

5-Day Cement Industry Training Course In

ENERGY MANAGEMENT AND EFFICIENCY (ISO 50001) FOR CEMENT PLANTS

Dubai - UAE, 01 – 05 June 2026

COURSE LEVEL: INTERMEDIATE

COURSE OVERVIEW:

Energy consumption represents the largest variable cost in cement manufacturing, making systematic energy management a cornerstone of operational excellence and sustainability. This course defines the requirements of the ISO 50001 standard within the specific context of a heavy industrial facility, focusing on the establishment of energy baselines and performance indicators. By integrating technical efficiency with management systems, participants will learn how to drive continuous improvement in energy use.

The scope of this training includes the identification of "Significant Energy Uses" (SEUs) across the plant, from the high-torque grinding mills to the thermal energy requirements of the rotary kiln. It covers the technical methodologies for energy auditing, the calculation of specific energy consumption, and the implementation of energy-saving opportunities (ESOs). Furthermore, the course addresses the cultural shift required to embed energy efficiency into the daily routines of production and maintenance teams.

Coverage includes detailed modules on Waste Heat Recovery (WHR), the optimization of compressed air systems, and the impact of alternative fuels on the thermal energy balance. Through the study of the ISO 50001 "Plan-Do-Check-Act" cycle, participants will learn how to document energy performance and prepare for external certification audits. Attendees will gain the strategic and technical tools necessary to reduce the carbon footprint of the plant while significantly lowering operational expenses.

COURSE OBJECTIVES:

After completion of this course, the participants will be able to:

- Explain the structure and requirements of the ISO 50001:2018 standard.
- Identify the primary energy drivers in the cement manufacturing process.
- Establish accurate Energy Baselines (EnB) for different plant departments.
- Define Energy Performance Indicators (EnPIs) to track efficiency gains.
- Conduct an internal energy audit to identify sources of energy waste.
- Optimize the "Specific Heat Consumption" of the kiln and preheater.
- Reduce the "Specific Power Consumption" of raw and cement grinding mills.
- Evaluate the financial and environmental benefits of WHR systems.
- Manage the energy impact of "False Air" ingress and thermal radiation.

- Implement energy-efficient procurement practices for motors and equipment.
- Develop an Energy Management Team and clear communication channels.
- Prepare the necessary documentation for ISO 50001 certification and surveillance.

TARGET AUDIENCE:

This course is intended for Energy Managers, Plant Managers, Process Engineers, Sustainability Officers, and Maintenance Heads.

TRAINING COURSE METHODOLOGY:

A highly interactive combination of lectures, discussion sessions, and case studies will be employed to maximize the transfer of information, knowledge, and experience. The course will be intensive, practical, and highly interactive. The sessions will start by raising the most relevant questions and motivating everybody to find the right answers. The attendants will also be encouraged to raise more of their questions and to share in developing the right answers using their analysis and experience. There will also be some indoor experiential activities to enhance the learning experience. Course material will be provided in PowerPoint, with necessary animations, learning videos, and general discussions.

The course participants shall be evaluated before, during, and at the end of the course.

COURSE CERTIFICATE:

National Consultant Centre for Training LLC (NCC) will issue an Attendance Certificate to all participants completing a minimum of 80% of the total attendance time requirement.

COURSE OUTLINE / COURSE CONTENT:

MODULE 1: PRINCIPLES OF ISO 50001 IN CEMENT

- Evolution of energy management standards in heavy industry.
- The business case for energy efficiency: Cost vs. Environment.
- Key definitions: Energy review, baseline, and performance indicator.
- Leadership commitment and the Energy Policy statement.
- Integration with ISO 9001 and ISO 14001 systems.

MODULE 2: IDENTIFYING SIGNIFICANT ENERGY USES (SEU)

- Mapping energy flow: From high-voltage intake to departmental use.
- Thermal energy sinks: The kiln, calciner, and preheater tower.
- Electrical energy sinks: Grinding mills, fans, and compressors.
- Data collection techniques: Sub-metering and DCS extraction.
- Normalizing data for production volume and material hardness.

MODULE 3: THERMAL ENERGY OPTIMIZATION

- Improving the kiln heat balance and reducing radiation losses.
- Preheater efficiency: Minimizing exit gas temperatures.
- Impact of alternative fuels on specific heat consumption.
- Optimizing clinker cooler heat recovery for secondary air.

- Calculating and reducing the moisture-related energy penalty.

MODULE 4: ELECTRICAL ENERGY OPTIMIZATION

- Efficiency of Vertical Roller Mills (VRM) vs. Ball Mills.
- Optimization of large process fans using Variable Frequency Drives.
- Managing the "Specific Power" (kWh/ton) of each process stage.
- Reducing "No-Load" running time for conveyors and auxiliaries.
- Power factor correction and harmonic filtration in substations.

MODULE 5: WASTE HEAT RECOVERY (WHR) SYSTEMS

- Thermodynamic cycles for WHR: Organic Rankine Cycle (ORC) vs. Steam.
- Capturing heat from the preheater exhaust and cooler vent.
- Financial analysis: Payback periods and ROI for WHR projects.
- Impact of WHR on the plant's total energy autonomy.
- Operational challenges and maintenance of heat exchangers.

MODULE 6: COMPRESSED AIR AND AUXILIARY SYSTEMS

- The high cost of compressed air: Leak detection and repair.
- Optimizing system pressure and storage capacity.
- Cooling water pump efficiency and piping head-loss reduction.
- Lighting systems: Transitioning to LED and automated controls.
- Lubrication and its impact on mechanical friction and energy.

MODULE 7: ENERGY PLANNING AND OBJECTIVES

- Setting realistic Energy Targets based on technical potential.
- Developing Action Plans: Responsibilities, resources, and timelines.
- Risk and opportunity management in energy supply.
- Legal and regulatory compliance regarding energy reporting.
- Long-term energy strategy and carbon neutrality goals.

MODULE 8: MONITORING, MEASUREMENT, AND ANALYSIS

- Calibration of energy meters and process sensors.
- Using "CUSUM" charts to track deviations from the baseline.
- Conducting effective Energy Performance Reviews.
- Internal auditing techniques for the energy management system.
- Managing non-conformities and implementing corrective actions.

MODULE 9: OPERATIONAL CONTROL AND MAINTENANCE

- Operating procedures for energy-critical equipment.
- Impact of maintenance on energy (e.g., filter cleaning, alignment).
- Energy-efficient start-up and shut-down sequences.
- Managing process "surges" that spike energy demand.
- Training operators on energy-aware process control.

MODULE 10: PROCUREMENT AND DESIGN FOR ENERGY

- Lifecycle costing vs. initial purchase price for motors.
- Evaluating energy efficiency in new project designs.
- Supplier engagement: Ensuring energy performance specifications.
- Modification of existing equipment for better efficiency.
- Role of the engineering team in energy-conscious design.

MODULE 11: COMMUNICATION AND AWARENESS

- Creating an energy-aware culture on the shop floor.
- Internal reporting of energy wins and performance gaps.
- Employee suggestion schemes for energy reduction.
- External communication with stakeholders and regulators.
- Training needs analysis for energy-critical roles.

MODULE 12: PREPARING FOR CERTIFICATION AND ASSESSMENT

- Documentation requirements: The Energy Manual and records.
- What to expect during a Stage 1 and Stage 2 ISO audit.
- Demonstrating "Continuous Improvement" to the auditor.
- Management review meetings and executive reporting.