QUEST
Professional Center

PROFESSIONAL TRAINING COURSE

Course No. 1572

Energy Optimization for Industrial Facilities Training Course

ENERGY MANAGEMENT & SUSTAINABILITY
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION
5 Days

DELIVERY
Classroom

Course Overview

The Energy Optimization for Industrial Facilities Training Course provides an advanced and practical framework for improving energy performance across industrial facilities while maintaining production, safety, quality, reliability, and operational continuity. The course focuses on identifying major energy-consuming systems, reducing avoidable losses, optimizing operating conditions, improving equipment efficiency, and establishing a structured approach to continuous energy improvement.

Industrial facilities typically contain interconnected thermal, electrical, mechanical, and utility systems, including boilers, furnaces, heaters, motors, pumps, compressors, cooling systems, steam networks, compressed air systems, heat exchangers, and process equipment. Energy performance is therefore influenced by the interaction between process requirements, equipment condition, operating practices, maintenance, controls, production levels, and utility demand. The course provides a system-wide approach to identifying these relationships and converting them into practical optimization opportunities.

The program covers energy assessment, energy and heat balances, process optimization, thermal efficiency, electrical efficiency, steam and condensate systems, compressed air, pumping and cooling systems, heat transfer, combustion, waste heat recovery, and energy monitoring. Participants will examine how operating parameters, equipment selection, maintenance strategies, process integration, and control systems can influence energy consumption and determine where improvements can be achieved without compromising operational requirements.

Particular emphasis is placed on prioritizing energy optimization initiatives according to measurable energy savings, technical feasibility, investment requirements, operational risk, reliability, and business value. Participants will also learn how to establish energy baselines, develop performance indicators, monitor energy use, analyze deviations, evaluate improvement projects, and verify the results of implemented measures.

Through industrial case studies, energy balance exercises, equipment performance assessments, process optimization workshops, waste heat recovery analysis, energy monitoring activities, and improvement planning, the Energy Optimization for Industrial Facilities Training Course develops practical capabilities that can be applied across manufacturing plants, oil and gas facilities, petrochemical operations, power and utility installations, chemical plants, mining operations, food

processing facilities, and large industrial organizations.

Objectives

- Analyze the principles of energy optimization and their relationship with industrial efficiency, operating cost, and production performance during the course.
- Develop facility-level energy balances to identify major energy inputs, useful outputs, losses, and significant energy users.
- Evaluate thermal, electrical, mechanical, and utility systems to identify inefficient operating conditions.
- Apply process optimization techniques to reduce energy consumption while maintaining production, safety, quality, and reliability.
- Assess the efficiency of boilers, furnaces, heat exchangers, motors, pumps, compressors, cooling systems, and steam networks.
- Design practical strategies for reducing thermal losses, electrical losses, pressure losses, and utility consumption.
- Evaluate waste heat recovery, heat integration, and energy reuse opportunities within industrial processes.
- Apply energy baselines, performance indicators, monitoring systems, and benchmarking techniques to track optimization results.
- Analyze the technical and economic feasibility of energy optimization projects and prioritize initiatives according to value and risk.
- Develop strategies that integrate energy efficiency with maintenance, operations, asset management, and process engineering.
- Strengthen management reporting, performance verification, and continuous improvement of industrial energy use.
- Align energy optimization programs with cost reduction, sustainability, operational resilience, and long-term business objectives.

Who Should Attend

This course is designed for professionals working in energy management, process engineering, mechanical engineering, electrical engineering, operations, maintenance, utilities, reliability, facilities, and industrial performance. It is particularly relevant to Energy Managers, Energy Engineers, Process Engineers, Mechanical Engineers, Electrical Engineers, Utilities Managers,

Plant Managers, Operations Managers, Maintenance Managers, Reliability Engineers, Energy Analysts, and specialists responsible for improving energy performance within industrial facilities.

The program is also suitable for Engineering Directors, Plant Directors, Operations Directors, Maintenance Directors, Asset Managers, Sustainability Managers, Technical Managers, and senior decision makers responsible for energy consumption, production efficiency, operating costs, equipment performance, and capital improvement programs. Professionals working in government entities, ministries, oil and gas companies, petrochemical facilities, power and utilities organizations, manufacturing plants, chemical industries, mining operations, and large industrial corporations can benefit from the frameworks covered in the course.

The course is particularly valuable for professionals involved in energy audits, process optimization, steam systems, combustion, rotating equipment, electrical efficiency, heat recovery, cooling systems, compressed air, energy monitoring, and industrial improvement projects. It also provides useful knowledge for finance, procurement, project management, and sustainability professionals involved in evaluating and supporting industrial energy optimization investments.

Learning Outcomes

- Explain the principles of energy optimization and their application across industrial facilities.
- Develop and interpret energy and heat balances for processes, equipment, and entire facilities.
- Identify significant energy users and analyze the operational factors driving energy consumption.
- Evaluate the efficiency of major thermal, electrical, mechanical, and utility systems.
- Identify energy losses and develop appropriate technical and operational improvement measures.
- Apply process optimization techniques that reduce energy consumption while maintaining production requirements.
- Evaluate heat integration and waste heat recovery opportunities and determine suitable applications.
- Apply energy performance indicators, baselines, monitoring, and benchmarking to assess improvements.
- Evaluate the technical, financial, operational, and reliability implications of energy optimization projects.
- Prioritize energy improvement initiatives according to savings potential, investment, risk, and

implementation feasibility.

- Prepare professional reports presenting energy performance, optimization opportunities, expected benefits, and implementation priorities.
- Develop an integrated energy optimization strategy that supports operational efficiency, sustainability, and long-term organizational performance.

Course Outline

DAY 01

Industrial Energy Assessment and Optimization Fundamentals

- Principles of energy optimization in industrial facilities
- Energy consumption drivers and significant energy users
- Energy and heat balances for industrial processes
- Identification of thermal, electrical, mechanical, and utility energy flows
- Energy baselines and operating performance
- Energy measurement, instrumentation, and data quality
- Energy performance indicators and benchmarking
- Identifying avoidable losses and inefficient operating conditions

> **PRACTICAL APPLICATION**
>
> Develop an energy balance for a representative industrial facility and identify its major energy users, losses, and optimization opportunities

DAY 02

Thermal Systems, Steam and Process Heating Optimization

- Boiler efficiency and combustion optimization
- Furnace and process heater performance
- Steam generation, distribution, and utilization
- Steam pressure management and condensate recovery
- Steam traps and distribution losses
- Heat exchanger performance and heat transfer efficiency

DAY 02 — CONTINUED

- Fouling, scaling, pressure drop, and thermal performance
- Insulation and reduction of heat losses

> **PRACTICAL APPLICATION**
>
> Assess the thermal and steam systems of an industrial facility and develop an energy optimization plan for key process heating systems

DAY 03

Electrical and Mechanical Energy Optimization

- Electrical energy consumption in industrial facilities
- Motor efficiency, loading, and control strategies
- Variable-speed applications and operational optimization
- Pump efficiency, flow control, and system performance
- Compressor efficiency and compressed air optimization
- Transformer efficiency and electrical distribution losses
- Cooling systems, fans, and auxiliary equipment
- Preventive and predictive maintenance for energy performance

> **PRACTICAL APPLICATION**
>
> Conduct an energy performance assessment of electrical and mechanical equipment and identify priority optimization opportunities

DAY 04

Heat Recovery, Process Integration and Optimization Projects

- Principles of process heat integration
- Identification of industrial waste heat sources
- Waste heat recovery technologies and applications
- Heat recovery from exhaust gases, flue gases, and process streams
- Energy cascading and improved utilization of thermal energy
- Process integration and optimization of interconnected systems

DAY 04 — CONTINUED

- Technical constraints, safety, reliability, and maintenance considerations
- Economic evaluation of energy optimization opportunities

PRACTICAL APPLICATION

Develop a heat recovery and process integration proposal and assess its technical feasibility, expected energy savings, investment needs, and operational impact

DAY 05

Energy Performance Management, Monitoring and Continuous Improvement

- Developing an integrated energy optimization strategy
- Establishing energy targets, baselines, and performance indicators
- Continuous energy monitoring and deviation analysis
- Verification and measurement of energy savings
- Prioritizing optimization projects according to savings, cost, risk, and feasibility
- Integrating energy optimization with operations, maintenance, and asset management
- Executive reporting and energy performance dashboards
- Governance, accountability, and ownership of energy performance
- Linking energy optimization with sustainability, cost management, and operational resilience

FINAL WORKSHOP

Develop and present an integrated Energy Optimization for Industrial Facilities strategy covering energy assessment, major energy users, thermal and electrical efficiency, process optimization, steam systems, heat recovery, monitoring, economic evaluation, performance indicators, governance, and implementation priorities

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Register or Request More Information

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