure, where payments are made based on a contractually guaranteed level of EE improvement and energy cost savings. The public partner contracts for a specific result (e.g. energy savings in kw/h) rather than for specific products or services"* (EPEC; 5: 2012).

ESCOs will incur expenses (such as investing in equipment) when they implement an energy retrofit project but these expenses are expected to produce energy savings over time. Regardless of the type of financing instrument used to fund a project, ESCOs effectively share in the resulting savings stream from reducing energy consumption by guaranteeing a portion of the energy savings achieved for a contracted period of time. If the present value of the ESCO's effective share of savings over the life of the contract is greater than the present value of all costs, the ESCO makes a profit. If not, it incurs a loss.

An ESCO can provide a range of services

- Analyse energy systems and integrate technology to select the optimal package of cost saving options (e.g. energy audit, energy analysis, engineering design analyses, project management services). The ESCO provides all of the services required to design and implement a comprehensive project at the customer facility, from the initial energy audit through long-term monitoring and verification (M&V) of project savings ( ICF, 2007:1).

- Mobilise resources to create 'personalised' energy products in an efficient and effective manner, drawing on the experience of all partners involved (i.e. construction management services, equipment commissioning, equipment maintenance & servicing, project management, technical support, and training).

- Offer project financing expertise, accommodate both simple and sophisticated contracts and are conversant with relevant legal issues (i.e. financial, legal and contract services).

- Provide access to alternative sources of funding, when public authorities face constraints on their borrowing capacity. Private contractors can finance projects through mechanisms that are different from formal loans and can be tailored to the individual cash flows of each project. Hence ESCOs are able to support an EE project when internal sources or on-balance sheet investments are limited.

- Offer expertise in selecting subcontractors, managing projects, overseeing construction work, and implementing quality and risk management controls.

- Deliver energy savings through the implementation of cost-effective techniques for measuring and monitoring energy savings, such as client training and exception reporting project savings guarantee (i.e. energy management, risk management, project & performance guarantees).

Source: EPEC (2012), R20 (2013) and EPA (2011)

**In-depth Case Study Four**

**Should You Use an ESCO or an In-House Team: The Pros and Cons**

The decision to implement an EE retrofit project using an ESCO, or in-house resources, or a combination of the aforementioned options depends on

- The availability and expertise of in-house staff
- The size and complexity of the project

The pros and cons of selecting an ESCO compared to drawing on in-house skills to implement the project are summarised in the figure below

**Advantage: ESCO**

- Structure contracts , enabling savings to pay for capital improvements
- Provide and/or arrange for project financing off the balance sheet
- Guarantee equipment performance and savings

**Advantage: In-house**

- Cost to implement the project is less
- Exercise greater control of the project from start to finish and hence has more control over the timing of the project

**Disadvantage: ESCO**

- Require another energy audit be completed by their staff , even if audit was commissioned
- Compromise technical analysis: experts in a technology and bias to recommend own technology
- Incur additional monitoring and verification costs to confirm energy savings, if a guaranteed savings model is entered into with ESCO

**Disadvantage: In-house**

- Spend substantial time / resources managing & overseeing the project
- Multiple decision makers could delay the project.
- If technical difficulties arise, staff may lack the expertise to resolve the problems

Source: R20, 2013: 14

**In-depth Case Study Five**

**Weighing-up your Options: Shared Savings or Guaranteed Savings Contract**

Once a municipality / provincial government decides to use the services of an ESCO to implement the EE project, the next step is to consider the type of contract that they will enter into with the ESCO. Performance Contracts are the industry standard. An ESCO's payment is determined by performance, as it is linked to energy savings realised from implementing the EE project. Evaluation, measurement and verification provisions, stipulated in the contract, determine the value of payments. The ESCO designs and implements the evaluation, measurement and verification plan, whereas the municipality / provincial government receive the results, and a third-party validates the results.

Two types of performance contracts exist- the shared savings and the guaranteed savings model. The primary difference between these two models is whether the ESCO or municipality/provincial government assumes the credit risk.

Under a guaranteed savings model, a municipality / provincial government sources capital directly from a third-party financier and the municipality / provincial government assumes the financial risks arising from the loan. An ESCO is paid by the municipality / provincial government to provide all necessary support activities and facilitate financial arrangements. An ESCO provides a guarantee that the Rand value of energy savings will cover the loan. If the Rand value of guaranteed savings is less than expected, the ESCO is obliged to reimburse the municipality / provincial government the difference between expected savings and Rand value of the loan. If energy savings exceed the ESCO's guarantee, a municipality / provincial government keeps the excess, unless further sharing arrangements have been made.

Under a shared savings model, the Rand value of energy savings is distributed between the municipality / provincial government and the ESCO, based on a negotiated rate stipulated in the contract. If there are no cost savings, the municipality / provincial government pays the energy bill and owes the contractor nothing for that period. In a classic shared savings arrangement, the ESCO provides financing and also bears both project development and performance risk. An ESCO is exposed to rising electricity costs beyond the escalation clause agreed to in the initial Energy Savings Agreement. As an ESCO typically agrees that the municipality / provincial government will not pay more for electricity than it did at the start of the contract. If there are energy savings, the ESCO is still responsible for meeting financial obligations arising from upfront capital investment in equipment. At the end of the contract, ownership of equipment transfers to the municipality / provincial government, based on the conditions specified in the contract.

In summary the key difference between the two contracting models is as follows: A guaranteed savings contract can be used to reduce the cost of financing an EE project because it increases the cash-flow position of the funding municipality / provincial government agency, which reduces the probability of default. Whereas a shared savings contract allows a municipality / provincial government, that may not have access to up-front capital, to enter into agreements with an ESCO which can secure up-front financing. In addition a shared savings contract makes it easier for a public entity to afford an ESCO as they are paid based on the energy savings produced over time. Under a Shared Savings Contract, there are usually no up-front costs for the government, and the government will still reap the long term benefits resulting from the efficiency improvements.

| Variable | Shared Savings | Guaranteed Savings |
|---|---|---|
| Financing responsibility & credit risk | ESCO | Public entity |
| Performance risk | ESCO | ESCO |
| Contract on balance sheet of public entity | No | Depends on financing vehicle, BUT public entity includes cost on its balance sheet |
| Financing repayment varies with the energy and/or cost savings produced | Yes | No |

Source: R20; 2013: 12-15

**Details of Online Resources:**

Final Publishable Report, EUROCONTRACT IEE (February 2008): Presentation of adapted EPC models for refurbishment in the public sector (pages 49- 56). http://ieea.erba.hu/ieea/fileshow.jsp?att_id=5828&place=pa&url=Eurocontract_Final_Report_Publishable. pdf&prid=1576

EPC Watch – Watching the world of Energy Performance Contracting (EPC), information website which has a Q&A section on the basics of EPCs. http://energyperformancecontracting.org/

Joint Public-Private Approaches for Energy Efficiency Finance: Policies to Scale up Private Sector Investment, International Energy Agency (2011).Pages 24 to 28 provide an introduction to EPC and illustrate various EPC structures. http://www.iea.org/papers/pathways/finance.pdf

Introduction to Energy Performance Contracting, ICF International, National Association of Energy Service Companies (NAESCO) (October 2007). Prepared for the US Environmental Protection Agency – Energy Star Buildings. Section 2 (pages 6-7) explains the basics of an EPC (or ESPC as referred to in the NAESCO document). http://www.energystar.gov/ia/partners/spp_res/Introduction_to_Performance_Contracting.pdf

Flex Your Power Municipal Best Practices Guide provides assistance to local governments on improving energy efficiency and energy conservation. A number of case studies are available at http://www.fypower.org/bpg/index.html?b = institutional

Guide to Preparing Feasibility Studies. This California Energy Commission report provides guidance to local governments in assessing the feasibility of potential energy efficiency activities.
http://www.energy.ca.gov/reports/2000-03-20_400-00-002.PDF

High-Performance Cities. Apollo Alliance document serves as a guide to energy-saving policies for local governments and provides multiple case studies.
http://www.cows.org/pdf/econdev/apollo/rp-high_perform_cities.pdf

# 7.Step 3: GAIN EXECUTIVE APPROVAL (BLUEPRINT)

After the project's conceptual blueprint has been developed and the project manager has tested the viability of the EE project, based on the blueprint, the assessment is submitted to executive committees for approval.

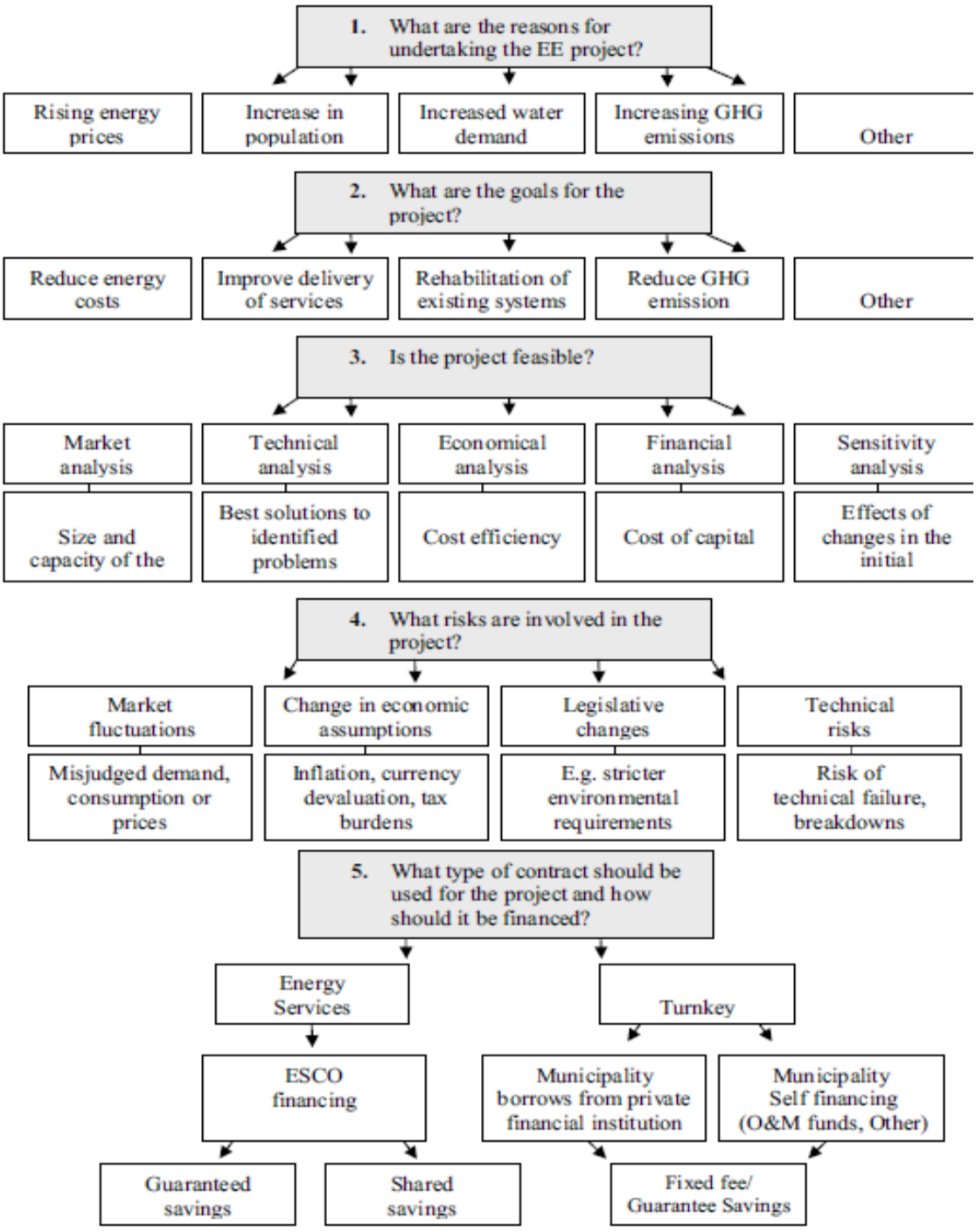
Each committee requires documentation to be submitted in a different format and hence the project manager must ensure that documents are submitted in the appropriate format. Furthermore, each committee has a different process to enter an item on the agenda for discussion and hence the project manager must also pay attention to procedural issues. In the case of municipalities Mayco approval must be submitted either to the council, for appropriation in the budget, or the midyear adjustment budget, depending on which process commences sooner

Step 3 is crucial because it gives officials the authority to allocate resources to the EE project. More specifically after the EE project has been approved the project manager can increase the size of the EE project team, focussing on hiring critical technical and financial skills needed to complete Step 4. It is advised that the size of the EE project is increased gradually, as the EE project gains momentum.

Before documents are submitted for executive approval; the project manager must ensure that the pack of documents submitted to the executive committee answers the five questions below (refer to Figure 3 for more details)

- What are the reasons for undertaking the EE project?
- What are the goals of the EE project?
- Is the EE project feasible?
- What risks are involved in the EE project?
- Watt type of contract should be used for the EE project and how should it be financed?

## Figure 3: Issues considered by executive management to approve implementing an EE project




Source: IFC, 2008: 13

# 8.Step 4: CONDUCT ENERGY AUDIT & PILOT

Throughout the EE project lifecycle, the options identified in the conceptual blueprint created in step 2 are explored at a deeper level and tested (i.e. visualise it as a funnel process). It is best to think of the EE implementation process as iterative rather than linear, instead of repeating an issue it is covered from a different perspective.

In Step 4 the original list of assets to be included in the EE project is in Step 2 is refined before a baseline survey and energy audit is conducted. Conducting a baseline survey and an energy audit is an intricate process. Before data can be analysed, it needs to be collected and cleaned. Basing decisions on analytical trends is insufficient. The effect these trends might have on the public entity needs to be assessed. The greater the number of assets that have been identified as part of the EE project, the more complicated the baseline energy survey and energy audit becomes, increasing the time and cost of these activities.

Also it will be difficult for the baseline survey and energy audit to take place in step 2 because the project manager will probably need to hire resources to conduct the energy audit, especially technical energy and financial modelling skills. Unless the EE project has executive management approval it will be difficult to bring in new resources or hire a consultant to conduct an energy audit. It is recommended at this stage of the project that the size of the EE project team is increased to include a technical and financial expert.

The purpose of Step 4 is to assess the potential performance of the EE project and establish EE performance measures, using established technical modelling tools, referred to as a baseline energy survey and energy audit. This step is the most technical step in the EE project life cycle as energy baselines and benchmarks must be established, audit is conducted and technical value of EE project assessed, and EE project goals are set.

The first phase of step 4 is to gain detailed information about current energy consumption patterns of targeted buildings, facilities and street lights before any EE measures are implemented. The collected information is referred to as the baseline survey because it establishes the base from which to assess whether installing EE technologies has reduce energy consumption.. Hence the baseline survey serves as the yardstick to judge the performance of the EE project.

The second phase of step 4 explores the possible future impact of the EE project. An energy audit is conducted to model potential energy savings taking into consideration the targeted technology and past energy consumption habits. During the audit the actual performance of a building's systems and equipment is compared to its designed performance level or the performance level of top performing technologies.

The scope and detail of the audit will be determined by the complexity of the project, internal availability of resources and type of implementation model selected[23]. The engineering and financial modelling exercise involved in conducting an investment grade energy audit is complicated. Often a municipality / provincial government draw on external skills to conduct investment grade energy audits that model data and establish an accurate baseline. It is common practice to 'incorporate investment grade energy audits into ESCO's energy performance contracts, which are contracts that offer a one-stop process for purchasing, installing, maintaining, and often financing energy-efficiency upgrades at no upfront cost' (EPC, 2011:12). The SCM implications of hiring external skills, either an ESCO to conduct an investment grade

[23] There are different types of energy audits required at different steps of the EE project. When the implementation plan is designed in step 2 a desk-top or a walk through energy consumption study is required to gain Mayco's sign-off that in principal the EE project can continue. Once the EE project has been approved in general by Mayco, a more technical type of audit is required to further explore the potential cost savings of the EE project. If an ESCO is selected as the implementation agent of the EE project then the ESCO will conduct the investment grade audit that establishes baseline energy consumption, as this baseline is used to determine energy savings and payments.

energy audit as part of a broader EE implement model or drawing on external skills from sister government entities are investigated in case study six.

Three approaches are used to assess baseline energy consumption and estimate potential future energy savings of implementing EE technologies. They are conducting baseline energy assessments using standardised tools, determining an asset's relative performance compared to its peers (i.e. benchmarking) and conducting technical energy audits (EPA, 2011: 12). The steps to apply these three approaches are explained below.

The third phase of step 4 is conducting a pilot study. Before an EE project is launched, it is crucial to test the accuracy of the energy audit, focusing on the performance of the EE technology, baseline metrics and proposed energy savings.

The activities in step four are therefore to:

- **Test and verify the selection and ranking of assets** targeted for the EE project in Stage 2, based on the size of the sites and level of energy consumption[24].
  - ✓ **Collect, clean and manage current consumption data** of proposed targeted buildings, facilities and street lights identified in step 2.
  - ✓ **Feed collected data into standardised tools** to develop a more detailed assessment of current energy consumption of identified assets.
  - ✓ **Benchmark the energy performance**[25] of targeted buildings, facilities and street lights compared to the performance of similar assets across the country. Results of benchmarking exercise gives

[24] A review of the proposed list of targeted assets before the EE audit is recommended, although this step is not critical. If fewer assets are included in the audit it will make it easier to conduct the audit.
[25] "Benchmarking" is a term that is used to compare a building's energy/resource Efficiency with that of average efficiency in comparable buildings. Benchmarking is an effective tool to compare efficiency Performance

an official information to prioritise sites that need EE technologies installed and / or require a more in-depth comprehensive energy audit (EPA, 2011: 12).

- ✓ **Refine the list of targeted assets in Step 2** that might offer the best opportunities for EE energy savings, based on the results of new data collected and benchmarking exercise to create a 'final' list of targeted assets to be assessed during the energy audit.

- Investigate the **different type of energy audits** (i.e. energy survey and analysis versus detailed analysis of capital intensive modifications - see point below) **and select the most appropriate audit,** taking into consideration (R20: 2013:23):
  - ✓ The complexity of the asset portfolio targeted under the EE project, especially facilities and buildings;
  - ✓ The size, scope, and ambitious nature of efficiency retrofit goals;
  - ✓ The value of the project budget;
  - ✓ The number of in-house resources available and their expertise;
  - ✓ *The cost effectiveness and efficiency of using internal compared to external resources;*

- ✓ *The value a potential funder places on the results of an independent energy audit, especially the financial analysis of EE efficiency measures*[26]*? And*
- ✓ The ability of the EE team to access external technical assistance (i.e. hire an energy consultant, contract with an ESCO, or partner with ESKOM).

- **Conduct an energy audit using the approach that best suit's the EE project's needs, resources, skills, available budget, and potential CAPEX invested in EE technologies.**
  - ✓ *The standard audit is known as an energy survey and analysis, which is designed* to provide a **detailed analysis of energy consumption patterns** (R20, 2013: 23). The audit report will verify that the selected assets for the EE project are correct by analysing the benefits of energy savings, using simple payback calculations of recommended measures and a high-level analysis of risks and mitigating actions.[27]. A standard audit is only recommended for very low-value capital EE projects, as a simple payback calculation does not consider the long-term benefits of an investment and

[26] Funders generally place greater reliance on reports produced by third parties to support the underwriting process and calculate exposure to financial investment risk

[27] The audit should provide details of the assets, their location, the current levels of energy utilization, the maintenance costs (or frequency) and connections into the grid. Furthermore, the audit should outline the methodology for data collection, the existing facilities that will be retrofitted, the savings generated from the retrofitting project, the estimated costs of implementing the project, and provide a financial cost-benefit analysis.

hence provides insufficient information to make robust investment decisions for EE projects (R20, 2013: 23).

- ✓ If the results of the **standard energy audit are positive**, and the municipality / provincial government want to raise capital to implement the EE project, **a deeper financial assessment** of the EE project's potential efficiency measures will need to be conducted. The municipality / provincial government can use internal or external resources to conduct the in-depth financial assessment, depending on the availability of in-house skills. Alternatively the municipality / provincial government can contract with an ESCO to conduct the financial analysis as part of the performance contract process.
- ✓ *An investment grade audit is required for EE projects with a high capital value and long-term potential value creation. The audit which provides a detailed analysis of capital-intensive modifications, "assess* multiple building, facility and street lighting systems and their energy consumption, using energy modelling software" (R20, 2013:23). **The audit analyses the interaction between efficiency strategies and their life-cycle costs**, from an engineering perspective, typically taking a comprehensive and integrated view of

a building or facility[28]. **In addition, the financial analysis of potential energy savings is of an investment grade quality** (i.e. same as deeper financial assessment referred in the point above) and hence more robust than the standard audit[29]. Given the technical nature of the investment grade audit it is prepared by an expert team, typically an ESCO.

- **Analyse the results of the audit, irrespective if it is a standard or investment grade audit,** to compile the final list of targeted assets and respective EE technologies to maximise energy savings and fine-tine the **EE project's high-level goals,** originally stipulated in Step 2.
  - ✓ *Evaluate energy efficiency measures uncovered by the energy audit and determine whether there are any synergies from implementing multiple EE measures in a buildings and facilities.*

- **Run a pilot EE project[30]** to gather performance data, identify areas for improvements and demonstrate energy savings that can be used to secure additional stakeholders' support, such executive leaderships and funders.

[28] Energy savings are measured on a broader scale than a unit of equipment or a single intervention Evidence shows that a "long-term and holistic vision with an integrated design approach to building and facilities upgrades offers the best potential to maximise energy savings and increase the return on investment (R20, 2013:24). For example, considering the effect of insulating a building and installing a HVAC system, simultaneously.

[29] The financial metrics used to value EE projects, such as Net Present Value and Internal Rate of Return, consider the time-value of money and the streams of benefits over the life of the project. The rule is that energy efficiency measures with a positive NPV and low lifecycle costs should be prioritised for funding.

[30] It is recommended that a pilot study is conducted even if similar technology has been used in other government buildings. The results of the pilot are influenced by a host of factors including the skills and expertise of a buildings maintenance crew and the particular features of a building, especially when integrated EE technologies are installed.

- ✓ *Use funds from the internal budget and /or grants to finance the implementation of the pilot.*
- ✓ *Use the results of the pilot study to address technical, managerial or system challenges and mainstream aspects of the pilot that have worked well ( i.e. identify process innovations that occurred during the pilot and create systems in the final implementation plan to mainstream these innovations into the roll-out of the EE project.*

- ➢ *Increase size of team*

**In-depth Case Study Six**

**Hiring a consultant to conduct an energy audit: Overcoming the challenges**

A service provider might have to be hired to conduct an energy audit if internal resources are unavailable. In addition, if the municipality / provincial government decide to use an ESCO implementation model, the results of the audit will become the baseline against which to judge the EE project's performance. An audit is required to determine the cost of the retrofit, but the value of the performance savings contract cannot be determined without an audit.

*"In other words, the cost of the retrofit can only be determined post the audit; but the guarantee of savings is dependent on the audit. The two processes are intricately interlinked, but the contracting system of the MFMA does not readily allow for this: a municipality cannot easily appoint a service provider for an unknown amount; but if they split the audit and retrofit into two contracts there is no guarantee that the company that did the audit will be given the contract to retrofit"* (Robinson, 2013).

The EE project might face an SCM challenge at this point because the MFMA makes it difficult for a municipality to appoint a service provider for an unknown amount; but if the tender for the energy audit and EE project retrofit is split into two contracts, there is no guarantee that the service provider who conducted the audit will be given the EE project retrofit contract.

The use of different service providers to conduct the audit and implement the project – particularly where the project implementers take risks for performance has created problems with respect of holding the service provider accountable for performance levels. Performance variances in these instances are blamed on errors in baseline studies. "ESCOs will not take on a job where they must guarantee savings against an audit that they didn't undertake themselves" (Robinson, 2013). As a result, the service providers prefer to conduct their own baseline studies. Municipal procurement policies prefer an independent process to verify baseline data and hold service providers accountable against this objective baseline data.

Two approaches have been developed by municipalities to avoid a two-stage procurement process.

The first approach is using a public body to conduct an investment grade energy audit. For example Polowkane Municipality reduced the complexity of its SCM process by hiring the University of Johannesburg to conduct an energy audit for its EE Project. Summarily, Eden Municipality used the same approach to hire the CSIR to conduct specialised, technical services for its Water Catchment project.

The second approach is designing a tender process that allows a single service provider to conduct the audit and implement against agreed performance. SCM allowed the call for proposals to include an audit and retrofit component, yet the "assessed cost to retrofit equipment for the EE project was based on the indicative cost for a typical retrofit of a set rand value. This enabled the Bid Adjudication Committee to assess price and functionality and Supply-Chain have built in checks and balances through making the process include re-adjudication by the Bid Committee at each stage of the subsequent retrofit costing process" (Robinson, 2013).

**Online Resources**

The Rocky Mountain Institute offers a free, downloadable energy audit sample forms, in an Excel workbook, at their website: www.rmi.org.

U.S. EPA's Energy Star website has many tools, such as Financial Value, Building Upgrade, and Cash Flow Opportunity calculators. Refer to http://www.energystar.gov/index.cfm?c=assess_value.financial_tools.

Public Procurement of Energy Efficiency Services – Getting Started, Energy Sector Management Assistance Program, World Bank (November 2010).Pages 17 to 23 expound the World Bank procurement guidelines dividing an EPC in two contract types: split design and construction and combined design and construction. http://www.esmap.org/esmap/sites/esmap.org/files/BN009-10_EECI-Public-Procurement-Getting-Started.pdf

Measuring Energy Efficiency. Indicators and Potential in Buildings, Communities and Energy Systems. VTT Research Notes 2581, 2011. Chapter 5 illustrates methods for EE measurement in buildings.http://www.vtt.fi/inf/pdf/tiedotteet/2011/T2581.pdf

Public Procurement of Energy Efficiency Services – Getting started, Energy Sector Management Assistance Program, World Bank (November 2010) Presentation of financing options (pages 25-30).
http://www.esmap.org/esmap/sites/esmap.org/files/BN009-10_EECI-Public-Procurement-Getting-Started.pdf

Measurement and Verification and the IPMVP, Clinton Foundation, Clinton Climate Initiative, President Climate Commitment (April 2009) Summary of the IPMVP.
http://www2.presidentsclimatecommitment.org/documents/ccitoolkit/Measurement_and_Verification_and_The_IPMVP.pdf

Climate Friendly Buildings and Offices – A Practical Guide, United Nations Environmental Programme (2010) Section 3 contain information on baselining and

benchmarking. Section 6 contains three case-studies, including detailed energy analysis, on public buildings used by the United Nations and the African Development Bank.
http://www.unep.fr/scp/publications/details.asp?id=DTI/1278/PA

Energy Star Portfolio Manager Benchmarking tool:
(http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager)

U.S. Environmental Protection Agency, Energy Star Building Upgrade Manual, 2008: A Strategic guide for planning and implementing a profitable energy saving building upgrade, following a five---stage process. Chapter 2 focuses on benchmarking. Available for free download online: www.energystar.gov.

Building Upgrade Manual. The ENERGY STAR Building Upgrade Manual describes a five-step systematic approach to improving energy efficiency in existing buildings, including recommissioning/commissioning, lighting, supplemental load reductions, fan systems upgrades, and heating and cooling system upgrades. Available for free download online
http://www.energystar.gov/index.cfm?c=business.bus_upgrade_manual

Energy Audit Workbook: A workbook from the Washington State University Energy Program that provides instructions, checklists, and worksheets for conducting an energy audit www.energy.wsu.edu/Documents/audit2.pdf

U.S. Department of Energy, Building Energy Software Tools Directory, Whole-Building Analysis: Retrofit Analysis This website describes a series of software tools that can aid the energy auditing and analysis pro-cess Links to the tools—some available free of charge, some for purchase—are included http://apps1.eere.energy.gov/buildings/tools_directory/subjects.cfm/pagename=subjects/pagename_menu=whole_building_analysis/ pagename_submenu=retrofit_analysis

# 9. Step 5: ACCESS FUNDING & BUDGETING

The purpose of Step 5 is to evaluate and determine the optimum method to finance the implementation of EE measures identified in Step 4 (i.e. energy audit) that will produce energy savings, demonstrated by pilot study. Hence Step 5 explores the factors that the project manager, supported by the EE multidisciplinary team, will need to consider when he/she raises funding for the EE project.

Key decisions taken during step 5 include calculating the Rand value of finance required, identifying financial instruments (i.e. loans, bonds, energy performance contracts, lease-purchase agreements, and grants) and negotiating with private and/or public institutions (referred as a finance source) to secure funding. The negotiating period can be lengthy because a few institutions will be approached to fund different aspects of the EE project and the due diligence credit process of each respective institution is different, from the level of detailed information required in the funding proposal, supporting information attached to the proposal, and frequency of on-site audits.

The length and complexity of the negotiation process to secure funding from institutions is influenced by the scope of the EE project, nature of institution's due diligence process and Rand value of funding required. As these factors will tend to be different from case-to-case, the guideline recommends that the project manager of the multidisciplinary team appointed in Step 1 determines whether the skills and experience of the team is sufficient to complete the end-to-end process of securing finance or whether there are certain aspects of the process where skills are insufficient. The likelihood that the appropriate level of financial skills does not exist on the EE multidisciplinary should be slim, as the draft high-level implementation produced in Step 2 identified a financial EE expert that would need to be appointed. If the project team's skills are insufficient to compete step 5, arising from unforeseen circumstances, then the project manager will need to follow SCM processes to

appoint either an employee or a consultant with the appropriate financial skills. Hence the discussion of financial strategies followed by local government to access funding for an EE project in step 5 assumes that a member of the multidisciplinary team has a working knowledge of climate change funding mechanisms and other team members have background, as they have read the report titled “Towards a Financing Framework for Implementing Climate Change Projects”.

The section does not discuss specific financing options to fund an EE project, as options are influenced by the project’s location, existing policies at the municipal level (e.g. by-laws). By grouping financial instruments into three broad categories and understanding the relationship between these categories, a range of financial strategies start to emerge. This section will discuss the main aspects of the three financial strategies- external, internal and mixed. The section is not an exhaustive source of information, and officials are encouraged to complement the information presented in Step 5.

The discussion of financial strategies in step 5 covers the following topics:

- Type of EE funding instruments available in the market
- Advantages and disadvantages of funding instruments
- The relationship between the EE project lifecycle and financial instruments
- Methods to calculate the R value of funding.
- Questions to uncover the municipalities’ / local government’s debt tolerance level and cash flow position, which are factors that will influence the selection of a funding model.

**In-depth Case Study Seven**

**A Universe of Financial Instruments Exists**

**Traditional Debt** covers loans from an institutional lender or issuing bonds. Bonds are well-suited for EE projects (i.e. the capital cost can be amortised over a multi-year repayment term, allowing finance costs to be recovered from energy savings over the life of the project)

**Energy Performance Contracts**: Under a performance contract, irrespective if it is a shared or guaranteed savings model, an ESCO can be used as a vehicle to raise funding for the EE project. Irrespective of which model is selected, a performance contract allows a local government to finance energy-saving capital improvements with no initial capital investment, by using money saved through reduced utility expenditures. The municipality / provincial government can obtain commercial debt to implement the EE project, and the repayments of the loan will be serviced from the energy savings stipulated in the performance contract with an ESCO. The energy savings guarantee is key to reducing the perceived risk of the EE project, but the value of the guarantee is influenced by the credit standing of the ESCO.

**Asset-Based Finance**: A lease agreement allows municipality / provincial government to use equipment without purchasing it, at the beginning of a project. Hence 'leasing can form an important element of the financing for an EE project, particularly if it is combined with other soft funding sources, and also when it form part of an overall contractors sales package' (EPEC, 20: 2012). Leases came in to forms, a financial or an operating lease. A financial lease must be reflected on the income statement and balance sheet. Whereas under an operating lease the municipality / provincial government does not assume the risk of ownership. Hence the lease expense is treated as an operating expense in the income statement and the lease does not appear on the balance sheet. As assets installed in an EE project rarely have any residual value, this type of lease is rarely applicable to EE in buildings.

**Public Sector Loans, Rebates, and Other Assistance.** The government through one of its agencies, including parastatals, provides financial assistance via low-interest loans that can be paid-off using energy cost savings.

**Eskom rebates and other incentives**. Demand side management programmes allow a municipality / provincial government to qualify for rebates or other financial assistance to offset the cost of improving energy efficiency in their facilities.

**Grants.** Municipality / provincial government are given risk-free seed capital (i.e not charged interest), but they must meet negotiated performance targets and report to donors regarding how the money was used.

**Capital budgets and operating budgets**. Using capital or operating budgets has many advantages: funding is already on hand, there is no need to negotiate financing arrangements, and there are no interest payments. Using life-cycle cost accounting to quantify future energy savings can help local governments improve the chances of incorporating energy efficiency into their limited capital budgets (Zobler and Hatcher, 2008). Many local governments have used a "paid from savings" approach to fund purchases of energy-efficient products.

**Innovative Debt Funding:** Based on project finance principles, in theory, the investment cost of an EE project can be reimbursed by its cash flow savings. In practice commercial banks are risk averse. They are reluctant to rely solely on generated cash flow savings and hence request additional security in the form of collateral and guarantees. Guarantees can be provided by third parties to support commercial bank financing and provide additional support. In addition a commercial bank can also issue guarantees as third parties to support a particular project where other sources of funding are available.

Source: EPEC (2012), R20 (2013) and EPA (2011)

**In-depth Case Study Eight**

**Advantages and Disadvantages of Selected EE Funding Instruments**

| Financial Instrument | Pro | Con |
|---|---|---|
| Internal budget | • Void taking on debt and associated interest expense<br>• Not need to dedicate resources to securing external finance<br>• Maximise savings from EE project as it does not need to wait for external funding | • Intensive competition for funding<br>• Opportunity costs of losing cash for core priorities |
| Debt irrespective of source | • Relatively cheap to use, provided a municipality has a strong balance sheet<br>• Market is very well developed and many options exist, from soft loans (i.e. development finance institution) to corporate commercial debt | • May require voter approval and/ or limited by government debt capacity<br>• Timeline from applying for funds to receiving them can be long<br>• Loan underwriting depends on the credit rating of the borrower<br>• Costs to process loan is high and therefore institutions R and value of their base loan product is relatively large |
| Grants | • Risk free finance that can be used to fund the risky phase of a EE project, such as pilot study | • Application process is complicated and time consuming<br>• Need strong networks to know when tenders are released<br>• Very competitive application process as funds are limited |
| Public sector loans and rebates | • After grants, they are the easiest loans to qualify for<br>• Specialised funds targeted to finance EE measures and therefore application process is more focused | • End-to-end application process is lengthy paper intensive, and turnaround times are slow |
| Innovative debt financing | • Reduces the Rand value of up-front capital to initiate project<br>• Reduces the cost to develop a project<br>• Provides off balance sheet solution therefore no additional debt | • Market not developed due to legislative bottlenecks<br>• Need a financial team that has a sophisticated understanding of risk-return profile of financial instruments |
| Asset based finance | • Use energy savings to pay-off cost of technology over the duration of the project | • Combined with other soft lending options |
| ESCO Performance Based Contracts | • Makes it easier and cheaper to secure a loan as guaranteed savings are used to service loan repayments<br>• Allows public entities to tap into the expert skills of ESCO in other areas | • Potential for monitoring and verification disputes<br>• Negotiations can be long and complex<br>• Part of energy savings shared with ESCO |

**Source: R20 (2013), EPEC (2012) , Abramson (2011)**

**In-depth Case Study Nine**

**Summarising EE Funding Instruments into Broad Categories**

| Finance Source Institutions | International Climate Funds | Bilateral and Multilateral ODA | RSA Public Sector | Private Sector RSA & International |
|---|---|---|---|---|
| Financial Instruments | Clean Development Mechanism<br><br>Global Environmental Facility<br><br>Global Climate Change Alliance (GCCA)<br><br>UNEP and Clean Technology Funds | Bilateral Grants<br><br>EU/Commission<br><br>GTZ, DANIDA, DFID, etc | Intergovernmental Transfers<br><br>Local Municipal and Provincial Revenue<br><br>Green Fund<br><br>Energy Efficiency - Demand Side Management Grants | Grant Funding<br><br>Venture Capital<br><br>Equity Finance<br><br>Debt<br><br>Project Finance |

Source: Misuka Green Development Solutions

Each of the financial instruments, identified in the table above, has different properties. The development of a range of financial instruments was in response to financiers' need to manage their risk, over the duration of the EE project. Certain stages of the EE project lifecycle are risker than others. As financial markets evolved, financial instruments become more specialised to address specific risks. Financial innovation has made it easier and less risky to finance EE projects as financial instruments have been developed to suit the characteristics of the phases in the project life cycle of an EE project, from testing technology (i.e. pilot) to mainstreaming EE technologies into business as usual. Both domestic and international case studies show that relying on one financial instrument and source of finance is not a viable approach.

Municipalities / provincial governments that have implemented EE projects used innovative funding models that drew on many financial instruments and sources of funds throughout the EE project's lifecycle. Hence the most effective financing model is drawing on a few financial instruments from different financial institutions. Refer to Case Study ten that describes the different funding model used by the City of Cape Town and Polowkane Municipality to fund their EE projects. Also refer to Case Study ten for a generic description of funding instruments that are best situated to a stage of the EE project. These case studies can be used as a reference point to start developing a funding model for the EE project.

**In-depth Case Study Ten**

**Use a Range of Financial Instruments from Multiple Sources**

### City of Cape Town Experience

In 2009/2010 an ESCO was appointed to conduct energy audits and energy efficiency retrofits in four City-owned administrative buildings. Large, administrative buildings with a strong public interface were selected.

The CoCT funded its EE project using an energy performance 'guaranteed savings' contract, funded through DANIDA UEMP.

The ESCO guarantees energy savings on an annual basis, and submits a bank guaranteed cheque covering the estimated savings to the CoCT. *" If actual savings are less than the cheque value, the ESCO supplements the realised savings with their own funds to reach the guaranteed amount. If the savings are greater than guaranteed amount per the contract then the guarantee period is shortened and the ESCO is released of the commitment earlier. The ESCO was only required to guarantee savings resulting from the technical interventions. The ESCO guaranteed savings across all 4 buildings combined. If one building over-performs and another under-performs, the total savings will be calculated, and the ESCO is bound by this total. This means that only one guarantee is submitted each year (administratively less cumbersome), but also that the ESCO can spread its risk" (Robinson, 2013).*

### Polowkwane Municipality Experience

Polowkane initiated a demand side management, energy efficiency project to replace lighting in municipal owned buildings, streetlights and air-conditioners. The municipality applied the 'path of least resistance' implementation model and hence used grant funding and standard contracting mechanisms that met the requirements of the MFMA.

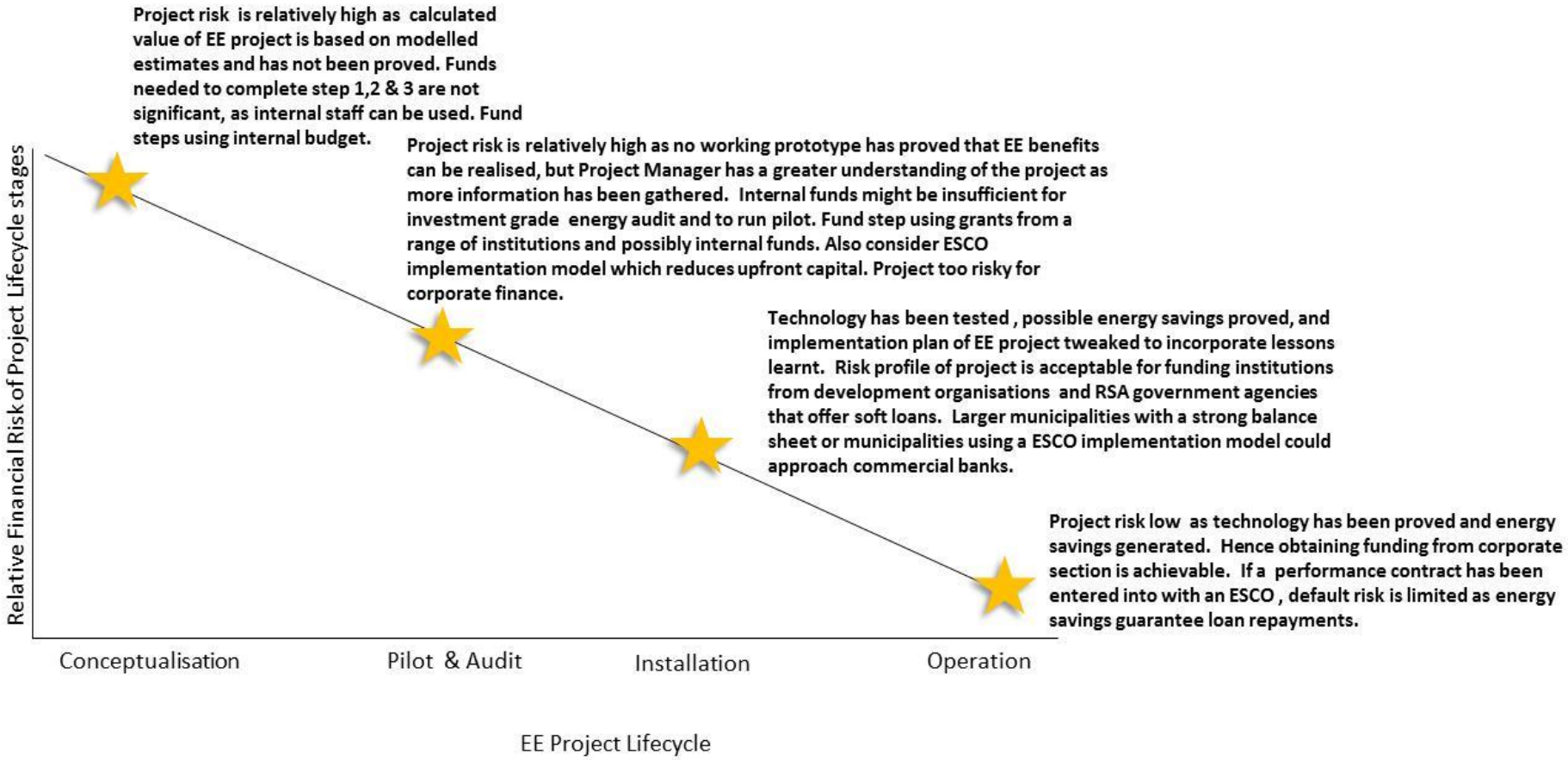
The municipality used its own budget to fund the initial energy study to establish whether the EE project was financially viable. Project management costs were financed as part of the engineering Branch's institutional costs (i.e. Branch was appointment the implementation agent).

Capital and implementation costs of the project were funded by the Energy Efficiency Demand Side Management Grant from the Department of Energy, which is classified as an intergovernmental conditional grant. The transfer of funds follows the intergovernmental conditional grant. The conditional grant was given to the municipality to finance the capital and implementation costs to renew the technology identified and approved in the application.

The municipality did not use specialised climate change financial instruments or sources. In 2008 climate change funding was considered but it proved too difficult to secure. In addition the municipality's balance sheet was not strong enough to qualify for private funding and loans. Lastly, the cost of implementing a Section 33 process was considered to be significant compared to accessing the EEDSM grants.

## In-depth Case Study Eleven

## Mapping Funding Instruments to Stages in the EE Project Lifecycle (large scale, multi-site project that integrates EE technologies)



The guideline provides a step-by-step explain of the issues that the EE project team, led by the project manager and the team's technical financial expert, should consider when identifying the best funding option and negotiating with funders.

- Calculate **the Rand value of funding** needed to implement the EE project.
  - ✓ Use information gathered from Step 2 (i.e. high-level implementation plan) and Step 3 (investment grade energy audit and pilot study) high-level feasibility study).
  - ✓ Use online tools to help calculate the Rand value of funding, refer to the *ENERGY STAR Program for resources*[31] *to evaluate the level of investment and develop a financial business case.*

- **Understand the municipality's / provincial government's financial parameters,** which provide the context to evaluate funding options (refer to case study thirteen for a detailed discussion)
  - ✓ Debt capacity of a municipality / provincial government;
  - ✓ Level of internal expertise to support funding process;
  - ✓ Risk tolerance of a municipality / provincial government
  - ✓ Cash flow position of a municipality / provincial government

[31] Cash Flow Opportunity Calculator to determine how much new energy efficient equipment can be purchased based on estimated cost savings, whether equipment should be purchased now using financing or whether it might be better to wait and use cash from a future year's budget, and whether money is being lost by waiting for lower interest rates. Financial Value Calculator can be used to determine how energy efficiency improvements can affect organisational profit margins and returns on investments.

**In-depth Case Study Twelve**

**Before A Funding Model Is Selected, Five Questions Must Be Asked**

***What is the strength of the municipality/provincial government's balance sheet*?**

A strong balance sheet, where equity is significantly greater than debt, allows an entity to borrow more capital, whereas a weak balance means that an entity can borrow less capital. Although if an entity has a weak balance sheet it can still approach apply for a loan, provided another party stands guarantee for the loan. Hence an official who is leading the EE project needs to understand the municipality / provincial government's financial position, which creates the boundaries for the municipality / provincial government debt capacity.

***What is the level of risk tolerance of the municipality/provincial government?***

There many different funding options available from risk-free money in the form of grants to commercial loans, and each of these funding offerings has a risk-return profile. Matching municipality/provincial government's risk profile to funding options will makes it easier to select an acceptable funding option by eliminating options.

***What is the level of in-house expertise, regarding financial strategy and the compliance requirements of supporting funding options?***

For example the processes and level of financial information to gain grant funding is less complicated than commercial banks' due diligence process that will test the financial and operational viability of the project, under different scenarios.

***What are the cash-flow implications of energy efficiency investments on the budget?***

Answering this question involves assessing whether EE upgrades can be supported from the anticipated savings. If the answer is no, a decision will have to be made whether to finance EE upgrades in the current budget cycle or to wait and use cash from a future budget. In turn to answer the aforementioned question, officials will need to determine whether money is being lost by delaying the project for the next budget cycle in respect to losing energy savings from implementing the project, or an increase in energy costs, or an increase in interest rates? A related question is whether the EE project will be financed using CAPEX or OPEX. A literature review shows that OPEX is generally easier to secure than CAPEX. CAPEX is scarce and hence the project competes against other more pressing priorities; and the approval process for requesting CAPEX is time consuming and expensive.

***What is the transaction cost associated with a funding option?***

As the capital needed to launch a EE project is low, the costs associated with preparing technical feasibility studies and negotiating key agreements can become disproportionately high, unless an effort is made to maximise opportunities for standardisation to reap the benefit of scale economies. Hence the transaction cost associated with a particular funding option can often be a decisive element on whether a particular project will be feasible and what financing method is to be employed. Generally, the transaction cost of off the shelf funding options is less than customised, non-standard EE financing.

Source: R20, 2013: 26 and EPRC, 2012: 19-22

Understanding the financial parameters of a municipality / provincial government with the a high-level knowledge of the architecture EE financial instruments , gives an official the context identify possible funding options and assess their applicability.

The next section of step 5 discusses the possible sources of finance and financial instruments that a municipality / provincial government can use to fund the implementation of the EE project.

Internal, external and innovative financial strategies are considered, staring with the simplest way to secure funding to the most complicated (i.e. in ascending order), with respect to complying with SCM and PFMA/ MFMA obligations, from a procedural process / compliance perspective. The risk-profile of each financial option and the potential effect it might have on the municipality / provincial government's financial position is not considered, as this analysis would have to be done on a case-by-case basis.

- Assess whether the municipality / provincial government **can use an internal financing strategy to fund the majority of the EE project, with the possibility of complementing shortfall with grants from government, parastatals, or donors.** In other words, can the public entity leverage its existing resources to fund the EE project without raising capital / entering into a loan with third-party financial institutions? Benefits of self-financing include avoid expenses and administrative costs associated with managing debt, such as interest chargers and resources to meet lenders' information requirements**.** If the answers to the five questions (EPEC, 2012: 20) below are positive then a viable funding option could be funding the EE project from OPEX / CAPEX budget[32]

[32] In the United States self-financing is broader then using an entity's own budget. Public entities use a green revolving fund. Under this model, an entity sets aside a Rand value of money for a capital pool that is lent out to other public institutions applying for EE project funding. As EE projects begin to recover operating costs-savings, the money is invested back into the capital pool. Refer to the launch of the Billon Dollar Green Challenge project, a collaboration between the Sustainable Endowments Institute and 12 partner public sector

and/ or deferred maintenance budget allocations approved through the official annual budgeting process lead by Finance[33].

- ✓ *Does this project have higher priority compared to other public projects competing for the same funding?*
- ✓ *Will the benefits achieved by a particular project outweigh the benefits of alternative projects?*
- ✓ *Are alternative financing mechanisms more expensive than the returns on the project?*
- ✓ *Is the timing of the project critical? Can the public partner afford to wait until it can raise alternative financing?*
- ✓ *Is there sufficient budget flexibility to recoup cost-savings over a number of years (Abramson, et.al, 2011: 8)?*

- Assess whether the municipality / provincial government is in the financial position to **apply for external sources of finance** from various institutions to meet the shortfall between grants and available budget resources. Financial instruments and sources to consider are listed in ascending order of the complexity of the instruments.
  - ✓ ***Asset-based finance*** *is used to finance lighting, heating and cooling systems (refer to in-depth case study seven for information about operating and commercial leases)**.***

organisation for a working example of a self-managed revolving loan fund that finances EE improvements (Abramson, et al, 2011:10).

[33] Even though the municipality / provincial government have the budget to fund the EE project, it might not be a viable option, if internal resources are not available to support the technology. Often the public sector entity does not have access to 'energy consumption data and information about best value technologies and project implementation required to lead EE projects. Hence using an ESCO model might be a better option than the self-financing model (EPEC, 2012: 20).

- ✓ ***Vender finance*** *is provided by large equipment suppliers to their customers to the finance the purchase of new equipment. The public entity enters into a short-term loan contract directly with the equipment manufacturer (i.e. municipality is a borrower and loan reflected on balance sheet).*
- ✓ ***Concessionary and/or soft loans from development finance institutions (i.e. DBSA, World Bank, DFID, etc.).*** *Each institution has different lending criteria, from a R value and process perspective. The project manager or financial expert on the team will need to investigate the various loan options; taking into consideration the public entity's financial parameters (refer to case study twelve).*
- ✓ ***Commercial debt from corporate banks.*** *Their lending criteria and due diligence processes tend to be stricter than development finance institutions[34], and also commercial debt is more expensive to service compared concessionary loans. In the past commercial banks have been reluctant to fund EE projects, without some form of collateral or guarantee. A third-party can give the commercial bank a guarantee on part of the loan and*

[34] Standard commercial loans are the most difficult loans for a municipality / local government to secure. Commercial banks do not apply project finance principles, when they assess a credit application for an EE project. Based on project financing principles, the investment cost of the EE project should be reimbursed from the cash flow savings generated by the EE project. Hence it is difficult for the bank to satisfy its requirement 'for a clear delineation of a particular EE measure that identifies sources of repayment and the underlying securing supporting the financing"( EPRC, 2012:22).

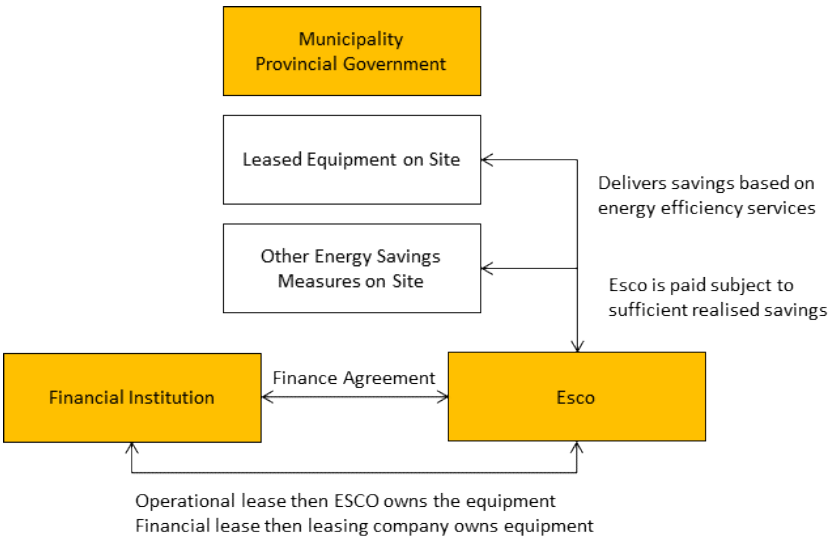
*debt service. For example, a credit guarantee from international donors or government department can be used to support a municipality's application to a bank that would have been rejected because of the municipality's credit rating.*

- Assess whether **a third-party involved in project implementation, such as an ESCO, should be used to secure external funding**[35].
  - ✓ The most common example is using energy savings guaranteed under performance contracts to obtain debt by linking loan repayments to the ESCO performance contract. For example*, local governments commonly use asset based finance in conjunction with an ESCO performance contracting implementation model. Under this finance model, the ESCO is obligated to repay the lessor finance payments from energy savings stipulated in the performance contract between the ESCO and the public entity*[36]*. As the ESCO enters into the lease agreement, financial risk is shifted to the balance sheet of the ESCO. Hence the rising finance for the EE project is not recorded on the public entity's balance sheet. This finance model may*

[35] Applies to smaller municipalities that may have weak balance sheets.
[36] Under a performance contract, the cost of new technology to retrofit targeted assets is reimbursed through energy savings realised over the contract period, and the ESCO that installs the improvements contractually guarantees a combination of savings on energy consumptions and improved system performance ( Abraham, et.al, 2011: 9).

*expose the public entity to operational risk if the ESCO defaults on loan repayments, as the lessor could reclaim equipment.*

**Figure 4 Financing option: ESCO performance contract and commercial lease**




Source: EPEC, 2012:20

- **Assess whether an innovative debt funding strategy is needed, and explore the various types of innovative EE funding models**[37]. Even though these different models exist, they share a common feature: A special purpose vehicle is created to carry the upfront capital cost of EE equipment / systems and a return is earned from the energy savings from implementing the EE project (Abramson, et al, 2011: 13). Hence the purpose of the models is to create tailored structured agreements between investment funds, building owners and ESCOs to overcome barriers that make it difficult to access upfront capital. Based on international case studies, the most common

[37] Refer to Case Study thirteen for an example about a revolving loan scheme. Revolving loan funds are capital funds that make loans, collect payments, and re-lend these payments to fund new projects. The original capitalization can come from many sources. A revolving loan is cheap form of debt. .

innovative debt financing model used by public entities is the Efficiency Services Agreement[38] described by Abramson et al (2011- 13-14).

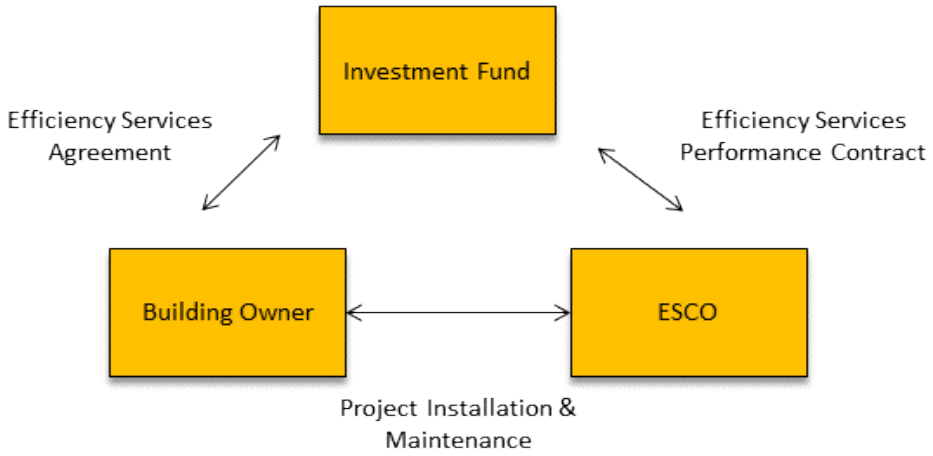
- ✓ An investment fund acts as intermediary between the municipality or provincial government, which is assumed to be the building owner and the ESCO that implements EE project. Hence the investment fund acts as both the financier and owner of all of the energy efficiency assets over the duration of the EE project and develops two separate contracts—an Electricity Service Agreement (ESA) with the building owner and an Efficiency Services Performance Contract (ESPC) with an ESCO.
- ✓ The investment fund and the building owner enter into an Efficiency Services Agreement stating that the investment fund must provide all the upfront capital for EE investments. A special purpose entity is created, using a mixture of equity and debt provided by the fund's capital partners and other outside banks or lenders, to finance EE measures.
- ✓ Over the term of the ESA the building owner agrees to pay a regular service charge to the investment fund to pay-off the capital investment and also give the investment fund's partners and lenders a return on their investment. Service charge is

[38] It is used as the model is relatively simple to administer and it produces significant benefits. First, allows public entity to avoid upfront capital outlays by charging for energy value realised versus equipment costs. Second, Reduces project development costs, including financing, by 'uses a standardized contractual structure to aggregate multiple energy efficiency projects into a single portfolio that is funded through a mixture of equity and debt. This aggregation creates a pipeline for replicating projects across an entire portfolio of facilities" (Abramson, 2011: 14). Third, public entity has access to off balance sheet funding.

calculated to protect the building owner from paying more for energy than he or she did before entering into the agreement.

- ✓ At the same time, the investment fund establishes a separate Energy Services Performance Contract (ESPC) with the appointed ESCO, covering required engineering, procurement, and construction services and also defines on-going maintenance and monitoring services that will be required after the project becomes operational to ensure, measure, and verify cost-savings.

Figure 5 Finance option: Efficiency Services Agreement




Source: Abramson, 2011: 14

- **Rank the most applicable funding models, using a standardised set of 10-15 focused questions**. These questions should be developed by the multi-disciplinary EE project team. Even though municipalities / provincial governments have a similar context, nuances exist between their processes, financial resources and skillset and attitude towards risk. Hence a set of

generic questions prepared for municipalities / provincial government will not address these nuances, which are particularly important when selecting a 3-5 year finance model.

- Select the best 2-4 potential funding models from the results of the ranking exercise, and detail **co-funding requirements**[39] for these models, such as long-term recurrent costs, costs for project management and reporting, HR and system costs.

- Develop a **funding proposal**[40] **for selected institutions, paying attention to each organisations requirements**[41] regarding the level of information needed, templates to be used, and supporting documents to be submitted with the proposal. Even though each institution has different requirements, a funding proposal needs to contain the following core information (EPEC, 2012:34).
    - ✓ *Detailed baseline data (including all operational aspects of facilities)*
    - ✓ *A full analysis of energy consumption for each fuel and asset type with costs and operating conditions;*
    - ✓ *A detailed cost of each EE measure and the total cost;*
    - ✓ *The amount of expected savings during installation period;*
    - ✓ *The basis of savings and design/build cost for each measure;*

[39] These are existing recurrent costs in a municipality usually under engineering and financial reporting for maintenance and operation. It is not part of the new project costs. Where the information is available – it can be quantified – however in most instances this is very difficult. The usefulness of this data is expost – where you can show the reduction in maintenance costs. Not easy to determine upfront, and is dependent on the geographic distribution of the facilities, the staff, etc.

[40] Purpose of the proposal is to give funders sufficient information to judge the technical merits, economic benefits and feasibility of the EE project

[41] It is recommended that the project manager and /or financial expert on the EE team visits potential funders' websites and calls them to understand their end-to-end due diligence credit process and templates that may need to be completed.

- ✓ *A full description of the analysis methods, calculations, data input and all assumptions for each EE measure;*
- ✓ *A clarification of/dependencies between EE measures;*
- ✓ *The final Monitoring &Verification plan;*
- ✓ *A energy reconciliation and balance to historical actuals;*
- ✓ *A work schedule;*
- ✓ *The carbon footprint for impact on CO2 emissions;*
- ✓ *A risk analysis of the EE project;*
- ✓ *The confirmed minimum level of guaranteed savings ( if ESCO model used);*
- ✓ *The confirmed minimum net present value of the proposed project and the actual net present value of the proposed project ( if ESCO model used);*
- ✓ *The building capacity and awareness activities to be implemented; and*
- ✓ *The qualifications and skills of implementing agent, which includes established EE multi-disciplinary team and external technical experts, who will be used.*

- **Negotiate contract terms with funder and sign the contract**

- ✓ *Do not agree to contract terms that are not enforceable, and ensure that the legal agreements are documented and comply with legislation (including the MFMA and PFMA).*

- **Incorporate EE funds from external financers** into the budget of the municipality / provincial government, and **allocate identified funds** for the EE project onto a branch / department's budget in either the annual budgeting cycle or adjustment budgeting cycle.
  - ✓ *Ensure the financing and appropriation of funds for the EE project is reflected in the annual draft budget of the municipality[42] or provincial government[43].*

- **Prepare implementation and expenditure information for the EE project, which covers the current financial year, as part of the Branch or Department's annual planning and expenditure process.**
  - ✓ *Use the project implementation plan developed in Step 2 and detailed results of the investment grade audit in Step 5 to complete the municipality / provincial government's service delivery and budget implementation template. For example, if the project manager of EE Project is implementing the project in a municipality, he will complete the Service Delivery and Budget Implementation*

[42] The draft budget reflects the municipal IDP and is published for public comment, including community/ward meetings for a period of 60 days. After Mayco considers public comments, the budget is submitted to the Municipal Council for approval, before the end of May each year.
[43] Provincial government has a similar budget cycle process to municipalities except the budget cycle is from April to March.

*Plan (SDBIP) works Refer Annexure Three for an example of the Polokwane Municipality's SDBIP.*

- ✓ *Follow the interdepartmental process to get the Executive Director of the Directorate to approve the service delivery and budget implementation template for the EE project, and obtain approval for the template by the relevant executive management committee ( for Mayco at the municipal level).*

**In-depth Case Study Thirteen**

**Innovative EE Finance Solutions on the Horizon**

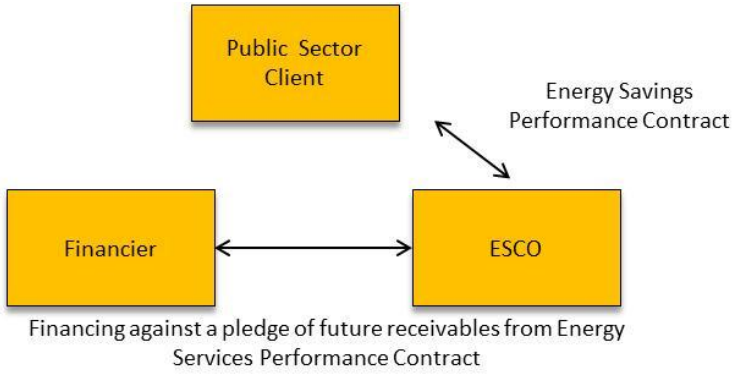
The market for EE financial instruments is in its infancy. Promising innovations include green leasing structures, municipal bonds backed by property tax liens, and government-backed loan guarantees to protect against building owner default risk, and on bill financing where utilities finance energy improvements through a surcharge on electricity bills. These innovations have not been mainstreamed because the configuration of government policies creates incentives that support a fossil fuel dependent economy. This case study highlights two niche market EE financial solutions that have gathered supported.

**A grant based Revolving Fund: JESSICA Scheme: Excerpt from EPEC 2012: 22**

Nordic and European Development banks give grants to public entities in the form of a revolving concessionary loan. The Revolving Fund is created to address a specific market failure in the climate change financial market. For example a RF will be established to implement retrofitting heating, cooling and lighting systems in buildings and facilities. A development bank will give a grant to a public entity to implement EE projects from the RF. The development bank expects the grant to be paid back by the public entity, in part using a soft loan, which will allow capital to be released from successfully operating projects, for investment in new initiatives. RFs can minimise the transaction costs associated with providing funding. A single entity manages the RF, and it can accumulate valuable local knowledge and expertise and apply this to standardising processes and procedures. The RF becomes self-sustaining and provides on-going financing after the first capitalisation. As a fund, rather than a specific project, the initial investment can be raised from a combination of sources. However, one of the issues often facing RFs is that the public partner may be constrained by budgetary rules on the extent to which it can recycle grant monies, since savings achieved may simply reduce the overall budget.

**Receivables Purchase Agreement: Excerpt EPEC 2012: 23**

The public partners pledges the projected future stream of energy savings to the ESCO. The ESCO then sells this pledge, minus annual costs earmarked for the operation and maintenance of the project, to a third-party financier. The primary advantages of an receivables purchase agreement (RPA) are speed of execution and transaction simplicity. Specific legal systems (e.g. France and Germany) also underpin the use of RPA by ensuring that the underlying obligations to pay by the public sector become irrevocable. The main disadvantage is that the valuation and discounting of the future cash flows created by the project depend on a third party (usually a commercial bank) providing the funding. It is generally more expensive compared with other forms of long-term debt provided on a project basis. Under RPA, the public partner has an obligation to pay up to the amount of savings generated from the project. As this is an estimate, the ESCO bears the risk of the energy savings being insufficient to cover the payments on the financing at certain points throughout the life of the project.



**In-depth Case Study Fourteen**

**Six Basic Steps to Create an EE Financial Plan**

Detailed financial plans would include different types of finance and the municipality / provincial government would make the choice of financial instruments based on various factors. An important factor in sourcing for the project is to determine what kind of funding is needed at which stage of the project, e.g. pre-feasibility studies and feasibility studies are normally funded through own resources, technical assistance from development partners or special loans for project development. After the initial stages of the project, the municipality / provincial government would be in a position to select the technical EE option most suitable for implementation and from this point, a detailed financial plan can be prepared.

As part of the financial plan, municipalities / provincial governments need to determine the following:

- What is the extent of municipal / provincial own resources they are able to allocate towards early stage project development and what is the shortfall?
- Is there a role for the private sector on the project and what financial contribution would the private sector institution be able to make?
- What are the short term funding needs e.g. baseline studies, project development, upfront capital costs and resource requirements and the medium to longer term costs i.e. on-going maintenance costs including costing any additional resources, if applicable and monitoring requirements if any?
- Would it be necessary for the municipality / provincial government to take on debt funding to implement the project and what income (or savings) would the project generate that may be set aside to repay the debt?
- What is the extent of debt financing that is feasible given the credit rating of the municipality / provincial government? (Municipal / Provincial Treasury should be able to assist in this process)
- Once the options and choices are clear to the project team, a detailed financial model should be prepared and a range of variables such as the interest rate, expected savings and other factors should be tested against the expected outcomes of the project to ensure that if implemented, it is financially sustainable.

**In-depth Case Study Fifteen**

**Issues Covered in a High-Quality EE Funding Proposal**

The International Finance Corporation Guidelines (2008), which is an organisation affiliated to the World Bank, suggests that the EE project team should check that the proposal contains the following information.

- Keep the presentation to investors simple and have all required documentation ready, including supporting documents that verify the financial analysis.
- Make the timeline achievable
- Choose responsible and experienced project partners.
- Ensure that the evaluation, measurement and arrangements and plan are clearly defined.
- Include performance and investment guarantee provision in the contract with the implementing agent (ESCO)
- Ensure that procurement plans are in place and address price fluctuations.
- Always be aware of what the risks are and allocate them when feasible to the appropriate parties. Propose mitigating measures that lower these risks which make the project more viable for financing.
- Consider probability of delays in delivery, technology failures, and default by the parties. Estimate, within margins, the impact on the financial viability of the project.
- Ensure that an operation and maintenance plan is in place including personnel that are trained to operate and maintain the investments.
- Utilize known technologies in early projects.
- Plan for cost over-runs by establishing a contingency fund.

**For examples and guidelines to prepare business plans refer to**

SEER - Solar Energy System Installations and Energy Efficiency Retrofits
http://www.truevaluemetrics.org/DBpdfs/Energy/Solar/SEER_BusinessPlan_130223c.pdf

Preparing a Successful Energy-Savings Proposal
http://hpac.com/print/archive/preparing-successful-energy-savings-proposal

Best Practice Guide for Energy Efficiency Projects
http://www.ruseff.com/filebank/downloads/Best%20Practice%20Guide%20for%20EE%20Projects.pdf.

**Online Resources:**

*Client/ESCo SELECTION, IEE – BioSolESCo, TV Energy (2009):* The section on ESCO selection presents the criteria which a client should consider when choosing an ESCO. http://www.biosolesco.org/guidance/uk/Biosolesco4_eng.pdf

*Third Party Financing – Achieving its Potential, Energy Charter Secretariat (2003)* Section 2.2 provides a summary of the main financing approaches for an EPC. http://www.encharter.org/fileadmin/user_upload/document/Energy_Efficiency_-_Third-Party_Financing_-_2003_-_ENG.pdf

*Comparison and Evaluation of Financing Options for Energy Performance Contracting Projects, EUROCONTRACT IEE*, Reported by Graz Energy Agency Ltd (August 2010).Chapters 4 to 6 show various financing options and their parameters: credit financing (Chapter 4), leasing financing (Chapter 5) and cession and forfeiting of contracting rates (Chapter 6). http://www.ieadsm.org/Files/Tasks/Task%20XVI%20-%20Competitive%20Energy%20Services%20(Energy%20Contracting,%20ESCo%20Services)/Publications/101126_GEA-T16_Finance%20Options%20 for%20Energy-Contracting%20incl%20Examples.pdf

*Financing Energy Efficiency Projects.* This ENERGY STAR article describes how energy cost savings can be used to finance energy-efficiency investments. http://www.energystar.gov/ia/business/government/Financial_Energy_Efficiency_Projects.pdf

*Energy Star has financial tools to assess the financial effect of efficiency measures, such as* Financial Value, Building Upgrade, and Cash Flow Opportunity calculators. http://www.energystar.gov/index.cfm?c=assess_value.financial_tools

*INDIA Manual for the Development of Municipal Energy Efficiency Projects*. Section 2.7 provides guidelines for packaging a project for financing. In general the manual provides detailed information about conducting a EE project from conducting an investment grade energy audit to hiring an ESCO, and setting-up system to monitor

the ESCO's performance.

http://www.iwahq.org/contentsuite/upload/iwa/Document/Manual_for_%20Developing_Municipal_Energy_Efficiency_Projects-India.pdf

# 10. Step 6: IMPLEMENT THE EE PROJECT

In Step 6 the EE project goes 'goes live'- resources are mobilised, equipment is installed, and results are monitored. In other words the documentation prepared in step 2 to create the EE project blue print is implemented. In addition the results of the investment audit and financial viability of the EE project is also tested.

As step 6 implements all the work completed in the other steps, some of actions completed in Step 6 seem to be the same as the other steps. At face value there appears to be repetition, yet this is not the case. Although Step 6 covers all the issues explored in the other steps, this exploration is at a more detailed and refined level of analysis (refer to figure 6).

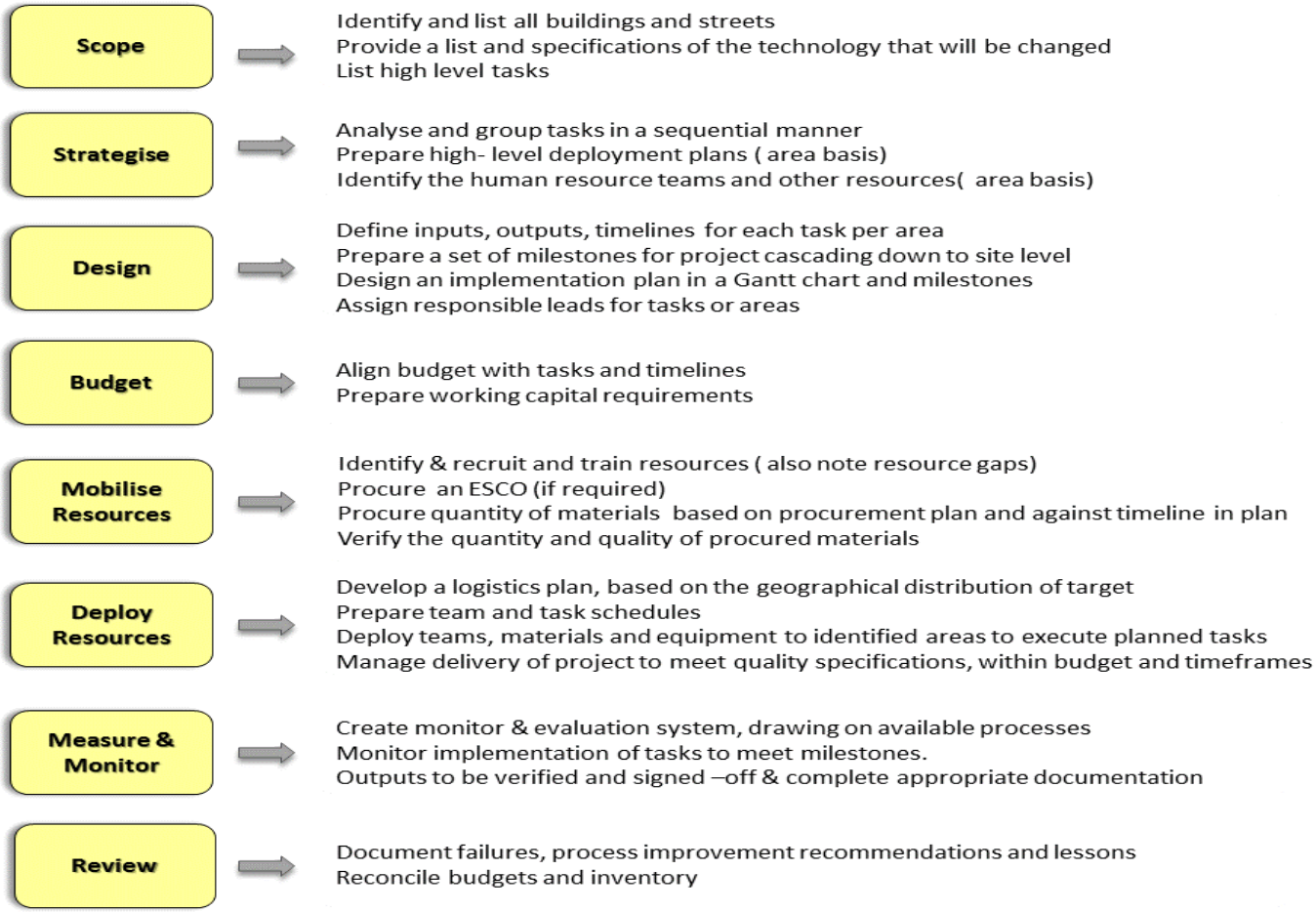
By this stage the project manager has a deeper understanding of project and hence he/she will test and verify that the information gathered in the previous steps is correct. Hence Step 6 builds on and integrates the work of the other steps.

Key activities of step 6 include the following. First, adding new members to the EE project team[44]. Second working with SCM and Finance to spend the resources allocated on the budget within the financial year. Lastly, establishing processes to monitor and evaluate performance, and if necessary make the required remedial actions.

Step 6 outlines the actions and decisions to implement the EE project, irrespective of whether an in-house or ESCO model is chosen. Depending on the implementation option selected, certain steps will be more crucial for the EE project manager to master. If an ESCO model is chosen the EE project manager will focus on launching SCM processes and not installation.

[44] At the moment the EE team will probably comprise a project manager who was hired in Step 2 to draft the conceptual blue print; a technical EE expert and financial expert hired in Step to support the process to hire an expert team to conduct an investment grade audit.

## Figure 6 Operational Action Plan



- Create a **high-level flow chart of the EE project's critical success factors** and associated goals (i.e. hiring an ESCO, designing and implementing a monitoring and evaluation system, installing EE technologies, etc.)
    - ✓ *Use the chart as a tool to gain a rough idea of the type level and timing of resources required.*

- Confirm the **completeness and accuracy of the high-level implementation plan** created with Step 2, as the EE team has a deeper knowledge about the EE project.
    - ✓ *Compare the high-level implementation plan developed in Step 2 with the flow chart and adjust the implementation plan, accordingly.*
    - ✓ *Develop a detailed staggered implementation plan to ensure that the EE Project starts with implementing the most cost-effective and feasible EE measures at the beginning of the EE project and gradually moves onto more complex measures as the project matures.*
    - ✓ *EPA(2012:14) recommends using a five-stage approach to upgrading facilities in the following order: Conduct retrocommissioning, Install energy-efficient lighting, Reduce supplemental loads, install fan system upgrades, and install heating and cooling system upgrades. Refer to ENERGY STAR Building Upgrade Manual for more detail.*

- Use revised implementation plan to **identify possible bottlenecks**, especially at the institutional level regarding interpretation of legislation, procedures and processes that that might affect the implementation of the EE project described in the high-level implementation plan.
    - ✓ *Municipal Systems Act requires a Section 78 investigation if implementation is outsourced, to a third party, such as an ESCO, and if this has implications on the existing organisational arrangements.*
    - ✓ *If municipal assets are to be leased or sold to establish a partnership, the municipality must comply with the asset disposal strategy*[45].
    - ✓ *When municipality / provincial government must comply with Section 33 of the MFMA /PFMA, respectively, when they enter into a contractual commitment for longer than three years.*

[45] Refer to the National Treasury's – Guide to Municipal Asset Transfer: http://mfma.treasury.gov.za/MFMA/Guidelines/Asset%20Transfer%20Guide.pdf

**In-depth Case Study Sixteen**

**Highlighting relevant components of Section 33**

***Section 33 of the MFMA***

*Section 33 of the MFMA prescribes that a municipality may enter into a contract which will impose financial obligations on the municipality beyond a financial year, but if the contract will impose financial obligations on the municipality beyond the three years the municipality must ensure that it derives significant capital investment or financial economic or financial benefit from the contract. It must also engage in a public participation process for at least 60 days by:*

*Making available the draft contract and an information statement summarising the municipality's obligations in terms of the proposed contract; and invite comments from local community and other interested persons*

*Soliciting the views and recommendations of the National Treasury and the relevant provincial treasury, the national department responsible for local government; and other relevant national departments.*

*Further the municipal council must take into account:*

- the municipality's projected financial obligations and the impact of those financial obligations on the municipality's future municipal tariffs and revenue;
- any comments or representations on the proposed contract received from the local community and other interested persons; and
- any written views and recommendations on the proposed contract by the National Treasury, the relevant provincial treasury, the national department responsible for local government and any national relevant department.

*The act also lists the exclusions in the act, such as employee contracts and other such long term contracts.*

**In-depth Case Study Seventeen**

**Highlighting Relevant Components of Section 78**

Section 78 of the Municipal Systems Act was amended, and the main sections referring to procuring an external entity to provide a municipal service is outlined below:

(a) by the substitution for subsection (3) of the following subsection: "(3) If a municipality decides in term of subsection ( 2)(b) to explore the possibility of providing the municipal service through an external 25 mechanism it must

(a) give notice to the local community of its intention to explore the provision of the municipal service through an external mechanism; **[and]**

(b) assess the different service delivery options i n terms o f section 76(b). taking into account -

i. the direct and indirect costs and benefits associated with the project, including the expected effect of any service delivery mechanism on the environment and on human health. well-being and safety;

ii. the capacity and potential future capacity of prospective service providers to furnish the skills, expertise and resources necessary for the provision of the service;

iii. the views of the local community;

iv. the likely impact on development job creation and employment patterns in the municipality: and

v. the views of organised labour: and

(c) conduct or commission a feasibility study which must be taken into account and which must include-

(i) a clear identification of the municipal service for which the municipality intends to consider an external mechanism;

(ii) an indication of the number of years for which the provision of the municipal service through an external mechanism might be considered;

(iii) the projected outputs which the provision of the municipal service through **an** external mechanism might be expected to produce;

(iv) an assessment as to the extent to which the provision of the municipal service through an external mechanism will-

**(aa)** provide value for money;

(bb) address the needs of the poor;

(cc) be affordable for the municipality and residents;

**(dd)** transfer appropriate technical operational and financial risk

(v) the projected impact on the municipality's staff, assets and liabilities;

(vi) the projected impact on the municipality's integrated development plan;

(vii) the projected impact on the municipality's budget for the period for which an external mechanism might be used, including impacts on revenue, expenditure, borrowing, debt and tariffs: and

(viii) any other matter that **may** be prescribed.": and

(b) by the addition of the following subsection:

"(6) The national government or relevant government may in accordance with an agreement assist municipalities in carrying out a feasibility study referred to in subsection ( 3 ) ( c) or in preparing service delivery agreements.".

- **Understand resource requirements, in terms of people, skills, materials, logistics support and equipment, needed to roll-out the revised implementation plan**.
    - ✓ **Note resources that are not available internally** and make a list of resources constraints that can either be addressed through partnerships with other organisations, hiring personal following HR policies, or hiring resources using SCM processes.
    - ✓ **Approach Human Resources to recruit personnel** with relevant skills and experience to join the EE multi-disciplinary project team.
    - ✓ Remember that the assessment of resources required to implement the EE project must **consider whether an ESCO performance contract implementation model is selected**. Using this model will affect the design and scope of the tender process (EPEC, 2012:35):
        - The bidder (i.e. ESCO) will need to conduct an investment grade audit.
        - The EE project manager will need to negotiate with bidder to agree on baseline.
        - The bidder (ESCO) needs to develop detailed Monitoring and Valuation Plan based on the results of the investment grade audit in partnership with EE project Manager.

- ✓ Reconfirm[46] that ESCO performance contract implementation model will be used to implement the project, before approaching SCM.

- Approach outside stakeholders from PPP Unit, MFMA Help Desk, TAU, DEA, DBSA, ESKOM, etc. for **technical assistance** to address potential bottlenecks and share revised implementation plan with them.

- **Launch supply chain management (SCM) processes**[47].
  - ✓ Use the results of the investment grade energy audit to **prove bona fide demand for service.**
  - ✓ Use the exercise that mapped available internal resources to the resources required to implement the EE project, as per the revised implementation plan, to **support argument for tender**.
  - ✓ Develop a **tender specification guideline** for the Specification Committee.
  - ✓ **Draft the tender** that will be published: Ensure that specifications are easy to understand, stipulate minimum requirements[48] regarding target systems, minimum energy savings, sharing of savings and

[46] This decision was first taken in Step 2 when the high-level implementation was created and in Step 4 when the municipality / provincial government decided on the type of audit that was required. As more information is uncovered after each successive step, the project manager has an opportunity to test the validity of hoos/ her past decisions as the EE project unfolds. Hence implementing the EE project should be seem as iterative rather than a linear process.

[47] The steps of the SCM process will be shaped by the municipality / provincial government's decision to use in-house resources or an ESCO. As the ESCO route is often preferred and is more complicated, the generic SCM steps are itemised below

[48] Care should be taken to ensure that the specifications are not tailored for a specific product or company (in this instance the municipality should justify a sole source procurement method

required services49, etc. Evaluation and also Preferential Procurement Policy Framework Act PPPFA criteria should be stipulated in the advertisements.

- ✓ ***Pre-qualify bidders that meet the minimum set of specific objective technical and financial requirements*** to implement the EE project. Three-four bidders are screened to ensure that they have the resources, skills and experience to implement the EE project (i.e. bidders are not short-listed).
- ✓ **Invite pre-qualified bidders to submit a comprehensive proposal** and give them the baseline energy survey and standard audit completed in step 4. This information will feed into bidders' investment grade audit (assuming ESCO route selected). Note that the municipality / provincial government define the baseline used to calculate energy savings.
- ✓ **Ensure that the comprehensive proposal submitted by pre-qualified bidders at least contains the following (EPEC, 2012:34):**
    - A preliminary assessment of energy savings, which is a detailed document that validates the saving and cost for each EE measure, showing energy saving calculation, explaining their methodologies used;
    - Confirmed minimum level of guarantees savings;

[49] For example engineering, project design, installation, financing, monitoring and evaluation, operations and maintenance.

- Confirmed minimum level of guaranteed savings;
- Confirmed minimum net present value of the proposed project and the actual net present value of the proposed project;
- Final building capacity and awareness activities to be implemented;
- Qualifications of the proposed experts; and
- Financial proposal to secure funding for EE project (optional as depends on whether the ESCO will play a role in securing funds)

✓ **Note discrepancies[50] will arise between the standard audit conducted in Step 4 and the investment grade audit conducted by the ESCO**. These audits are performed at a different level of detail and probably use different methodologies to calculate savings. Calculating energy savings is not an exact science because it is based on assumptions and hence that is why bidders must submit their detailed calculation[51].

- Differences in the methodology used to calculate savings in the audits conducted in step 4 and 6 should be viewed as an opportunity to test assumptions, ultimately creating

[50] Assume that the investment grade audit will show energy savings and not a loss. Hence the EE project will economic viable.

[51] Even after the project has been implemented, calculating energy savings is difficult because energy savings cannot be directly measured, they must be calculated by comparing energy use and demand after implementing the EE project with an energy baseline defined at the start of the project.

a more robust assessment of savings and costs for each EE measure.

- Verify that the confirmed net present value of savings shown in the investment grade energy audit by bidders falls into the municipalities expected savings range (i.e. savings are not low). If savings fall outside the acceptable range, the project manager needs to alert his / her superior.

✓ **Evaluate bids and rank bidders**, based on criteria specified in terms of reference (ToR), paying consideration to bidders that provide the best value, but not necessarily the cheapest quote.

✓ **Identify which bidder offers the best value** by assessing whether the bidder is assuming risks or transferring them back to the public entity and overall cost of the EE project, considering the time value of money (EPEC, 2012: 35). According to the EPEC (2013:35) the following information from a bidder is needed to assess his / her value:

- detailed feasibility study, using a sophisticated computer simulation tool to model all energy inflows and outflows;
- engineering study with source data, assumptions and calculations;
- detailed “scope of work”;

- detailed construction documentation that follows the progress of the installation;
- methodology to calculate cost avoidance and energy-use data and other assumptions; and
- financial statement to assess the cash flow position of the bidder, diversification of the revenue streams; debt/equity ratio compared to industry standard, and credit rating.

✓ **Notify Adjudication Committee of bidder selection decision and confirm that the Adjudication Committee approves of the process.**

- Appoint and notify selected bidder, provided the Adjudication Committee is satisfied with the SCM tender process.
- Refer the outcome of the SCM tender process to the Evaluation Committee, if the Adjunction Committee deems the process to be unsatisfactory and non-compliant.

✓ **Negotiate contract** with selected preferred bidder (ESCO)

- Decide on shared savings or guaranteed savings performance contracting model with the preferred bidder.

- Get the ESCO to develop a detailed evaluation, measurement and verification (EM & V) protocols that will determine the Rand value of the payments made to the preferred bidder (i.e. these protocols determine the evaluation method used to assess savings). The protocols are an output of the investment grade audit and discussions with the municipality / provincial government. It is common practice to base the protocols on the International Performance Measurement and Verification Protocol ("IPMVP").[52]

✓ **Draft contracts and appendixes**. Note that the EM &V plan is incorporated into the final energy performance contract with the preferred bidder (ESCO).

➢ **Establish governance structures and reporting mechanisms**.

✓ **Establish communication channels** between the EE project team, other departments and across public entities, especially between implementing agents and support service departments to expedite and troubleshoot potential SCM and Finance bottlenecks.

[52]Refer to the Efficiency Valuation Organization (EVO) at: http://www.evo---world.org. The Protocol "provides a framework and definitions that can help the project manager develop M&V plans for the project. It includes guidance on current best practice techniques available for determining energy savings and verifying the results of energy efficiency, renewable energy, and water efficiency projects in commercial and industrial facilities. When evaluating an entire program, savings from a sample of individual projects can be determined using EM&V methods and then applied to all of the projects in the programme" (EPA, 2012: 20)..

- ✓ **Develop the architecture** of an evaluation, measurement and verification system[53] to track progress and calculate the benefit/ energy savings of the EE project**.**
    - If an ESCO implementation model was selected, use the protocols attached to the contract as the starting point. Otherwise refer to the International Performance Measurement and Verification Protocol ("IPMVP"). Irrespective of whether an off the shelf or custom made protocol is used, the evaluation method must tie back to the project's objectives (i.e. reduction of energy consumption).
    - Architecture should specify (a) scope and scale of the system: what level of information is required (b) the high-level goals of the EE project and associated metrics to assess whether the EE project will reach its goals, within timeframes and budget, (c) how often metrics will be assessed and (d) standards concerning feeding information into the EM & V system in respect to integrity of information and timing of updates (i.e. frequency of reports generated).

[53] Evaluation, Measurement and verification (EM&V) is a subset of the evaluation process that refers to determining the direct benefits associated with reduced energy demand and/or efficient or cleaner generation at a single project or site (e.g., an energy-efficient lighting retrofit in a state facility) using one or more techniques ranging from simple estimates of savings to actual measurements and computer simulations.

- At least three forms of reviews should be built into the EM & V system: A regular weekly / monthly review which ensures that information in the system is current. Periodic reviews, for example, every quarter that tests whether interim goals and milestones being met and hence the likelihood of meeting annual performance targets. Exception reviews that are triggered by an anomaly in the system and alert the EE project team for the need to take corrective action, otherwise annual targets will not be met.

✓ **Create and approve reporting standards and templates** to provide Council, Mayco, donors, and funders with information in the format they require, when they need it.

➢ **Install new technologies and retrofit** buildings, facilities and streetlights.

✓ **Use staggered approach** that sequences upgrades in a logical, systems-oriented way.

✓ **Ensure officials involved** in installation and maintenance of new technologies receive training.

➢ **Operate and maintain** retrofitted lighting and cooling system in targeted assets

✓ **Implement, test and update on-site management systems** on a regular basis. Each large building or facility should have a dedicated

on-site technical team, otherwise a few buildings and facilities can be clustered and managed a unit, which has its own team.

- ✓ **Schedule regular maintenance** and tune-ups to ensure system efficiency (i.e. preventive maintenance).

- **Evaluate the performance of the EE project, using information drawn from the Evaluation, Measurement and Verification (EM & V) system**
  - ✓ **Gather information on energy consumption** and costs from the tracking system. It is suggested that the integrity of the information is verified by a third-party, especially if the ESCO route was selected.
  - ✓ **Analyse verified data** against defined metrics to determine energy efficiency achievements[54].
    - **Calculate gross and net savings compared to the energy baseline survey and established energy saving goals:** Gross savings represent the changes in energy use and demand that result from implementing the EE project. Net savings are determined by accounting for externalities (free riders, spill-over effects) from gross savings and hence identify energy savings that are directly attributable to the project.

[54] Leadership Group of the National Action Plan for Energy Efficiency has developed a Model Energy Efficiency Program Impact Evaluation Guide that identifies a structure and several industry-standard approaches for calculating the impacts of energy efficiency programs. The guide provides detailed information on the processes and approaches for quantifying energy and demand savings and avoided emissions resulting from energy efficiency programmes.

- **Calculate actual co-benefits of the EE project and compare against** broader EE policy objectives in step 1 and EE project specific goals in EM & V system. Co-benefits include avoided greenhouse gas emissions and other environmental benefits, energy price effects.
- **Compare calculated savings and co-benefits to external benchmarks[55].** The benchmarking exercise should cover two levels of analysis. First, compare the performance of the project's assets (i.e. the selected performance metrics) against similar assets in a defined geographical area[56]. Second, compare the efficiency and effectiveness of the implementing model and agent, focussing on management and operational practices) compared to other implementation models used by peers[57].

✓ **Ascertain whether the EE project achieved its goals at the project and individual site level, and take the appropriate remedial actions.**

[55] Conducting a benchmarking exercise allows the project manager to assess the outcomes of the project on a broader scale to uncover areas where the EE could be tweaked to improve performance. The EPA provides an energy performance scale benchmarking tool in its online, free, Portfolio Manager tool.
[56] This is referred to as a quantitative benchmarking exercise and it 'compares numerical measures of performance, looking at how performance changes over time, or [how the performance of targeted assets selected for the EE project compares to similar assets]' (RERE, 2013:22)
[57] Referred to as qualitative benchmarking exercise as it "analyses management and operational practices across the EE project to identify best practices and needs for improvement" ' (RERE, 2013:22)

- If goals / targets were not achieved investigate the underlying reasons for the discrepancy and revise the EE project implementation, such as installing EE measures in additional priority buildings.
- If goals / targets were achieved consider setting higher goals for achieving greater energy cost savings and adjust the implementation plan accordingly.

➢ **Create a communication plan** to inform executive management and stakeholders about the results of the EE project.

✓ Develop a communication strategy that uses different platforms (e.g. training seminars, social media, demonstration projects, and the distribution of educational materials, etc.) to information stakeholders about the results of the EE project. Example of other government EE campaigns are

- U.S. state of Colorado's energy website, "Recharge Colorado" (http://rechargecolorado.org/), provides an excellent example of explaining the benefits of EE to residential and business audiences.
- The government of Sir Lanka's EE awareness programme includes seminars, workshops, printed materials, electronic media, curriculum for schools, and competition

(www.energy.gov.lk/sub_pgs/energy_managment_awareness_slneea.html)

- ICLEI's Green Business Challenge program and Web application

✓ Share information about the results and progress of the EE project on a regular basis to increase the public's awareness about EE and encourage the public to implement EE measures in their buildings.

## Online Resources

*A model Request for Proposal (RFP) to prequalify ESCOs, model performance contract, and other tools related to developing and implementing a state-wide Energy Savings Performance Contracting (ESPC) programme: http://www.energyservicescoalition.org/espc/tools/index.html*

*Energy savings estimates of LED: http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/nichefinalreport_january2011.pdf*

*Institute for Sustainability: Retrofit Guides: http://www.instituteforsustainability.co.uk/guidesummaries.html*

*ICLEI: CLIMATE CHANGE Mitigation Tools: http://www.icleiusa.org/climate_and_energy/climate_mitigation_guidance/climate-work*

*Extension Municipal Energy Efficiency Workbook: http://florence.uwex.edu/files/2010/12/MunicipalEnergyPlanningWorkbook.pdf*

*US Environmental Protection Agency: Energy Efficiency in local Government Operations*

*http://www.epa.gov/statelocalclimate/documents/pdf/ee_municipal_operations.pdf*

*Itron - National Energy Efficiency Best Practices Study, Volume P1, Portfolio Best Practices Report - http://www.eebestpractices.com/pdf/Portfolio_BP_Report.pdf*

*Public Procurement of Energy Efficiency Services – Lessons from International Experience, World Bank (November 2010) Chapter 4 (pages 43-55) details relevant procurement methods for EE. Chapter 6 (pages 92-102) defines the bid evaluation process, lists evaluation criteria and provides project examples.* http://www.esmap.org/esmap/sites/esmap.org/files/P112187_GBL_Public%20Procurement%20of%20*Energy%20Efficiency%20Services_Lessons%20from%20International%20Experience_Singh.pdf*

*Joint Public-Private Approaches for Energy Efficiency Finance: Policies to Scale up Private Sector Investment, International Energy Agency (2011) Comprehensive report on the critical elements of joint public-private approaches to accelerating and scaling up private investment in EE with particular focus on lessons learned with regard to energy performance contracts, risk guarantees and dedicated credit lines.* http://www.iea.org/papers/pathways/finance.pdf

*Standard Procurement Document – Prequalification Document for Procurement of Works and User's Guide, The World Bank (2006) Section III (pages 19-24) describes how to set up the general qualification criteria and requirements for contractors, which can also be applied to preparing bids for private partners for energy efficiency PPP. http://siteresources.worldbank.org/INTPROCUREMENT/Resources/Prequal-EN-09-sep-10.pdf*

*U.S. Department of Energy, Federal Energy Management Program, Operations and Maintenance guidance*

*http://www1.eere.energy.gov/femp/program/operations_maintenance.html*

*Leading by Example: Streamlining EE in the Local Government Sector. This ACEEE Summer Study paper describes the Association of Bay Area Government Energy Watch programs. The paper provides information on energy efficiency barriers that the programs have encountered and addressed. http://eceee.torped.se/conference_proceedings/ACEEE_buildings/2008/Panel_8/8_414/Paper*

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# Annexure One

## eThekwini Municipality Internal Energy Management Policy

**19 January 2012**

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### 1 DEFINITIONS

| | |
|---|---|
| CDM | Carbon Development Mechanism |
| CO2e | Carbon Dioxide Equivalent |
| DoE | Department of Energy |
| EMIP | Energy Management Implementation Plan |
| EEMS | eThekwini Energy Management System |
| EMSC | Energy Management Steering Committee |
| EO | Energy Office |
| GHG | Green House Gases |
| KPIs | Key Performance Indicators |
| RE | Renewable Energy |

### 2 PREAMBLE

(1) Energy[58] supply in South Africa is constrained due to both national and international energy supply trends and prices. Energy prices, having already increased substantially, are expected to continue to rise even further in the future.

(2) Concerns regarding climate change have also resulted in pressure on the country, in general, and on the corporate sector, in particular, to reduce emissions of ~~green house~~greenhouse gases (GHGs).

(3) In response, eThekwini Municipality developed and adopted the eThekwini Energy Strategy in 2010. The Energy Strategy includes an objective to reduce the energy use within the municipal infrastructure systems[59]. This Internal Energy Management Policy is aimed at the management of energy in these infrastructure systems.

(4) At a municipal level, energy management includes all the measures that are planned and implemented to ensure optimal energy consumption by municipal infrastructure systems. Similar to other management systems, energy management also influences the municipality's organisational and technical procedures, as well as behaviour patterns, in order to achieve a desired outcome.

(5) The Internal Energy Management Policy seeks opportunities for energy reduction and saving as well as the generation of green energy[60].

(6) The predominant energy forms consumed within the eThekwini Municipality include electricity and liquid fuels (petrol, diesel and oil). There is an existing eThekwini Motor Fleet Policy, which takes into account liquid fuels. This Energy Management Policy therefore focuses on the management of electricity energy.

### 3 PURPOSE

(1) To optimise the use of energy by the municipality by systematic improvement in the

[58] Energy, in this context, refers to electricity and fossil fuels (liquid, solid, gas).
[59] Municipal infrastructure systems include buildings, plant & equipment and vehicles.
[60] Green energy or renewable energy means energy generated from natural non-depleting resources including solar energy, wind energy, biomass energy, biological waste energy, hydro energy, geothermal energy and ocean and tidal energy;

energy economy[61] of the infrastructure operated by the municipality, thereby reducing costs and mitigating the impact of GHG emissions on the environment

(2) To provide a *systems approach* for the eThekwini Municipality that will enable it to optimise energy use on an on-going basis and to promote the development of renewable energy sources for its own use.

(3) To develop an accurate energy monitoring and evaluation management process for ensuring the implementation of energy efficiency measures.

(4) To implement an eThekwini Energy Management System (EEMS) that will manage the municipality's internal energy demand as well as to identify potential renewable energy opportunities for implementation. The EEMS would be the basis for investing in and initiating internal energy efficiency and renewable energy interventions. The EEMS would also include the organisational and informational structures as well as the resources required for implementing this internal energy policy.

## 4 PROBLEM STATEMENT

(1) Effective energy management is fundamental to sustainable and profitable business practices and is in line with national imperatives[62]5 that specifically deal with the generation and consumption of energy in all its forms.

(2) Energy is used by the eThekwini Municipality in the provision of municipal services, notably: transport, the operation and maintenance of municipal infrastructure (such as office buildings, street lights, traffic signals, waste treatment plants, public facilities, markets, the distribution of water and electricity, etc).

(3) The two primary forms of energy purchases are liquid fuels (diesel and petrol) and electricity.

(4) The predominant electricity consuming municipal infrastructure systems include public housing (hostels), water treatment plants, street lighting, buildings and recreational facilities. Currently the estimated municipal consumption is in excess of 860 GWh of electricity per annum (including transmission losses). This equates to an approximate cost of R473 million and 886,786 tons of carbon dioxide equivalent ($CO_2e$)[63] per annum (2010).

(5) While there are a number of energy management and renewable energy initiatives taking place throughout the municipality, there remain a number of key gaps, which can be summarised as follows:

a. There is no clearly articulated and over-arching approach and methodology for energy management,

b. There exists no centralised institutional structure within the municipality that is responsible for internal energy use and, therefore, no coherent approach to monitoring and management of energy use,

c. There are no clearly articulated incentives to save energy or implement energy saving programmes, and

d. There is a lack of accurate baseline data for energy use across most infrastructures operations.

## 5 POLICY MEASURES

(1) Institutional responsibilities

[61] Energy economy is the efficiency with which energy (in particular) is used within a society or element thereof.
[62] *White Paper on Energy Policy* (1998), *National Energy Act* (2008), Energy Efficiency Strategy of South Africa, First Review, October 2008
[63] 1 kWh grid electricity = 1.03kg $CO_2$

a. The Energy Office is responsible for the overview of this policy

b. An Energy Management Steering Committee (EMSC) will be constituted with membership representing each of the entities responsible for major energy use within the municipality. The EMSC will be chaired by the Deputy City Manager (Human Settlements and Infrastructure). Responsibility for the implementation of each of the interventions identified by the EMSC will be allocated to the entity within the municipality unit most directly responsible for the system concerned.

(2) Systems Optimisation

a. The eThekwini Municipality will adopt a Systems Optimization Approach to Energy Management,[64]

b. An eThekwini Energy Management System (EEMS) will be developed to systematically record energy demand by its internal infrastructure systems as well as to plan, implement, audit and make continuous improvements to the system (i.e. adopting a Plan, Do, Check and Act cycle) which is described in more detail in the procedures section of the policy.

(3) Monitoring System

a. The Energy Office will establish a system of electricity monitoring that will provide up to date and accurate information to municipal departments on their electricity use.

(4) Financing

a. An energy intervention finance competency will be established at the Energy Office to assist departments to secure funding for energy management interventions identified by the Energy Management Steering Committee.

(5) Performance indicators and incentives

a. Baselines and energy saving targets for the municipal units will be defined through the EMSC.

b. The targets will be incorporated into Key Performance Indicators (KPIs) of the head of the respective municipal unit or department.

c. The Energy Office will work with designated staff members to develop programmes and projects to meet the KPIs.

**6 PROCEDURES**

(1) Constitution of the Energy Management Steering Committee:

a. An Energy Management Steering Committee (EMSC) will be constituted with an associated secretariat supplied by the Energy Office.

b. Membership of the EMSC will include representation from all the departments that

[64] Systems optimization is defined as the continuous monitoring of a set of energy-related parameters, in order to optimize the use of energy within certain constraints

that use of significant quantities of energy.

c. The committee will be chaired by Deputy City Manager, Human Settlements and Infrastructure or his/her designated representative.

d. The EMSC will meet on a quarterly basis and will oversee the Energy Management System.

e. The agenda for the EMSC will cover; baselines and targets, technology, projects and programs and the allocation of responsibilities, and budgeting and implementation issues.

f. The following departments will participate in the EMSC:

i. Architecture Department

ii. Electricity Department

iii. Energy Office

iv. Environmental Planning and Climate Protection Unit

v. Housing Department

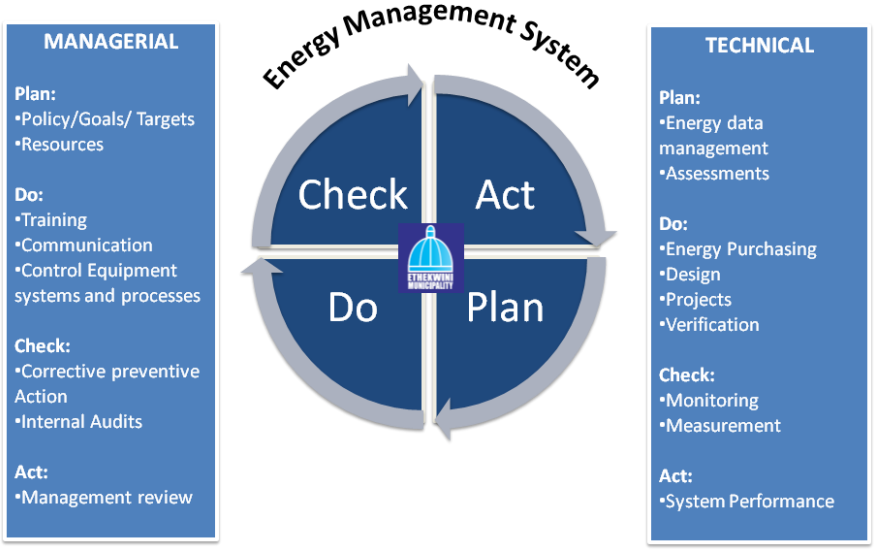
vi. Treasury Cluster

vii. Water and Sanitation Department

(2) Energy Management System

a. The EMSC will oversee the implementation of the *eThekwini Energy Management System* (EEMS) following the plan, do, check, act approach outlined below:

**Figure 1: Energy Management System**[65]




[65] Original model developed by Dr. W. Edwards Deming, 1950
Image adapted from http://www.mse2000.net/MSEOverview/tabid/54/Default.aspx

**i. Plan**

a.a. The Energy Management Steering Committee (EMSC) will develop and review an Energy Management Implementation Plan (EMIP). The EMIP will:

a.a.a. set targets for energy use and energy generation in different areas of municipal operation. Targets will be established with reference to national energy targets and national allocations made to the eThekwini Municipality;
a.a.b. set a clear list of tasks and activities to achieve the targets;

a.a.c. outline a clear allocation of responsibilities;

a.a.d. outline a clear system for monitoring and evaluation of actions; and

a.a.e. outline an allocation of human and financial resources.

a.b. The EMSC will meet on a quarterly basis to review the tasks and activities

a.c. The EMSC will meet annually to revise the Energy Management Implementation Plan.

**ii. Do**

a.a. Municipal units responsible for energy use will implement the aspects of the EMIP relevant to them.

a.b. To promote implementation, municipal units will allocate energy management responsibility to a relevant staff member who will participate in the EMSC, design the components of the energy management implementation plan relevant to their unit and promote the implementation of these components within their unit.

a.c. Municipal units will ensure that the activities and outcomes of the energy interventions are communicated within their respective departments

**iii. Check**

a.a. The Energy Office will audit the effectiveness of the implementation of the plan through a system which records all activities undertaken by line functions in implementing energy initiatives;

a.b. The Energy Office will report to the EMSC on the effectiveness of the various energy interventions carried out by the municipal units on a quarterly basis;

a.c. The EMSC will outline corrective or preventive actions based on the report back by the Energy Office.

**iv. Act**

a.a. The EMSC will review the implementation plan at the end of each year based on the results generated through the monitoring system and amend the plan based on the experiences of the previous year.

**(3) Monitoring System:**

a. A clear methodology and system for Monitoring and Verification will be developed by the EMSC and included in the Energy Management Implementation Plan

b. The Energy Office will take responsibility for implementing the procedures for the establishment and maintenance of the monitoring and verification system.

c. The monitoring and verification system will include:

i. Establishment of a system providing current and regular reports from the monitoring equipment;

ii. Installation of monitoring equipment;

iii. Checking the accuracy of and reusing of existing monitoring and measuring equipment and/or installing new monitoring equipment;

iv. Maintaining records of significant and accidental deviations from normal energy consumption;

v. Comparing energy indicators against those of similar municipalities;

vi. Evaluating compliance of municipal energy use with standards and targets.

(4) Financing:

a. An energy intervention finance competency within the Energy Office will be established

b. The energy intervention finance competency will:

i. Assist line departments to develop business plans for the identified energy interventions.

ii. Investigate funding sources for interventions, that include donor agencies, national public sector departments and the private sector

iii. In the absence of external funding options, present the business plan to the eThekwini Treasury, through the Energy Steering Committee for funding.

iv. Once funding is secure, be responsible for financial reporting to the funding agent.

**7 POLICY EVALUATION AND REVIEW**

(1) The overall policy will be evaluated for effectiveness at intervals of three years.

(2) The evaluations will be done on the basis of the recorded achievements in the generation of energy from renewable sources and in obtaining energy efficiencies within the eThekwini Municipal operations. These achievements together with their contribution towards the reduction in GHG emissions will be measured against subsequent targets.

(3) The evaluations will be done by the Energy Office, in consultation with each of the responsible entities involved. The outcome of the evaluation will be presented to the EMSC

(4) The evaluation will make recommendations to:

a. retain a particular policy measure unaltered;

b. amend a particular policy measure (giving the amendments proposed); or,

c. discard a particular policy measure in its entirety.

(5) The revised policy is to be communicated to all entities within eThekwini Municipality immediately on approval.

## Annexure Two

City of Cape Town

Vision Statement

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### Our Future

Increasingly, globalisation has redefined the way in which cities view their development agenda. More so than ever before, global competitiveness, global resource constraints, global events, and global perceptions are central drivers to the future of individual cities. This global environment within which cities interact is itself facing new and challenging trends. The financial crisis, climate change and increasing risks to resource availability have become and are likely to remain the defining development parameters for cities across the world. These global challenges have brought about a realisation that sustainability and environmental resource protection are no longer interesting concepts but must become central strategies within the development strategies of cities if economic and social stability and resilience are to be achieved in a fast changing world.

### Our Definition of Sustainable Development

The City of Cape Town recognises that unless determined steps are taken to reverse the current environmental decline and resource consumption patterns, the social and economic cost and risk to the City and its citizens will increase dramatically. The City therefore recommits itself to a respect and recognition of the value and importance of its natural and heritage assets. In so doing the City will enhance, manage, utilise and protect these assets so as to grow the economy, extend social opportunity, develop its communities and build a more equitable and resilient society.

### Our Responsibilities

Responsible environmental governance that:

- Works towards providing a quality living environment for all citizens of Cape Town.

- Protects, enhances, and manages our natural and heritage assets to ensure they continue to underpin our economy, social opportunity and provide a host of ecological services to the people of Cape Town, both now and in the future.
- Complies with national environmental and heritage legislation, meets provincial requirements and supports international environmental treaties, agreements and initiatives.
- Regulates our natural and heritage assets in a balanced manner that secures our environment for the common good, promotes sustainability while creating opportunity, stimulating economic growth while promoting enjoyment.
- Works continuously to invest in our natural and heritage assets as key drivers of our social and economic development.
- Proactively engages and partners with national and provincial government on all environmental and heritage issues including those beyond our jurisdiction but which are central to our identity, sense of place, economy, and resource security.
- Empower its communities through social development and education while entrenching a shared environmental accountability and responsibility.
- • Leads in defining the appropriate balance between socio economic growth and environmental protection.

**Our Environmental Principles**

- Protection of all of our constitutional rights
- Long term benefits will be valued over short term gain

- Entrenching sound environmental values and responsibility within all aspects of society, governance and decision making
- A recognition of the large disparity in environmental wealth and opportunities across our City and the need for environmental redress
- A recognition of the need for broad representation of Cape Town's places, structures and memories in the lives of various communities over time; including the struggle for democratic rights
- A commitment to building an environmentally resilient city
- A commitment to building resilience, independence and sustainable livelihoods within our communities and individuals.
- A commitment to open and transparent environmental governance.

# Annexure Three

Polokwane Municipality

Example of a SDBIP

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**POLOKAWANE MUNICIPALITY**

**SERVICE DELIVERY AND BUDGET IMPLEMENTATION FORMAT**

**ENERGY EFFICIENCY AND DEMAND SIDE MANAGEMENT (EEDSM) SDBIP FOR 2011/12**

| | |
|---|---|
| **Name of Municipality** | **Polokwane** |
| **Province** | **Limpopo** |

| | | | | |
|---|---|---|---|---|
| 1 | Project Name | 2 | Project Contact person | |
| **Demand Side Management - Retrofit of Streetlights & Building Lights** | | 2.1 | Title | **Mr.** |
| 3 | Project Description | 2.2 | Name | **Wimpie Redelinghuys / Pine Pienaar** |

| | Project Allocation | Description/No. of retrofit planned | 3.4 | Location | | | |
|---|---|---|---|---|---|---|---|
| | | | | Degree | Min (') | Sec (") | Sec ('') |
| 3.1 | Street Lighting | Retrofit of 1000 x 125W Streetlight fittings with 70W HPS Fittings. | Latitude | | | | |
| 3.2 | Traffic Lighting | | Longitude | | | | |
| 3.3 | Building Lighting | Retrofit of 12 000 x 57W Flourescent Lamps with 35W T5 Flourescent Lamps.. | | | | | |

| 4 | Related Activities per Deliverable Item | | | |
|---|---|---|---|---|
| | Deliverable Name | Activity | Start Date | End Date |
| 4.1 | Efficient Street Lighting & Building Lighting. | 4.1.1 Write approval report | 1-Jul-11 | 31-Jul-11 |
| | | 4.1.2 Obtain project approval | 1-Aug-11 | 15-Sep-11 |
| | | 4.1.3 Adjudication report | 19-Sep-11 | 23-Sep-11 |

| | | | | | |
|---|---|---|---|---|---|
| | | | 4.1.4 Obtain adj. approval | 26-Sep-11 | 30-Sep-11 |
| | | | 4.1.5 Appoint service providers | 1-Oct-11 | 15-Oct-11 |
| | | | 4.1.6 Order material | 17-Oct-11 | 28-Oct-11 |
| | | | 4.1.7 Implementation | 1-Nov-11 | 31-May-12 |
| | | | 4.1.8 Inspection | 1-Jun-12 | 17-Jun-12 |
| | | | 4.1.9 Completion | 18-Jun-12 | 30-Jun-12 |
| 5 | Description progress on Project Deliverables | | | | |
| | | Baseline Information & data | | Projected Savings | Actual Savings |
| 5.1 | Street Lighting | Current light (W) | Retrofit (W) | Total no of Lights | | |
| | | 125 | 70 | 1000 | 54 450 Kwh | To be measured and verified |
| | | | | | | |
| | | | | | 220 825 Kwh per year after project completion. | |
| | | | | | | |
| 5.2 | Traffic Lighting | Current light (W) | Retrofit (W) | Total no of Lights | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 5.3 | Building Lighting | Current light (W) | Retrofit (W) | Total no of Lights | | |
| | | 57 | 28 | 12 000 | 420 000 Kwh | To be measured and verified |
| | | | | | 1 016 160 Kwh per year after project completion. | |
| | | | | | | |
| 6 | Project Budget | | | | | |
| | | | | DoRA Funding | Other sources | |
| 6.1 | Street Lighting | | | R 850,000.00 | N/A | |
| | | | | | | |
| 6.2 | Traffic Lighting | | | N/A | N/A | |
| | | | | | | |
| 6.3 | Building Lighting | | | R 8,650,000.00 | N/A | |
| | | | | | | |
| 6. | Measuring and Verification | | | R 200,000.00 | N/A | |

| | | | |
|---|---|---|---|
| 4 | | | |
| 6.5 | Labour costs | R 1,500,000.00 | |
| 6.6 | Project Management | R 500,000.00 | |
| 6.7 | Disposal of Light fittings | R 300,000.00 | |
| | Total | R 12,000,000.00 | |

| 7 | Emplyoment Opportunities | | | | | |
|---|---|---|---|---|---|---|
| 7.1 | Category | Rate | No. of People | No. of Months | Person Job Days | Comment |
| 7.2 | Women | | | | | |
| 7.3 | Men | | | | | |
| 7.4 | | | | | | |

| 8 | SMMEs to Be Used | | | |
|---|---|---|---|---|
| | Business Sector | No. of SMMEs | SMMEs that are HDE | Comments |
| 8.1 | Annual Contractors | | | |
| 8.2 | | | | |
| 8.3 | | | | |
| 8.4 | | | | |
| 8.5 | | | | |

| 9 | Measurement and Verification (M&V) System | |
|---|---|---|
| 9.1 | Is Measurement & Verification (M & V ) System in place? | **No** |
| 9.2 | Give details: | Polokwane Municipality are busy to prepare bid documents to appoint M & V Experts on the Data Base. |

| | | | |
|---|---|---|---|
| | | | |
| 9.3 | M & V Expert Details: | **Name:** | |
| | | **Physical address** | |
| | | **Contacts:** | |
| | | **Tel:** | |
| | | **Fax:** | |
| | | **Email:** | |

| | | |
|---|---|---|
| | Signature | |
| | Municipal Manager | |
| | Date | |

# Annexure Four

European PPP Expertise Centre 2012 : Excerpt from page 32-33

Assessing an ESCO's Competence: Key Questions

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**How long has the ESCO been in business?**

- Does this ESCO have a proven track record in performing energy services projects?
- Can it provide a list of satisfied clients?
- What has been its performance (savings) on past projects?
- How did the results compare with the original expectations?

**Corporate capabilities**

- Does the ESCO have strong core competencies in energy management and state-of-the-art technology?
- Does the ESCO have the organisational depth to implement the project in a cost-effective and timely manner?
- Does the ESCO have standard operating procedures?
- Are they documented? How much freedom does the ESCO staff have to vary from them?
- What is the expertise and experience of the project team (CVs and track record) that would be assigned to the project and of the support staff who would back them up?

**Project implementation**

- How experienced is the ESCO in minimizing the disruption to the workers in the public building(s) renovated?
- What training will be provided to the public building operations staff?
- What input will the public manager have regarding the design, construction and implementation of the project?
- What input will the public manager have regarding the selection of equipment, suppliers and installers?

- Does the ESCO have any restriction or bias regarding equipment, suppliers and installers?

**Project performance**

- Will the ESCO guarantee the recovery of all project costs and interest costs through the savings that are to be achieved within a guaranteed period of time?
- Will the ESCO guarantee all savings or just a portion of savings?
- Will the ESCO be ultimately responsible for every element of the project?

**Project financing**

- How will the project be financed and at what interest rate?
- Will all project costs be disclosed?
- How will any additions or extras be charged?
- How can good value be ensured?
- Will fees be consistent through the entire project?

**Project capabilities**

- Typical improvement measures installed
- Design and project implementation procedures
- Software support systems

**Project management process**

- Selection, use and control of subcontractors

**Project capacity**

- Number of concurrent projects that can be comfortably performed
- Project managers and their respective project team

**Scope of services**

- Discrete services provided under energy performance contracting

**Particular strengths of the ESCO**

- Services contracted out including the following
  - ✓ preliminary assessment of energy savings;
  - ✓ project management;
  - ✓ construction including provision of trades;
  - ✓ commissioning;
  - ✓ operator training;
  - ✓ procedure documentation;

- ✓ mechanical and electrical maintenance;
- ✓ invoicing system and methods for calculating savings;
- ✓ remote measurement and savings performance evaluation;
- ✓ project financing; and
- ✓ energy services agreement negotiation.

**Experience in energy performance contracting**

- Description of EE and conservation projects during the last three years, where payment was not predicated on actual savings;
- Description of experience in training of building operators, provision of building mechanical and electrical maintenance services, and energy use measurement; and
- Description of EPC projects completed and in progress.

**Financial stability**

- Sufficient working capital and access to project financing;
- Demonstration of adequate skills in financial
- engineering at ESCO management level;
- Adequate and appropriate insurance; and
- Ability to comply with bonding requirements.

**In general, companies are expected to:**

Demonstrate their capability to provide comprehensive energy management services, in the relevant market sector, for plant, processes or facilities, including but not limited to:

- comprehensive preliminary assessment of energy savings and feasibility analyses; design, engineering, selection and installation of equipment, systems and modifications to improve energy (and other resources) efficiency without reducing the reliability or performance of such equipment;
  - ✓ construction management;
  - ✓ training of clients' operations and maintenance staff in energy-efficient practices; maintenance and service of installed measures;
  - ✓ measurement and verification of energy (and other resources) savings; and
  - ✓ financing for such projects.

- Guarantee that payments for EE improvements will be contingent on energy savings so that the client will not have any financial obligations that exceed the avoided utility costs.
- Outline their capability with respect to other related energy services including, but not limited to, technologies and applications of particular relevance to the client, e.g. boiler, compressed air, facility management and operations, (or other systems, power quality, HVAC, etc.).
- The public partner evaluates the qualification information against pre-specified evaluation criteria producing a list of pre-qualified firms, which are invited to submit detailed proposals.

## Annexure Five

Excerpt from Abramson et al 2011 page 15-16

Innovative Funding Models: Managed Energy Services Agreement (MESA)

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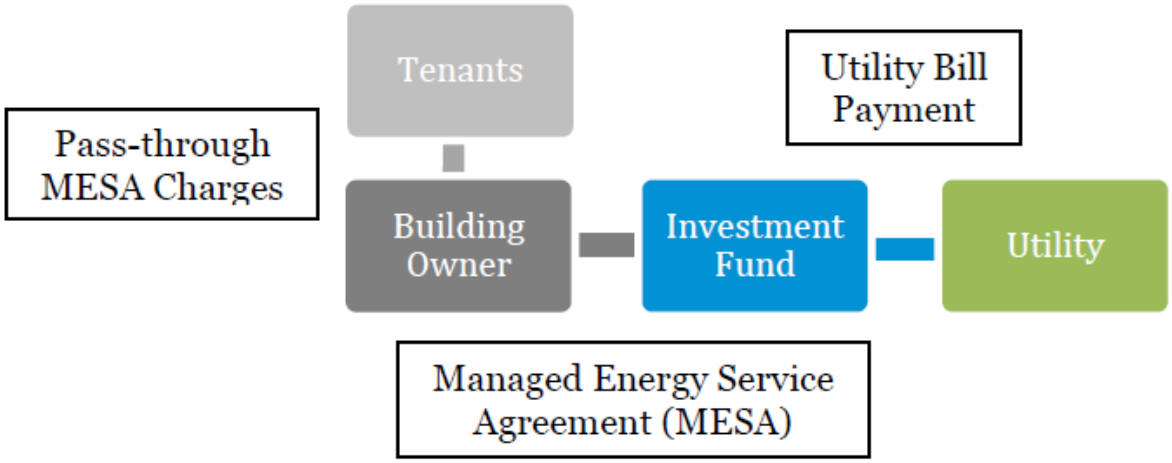
There are numerous similarities in structure and function between a Managed Energy Services Agreement (MESA) and the ESA model previously described, albeit with some important differences. Once again an investment fund acts as both the financier and owner of all energy efficiency assets during the length of a contractual agreement with a building owner and assumes full responsibility for all upfront costs through a special purpose entity funded by a mixture of equity and debt provided by the investment fund's capital partners and lenders.

However, instead of charging the building owner a service charge that scales with energy savings, the investment fund instead assumes the role of paying the building owner's on-going utility bill directly and charges the building owner a fixed monthly fee equal to the building's historical energy rates adjusted for key occupancy and weather-related variables that are agreed upon prior to finalizing the agreement.20 In this way, the investment fund becomes an intermediary between the building owner and the local utility and generates revenue by capturing the differential between the building's old energy costs and its decreasing energy costs as the building is made more efficient over time. Despite this different payment structure, the end financial result is essentially the same as for the ESA model.

The investment fund once again coordinates with various service providers to implement projects for the building owner, although Transcend Equity Development Corporation—the originator and main practitioner of the MESA model—has chosen to internalize many of the tasks an ESCO would otherwise perform, including conducting much of the engineering, design, and monitoring services. Transcend then outsources installation and construction functions to a range of ESPs and contractors with whom it creates individual performance agreements and guarantees.

Figure 7 Managed Energy Services Agreement




Due to its similarities with the ESA model, the MESA model addresses the same traditional barriers to energy efficiency financing, including issues with high upfront capital costs, corporate capital constraints, high development costs, and mortgage lender limitations.

However, the MESA model also has additional benefits for multi-tenant commercial building spaces. While both models enable the building owner to avoid capital outlays and thus reduce his or her reluctance to investing in improved energy performance, the MESA model goes farther. It reduces split incentives in these types of commercial properties by giving landlords the additional capability to —pass-through MESA sub-charges to their various tenants in the form of their standard energy bills. This arrangement meshes well with standard commercial lease structures since it does not change bill-payer alignment. Additionally, since repayment is tied through the utility bill itself, the risk of tenants or a building owner failing to make payments is reduced compared to servicing debt through individual service charges. Because a utility bill —keeps the lights on, tenants have to pay this bill unless they want to sit in the dark.

By expanding the number of external financing products available to two of the most underserved energy efficiency market sectors—commercial properties and industrial facilities—the ESA and MESA models represent significant positive steps toward opening up the wider energy efficiency marketplace. However, many challenges continue to face models of this kind. Principal among these is the fact that both models remain very new and therefore have not developed long enough track records of success to convince risk averse investors that they should commit the levels of funding required to bring either strategy to scale in the wider marketplace.

## Annexure Five

Excerpt by David Metcalfe, Created on 2011-11-01

Six ways to Fund Energy Efficiency Retrofits

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Energy efficiency is one of the most popular first steps to take when addressing corporate energy footprints, for the simple reason that small investments can produce big results.

Not only does energy efficiency help keep firms in line with their regulatory obligations, but it also engages stakeholders, whether they be shareholders, employees or customers. Energy efficiency helps with the finances, too: Given the price volatility in energy markets, any savings made contribute towards a sense of stability.

Yet despite a clear-cut argument to create and implement energy efficiency programs, extracting funding from already tight budgets is tough. In these post-recession times any investment -- even if it is one that will generate savings in the long term -- struggles to gain approval from cash-strapped CFOs.

Internal barriers are numerous: Energy efficiency retrofits rarely fit into the short-payback mold of other investments; efficiency isn't a core strategy for many firms and lacks priority compared to other projects; and, where the occupier of a building does not own it, a gap between who benefits and who pays between tenants and landlords is also a problem.

Legislation also has a part to play, with proposals such as the International Accounting Standards Board's and the Financial Accounting Standards Board's plans to treat all leases -- including leasing of energy-efficiency equipment -- as on-balance sheet makes this option less attractive.

As for any project, access to capital is key, but our research finds that the majority of businesses prefer to pay their own way when it comes to energy efficiency (with tax incentives one benefit of taking this route). Having spoken to 13 energy management financing experts, Verdantix finds in its recent report, How To Finance Corporate Energy Efficiency, that there are many alternative funding solutions available, although the market is still in its infancy.

Government loans and grants are just one option; we found 221 energy efficiency loan programs offered across 48 U.S. states funded by the Department of Energy, and President Obama's Better Building Initiative also proposes extra financial help for improving energy efficiency in buildings, with additional dollars promised in the 2012 federal budget.

In other jurisdictions, banks -- such as National Australia Bank and the U.K.'s Co-operative Bank -- also offer tailor-made loans for energy efficiency projects.

Other options include funding initiatives through commercial leases; tapping in to capital available through the Property Assessed Clean Energy (PACE) program (71 projects have had a total of $9.7 million of finance approved in the U.S. since 2008); working with third-party funding -- the investor then benefits from returns through shared savings; or finding an energy services firm to manage the project from start to finish. These firms then recuperate their investment by through a service charge levied direct to tenants.

Whatever route energy directors take, Verdantix has six best practice recommendations to make certain their business finds a source of funding that is the best match for its corporate energy efficiency program.

1. Give investors a guarantee. Budget constraints risk strangling many a project before it even begins -- so why not ask for a guaranteed return on investment when it comes to energy efficiency projects? Performance contracts shift risk onto the contractor, encourage better building management and give investors transparency over operational cashflow.

2. Green the lease. Both tenants and landlords benefit from energy-efficiency building retrofits -- the former have lower energy bills and the latter gain by reducing the risk of building obsolescence. Uptake of Green Leases has been slow, but when there is data to support the energy reduction benefits and a transparent financial structure, financial gains from energy efficiency investments can be accumulated on both sides.

3. Multi-site programs generate multiple savings. Energy efficiency has moved beyond tactical site management. Instead, look ahead into the business cycle to create multi-year investment plans that span all sites and operations. CFOs will like the sound of the potential savings.

4. Work with the CFO. Engage the CFO when considering financing options for energy efficiency investments. They know better than anyone if an externally financed or a self-funded solution will work best.

5. Independent verification is key. Customers and investors want crystal clear information about success (or otherwise) in sustainability. Contract an independent firm to verify energy savings generated, using schemes such as the International Performance Measurement and Verification Protocol, to instill confidence.

6. Broaden payback calculations. Go beyond simple payback calculations and incorporate other benefits -- what's the value of risk reduction, or a contribution to carbon reduction targets, for example? -- and that way funding will be assured, even if payback periods are lengthy.

Our research shows that funding doesn't have to be the deal breaker when it comes to investments in energy efficiency retrofits. Working through these six best practice recommendations will help energy directors bring solutions, not problems, to the CFO, ones that will generate savings from their inception.