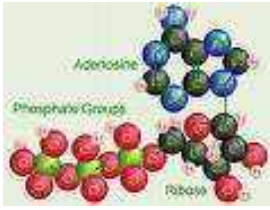


## Basics of Energy and its Various Forms



- ✍ Various Forms of Energy
- ✍ Potential Energy
- ✍ Chemical Energy
- ✍ Nuclear Energy
- ✍ Stored Mechanical Energy
- ✍ Gravitational Energy
- ✍ Kinetic Energy
- ✍ Radiant Energy
- ✍ Thermal Energy
- ✍ Energy Conversion
- ✍ Grades of Energy
- ✍ High-Grade Energy
- ✍ Low-Grade Energy
- ✍ Electrical Energy Basis
- ✍ Law of Conservation of Matter
- ✍ Units and Conversions
- ✍ Energy Units

## Energy Scenario

- ✍ Primary and Secondary Energy
- ✍ Global Primary Energy Consumption
- ✍ Energy Distribution Between Developed and Developing Countries
- ✍ Electrical Energy Supply
- ✍ Nuclear Power Supply
- ✍ Hydro Power Supply
- ✍ Final Energy Consumption
- ✍ Sector Wise Energy Consumption in India
- ✍ Energy Needs of Growing Economy
- ✍ India's Energy Needs
- ✍ Per Capita Energy Consumption
- ✍ Energy Conservation and its Importance
- ✍ Efficient Generation of Energy Resources



## Electrical System



- ✍ Power Generation Plant
- ✍ Transmission and Distribution Lines
- ✍ Electricity Billing
- ✍ Need for Electrical Load Management
- ✍ Reactive Power Compensation
- ✍ Step by Step Approach for Maximum Demand Control
- ✍ Power Factor Improvement and Benefits
- ✍ Improving Power Factor
- ✍ Transformers

## Electric Motors

- ✍ Motor Types
- ✍ Sizing to Variable Load
- ✍ Motor Characteristics
- ✍ Motor Speed
- ✍ Power Factor
- ✍ Motor Efficiency
- ✍ Reducing Under Loading
- ✍ Power Factor Correction
- ✍ Rewinding Effects on Energy Efficiency
- ✍ Speed Control of AC Induction Motors
- ✍ Sampling Criteria
- ✍ Measurements



## Energy Efficient Technologies in Electrical Systems



- ✍ Maximum Demand Controllers
- ✍ Maximum Demand
- ✍ Automatic Power Factor Controllers
- ✍ Voltage Control
- ✍ KILOVAR Control
- ✍ Variable Speed Drives
- ✍ Variable Frequency Drive
- ✍ Conventional Vs. Electronic Ballasts
- ✍ Energy Efficient Lighting Controls
- ✍ Time Based Control

## Energy Performance Assessment of Motors and Variable Speed Drives

- ✍ Performance Terms and Definitions
- ✍ Motor Loading
- ✍ Efficiency Testing
- ✍ Field Tests for Determining Efficiency
- ✍ By Input Power Measurements
- ✍ By Line Current Measurements
- ✍ Efficiency and Power Factor
- ✍ Protection and Power Quality
- ✍ Information Needed to Evaluate
- ✍ Energy Savings
- ✍ Method of Flow Control
- ✍ Pump or Fan Data
- ✍ Efficiency Information on all Relevant Electrical System Apparatus



## Lighting System

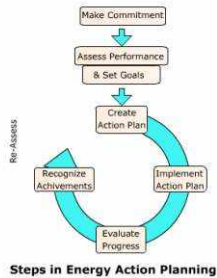
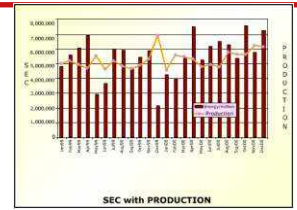


- ✍ Basic Terms in Lighting System and Features
- ✍ Lamps
- ✍ Incandescent Lamps
- ✍ Reflector Lamps
- ✍ Gas Discharge Lamps
- ✍ Luminaire
- ✍ Luminous Efficiency
- ✍ Colour Rendering Index
- ✍ Recommended Illumination
- ✍ Energy Efficient Replacement Options
- ✍ Energy Saving Potential in Street Lighting
- ✍ Installation of High Pressure Sodium Vapor Lamps
- ✍ Installation of LED Panel Indicator Lamps
- ✍ Installation of 'Exclusive' Transformer for Lighting
- ✍ Installation of Servo Stabilizer for Lighting Feeder
- ✍ Installation of High Frequency Electronic Ballasts

## Energy Monitoring and Targeting

- Definition
- Elements of Monitoring and Targeting System
- A Rational for Monitoring, Targeting and Reporting

- Data and Information Analysis
- Relating Energy Consumption and Production
- CUSUM
- Steps for CUSUM Analysis



## Energy Action Planning

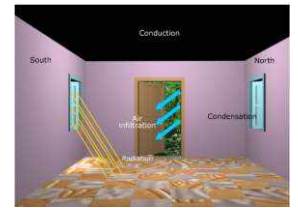
- Introduction
- Energy Management System
- Top Management Commitment
- Appoint as Energy Manager
- Location of Energy Manager
- Form A Dedicated Energy Team
- Plan and Develop an Audit
- Set Goals

- Institute an Energy Policy
- Assess Energy Performance
- Data Collection and Management
- Establishing Baseline
- Identify Metrics
- Benchmark
- Industry Average
- Analysis and Evaluation
- Conduct Technical Assessments and Audits

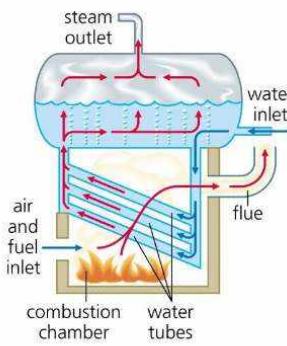
## A Home Energy Audit

- Objectives
- Heat Bandits
- Air Infiltration
- Energy Savers
- Vapor Barrier
- Window Treatments

- Damper
- Flow Restrictor
- Roof Overhang
- Windbreak
- Home Energy Audit Data



## Energy Efficiency in Thermal Utilities



Water Tube Boiler

- Fuels and Combustion
- Storage of Fuel Oil
- Removal of Contaminants
- Preparing of Coal
- Significance of Various Parameters in Proximate Analysis
- Chemical Properties
- Properties of Gaseous Fuels
- Combustion of Oil
- Optimizing Excess Air and Combustion
- Oil Firing Burners
- Low and High Pressure Gas Burners
- Boilers
- Boilers Systems
- Boiler Efficiency
- Boiler Evaporation Ratio

- Maintenance of Steam Traps
- Energy Saving Opportunities
- Benefits of Condensate Recovery
- Furnace
- Insulation and Refractories
- FBC Boilers
- Pressurized Fluid Bed Combustion
- Principle of Cogeneration
- Gas-Turbine Cogeneration Systems
- Classification of Cogeneration System
- Bottoming Cycle
- Prime Movers for Cogeneration
- Radiation/Convective Hybrid Recuperator
- Economiser
- Heat Pumps

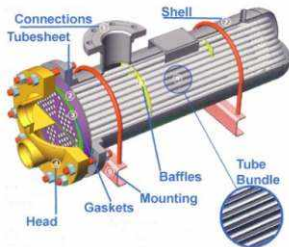
## Energy Efficiency in Electrical Utilities

- Compressed Air System
- Elevation
- Compressor Modulation
- HVAC and Refrigerating System
- Integrated Part Load Value
- Multi Staging for Efficiency
- Fans and Boilers

- Pumps and Pumping System
- Energy Conservation Opportunities in Pumping Systems.
- Cooling Tower
- Diesel Generating System
- Diesel Generator Captive Power Plants
- Energy Performance Assessment of DG Sets
- Energy Saving Measures for DG Sets



## Energy Performance



- Assessment of Boilers
- Measurements Required for Direct Method Testing
- Heat Output
- Boiler Efficiency by Indirect Method
- Energy Performance Assessment of Furnaces
- Energy Performance Assessment of Heat Exchanger
- Instruments for Monitoring
- Efficiency Testing
- Stator and Rotor I2R Losses

- Determining Motor Loading
- Fans and Blowers
- Water Pumps
- Compressors
- HVAC Systems
- Solar Energy
- Bio Energy
- Biomass Briquetting
- Tidal and Ocean Energy

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