

Energy Management & Audit

Lesson Objectives

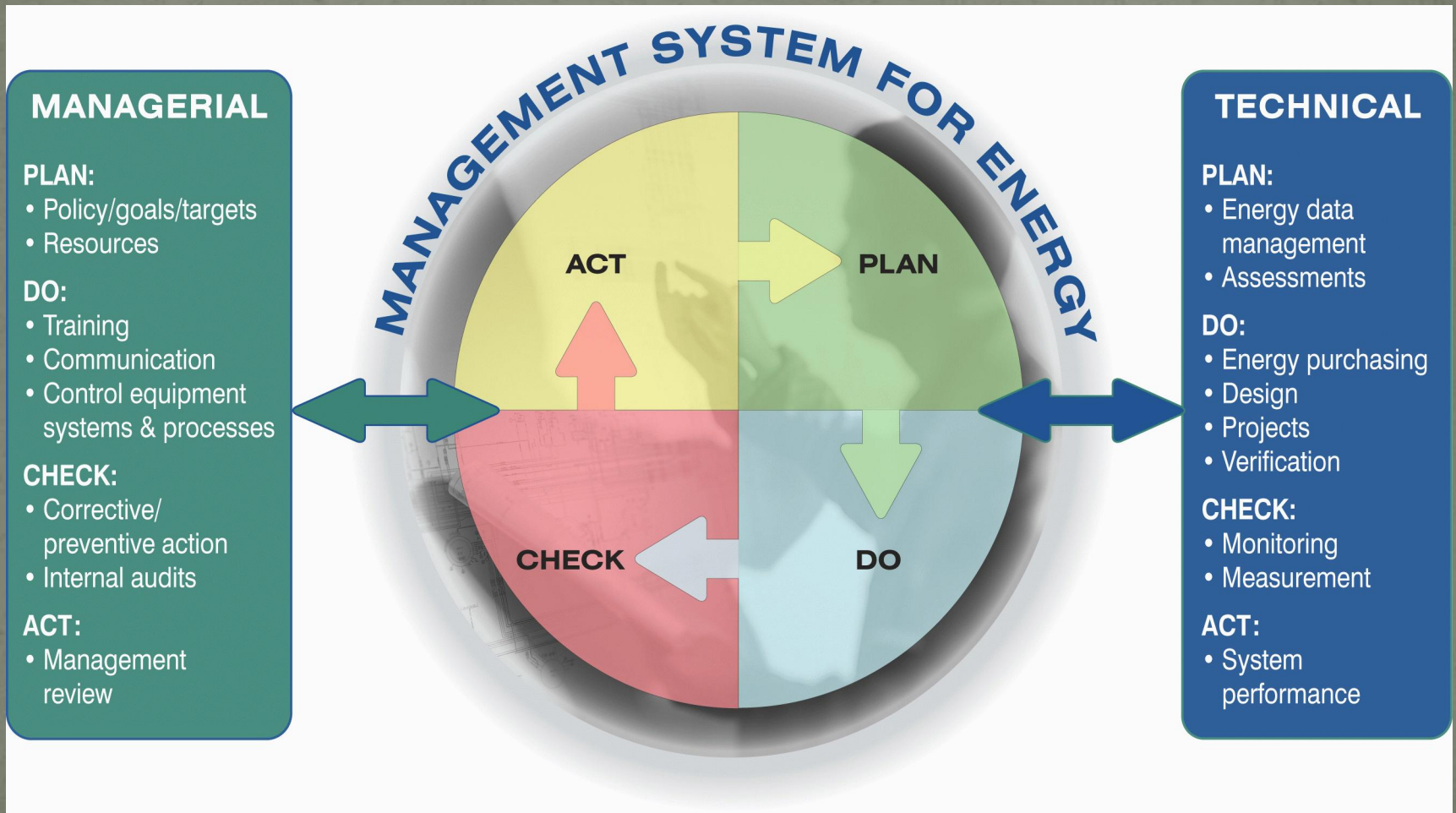
After completing this lesson, you will be able to describe the followings.

- Definition of Energy Management and Audit
- Need of Energy management and Audit
- Types of Energy Audit
- Energy Management Approach
- Energy Cost
- Bench Marking
- Energy Performance
- Energy Audit Instruments and Metering

Definition of Energy Management

- Energy Management is defined as “The strategy of adjusting and optimizing energy, using systems and procedures so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems”.
- The use of energy resources is required to be reduced by managing the utilization of electricity which is termed as energy management.
- It is all about reducing the cost of energy used by an organization.

The Energy Management System



The Objectives of Energy Management

1. To achieve and maintain optimum energy procurement and utilization, throughout the organization.
2. To minimize energy costs / waste without affecting production & quality.
3. To minimize environmental effects.

Energy Management Objectives Clarified

- The basic objective of any Energy Management System is to answer five simple questions:
 - How much energy is consumed
 - How is the energy consumed
 - Where is the energy consumed
 - When is the energy consumed
 - What is the quality of the energy consumed
- In order to address these queries Energy Audits are conducted. Lets understand audits.

Definition of Energy Audit

- **As per Indian Energy Conservation Act 2001, Energy Audit is defined as:**

“the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption .”

Need for Energy Audit

- The three top operating expenses are energy (both electrical and thermal), labour and materials.
- Energy would emerge as a top ranker for cost reduction.
- primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs.
- Energy Audit provides a “ bench-mark” (Reference point) for managing energy in the organization.

Types of Energy Audits

1. Preliminary Energy Audit
2. Targeted Energy Audit
3. Detailed Energy Audit

Preliminary Energy Audit

- Preliminary energy audit uses existing or easily obtained data.
- Establishes the energy consumption in the organization.
- Estimates the scope for saving.
- Identifies the most likely areas for attention.
- Identifies immediate(no cost or low cost) improvements.
- Sets a 'reference point'.
- Identifies areas for more detailed study/measurement.

Targeted Energy Audits

- Targeted energy audits are mostly based upon the outcome of the preliminary audit results.
- They provide data and detailed analysis on specified target projects.
- As an example, an organization may target its lighting system or boiler system or compressed air system with a view to bring about energy savings.
- Targeted audits therefore involve detailed surveys of the target subjects/areas with analysis of the energy flows and costs associated with those targets.

Detailed Energy Audit

- Detailed Energy Audit evaluates all systems and equipment which consume energy and the audit comprises a detailed study on energy savings and costs.
- Detailed Energy Audit is carried out in 3 phases.
 1. The Pre-audit Phase
 2. The Audit Phase
 3. The Post-Audit Phase

The Ten Steps for Detailed Audit

Step No	PLAN OF ACTION	PURPOSE / RESULTS
Step 1	<p><u>Phase I –Pre Audit Phase</u></p> <ul style="list-style-type: none"> ● Plan and organise ● Walk through Audit ● Informal Interview with Energy Manager, Production / Plant Manager 	<ul style="list-style-type: none"> ● Resource planning, Establish/organize a Energy audit team ● Organize Instruments & time frame ● Macro Data collection (suitable to type of industry.) ● Familiarization of process/plant activities ● First hand observation & Assessment of current level operation and practices
Step 2	<ul style="list-style-type: none"> ● Conduct of brief meeting / awareness programme with all divisional heads and persons concerned (2-3 hrs.) 	<ul style="list-style-type: none"> ● Building up cooperation ● Issue questionnaire for each department ● Orientation, awareness creation

Step 3

Phase II – Audit Phase

- Primary data gathering, Process Flow Diagram, & Energy Utility Diagram

- Historic data analysis, Baseline data collection
- Prepare process flow charts
- All service utilities system diagram (Example: Single line power distribution diagram, water, compressed air & steam distribution).
- Design, operating data and schedule of operation
- Annual Energy Bill and energy consumption pattern (Refer manual, log sheet, name plate, interview)

Step 4

- Conduct survey and monitoring

- Measurements :
Motor survey, Insulation, and Lighting survey with portable instruments for collection of more and accurate data. Confirm and compare operating data with design data.

Step10

Phase III –Post Audit phase

- Implementation and Follow-up

Assist and Implement ENCON recommendation measures and Monitor the performance

- Action plan, Schedule for implementation
- Follow-up and periodic review

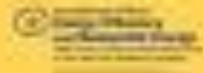
Questions which an Energy Auditor should ask

- What function does this system serve?
- How does this system serve its function?
- What is the energy consumption of this system?
- What are the indications that this system is working properly ?
- If this system is not working, how can it be restored to good working conditions/
- How can the energy cost of this system be reduced?



SAVE NOW OR PAY LATER.

Working to save America's energy and environmental future.



THANK YOU