5-Day Cement Industry Training Course
In

ALTERNATIVE FUELS (SITE VISIT)

Cairo - Egypt, 12 – 16 Jan. 2026

COURSE LEVEL: INTERMEDIATE

COURSE OVERVIEW:

The transition toward alternative fuels is a fundamental pillar of modern industrial energy management and environmental stewardship. This course provides a comprehensive definition of the various energy-rich waste streams, such as processed municipal waste, scrap tires, and liquid solvents, used to replace conventional hydrocarbons. By understanding the chemical and thermal properties of these fuels, participants can better appreciate their role in reducing operational costs and carbon emissions.

The scope of this training encompasses the entire lifecycle of alternative fuel utilization, from procurement and sourcing strategies to the technical requirements for industrial integration. It covers the mechanical engineering aspects of storage and transport systems, as well as the chemical considerations necessary to maintain product quality. Furthermore, the course delves into the regulatory landscape, ensuring that all alternative fuel initiatives meet stringent safety and environmental standards.

Coverage includes detailed modules on thermal substitution rates, the impact of moisture and ash content on combustion, and the maintenance of specialized equipment. Through a focused site visit, the course bridge the gap between theoretical energy calculations and practical shop-floor application. Participants will examine real-world feeding systems and emission control technologies to understand the complexities of managing non-homogeneous fuel sources in a continuous production environment.

COURSE OBJECTIVES:

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

- Classify various types of alternative fuels based on their origin and energy density.
- Determine the technical suitability of different waste streams for specific industrial processes.
- Calculate the thermal substitution rate to measure the displacement of fossil fuels.
- Evaluate the logistics and supply chain requirements for consistent fuel delivery.
- Design safety protocols for handling volatile and non-homogeneous materials.
- Analyze the impact of alternative fuel combustion on gas flow and heat distribution.
- Monitor trace elements and heavy metals to prevent environmental contamination.
- Assess the economic benefits of fuel switching through cost-benefit analysis.
- Implement maintenance schedules for specialized dosing and feeding machinery.
- Interpret environmental regulations regarding the co-processing of waste materials.

- Optimize burner configurations to accommodate varying fuel flame characteristics.
- Prepare operational reports on fuel consumption and emission performance indicators.

TARGET AUDIENCE:

This course is intended for Operations Managers, Energy Engineers, Sustainability Coordinators, Technical Supervisors, and Environmental Health and Safety (EHS) Specialists involved in energy intensive manufacturing.

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: OVERVIEW OF ALTERNATIVE ENERGY SOURCES

- History and evolution of alternative fuel use in industry.
- Global trends in waste-to-energy and co-processing.
- Understanding the energy hierarchy and circular economy.
- Comparing fossil fuels versus renewable and waste-derived fuels.
- Basic chemical principles of combustion and heat release.

MODULE 2: FUEL CATEGORIZATION AND PROCUREMENT

- Municipal Solid Waste (MSW) and Refuse Derived Fuel (RDF).
- Biomass sources: wood chips, rice husks, and animal meal.
- Liquid alternative fuels: spent solvents and waste oils.
- Procurement strategies and supplier quality assurance.
- Physical and chemical specification limits for various fuels.

MODULE 3: STORAGE AND MATERIAL HANDLING SYSTEMS

- Requirements for bulk storage and fire prevention.
- Safety zones and ventilation for volatile liquid storage.
- Conveyor types: screw, belt, and pneumatic transport systems.

- Managing material segregation and moisture absorption.
- Dust explosion prevention and ATEX compliance measures.

MODULE 4: FEEDING, DOSING, AND INJECTION TECHNOLOGY

- Principles of gravimetric and volumetric dosing.
- Mechanical design of injection lances and burners.
- Automation and control of fuel feed rates.
- Balancing primary and secondary air for efficient combustion.
- Integration of alternative fuel controls into the main DCS.

MODULE 5: COMBUSTION PROCESS AND FLAME DYNAMICS

- Influence of particle size on ignition and burnout time.
- Impact of fuel chemistry on flame temperature and emissivity.
- Controlling the oxygen profile to manage carbon monoxide.
- Managing the thermal load and heat distribution in the furnace.
- Effects of high moisture fuels on the combustion gas volume.

MODULE 6: ENVIRONMENTAL IMPACT AND EMISSION CONTROL

- Monitoring nitrogen oxides (NOx) and sulfur dioxide (SO2).
- Strategies for capturing heavy metals and volatile organic compounds.
- The role of bypass systems in managing chlorine and alkalis.
- Compliance with local and international emission limits.
- Documentation and auditing for environmental permits.

MODULE 7: EQUIPMENT MAINTENANCE AND RELIABILITY

- Wear and tear caused by abrasive alternative fuels.
- Corrosion issues in ducts and stacks from acidic gases.
- Preventive maintenance for shredders, feeders, and pumps.
- Cleaning protocols for storage bins and transport lines.
- Predicting equipment lifespan when using non-standard fuels.

MODULE 8: OPERATIONAL SAFETY AND EMERGENCY RESPONSE

- Personal Protective Equipment (PPE) for waste handling.
- Spill response procedures for liquid alternative fuels.
- Firefighting techniques for specific chemical waste fires.
- Health risks: biological hazards and chemical exposure.
- Safety training and drills for the operational team.

MODULE 9: ECONOMIC ANALYSIS AND PROJECT FEASIBILITY

- Capital expenditure (CAPEX) for fuel processing infrastructure.
- Operational expenditure (OPEX) and potential fuel savings.
- Impact of carbon taxes and environmental subsidies.
- Sensitivity analysis of fuel prices and availability.
- Building a business case for alternative fuel investment.

MODULE 10: SITE VISIT: PRACTICAL APPLICATION

- Inspection of the fuel reception and sampling area.
- Review of the pre-processing and blending station.
- Observation of the feeding systems in active operation.
- Walkthrough of the central control room and monitoring screens.
- Interaction with the maintenance and operations team on-site.

MODULE 11: CHALLENGES AND TROUBLESHOOTING

- Dealing with inconsistent fuel quality and calorific value.
- Solving issues with build-ups and process instabilities.
- Addressing community concerns regarding waste processing.
- Optimizing the process for maximum substitution rates.
- Case studies of successful and failed fuel transitions.

MODULE 12: FUTURE PROSPECTS IN INDUSTRIAL FUELS

- Emerging technologies in hydrogen and synthetic fuels.
- The future of carbon capture and storage (CCS).
- Policy shifts and their impact on industrial energy.
- Continuous improvement and innovation in fuel processing.
- Course summary and final assessment of participants.