

Department of Minerals and Energy, Pretoria

**Capacity Building in Energy
Efficiency & Renewable Energy**

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Abbreviations and Acronyms

BEE	Black Economic Empowerment
CaBEERE	Capacity Building in Energy Efficiency and Renewable Energy
CB	Capacity Building
CEF	Central Energy Fund
DANIDA	Danish International Development Assistance
DDG	Deputy Director-General
DEAT	Department of Environmental Affairs and Tourism
DK	Kingdom of Denmark
DKK	Danish Kroner
DME	Department of Minerals and Energy
DPW	Department of Public Works
DTI	Department of Trade and Industry
EE	Energy Efficiency
EMO	Energy Management Opportunity
ESCO	Energy Service Company
ESETA	Energy Sector Education Training Authority
FIDIC	Industrial Federation of Consulting Engineers
IDC	International Development Corporation of South Africa
NT	National Treasury
NER	National Energy Regulator
NGO	Non-Governmental Organisation
PDI	Previously Disadvantaged Individual
PM	Project Manager
PQ	Pre-Qualification
PSC	Project Steering Committee
PTT	Project Task Team
QA	Quality Assurance
RE	Renewable Energy
RSA	Republic of South Africa
SA	South Africa / South African
SALGA	South African Local Government Association
SANGOCO	South African Non-Governmental Organisations' Committee
SARS	South African Revenue Service
SMME	Small, Medium and Micro Enterprises
SP	Service Provider
ST	Short Term Adviser
TA	Technical Assistance
TOR	Terms of Reference
VAT	Value Added Tax
ZAR	South African Rand

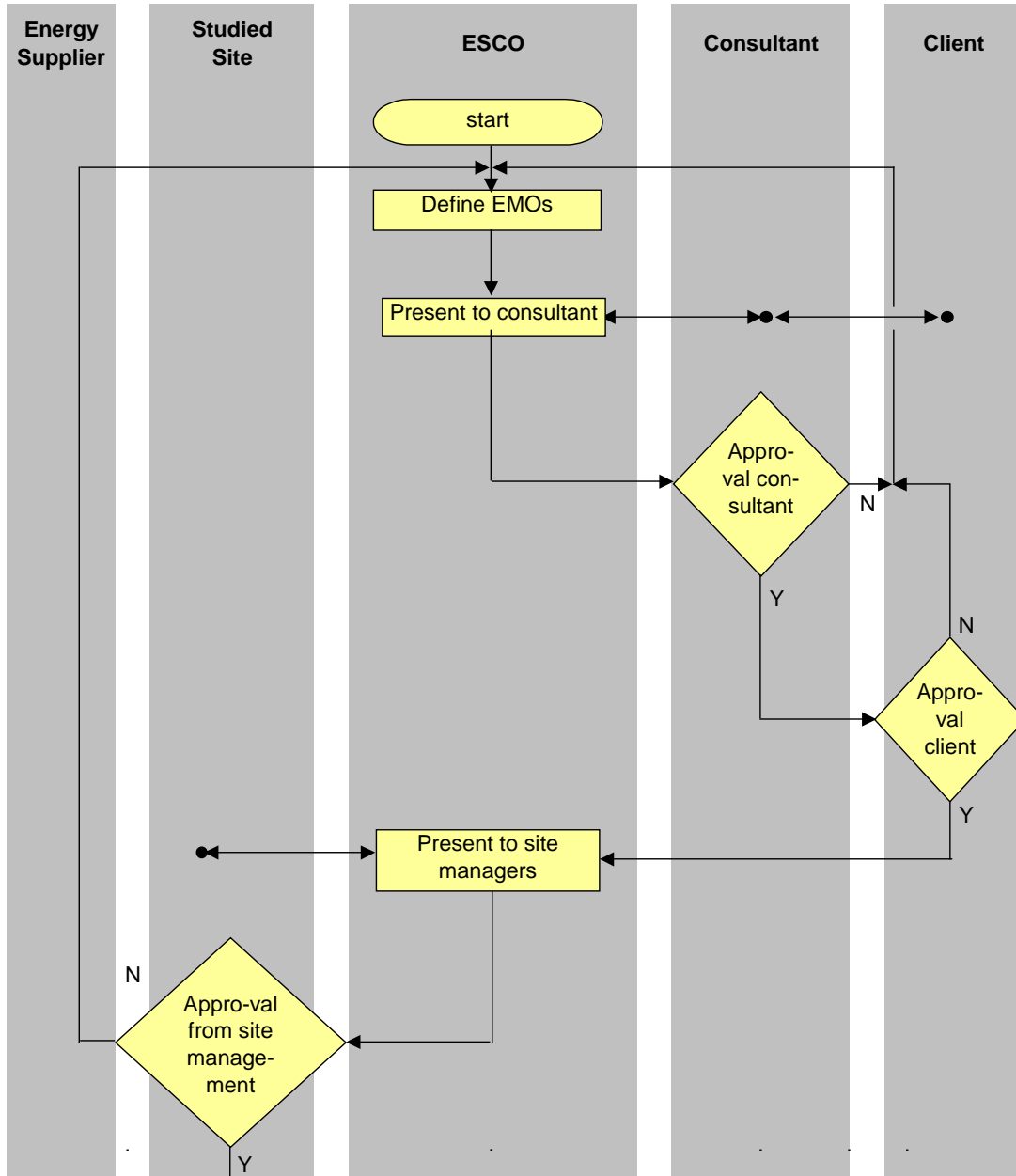
1 Introduction

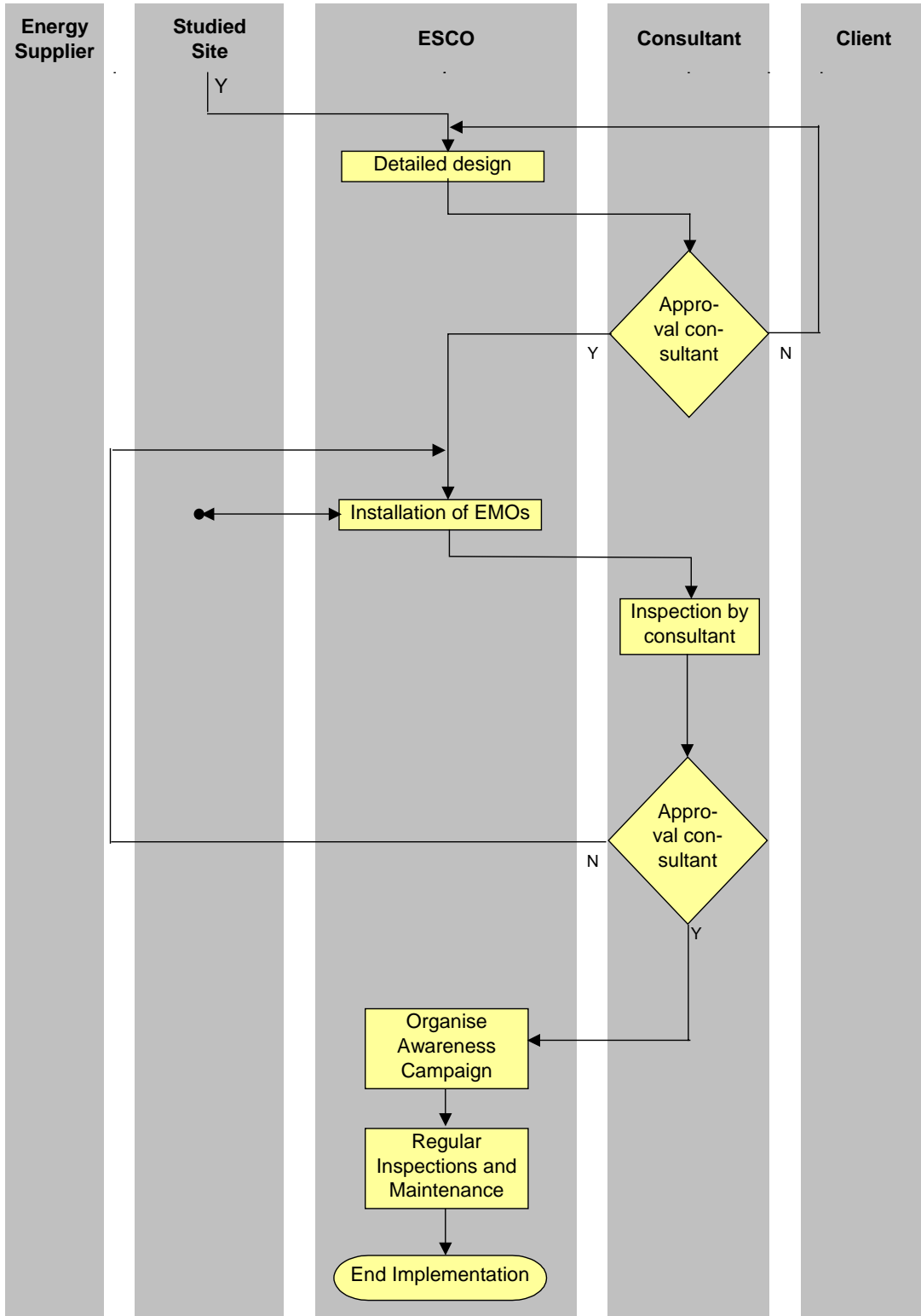
Once approved, energy saving strategies need to be physically implemented. It is important to standardise this process in order to make sure that all additions and modifications to installations or buildings are done according to all applicable standards. If the process of Implementation is not done using this standardised method, problems may occur during the handover of the installation. The work will have to be redone or revised which always costs extra money. As financial resources are always limited because they have to be recovered through the energy savings, it is essential to follow the instructions in this document.

Besides the technical modifications and additions to existing installations, this document also aims to change wasteful behaviour. Through mandatory Energy Awareness Campaigns personnel on-site will be involved and rewarded in order to achieve a more energy efficient working environment.

2 Flow Chart for Implementation

The following Flow Chart summarises the process of Implementation as described in more detail in this document.





3 Client approval

Before any EMO can be implemented, all parties have to agree on the proposed strategy. In the Auditing document it has already been mentioned that the Consultant and the ESCO must agree on the proposed energy management opportunities as described in the Detailed Audit.

The next step is to get written approval from the Client, which will be requested by the Consultant.

Once the Client has approved the proposed EMOs, site management (mainly the Maintenance Department) need to be informed. Usually a meeting or presentation on-site will be sufficient. In that meeting or presentation it should be clear to all parties what modifications or additions will take place in the installations. Also the consequences for personnel will have to be discussed. A verbal approval should be sufficient, but if the ESCO prefers a written approval, it must prepare a document for all parties to accept. The third reason for a meeting is to inform site personnel that works will be carried out on their premises.

4 Standards and Procedures for Implementation

4.1 General

4.1.1 Organisation and Staff of the ESCO

The ESCO needs to employ sufficient staff and resources to enable the competent design and installation of the EMOs. This would include experienced engineers, drawing personnel, administrators, artisans and labourers.

The engineering and management staff of the ESCO must be capable of providing the following services:

- Conducting preliminary and detailed energy audits on the facility and establishing viable EMOs
- Presentation of these initiatives to the Consultant, Client and User Departments to obtain their approval and resolve any queries
- Programming of the works in agreement with the Consultant, Client and User Department
- Directing the ESCO's employees or sub-contractors to ensure efficient, timely and safe execution of the work and co-operation with existing site personnel and other trades to ensure such execution
- Selection and engineering of equipment and components into working assemblies in conformance with the design intent
- Submission of equipment selections and installation drawings to the Consultant for their approval prior ordering or commencing any work
- Expediting the work
- Attendance of any progress meetings and programme monitoring meetings which may be arranged by the Client or Consultant
- Preparation and submission of testing, balancing and commissioning procedures

4.1.2 Contract Management and Programming

All activities, approvals, etc., must be managed by the ESCO's officially appointed project engineer.

The project engineer must prepare a detailed programme for the works including the following activities:

- Preliminary audit
- Detailed Audit
- Presentation of Detailed Audit and proposed EMOs
- Detailed design of the EMOs
- Drawing and equipment submissions to the Consultant
- Procurement and off-site manufacturing
- Installation on site
- Testing and commissioning procedures submission to the Consultant
- Testing and commissioning of the works

The project engineer must, throughout the progress of the work, amend and update the programme to incorporate all variations, delays and remedial action taken to ensure the completion date is met.

4.1.3 Drawing and Equipment Submissions

The ESCO must prepare installation drawings for each of the approved EMOs.

- The drawings must indicate all equipment and distribution systems to be installed by the ESCO and indicate how these interface with the existing equipment and systems already installed on site.
- The installation drawings must also indicate other services, equipment and structure in the vicinity of the new installation to ensure that there are no clashes and that services are properly co-ordinated.
- Two copies of all installation drawings must be submitted to the Consultant for its approval and their approval must be obtained prior to commencing the installation. The consultant will retain one copy and will stamp and return the other copy to the ESCO.
- On completion of the works, the ESCO must prepare “As Built” drawings embodying all modifications made during construction.
- Two copies of all “As Built” drawings must be submitted to the Consultant for its approval. The Consultant will retain one copy and will stamp and return the other copy to the ESCO.
- The ESCO must submit to the Consultant details of all the equipment they intend to install as part of the EMOs. No equipment must be installed until the Consultant has had an opportunity to review and approve the proposed equipment.

The Consultant may, from time to time, request samples from the ESCO. These samples will be physical examples to illustrate materials, equipment or workmanship and to establish standards by which the work may be judged. After approval, the Consultant may retain such samples for a period of time sufficient to ascertain that the relevant component has actually been installed as per the sample. The sample will then be returned to the ESCO for incorporation into the works.

4.2 DPW Standards

As the implementation of EMOs takes place in buildings that fall under the maintenance supervision of DPW, EMOs have to be implemented in accordance with DPW standards.

An update can be found on the internet: www.publicworks.gov.za/docs.

The following standards, at time of writing, should be consulted:

- STS 1: Air Conditioning And Ventilating Installations: Issue XI, 1998
- STS 2: Refrigeration Services: Issue VIII, 1998
- STS 3: Steam Boiler Installations: Issue VII, 1997
- STS 4: Central Heating Installation: Issue XI, 1999
- STS 5: The Standard Specification For Electrical Installations And Equipment Pertaining To Mechanical Services: Issue IX, December 1998
- STS 7: Technical Specification For Zone Alarms For A Sprinkler Fire Extinguishing System: FPO/82/2E: January 1999
- STS 18: Manual For Electrical/ Electronic/Mechanical Consulting Engineers: September 2003.

5 Inspections and Maintenance

5.1 Inspections

In order to strive continuously to obtain maximum Energy Savings, the ESCO will have to inspect all installed equipment on site regularly to see if it is still working well. The frequency of the inspections is dependent on the type of work involved. Also the likelihood of equipment failure influences the frequency of the inspections.

5.1.1 Monthly Inspections

Installations that have a big impact on the energy savings are easy to inspect and need to run or be standby 24 hours a day.

Examples of these installations are:

- Power Factor Correction
- Maximum Demand Controller
- Variable Speed Drives

5.1.2 6-Monthly Inspections

Installations that have no great risk of failing but are running continuously, require only two inspections per annum.

Examples of these installations are:

- Timers
- Cleaning of heat exchangers and air filters
- Air conditioning set points
- Lighting inspections

5.1.3 Annual Inspections

Major inspections that require a thorough walkthrough, and therefore take a long time, will only be inspected annually.

Examples of these installations are:

- Load switches of Demand Side Management installation
- Air leak inspections

5.2 Maintenance

Whenever faults are picked up during the inspections, they will need to be fixed.

A good relationship has to be built up between the Maintenance Department (on site) and the ESCO. Faults should be reported as soon as possible by the Maintenance Department on site, which only happens if there is good understanding between those parties. The Maintenance Department on site should only temporarily solve the problem; the ESCO will fix it properly.

Maintenance is, by contract, restricted to installations put in place by the ESCO. Existing equipment, especially if it has a big impact on the energy consumption, however, needs to be maintained as well.

If the Client does not maintain existing equipment properly, the ESCO can operate as a contractor. The ESCO will first propose and quote the required repairs and/or materials and submit this proposal to the Consultant. The Consultant will discuss the proposal with the Client; and only if all parties agree, can the ESCO then replace or service the equipment.

5.3 Progress Evaluation

Every 3 months the ESCO, the Consultant and the Client have a Progress Meeting to evaluate and inform each other.

The ESCO will prepare a Progress Report, including the following points:

- Inspections carried out and any findings that may be of concern
- Maintenance carried out
- Concerns on site behaviour, e.g. personnel not co-operating or energy consumption profile that is not in line with predictions
- An overview of achieved energy savings

6 Reference Awareness Campaign

Energy awareness is not yet fully developed in South Africa, compared to other countries. The main reason for this is cheap energy prices, which do not give people the incentive to change their consumption behaviour. If, on top of that, the user does not pay for the energy, people tend to care even less about energy consumption, with consequent wastage.

The ESCO will organise an Energy Awareness Campaign every year, which should coincide with National Energy Efficiency Month as launched by Department of Minerals and Energy. The ESCO will prepare all savings figures (including CO₂ emission reductions) that were achieved in the past year, including the EMOs implemented, and present this information to site personnel. Besides the achieved savings through EMOs, the ESCO should prepare a customised list of behaviour changes required on site to achieve maximum energy efficiency.

A short-list of behaviour changes is given below. The list is not exhaustive since all sites are different as are the behavioural patterns.

- Show location of light switches and the groups they switch.
- Instruct how to turn the air conditioning off.
- Instruct how to activate power saving features on computers.
- Make personnel aware that they should report leaking hot water taps to maintenance department.
- Instruct personnel at laundries to use lowest temperature possible.
- Instruct personnel at laundries to fill up washing machines and tumble driers, as it results in lower water consumption and therefore lower energy consumption.
- Instruct cleaning personnel to use a broom instead of water. If, from a hygiene point of view water needs to be used, use cold water instead of hot water.
- Instruct personnel in kitchens to fill up dishwashers, as it results in lower water consumption and therefore lower energy consumption.
- Instruct personnel in workshops that use compressed air to report leaking connections to the maintenance department.
- Instruct maintenance department to report all energy related maintenance problems to the ESCO, especially when no funds are available to effect repairs.

An awareness presentation should be held for all personnel on site, not just the managers. If the ESCO lacks the capacity to give the presentation (i.e. workshop), it must request the Department of Minerals and Energy to organise one. All costs involved will be for the ESCO, as awareness is also an EMO.

Appointing a person within the building/site as 'energy manager' has been introduced overseas. The User Department must appoint a person, or add to a job description of an existing employee, to gather energy saving tips from other personnel. These tips are sent to the ESCO 2 months prior to the National Energy Efficiency Month and will be reviewed by the ESCO. The ESCO will judge the best tip on achievable energy reduction and will reward the winner during the presentation.

Publication in internal company newsletters (if available) of new EMOs and the winner of best energy saving tip is a recommended strategy for constantly raising awareness of energy savings. The ESCO must investigate whom to contact for placement of an editorial in the internal company newsletter and must submit the article with consent of the Client.

7 Quality Assurance

In order to guarantee Quality Assurance for the Implementation phase, the task of the Consultant is important. The ESCO automatically is forced to implement quality equipment, otherwise the guaranteed energy savings are not generated and thus the ESCO will have to pay in.

The tasks of the Consultant with regard to Implementation consist of the following:

- Approval and recommendation to Client of viable EMOs.
- Approval and recommendation to Client of detailed design of EMOs.
- Inspection and approval of installed EMOs.
- Verify that installation is in line with DPW and SABS standards.
- Approve built-as drawings.
- Organise and minute quarterly Progress Meetings with Client and ESCO