

# **An Overview of Energy Management System (ISO 50001) with Its Implementation Plan**

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## **Introduction**

ISO 50001 specifies requirements for establishing, implementing, maintaining and improving an energy management system, whose purpose is to enable an organization to follow a systematic approach in achieving continual improvement of energy performance, including energy efficiency, energy use and consumption.

Energy Management System (EnMS) Plan can be developed by an organization in line with ISO 50001 Standard: Energy Management System.

The primary objective of this EnMS Plan will be to identify the significant energy users and to optimize the energy consumption within the organization. The following Goals can be targeted by developing an EnMS Plan by any organization:

- ✓ Maximize fiscal resources through direct and indirect energy savings.
- ✓ To comply with applicable in-house, National and International HSE Regulations/ Systems
- ✓ Reduce the environmental impact of any operations.
- ✓ Increase the comfort and safety of employees and all concerned of the organization.
- ✓ Improve the reliability of equipment and reduce maintenance.
- ✓ Provide the guidance and leadership necessary for the adoption of a culture of sustainability.

## Purpose & Scope

The purpose of this EnMS Plan is to optimize the energy uses in an organization by implementing the Energy Management System as per the ISO 50001 Standard:

EnMS Plan can be developed to formalize any energy management programs in line with organization's existing procedures and in a strategic manner allowing for the proactive pursuit of optimal energy solutions that will lead to environmental, societal and economic benefits. This plan can be implemented over all operations, facilities, services etc.

## Energy Management System (EnMS) function model

Energy Management System (EnMS) function model describes the overall two way (expectation and deliverable) process flow from Energy Champion to employees. It is specially designed for any organization for its effective EnMS Plan implementation purpose. Please see the Diagram No: 1 for more details.

## Definitions

Continual improvement: Recurring process which results in enhancement of energy performance and the energy management system

Energy: Electricity, fuels, steam, heat, compressed air, renewables and other like media

Energy baseline: Quantitative reference providing a basis for comparison of energy performance

Energy champion: Energy champion is the overall responsible party to implement and maintain the Energy Management System (EnMS) in an organization.

Preferably an organization's top management representative will be its Energy Champion.

Energy consumption: Quantity of energy applied

Energy Council: It is an energy management forum at any departmental level. Head of the Energy council will be the concerned departmental manager and members will be supervisors of that department.

Energy efficiency: Ratio or other quantitative relationship between an output of performance, service, goods or energy, and an input of energy

Energy Management Committee: The Committee consists of Top Management representative from the organization, its departmental wise management representatives and the Energy Management Focal Point.

Energy Management Focal Point: Focal point is an overall responsible for communication and technical support within the various departments in an organization related to EnMS Plan.

Energy Management Representative (EnMR): EnMR is an overall responsible to provide necessary support for effective implementation of EnMS Plan in an organization.

Energy Management System (EnMS): Set of interrelated or interacting elements to establish an energy policy and energy objectives, and processes and procedures to achieve those objectives.

Energy services: Activities and their results related to the provision and/or use of energy

Significant energy use: Energy use accounting for substantial energy consumption and/or offering considerable potential for energy performance improvement

*Note: Other standard definitions shall be taken from the ISO 50001 Standard*

## **Organization structure for the Energy Management System**

Two levels of committees shall work for implementation of Energy Management System Plan. These committees can be Energy Management Committee and other one is Energy Council. Energy Management Committee shall be headed by Organization's top management representative, all departmental managers as members and departmental HSE head as Energy Management Focal Point. All approvals related Energy Management System plan shall be taken in this Committee.

Energy Council, is a departmental level committee headed by respective departmental manager and supervisors as its members. This committee shall look after all EnMS Plan matters at departmental level. Please see the Diagram No: 2 for more details.

**Diagram No: 1 – Energy Management System (EnMS) function model**

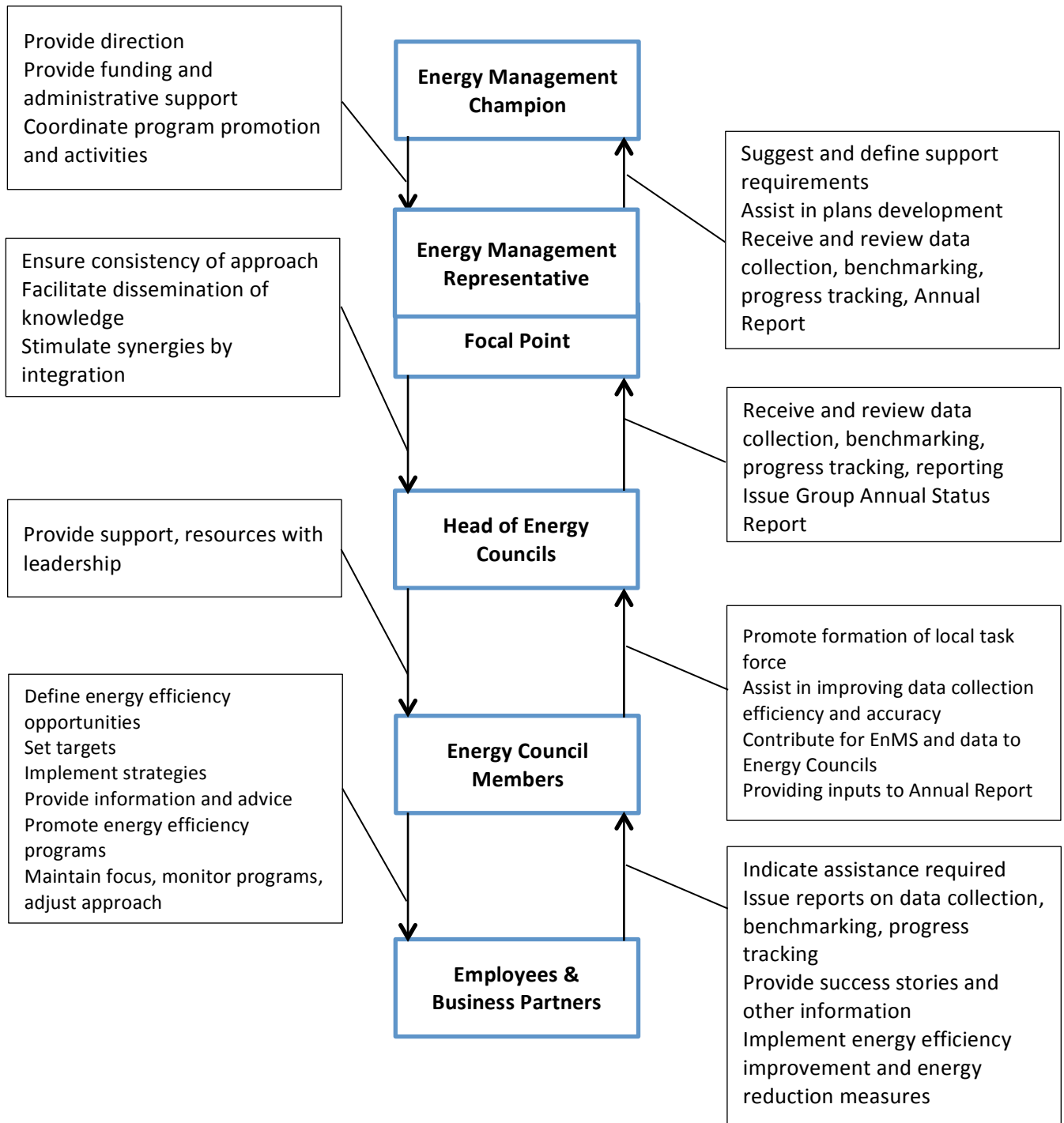
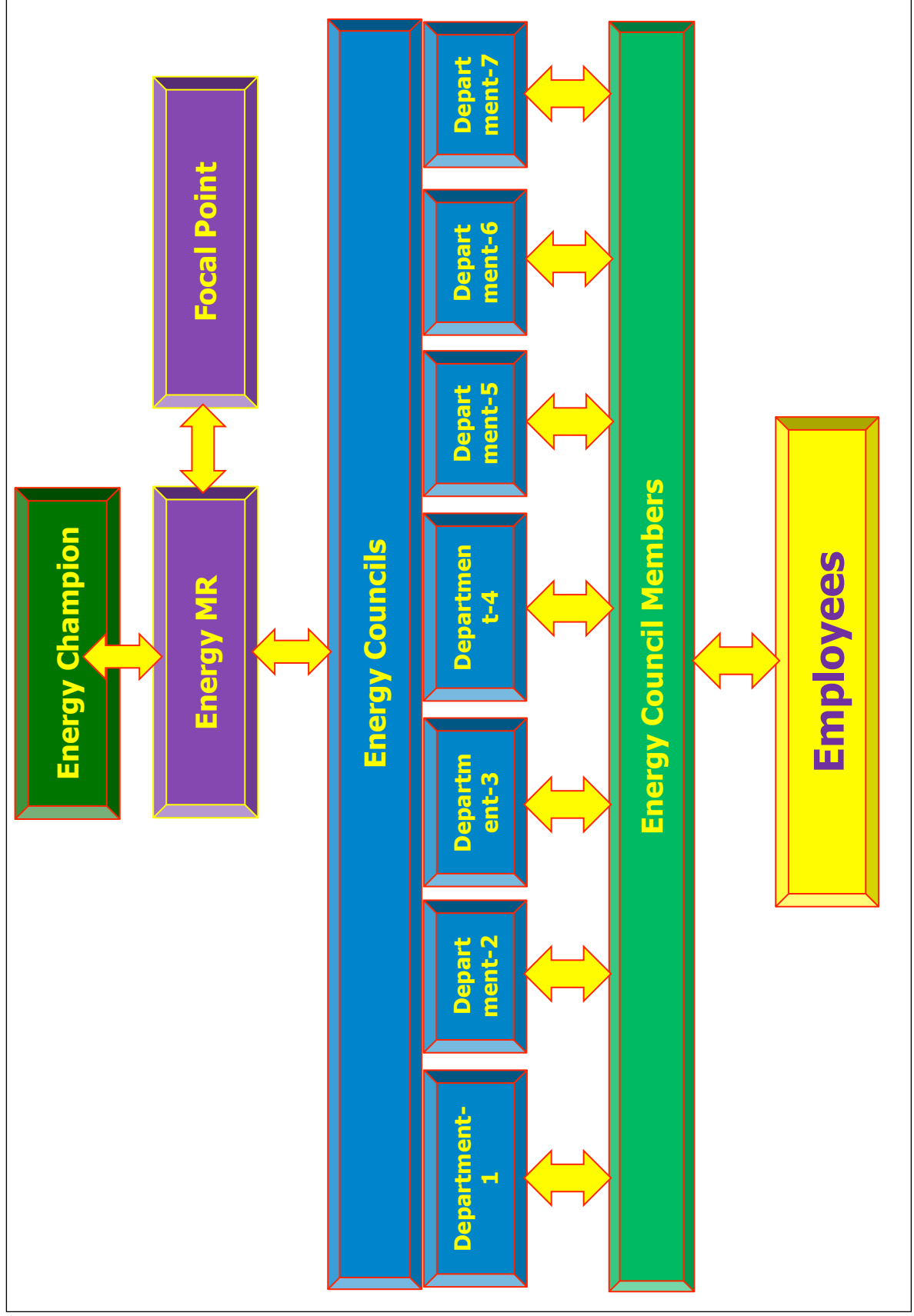


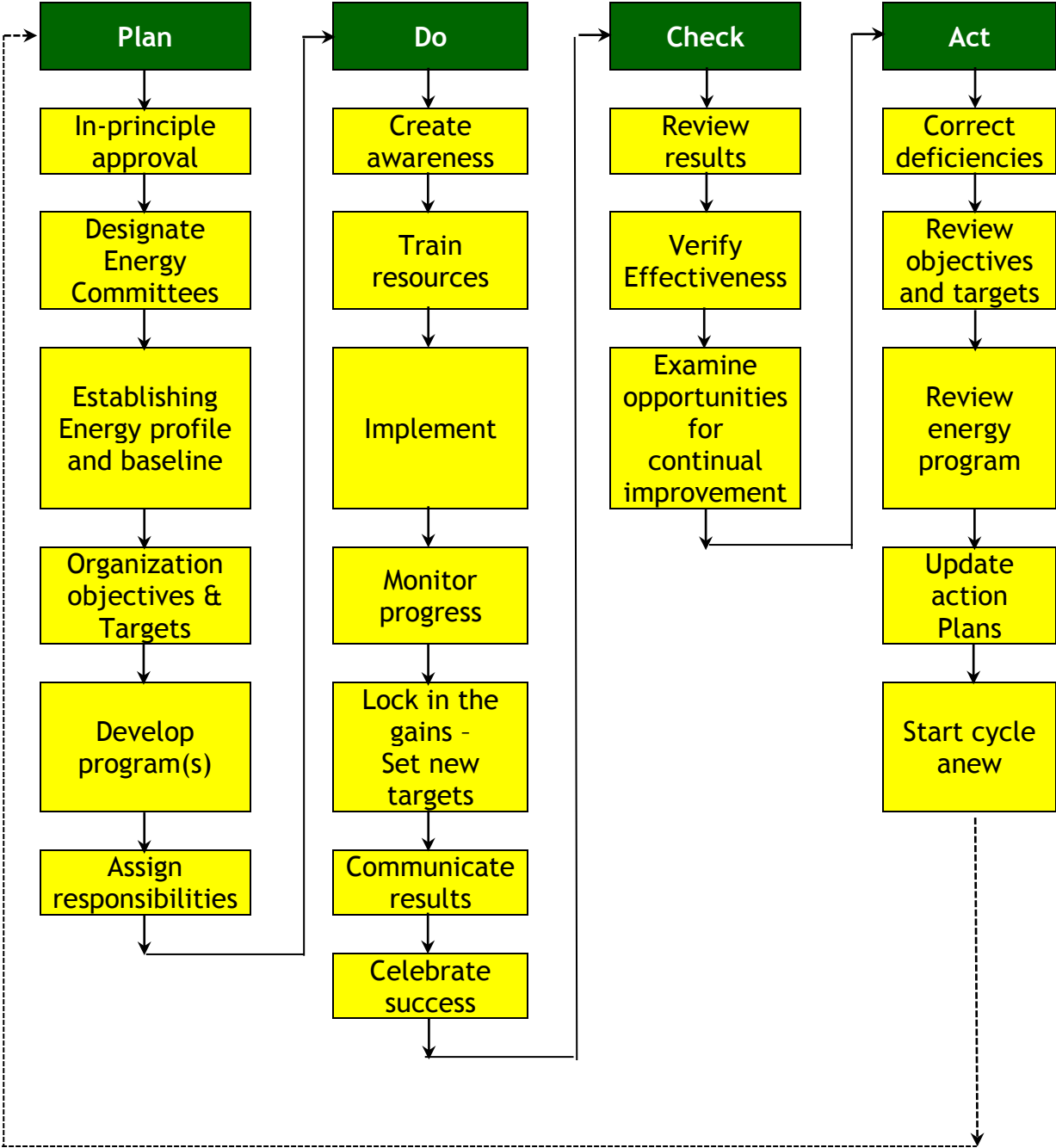
Diagram No: 2 - Organization structure for Energy Management System (EnMS)



# Outlines of Energy Management System plan

The Diagram No.3 briefs on key steps involved in EnMS plan in-line ISO 50001 Standard.

**Diagram No: 3 - Outlines of Energy Management System plan**



# Key Roles & Responsibilities of EnMS Organization

## Energy Champion

1. To ensure the implementation of the Energy Management Plan in the organization.
2. To communicate the Energy Management Message and its plan across the organization and visibly demonstrate commitment to Energy Management
3. Accountable for the implementation of the Energy Management Plan in the organization.
4. Achieving the Energy Management Plan objectives and targets within the organization.
5. Delegating the responsibilities related to Energy Management Plan to relevant levels of management in the organization.
6. Implementation of Energy Management Plan requirements within the organization.
7. Ensuring the new projects/ equipment/facilities are inbuilt with effective energy management systems
8. Ensuring the existing projects/ equipment/ facilities are upgraded with effective energy management tools as applicable
9. Provision of necessary resources and personnel for the effective implementation of the Energy Management Plan within the organization
10. Ensuring an effective Energy Management Plan review process is in place within the Organization

## Management Representative

1. To support the Energy Councils (Departmental Managers) for the implementation of Energy Management Plan, as relevant and applicable, within the Organization
2. To communicate the Energy Management Plan across the departments and visibly demonstrate commitment to Energy Management Plan
3. Supporting Energy Councils (Departmental Managers) in establishing Energy Management Plan performance measures for the respective departments
4. Providing guidance and support for the implementation of all Energy Management Plan requirements within departments.
5. Carrying out review of HSE documents during the project's concept, design, and construction and commissioning phases for incorporation of Energy Management.
6. Ensuring awareness and training programs on Energy Management System are in place for all employees within the departments.
7. Ensure that on-site Energy audit and assessment are being done within the-departments
8. Maintain communication and co-ordination across various departments within the organization to share knowledge, good practices and lessons learnt
9. Organize and update the EnMS Plan status in Management review meetings

## Head of Energy Council (Department Manager)

1. To support the Energy Champion in the implementation of Energy Management Plan and achieve its requirements.
2. To communicate the Energy Management Plan across the department and visibly demonstrate commitment to it.
3. Accountable for the implementation of Energy Management Plan in the-department.
4. Monitoring the Energy Management Plan performance measures of the department to achieve the set targets
5. Ensuring the adequacy of resources and competent personnel to implement Energy Management Plan within the department.
6. Ensuring all phases of the projects (i.e. concept, design, construction and commissioning phases) for incorporation of Energy Management.

7. Provide the necessary energy data or inputs to Management Representative for Energy Management Plan
8. Ensuring compliance with all applicable HSE legal and other obligatory requirements within the department.
9. Maintaining appropriate data management system for Energy Management Plan within the department
10. Facilitating, participation and full cooperation for Energy Assessments/ Audits
11. Conducting Management review within the department

#### Energy Management Focal Point (Departmental HSE Head)

1. To support the Energy Councils (Departmental Managers) for the implementation of Energy Management Plan
2. To communicate the Energy Management Plan across the department through Management Representative
3. Accountable for the implementation of Energy Management Plan applicable requirements across the department.
4. To support Management Representative and Energy Councils in establishing Energy Management Plan performance measures for the respective departments.
5. Providing guidance and support for the implementation of all Energy Management Plan requirements within the departments.
6. Ensuring all employees within the team have the required skills & training to competently perform tasks in Energy Management Plan effectively
7. Carrying out review of HSE documents during the project's concept, design, and construction and commissioning phases for incorporation of Energy Management.
8. Ensuring awareness and training programs on Energy Management System are in place for all employees within the departments.
9. Carrying out on-site Energy audit and assessment within the departments.
10. Maintain communication and co-ordination with various departments to share knowledge, good practices and lessons learnt
11. Participating in Management review meetings

#### Energy Council Members (Departmental Supervisor)

1. To support the Energy Council (Departmental Manager) for the implementation of Energy Management Plan as applicable and achieve with the department's set targets of Energy Management.
2. To communicate the Energy Management Plan across the team and visibly demonstrate commitment
3. Accountable for the implementation of all applicable Energy Management Plan requirements in the Team
4. Achieving the set Energy Management targets and deliverables of the Team
5. Ensuring all employees within the Team have the required skills & training to competently perform tasks related to Energy Management
6. Ensuring all phases of the projects (i.e. concept, design, construction and commissioning phases) for incorporation of Energy Management.
7. Provide the necessary energy data or inputs to Energy Council (departmental Manager) for Energy Management Plan
8. Ensuring compliance with all applicable HSE legal and other obligatory requirements within the Team
9. Maintaining appropriate data management system for Energy Management Plan within the department.
10. Facilitating, participation and full cooperation for Energy inspections/ Assessments/ Audits
11. Conducting Management Committee review meeting for the Team



### Employees

1. To carry out assigned work activities to the highest level of HSE performance
2. To maintain a culture of HSE awareness and personal responsibility for the health and safety of the workforce and protection of the environment
3. Accountable for the implementation of all applicable Energy Management Plan requirements for the work being done
4. Be familiar with the Energy Management Plan and continual improvement of its performance
5. Maintain access to systems and procedures that relate to Energy Management
6. Follow appropriate HSE policies, procedures, and work instructions at all times
7. Participate in Energy Assessments/ Audits
8. Communicate the best Energy Management Practices if any to the immediate supervisor
9. Report the adverse Energy Management practices or conditions to the direct supervisor

### Business Partners

1. To carry out work activities as per the contract requirements in-line with the clients HSE Management System
2. To maintain a culture of HSE awareness and personal responsibility for the health and safety of the workforce and protection of the environment
3. Accountable for the implementation of all applicable HSE Management System requirements for all work being done in the contract
4. Comply with contractual requirements with regard to Energy Management
5. Maintain access to HSE processes and procedures that relate to their work area and job function
6. Follow appropriate HSE policies, procedures, and work instructions at all times
7. Participate in Energy Assessments/ Audits conducted by the client.
8. Communicate the best Energy Management Practices if any to the client project representative.
9. Report the adverse Energy Management practices or conditions to the client project representative
10. Adhere to the contractor company's own HSE Management System, policies and procedures, as well as those of client.
11. Maintain appropriate knowledge and skills to perform work activities in a safe and Professional manner while implementing the Energy Management Plan
12. Shall obtain the approval of the client prior to implement any new initiative or technology with regards Energy Management
13. Keep records of all types of Energy consumption by their activities and pass these records to client on a monthly basis.
14. Conduct self-audit related to Energy Management to check status of Energy Management Plan, client HSE MS procedures and guidelines implementation.
15. Promptly report to client project representative about abnormal quantity of energy consumption
16. Seek specialist advice from client HSE Team on the Energy Management in case of any doubt.

## **Detailed Energy Management Plan**

Upon in-principle approval by Management, the Energy Council in co-ordination with Energy Directorate Management Representative will establish energy planning that would address the following:

### Energy Profile

The purpose of developing an energy profile is to understand the areas of significant energy consumption, i.e. the buildings, equipment and processes which account for the greatest energy use or which offer the

most potential for energy savings and the drivers for this energy consumption. The drivers can be areas such as production volumes, weather, occupancy, floor area, etc.

The identification of the energy profile is critical in understanding where energy is used within the organization and forms the basis for prioritizing the efforts to reduce energy consumption.

In line with ISO 50001 the following would be considered during establishing the energy profile of the organization:

1. *Analyze energy use based on measurement and other data*
  - How much energy the organization is consuming and its trends, changes, anomalies, etc.
  - Estimate how much energy will be consumed in the coming period, typically the next financial budget period.
  - Examine where energy is currently being sourced which will typically be a local utility company and examine other potential sources including e.g. internal waste heat.
2. *Based on energy use analysis, identify the areas of significant energy use*
  - Where the energy is being used significantly.
  - What is driving the energy use?
  - Which people have significant impact on energy use and identifies their relevant training needs.
3. *Identify and prioritize opportunities for improving energy performance, including use of renewable or alternative energy sources, where applicable.*
  - Identify energy reduction opportunities by a variety of means, e.g. analysis of the data from (a) and (b) above, energy audits and studies, examination of Energy Performance Indicators, energy housekeeping checks, etc. If no opportunities are found for significant energy users, it might be advisable to conduct a focused examination of that user.
  - Prioritize the known opportunities based on the departmental normal work and investment prioritization criteria.
  - It may be relevant to examine the technical and financial costs and benefits of renewable or alternative energy sources such as biomass, solar, wind, co-generation, etc.

In order to establish the Energy Profile of various departments the following need to be considered:

- Develop a mechanism to measure the energy uses in different offices/ equipment/ operations etc.
- Installing Energy Meter to record the consumption of energy in offices and other areas used by various departments.

More details on Energy Planning Process and Energy Management System implementation Plan can be viewed from the below given diagram Nos: 4 & 5.

### Energy Baseline

Keeping in view the seasonal variation and massive expansion of organization's business in near future, it is recommended to have at least one year energy data to generate the profile. The initial profile (energy baseline) serves as the starting point against which future improvements are measured.

Energy baseline data collection will begin upon installation of energy consumption recording devices/mechanism.

### Energy Performance Indicators (EnPIs)

Based on the energy profile and baseline data gathered for almost one year, EnPIs for different departments would be established. EnPIs are a quantitative index of energy performance as defined by the organization. The concept of an EnPI can be used to compare organizational performance at different points in time. They should be selected to facilitate monitoring of performance especially in the significant energy uses identified in energy profiling. All established EnPIs shall be reviewed quarterly in HSE performance meeting.

### Legal and Other Requirements

Energy Council of in co-ordination with Energy management Representative will identify the applicable legal requirements and other requirements to which the organization subscribes related to its energy use.

Example of legal requirements may include:

- National and international legal requirements

Examples of other requirements to which the organization may subscribe include, if applicable:

- Emissions trading requirements
- Agreements with customers
- Non-regulatory guidelines
- Voluntary principles or codes of practice
- Voluntary energy agreements
- Requirements of trade associations
- Agreements with community groups or non-governmental organizations
- Public commitments of the organization or its parent organization
- Corporate/company requirements

Energy Counsel should prepare and maintain a list of the pertinent energy legislation and other requirements, which affect the organizations activities, products or services in terms of energy management.

### Proposed Targets

The Energy Council shall establish, implement and maintain documented energy objectives and targets at the relevant functions, levels, processes or facilities within the department. The energy objectives and target(s) shall be measurable and a time frame set for achievement. The objectives and targets shall be consistent with the energy policy, including commitments to improvement in energy performance and to comply with applicable legal obligations and other applicable requirements.

In the process of selecting objectives, targets and action plans, the Energy council of organizations will consider:

1. Its financial criteria and priorities
2. Alternative energy resources
3. Maintenance and infrastructure needs
4. Operational requirements and constraints
5. Quality and appropriateness of energy resources
6. Environmental impacts
7. Safety and health issues
8. Available human and technical resources and

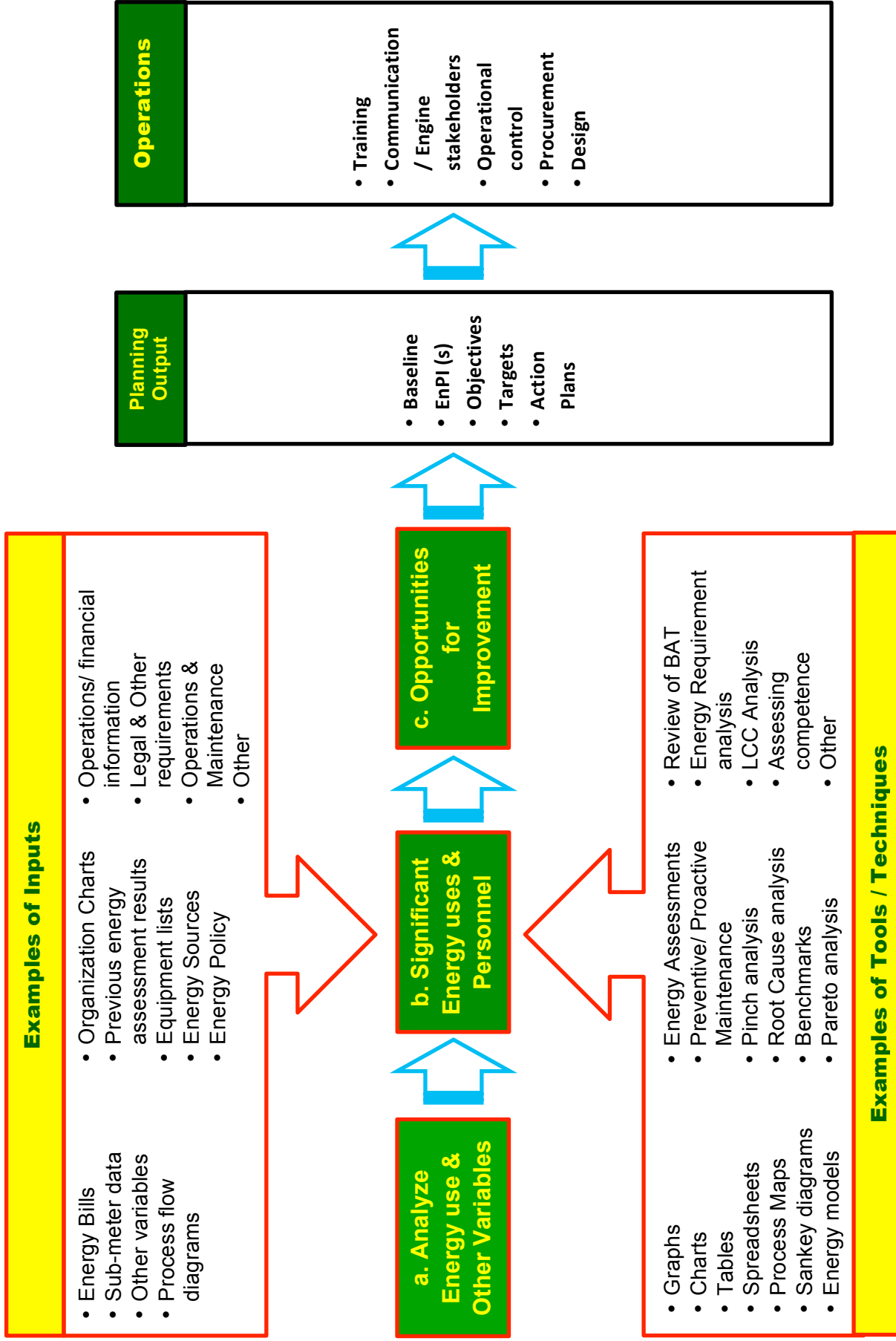
9. Ability to measure improvement in energy performance
10. Its energy profile including areas of significant use and drivers

The Energy Management Action plans should include an appropriate level of verification of savings achieved. In the case of significant savings this should include:

- Energy use prior to implementation
- Planned savings and benefits
- Means of verifying savings which may range from simple estimates and calculations to the use of standard measurement and verification techniques
- Actual implementation costs and where appropriate life-cycle costs
- Level of analysis should be commensurate with the scale of the improvement opportunity

Energy action plans should be documented and reviewed regularly to ensure they are up to date and relevant.

Diagram No: 4 - Energy Planning Process Concept Diagram





## **Energy Management System Awareness Program**

Management Representative with respect to Energy Management System will develop the Awareness Schedule for all departments and implement it. These awareness sessions can be planned based on the no. of employees in a department.

Subsequently all departments should develop the resources to provide the EnMS Awareness sessions continuously for effective implementation within the departments.

## **Implementation of Energy Management System Plan**

### General

As mentioned in Diagram No: 5 - Energy Management System implantation plan, all the phases of implementation will be carried out. If any change/ deviation to the above mentioned plan, it is mandatory to get prior approval from Energy Champion for the change before its implementation.

During EnMS implantation, it is advised to refer the above mentioned Diagram No: 5 - Energy Planning Process Concept Diagram for effective implementation.

### Training and Awareness

All the departments across the organization should develop the human resources with necessary trainings or awareness for effective implementation and monitoring of EnMS Plan. All departments should have certified or trained Energy Auditors (i.e. trained on ISO 50001 Standard).

Energy Management System awareness programs should be developed at departmental level and Business Partners mainly those are working on significant energy uses. These sessions should have minimum the following elements:

- Organization's Energy Message
- Significant Energy uses
- Roles and Responsibilities
- Benefits of Improved Energy performance
- Significant Energy uses management program includes targets, control measures etc.

### Documentation

The Departmental HSE Team shall develop the criteria to develop for Energy Uses Register (EUR) and EUR Management program in-line with existing HSE MS Procedures and ISO-50001 standard. Upon approval of these criteria by Energy Champion, all departments shall comply with it & develop their respective departmental Energy Uses Register and EUR Management Program in coordination with the departmental HSE Team.

### Design

Departments shall develop the mechanism for energy performance improvement opportunities to incorporate in the design of new, modified and renovated facilities, equipment, systems, process that can have a significant impact on energy performance.

The results of the energy performance evaluation shall be incorporated into the specification, design and procurement activities of the relevant project.

### Procurement of energy services, products, equipment and energy

When procuring energy services, products and equipment that have or may have an impact on significant energy use, Energy Council or Superintendent of Contract shall inform suppliers that procurement is partly evaluated on the basis of energy performance.

Energy Council or Superintendent of Contract shall define the criteria in coordination with departmental HSE Team for assessing energy use over the planned or expected operating lifetime of energy using products, equipment and services which are expected to have a significant effect on the organization's energy performance.

Departmental HSE team shall define energy purchasing/contract specifications as applicable for effective energy performance and upon Energy Champion approval; it shall be communicated to concern.

## **Checking Performance**

Departments shall update their respective Group Energy Performance Indicators (EnPIs) and Energy Significant Users (ESU) Management Program on monthly and quarterly basis respectively to department HSE Team. Department HSE Team shall compile this information for concerned department for further review process.

Department HSE Team shall develop or modify the existing Assessments/ audit criteria with Energy Management System program. Also Team shall compile all Audit findings and status for department level to review with Management.

## **Management Review**

All the inputs from checking performance section i.e. EnPIs, ESU Management Programs updates and Audits status and other relevant programs shall be reviewed on monthly basis in management forum.

Outcome of Management review shall be considered as required to update or modify the Energy Management System Plan or its relevant documents for effective implementation purpose.

## **Third party Certification for ISO 50001 Standard**

Upon implementation of Energy Management System (EnMS) Plan in the organization, Energy Management Committee will decide to go for EnMS Certification as per International Standard (i.e. ISO 50001 Standard).

## **Records Retention**

All records generated by this plan shall comply with relevant procedure requirements.

## **Path Forward**

Upon in-principle approval by Management, the EnMS Plan will be implemented as per the schedule given in diagram no: 5.



## **Abbreviations**

BAT – Best Available Technologies

BSC – Balance Score Card

DIS - Draft International Standard

EnMS – Energy Management System

EnPI - Energy Performance Indicator

EUS - Energy Significant Uses

HSE – Health, Safety and Environment

HSEMS – Health, Safety and Environment Management System

ISO - International Organization for Standardization

LCC – Life Cycle Cost

## **Reference Standards/ Procedures/ Documents**

ISO 50001 Standard