

Course No. 1568

Electrical Energy Efficiency & Power Optimization Training Course

ENERGY MANAGEMENT & SUSTAINABILITY
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Electrical Energy Efficiency & Power Optimization Training Course provides an advanced and practical framework for understanding, managing, monitoring, and optimizing electrical energy consumption and power system performance across industrial, commercial, utility, and infrastructure environments. The course focuses on improving electrical efficiency, reducing energy losses, enhancing power quality and reliability, and supporting informed decisions that contribute to operational performance, energy cost management, and organizational sustainability.

Electrical energy is a major component of operating costs and business continuity in many facilities, particularly manufacturing plants, oil and gas operations, utilities, infrastructure assets, and large commercial facilities. Effective electrical energy management depends not only on reducing consumption, but also on optimizing motors, transformers, distribution systems, electrical loads, lighting, cooling systems, power factor, power quality, operating patterns, and maintenance practices.

The program provides advanced coverage of electrical energy assessment, load profiling, demand analysis, power factor improvement, electrical loss reduction, motor and transformer efficiency, demand management, energy monitoring, and power quality. Participants will learn how to evaluate electrical performance using relevant measurements and indicators, identify inefficient operating conditions, and prioritize practical improvements without compromising reliability, safety, or production requirements.

The course also addresses power quality issues including harmonics, voltage imbalance, voltage variations, and electrical disturbances, together with preventive and predictive maintenance approaches that support equipment efficiency and reliability. Particular attention is given to the technical and economic evaluation of energy efficiency projects, enabling participants to assess savings opportunities, implementation requirements, risks, and expected operational value.

Through practical electricity consumption analysis, load assessment, motor and transformer evaluations, power quality case studies, energy monitoring exercises, and optimization workshops, the Electrical Energy Efficiency & Power Optimization Training Course develops practical capabilities that can be applied across industrial facilities, oil and gas organizations, power and utility operations, manufacturing plants, petrochemical facilities, infrastructure projects, and large commercial organizations.

Objectives

- Analyze the principles of electrical energy efficiency and their impact on energy consumption, operational performance, and cost management during the course.
- Develop structured approaches for measuring and analyzing electricity consumption and identifying major sources of inefficient energy use.
- Evaluate electrical loads, demand profiles, load factors, utilization patterns, and operating conditions.
- Apply practical techniques for improving power factor and reducing electrical losses within distribution systems.
- Assess the performance and efficiency of electric motors, transformers, cables, and other major electrical equipment.
- Design practical load and demand management strategies to reduce peak demand and improve electricity utilization.
- Evaluate power quality conditions, including harmonics, voltage imbalance, voltage fluctuations, and electrical disturbances.
- Apply electrical energy performance indicators and monitoring techniques to identify deterioration and abnormal operating conditions.
- Analyze the technical and economic feasibility of electrical energy efficiency and power optimization projects.
- Develop maintenance and operating strategies that improve electrical efficiency while supporting reliability and equipment life.
- Strengthen integration between energy management, electrical engineering, maintenance, operations, sustainability, and financial planning.
- Align electrical energy efficiency and power optimization initiatives with energy objectives, cost reduction, sustainability, and operational resilience.

Who Should Attend

This course is designed for professionals working in electrical engineering, energy management, maintenance, operations, utilities, facilities management, industrial engineering, and energy efficiency. It is particularly relevant to Electrical Engineers, Energy Managers, Maintenance Managers, Utilities Engineers, Operations Engineers, Reliability Engineers, Energy Efficiency Specialists, Energy Analysts, Power System Engineers, and professionals responsible for monitoring and improving electrical system performance.

The program is also suitable for Engineering Directors, Operations Directors, Plant Managers, Facilities Managers, Maintenance Directors, Energy and Sustainability Leaders, Technical Managers, and senior decision makers responsible for electricity consumption, operating costs, reliability, and energy improvement investments. Professionals working in government entities, ministries, public sector organizations, oil and gas companies, power and utilities organizations, petrochemical facilities, manufacturing plants, infrastructure organizations, and large commercial facilities can benefit from the course.

The course is particularly valuable for professionals involved in load management, motors, transformers, electrical distribution, lighting, cooling systems, power quality, metering, electrical maintenance, energy audits, and efficiency improvement projects. It also provides useful insights for finance, procurement, sustainability, and project professionals who need to understand the technical and economic implications of electrical energy optimization initiatives.

Learning Outcomes

- Explain advanced principles of electrical energy efficiency and power system optimization.
- Analyze electricity consumption data and identify major consumption patterns, losses, and inefficiencies.
- Evaluate electrical loads, demand profiles, load factors, and utilization characteristics.
- Apply practical power factor improvement techniques and identify opportunities to reduce distribution losses.
- Assess the efficiency of motors, transformers, cables, and electrical equipment.
- Develop load and demand management strategies to reduce peak demand and improve energy utilization.
- Analyze power quality problems, including harmonics, voltage imbalance, voltage variations, and electrical disturbances.
- Apply electrical energy performance indicators to monitor efficiency and identify operational deterioration.
- Evaluate the technical and economic feasibility of electrical energy efficiency improvement projects.
- Integrate preventive and predictive maintenance practices with electrical energy efficiency and reliability objectives.

- Prepare technical and management reports covering energy savings opportunities, risks, priorities, and recommended actions.
- Develop an integrated electrical energy efficiency and power optimization plan aligned with energy, sustainability, and organizational performance objectives.

Course Outline

DAY 01

Electrical Energy Efficiency Foundations and Performance Assessment

- Principles of electrical energy efficiency and power optimization
- Relationship between electricity consumption, operating cost, productivity, and reliability
- Electrical power systems and major sources of energy consumption
- Electricity consumption analysis and time-based consumption patterns
- Electrical energy balances and identification of energy losses
- Major electrical loads and operating characteristics
- Demand profiles, load factor, utilization factor, and operating patterns
- Electrical metering, measurement, monitoring, and data collection

PRACTICAL APPLICATION

Analyze electricity consumption data for a representative facility and identify major loads, inefficient consumption patterns, losses, and improvement opportunities

DAY 02

Load Optimization, Power Factor and Electrical Equipment Efficiency

- Principles of electrical load management
- Maximum demand analysis and peak demand reduction
- Power factor fundamentals and its impact on electrical system performance
- Power factor correction methods and practical applications
- Electric motor efficiency and motor control

DAY 02 — CONTINUED

- Motor selection, sizing, loading, and operating efficiency
- Transformer efficiency, load losses, and no-load losses
- Cable losses and distribution system efficiency

PRACTICAL APPLICATION

Evaluate an electrical system and identify opportunities to improve load management, power factor, motor performance, transformer efficiency, and distribution losses

DAY 03

Power Quality, Distribution Efficiency and Electrical Reliability

- Principles of power quality and key electrical performance parameters
- Harmonics, harmonic sources, and their effects on electrical equipment
- Voltage and current imbalance
- Voltage sags, swells, interruptions, and electrical disturbances
- Power quality improvement techniques
- Distribution system efficiency and electrical loss reduction
- Critical load management and supply reliability
- Relationship between power quality, equipment life, and operational reliability

PRACTICAL APPLICATION

Analyze a power quality case and identify the technical causes, operational consequences, and appropriate improvement measures

DAY 04

Energy Monitoring, Maintenance and Electrical Optimization

- Electrical energy monitoring and management systems
- Development and application of electrical energy performance indicators
- Detecting efficiency deterioration and abnormal operating conditions
- Preventive and predictive maintenance for electrical equipment
- Relationship between equipment condition and electricity consumption

DAY 04 — CONTINUED

- Automation and control of electrical loads and energy systems
- Efficiency improvement for lighting, cooling, pumping, ventilation, and auxiliary systems
- Evaluation of low-efficiency equipment replacement opportunities
- Technical and economic assessment of energy efficiency projects

PRACTICAL APPLICATION

Conduct an electrical energy performance review and identify priority efficiency projects based on savings potential, reliability, investment requirements, and operational impact

DAY 05

Electrical Energy Strategy, Performance Management and Continuous Improvement

- Developing an integrated electrical energy efficiency strategy
- Prioritizing efficiency and power optimization initiatives
- Establishing energy baselines and electrical performance indicators
- Benchmarking and monitoring improvements in electrical performance
- Integrating energy management with maintenance, operations, and sustainability
- Executive and management reporting on electrical energy performance
- Governance of electrical energy efficiency programs and accountability structures
- Change management and organizational adoption of energy initiatives
- Continuous improvement and performance review mechanisms

FINAL WORKSHOP

Develop and present an integrated Electrical Energy Efficiency & Power Optimization plan covering consumption analysis, load management, power factor, equipment efficiency, power quality, monitoring, maintenance, economic evaluation, performance indicators, governance, and implementation priorities



Register or Request More Information

Course page: <https://quest-training.com/courses/electrical-energy-efficiency-power-optimization-training-course>

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