CONCEPT

AI for Energy Efficiency Training Course: Machine Learning for Buildings and Industrial Sites



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Introduction:

AI for energy efficiency training course on machine learning for buildings and industrial sites is a one-week course for energy, facility and sustainability teams, ending with an AI energy optimisation use case and pilot plan for a case site. Many sites collect meter, BMS and SCADA data, yet savings stall because those signals rarely become baselines, fault alerts or control decisions. Nominees already run building services, plant utilities or energy reporting, and the course is taught through case studies on real consumption and equipment data. CoreConcept Training Center delivers this course on AI for energy efficiency.

Course Objectives:

- Inventory interval meter, BMS, SCADA and historian data and score AI energy use cases by value and data readiness
- Prepare energy time series and build machine learning baselines that support IPMVP-based savings verification
- Configure anomaly and fault detection for HVAC, chiller plant and process utilities and route alerts to maintenance teams
- Evaluate optimisation options for chiller plant sequencing, setpoint reset and industrial process energy use
- Forecast site load, plan demand response actions and set governance controls for model drift and control writeback
- Produce an AI energy optimisation use case and pilot plan with a business case and avoided emissions estimate

Target Audience:

- Managers responsible for site energy consumption, energy budgets and savings targets
- Facility managers who oversee building services, BMS operation and HVAC maintenance contracts
- Plant utilities and engineering managers responsible for chillers, boilers, compressed air and process heating
- Sustainability managers who report energy and emissions performance to leadership
- Digital and operational technology leads who manage energy data platforms and site system integration

Course Outline:

Day 1: Energy Data Landscape and AI Opportunity Screening for Sites

- Interval Meter, BMS, SCADA and Historian Data Inventory
- Significant Energy Use Map Linked to Available Sensor Points
- Supervised, Unsupervised and Reinforcement Learning Roles in Energy Work
- BACnet Point Naming and Tagging Review for Analytics
- AI Energy Use Case Long List and Readiness Scoring

Day 2: Data Preparation, Machine Learning Baselines and Savings Verification

- Time Series Cleaning for Gaps, Spikes and Meter Resets
- Feature Engineering with Degree Days, Occupancy and Production Drivers
- Gradient Boosting and Regression Energy Baseline Model Comparison
- Baseline Model Accuracy Checks Using CVRMSE and Bias Error
- IPMVP Option C Savings Verification with Machine Learning Baselines

Day 3: Anomaly Detection, Fault Diagnostics and HVAC Plant Optimisation

- Isolation Forest and Autoencoder Anomaly Detection on Consumption Profiles
- Rule-Based and Data-Driven Fault Detection for Air Handling Units
- Chiller Plant Sequencing and Chilled Water Setpoint Reset Models
- Model Predictive Control Concepts for Supply Air and Zone Temperatures
- Fault Alert Triage Workflow Linked to Maintenance Work Orders

Day 4: Process Energy, Load Forecasting, Demand Response and Model Risk

- Compressed Air, Boiler and Furnace Optimisation Using Soft Sensors
- Short-Term Site Load Forecasting with Weather and Production Schedules
- Demand Response Peak Shaving and Load Shifting Under Time-of-Use Tariffs
- Digital Twin and Energy Platform Selection Criteria for Sites
- Model Drift, Override Rules and Cyber Security for Control Writeback

Day 5: Case Study Work and the AI Energy Optimisation Pilot Plan

- Office Tower Case Chiller Data Baseline and Fault Review
- Manufacturing Plant Case Compressed Air Anomaly Investigation
- Avoided Emissions Conversion of Verified Savings for Carbon Reporting
- AI Energy Business Case with Savings, Platform Cost and Payback
- AI Energy Optimisation Use Case and Pilot Plan Completion

Skills You Will Gain:

- Energy Time Series Preparation
- Machine Learning Baselining
- Savings Verification Analysis
- Energy Anomaly Detection
- HVAC Fault Diagnostics
- Chiller Plant Optimisation
- Site Load Forecasting
- Energy Model Governance

Why Attend This Course:

- Deliver an AI energy optimisation use case and pilot plan to the energy manager and site leadership for funding approval
- Decide which baseline model, fault rule or optimisation option fits a given building or plant asset
- Avoid paying for analytics platforms that cannot verify savings or that write unsafe setpoints to live controls
- Coach facility and plant colleagues to read fault alerts, baseline charts and savings reports in a consistent way

Conclusion:

Back at work, the participant hands the energy manager and site leadership an AI energy optimisation use case and pilot plan naming the data sources, the baseline model, the savings verification method and the go or no-go criteria. Facility and plant teams use it to decide which pilot to fund first and which equipment data must be repaired before modelling begins. After the first pilot period, the organisation should review baseline accuracy, the share of fault alerts acted on, verified savings against plan and any control overrides recorded.

Frequently Asked Questions FAQ:

What should participants know before an AI for energy efficiency course?

Participants should understand how their building services or plant utilities operate and be able to read meter or BMS trend data. No programming is required. Bringing a sample of their own site consumption or equipment data helps them apply the case studies.

How does an AI for energy efficiency course differ from a general energy management course?

It concentrates on machine learning methods applied to site data: model baselines, anomaly and fault detection, optimisation and forecasting. General energy management courses focus on policy, audits and engineering savings calculations, while utility analytics courses focus on grid and metering networks.

Why does AI for energy efficiency need reliable energy baselines?

Baselines show what a building or plant would have consumed without a change, so savings can be verified rather than assumed. Machine learning baselines capture weather, occupancy and production effects, which makes fault alerts and savings claims more credible to finance teams.

What do participants take back from an AI for energy efficiency course?

Participants take back an AI energy optimisation use case and pilot plan for a case site, covering data sources, baseline model, fault detection scope, savings verification, business case and governance controls, ready to adapt to their own building or plant.