QUEST
Professional Center

PROFESSIONAL TRAINING COURSE

Course No. 1344

Energy Efficiency & Process Integration Training Course

PROCESS ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION
5 Days

DELIVERY
Classroom

Course Overview

The Energy Efficiency & Process Integration Training Course provides a practical and strategic framework for improving energy performance across industrial facilities, utilities, buildings, infrastructure, and process-driven operations. The course enables organizations to identify energy losses, optimize process interactions, improve resource utilization, and integrate energy efficiency into operational, engineering, maintenance, and investment decisions.

Energy efficiency is a critical priority for government entities, ministries, public sector organizations, banks and financial institutions, oil and gas companies, utilities, manufacturing facilities, and large corporations. Rising operational demands, asset aging, regulatory obligations, environmental expectations, and cost pressures require organizations to manage energy as a strategic resource. A disciplined approach to process integration helps reduce avoidable energy consumption while supporting productivity, reliability, safety, and service continuity.

This Energy Efficiency & Process Integration Training Course examines the relationship between energy use, process design, equipment performance, utilities, maintenance practices, operational controls, and organizational governance. Participants will learn how to establish energy baselines, analyze consumption patterns, identify significant energy users, assess losses, prioritize improvement opportunities, and evaluate practical measures for implementation.

The course also introduces process integration principles, including energy balance, heat recovery, utility optimization, pinch analysis concepts, process control, operational discipline, and lifecycle decision-making. Participants will explore how to identify opportunities for better integration between heating, cooling, steam, compressed air, pumping, motors, HVAC, process equipment, and utility systems without compromising safety, production quality, or operational requirements.

Through practical case discussions, structured analysis, and implementation workshops, participants will gain the capability to develop an energy efficiency improvement roadmap that is aligned with business priorities. The course supports executives in setting governance and performance expectations while equipping managers and specialists with practical tools to improve energy performance, strengthen operational resilience, and support sustainable asset management.

Objectives

- Analyze organizational energy use and identify the relationship between operational performance, process efficiency, asset condition, and energy consumption during the course.
- Assess significant energy users, major utility systems, and process areas using consumption, cost, criticality, and operational impact criteria.
- Develop an energy baseline and performance profile using available consumption data, operating conditions, production information, and asset records.
- Evaluate energy losses associated with heating, cooling, steam, compressed air, pumping, motors, HVAC, insulation, process control, and equipment operation.
- Apply energy balance principles to identify opportunities for reducing waste and improving process integration in practical exercises.
- Design energy performance indicators that monitor consumption, intensity, demand, losses, equipment performance, and improvement progress.
- Improve operating practices by identifying actions related to equipment loading, set points, shutdown routines, maintenance, and operator control.
- Strengthen the integration of energy efficiency into maintenance planning, capital projects, procurement, asset management, and operational decision-making.
- Implement a structured opportunity-assessment process that evaluates technical feasibility, operational impact, risk, cost, and implementation priority.
- Assess the role of heat recovery, utility optimization, process control, and energy integration in improving overall facility performance.
- Align energy efficiency initiatives with organizational sustainability, cost-control, risk-management, compliance, and business continuity objectives.
- Develop a time-bound energy efficiency and process integration action plan for implementation after the course.

Who Should Attend

The Energy Efficiency & Process Integration Training Course is designed for energy managers, sustainability managers, utilities managers, engineering managers, operations managers, maintenance managers, facilities managers, asset managers, plant managers, project managers, and technical services leaders. It is particularly relevant for executives, directors, and decision makers responsible for energy expenditure, operational efficiency, environmental performance, asset reliability, infrastructure investment, and strategic sustainability initiatives.

The course is suitable for process engineers, mechanical engineers, electrical engineers, energy engineers, utilities engineers, HVAC specialists, facility engineers, maintenance engineers, reliability engineers, control and instrumentation engineers, production supervisors, operations supervisors, maintenance planners, and technical analysts. It supports professionals working with process plants, oil and gas facilities, power and water utilities, manufacturing operations, buildings, data centres, transport infrastructure, and other energy-intensive environments.

Procurement, supply chain, finance, HSE, quality, risk management, internal audit, digital transformation, corporate strategy, and operational excellence professionals will also benefit where their responsibilities involve energy contracts, utility costs, equipment procurement, performance reporting, environmental requirements, capital investment, or resource-efficiency programs. The course promotes effective collaboration between technical and business functions to ensure that energy improvement opportunities are evaluated and implemented responsibly.

Learning Outcomes

- Explain how energy efficiency and process integration contribute to operational performance, cost discipline, sustainability, and asset lifecycle value.
- Identify significant energy users and prioritize systems for analysis based on consumption, criticality, operating conditions, and improvement potential.
- Develop an energy baseline using consumption data, production or service information, operating hours, and relevant performance variables.
- Interpret energy performance indicators and identify trends, deviations, and opportunities requiring operational or engineering action.
- Apply basic energy balance concepts to evaluate energy flows, losses, recovery opportunities, and process interactions.
- Assess common energy losses in steam, compressed air, pumping, motors, HVAC, heating, cooling, insulation, and process equipment.
- Identify opportunities to improve operating set points, equipment loading, sequencing, shutdown practices, and process control.
- Evaluate heat recovery and utility optimization opportunities using technical, operational, safety, and financial criteria.
- Integrate energy efficiency actions into preventive maintenance, reliability improvement, capital planning, and procurement processes.

- Develop practical energy performance indicators, reporting methods, responsibilities, and review routines.
- Prepare an opportunity register that defines actions, expected benefits, owners, risks, resources, and implementation priorities.
- Produce an initial energy efficiency and process integration roadmap relevant to the participant's workplace.

Course Outline

DAY 01

Energy Efficiency Strategy and Organizational Performance

- The strategic importance of energy efficiency for operational resilience, cost management, sustainability, compliance, and asset performance.
- Energy management fundamentals: consumption, demand, energy intensity, energy baselines, significant energy users, and performance indicators.
- The relationship between energy efficiency, process integration, maintenance, operations, engineering, and capital investment.
- Energy governance, leadership accountability, policy development, roles, responsibilities, and cross-functional coordination.

> **PRACTICAL APPLICATION OR DISCUSSION**
>
> Reviewing current energy challenges, consumption patterns, and priority improvement areas within participant organizations.

DAY 02

Energy Analysis, Data Management, and Performance Measurement

- Establishing energy baselines using utility bills, meter readings, process data, production data, operating hours, and asset information.
- Identifying significant energy users and evaluating consumption by process, equipment group, facility area, or operational activity.
- Energy performance indicators: total consumption, energy intensity, peak demand, load profile, equipment efficiency, and loss indicators.

DAY 02 — CONTINUED

- Data quality, metering strategies, sub-metering, measurement plans, data ownership, reporting frequency, and dashboard design.

PRACTICAL APPLICATION OR DISCUSSION

Developing an energy baseline and selecting key performance indicators for a selected facility, process, or utility system.

DAY 03

Utility Systems and Energy Loss Reduction

- Energy efficiency in steam and thermal systems: boilers, distribution, condensate recovery, insulation, heat loss, and operational control.
- Compressed air efficiency: leakage, pressure management, system demand, storage, equipment sequencing, and maintenance practices.
- Electrical systems: motors, drives, transformers, power quality, load management, equipment selection, and maintenance implications.
- Pumping, HVAC, refrigeration, cooling, ventilation, lighting, and building-services energy performance.

PRACTICAL APPLICATION OR DISCUSSION

Identifying energy losses and developing operational improvement actions for selected utility systems.

DAY 04

Process Integration and Optimization Opportunities

- Process integration principles: energy flows, supply and demand relationships, energy balance, and system interaction.
- Introduction to heat recovery, heat exchange networks, pinch analysis concepts, and waste heat utilization opportunities.
- Optimizing process control, operating set points, equipment loading, sequencing, start-up, shutdown, and idle-time energy use.

DAY 04 — CONTINUED

- Assessing energy efficiency opportunities using technical feasibility, safety, process quality, capital requirements, operating risk, and lifecycle considerations.

PRACTICAL APPLICATION OR DISCUSSION

Mapping energy flows for a process or facility and identifying integration and recovery opportunities.

DAY 05

Implementation, Governance, and Continuous Improvement

- Developing energy efficiency projects, opportunity registers, business cases, implementation plans, and verification methods.
- Integrating energy efficiency into maintenance programs, asset management plans, procurement specifications, design reviews, and project governance.
- Monitoring performance, conducting management reviews, tracking corrective actions, and sustaining energy improvement initiatives.
- Managing behavioural change, workforce engagement, technical capability, communication, and operational ownership.

FINAL WORKSHOP, ACTION PLAN, OR IMPLEMENTATION EXERCISE

Developing a 90-day Energy Efficiency & Process Integration action plan with priority systems, improvement opportunities, accountable owners, milestones, performance indicators, and review mechanisms.

Register or Request More Information

Course page: https://quest-training.com/courses/energy-efficiency-process-integration-training-course
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