



ELECTRICAL ENERGY

Essentials

Course Introduction:

Reducing the energy costs at one's facility must surely be one of the most effective and achievable strategies for lowering operating costs. This workshop gives you the practical tools to identify and implement programs and projects to reduce energy consumption in the most effective and practical ways. You will be provided with the skills and latest knowledge on proven methods of making real savings in your energy bills. You can start such programs as soon as you wish, and start saving immediately thereafter.

You will be greatly surprised at the levels of energy losses and poor efficiency of some of the devices in your facility that consume power when the facility is operational and also the energy consumption of your facility when it is not operational. Did you know that a typical microwave oven consumes more electricity power in the digital clock than it does heating food?

Course Objectives:

Upon the successful completion of this course, each participant will be able to:-

- Understand the power system analysis
- Gain knowledge of the generation of electric energy
- Understand the transmission of electrical energy
- Gain through understanding of the energy management systems. Understand the representation of lines and cables

Who Should Attend?

This course is intended for Operators, Engineers, Managers and Supervisors, who work in operation, maintenance, protection, control and safety of any electric equipment.

Course Outline:

MANAGEMENT OVERVIEW OF ENERGY EFFICIENCY

WHAT IS ENERGY EFFICIENCY?

- Energy and environment
- Energy forms and conversion
- Energy sources and energy sinks
- Can we make better use of the energy?
- How do we channel waste energy into useful output?
- Energy audit and principles

CASE STUDIES

- Schools
- Mines
- Factory

BASIC FINANCIALS

- Simple costings and ROI

PRACTICAL EXERCISES

- Examination of your facility
- Simple checklist on doing an energy audit

ENERGY EFFICIENCY IN PROCESSES USING FUEL DIRECTLY

- Improved efficiencies
- Reduction and re-use of heat wastage
- Recovery of exhaust heat from engines
- Energy efficient designs - equipment and buildings
- Cogeneration for better efficiency

ALTERNATIVE ENERGY SOURCES

- Fossil fuels
- Alternatives - renewable energy and hydrogen
- Green energy
- Fuel cells

MAIN FORMS OF ENERGY

- Energy converted to electricity for direct use
- Electricity in metal smelting (electrolytic processes)
- Use of fuels for motive power
- Direct use of fuels for heating applications
- Use of fuels as part of a process
- Example from iron production (reduction process using coal)
- Conversion equipment and challenges

ELECTRICAL ENERGY GENERATION

- Electricity as the preferred energy carrier
- Conversion systems for electrical energy
- Commonly used fuels
- Methods of improving conversion efficiencies
- Better equipment

- Waste energy recovery
- Process improvements
- Cogeneration for better efficiency
- Combined cycle process for gas turbines

ELECTRICAL ENERGY USAGE

- Sectors using the major portion of electricity
- Industrial, domestic, agriculture and agro-processing, mining and metals
- Better efficiencies in electricity usage
- Uses of electricity
- Motive power
- Lighting
- Space heating and cooling
- Better efficiencies in electricity usage

ENERGY EFFICIENT PRACTICES IN ELECTRICITY USE

- High efficiency motors
- Better T&D practices
- Role of power factor
- Motor rating and efficiency correlation
- Variable speed drives as energy-savers
- Lighting efficiency
- Efficient luminaires
- Use of daylight to supplement artificial lighting
- Intelligent buildings to reduce wastage of electricity

ENERGY EFFICIENCY IN CLIMATE CONTROL APPLICATIONS

- Need for climate control
- Industry and comfort examples
- Efficiency in heating
- Reducing heat loss through better design
- Efficiency in cooling
- Building design features to improve cooling
- The paradox of cooling
- Temperature reduction but no energy recovery
- Use of waste heat for cooling
- Comparison between compression refrigeration and absorption chillers
- Examples from industrial applications

ENERGY COST STRUCTURE

- Identifying types of energy used
- Tariff structures
- Components of electric tariffs
- Factors in controlling electric costs
- Electric utility incentive programs
- Electric meters
- Gas rates
- Oil, coal, and other rates
- Steam and hot water rates
- Factors in controlling fuel costs

INTRODUCTION TO ENERGY AUDITS

- Purpose
- Know your process, fuels and major systems
- Compare energy usage
- Energy use index and energy cost index
- Where energy is used in facilities
- Lighting and HVAC energy use
- Data forms for recording information
- Collecting the actual data
- Walk-through inspections
- Assess energy and cost saving opportunities

INSTRUMENTATION FOR AUDITS

- Energy audit instrumentation
- Temperature-measuring instruments
- Combustion efficiency measurement
- Airflow and air leak measurement
- Thermography
- Ultrasonic leak detectors
- Data logging
- Light level meters for checking superfluous lighting
- Electric meters: voltages, current, power, energy and power factor
- Use of software tools in energy audits

AUDIT AREAS

- Building
- HVAC systems

- Motor systems
- Boiler Systems
- Water systems • Lighting
- Heat recovery areas

FINANCIALS AND COSTINGS

- Energy audit reports
- Simple economic measures
- The time value of money
- Cost and benefit analysis
- Rate of return
- Life cycle costing
- After tax cash flows

SUMMARY AND OPEN DISCUSSION

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Fees:

To be advised as per course locations. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session

