Smart Buildings and Renewable Integration Training Course

Professional Development Training Course Outline

Category	Renewable Energy	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Smart Buildings and Renewable Integration Training Course provides a practical, future-focused foundation for understanding how intelligent buildings, renewable energy, automation, data analytics, and grid-interactive technologies are converging to create more efficient and resilient built environments. Current research highlights AI, IoT, digital twins, machine learning, smart grids, demand response, energy storage, and net-zero energy buildings as important areas in the evolution of intelligent energy management. The course connects these technologies with real-world building operations, helping participants understand how energy performance can be monitored, optimized, and continuously improved.

Particular emphasis is placed on the transition from conventional buildings to grid-interactive, data-driven, low-carbon buildings capable of coordinating solar PV, battery storage, HVAC, building automation, and flexible loads. Emerging digital-twin research shows increasing integration of AI and real-time data for forecasting, optimization, predictive maintenance, demand response, and renewable-energy coordination. Through practical exercises and case studies, participants explore how smart building technologies and renewable integration can support energy efficiency, operational resilience, decarbonization, and progress toward net-zero objectives.

Programme Curriculum

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Course Duration

5 days

Course Objectives

By the end of the course, participants will be able to:

1. Explain the principles of Smart Buildings, Building Automation Systems (BAS), and intelligent building operations.
2. Evaluate IoT sensors, connected devices, and real-time data architectures for building energy management.
3. Understand AI and Machine Learning applications for energy forecasting and optimization.
4. Develop a conceptual Digital Twin framework for smart-building performance management.
5. Assess HVAC optimization, occupancy analytics, and predictive controls for energy efficiency.
6. Design conceptual strategies for integrating solar PV and other renewable-energy technologies into buildings.
7. Explain the role of Battery Energy Storage Systems (BESS) in renewable-energy integration.
8. Apply Demand Response and load flexibility concepts to grid-interactive buildings.
9. Evaluate Building Energy Management Systems (BEMS) and energy-monitoring architectures.
10. Understand microgrids, distributed energy resources (DERs), and smart-grid integration.
11. Identify cybersecurity, interoperability, data governance, and resilience considerations.
12. Evaluate building projects using energy efficiency, carbon reduction, lifecycle performance, and ESG indicators.
13. Develop an integrated smart-building and renewable-energy roadmap supporting net-zero and climate-resilient operations.

Target Audience

1. Facility and Property Managers
2. Building Services and MEP Engineers
3. Energy Managers and Sustainability Professionals
4. Electrical and Renewable-Energy Engineers
5. Architects and Building Designers
6. Smart-City and Infrastructure Professionals
7. Operations, Maintenance, and Technical Managers
8. Sustainability, ESG, and Decarbonization Teams

Course Modules

Module 1: Smart Building Fundamentals

- Smart-building architecture and **Building Automation Systems (BAS)**.
- Connected buildings, **IoT ecosystems**, sensors, meters, and actuators.
- Building performance, energy efficiency, occupant comfort, and operational resilience.
- Introduction to **BEMS, HVAC controls, lighting controls, and intelligent monitoring**.
- **Case Study:** Conceptual transformation of a conventional commercial building into an IoT-enabled smart building.

Module 2: IoT, Data Analytics, AI, and Digital Twins

- **IoT data pipelines** for real-time building monitoring.
- AI and **Machine Learning** for energy forecasting and anomaly detection.
- Digital Twin concepts, architectures, and building-performance simulation.
- Predictive maintenance and **AI-enabled optimization**.
- **Case Study:** AI-powered Digital Twin for continuous building-energy optimization

Module 3: Building Energy Management and HVAC Optimization

- **BEMS** architecture, energy dashboards, and performance indicators.
- HVAC optimization and advanced control strategies.
- Occupancy-aware energy management and thermal-comfort considerations.
- Fault Detection and Diagnostics (**FDD**) and predictive maintenance.
- **Case Study:** Office-building HVAC optimization using sensor data, occupancy patterns, and predictive analytics.

Module 4: Renewable Energy Integration

- Solar PV fundamentals and **building-integrated photovoltaics (BIPV)**.
- Renewable-energy sizing concepts and energy-demand matching.
- Solar forecasting and renewable-generation monitoring.
- Integration of distributed energy resources (**DERs**).
- **Case Study:** Solar-PV-integrated commercial building transitioning toward **net-zero energy** performance

Module 5: Battery Storage, Microgrids, and Energy Flexibility

- **Battery Energy Storage Systems (BESS)** and their role in renewable integration.
- Energy storage dispatch and peak-demand management.
- Building-scale **microgrids** and distributed energy resources.
- Load flexibility, peak shaving, and demand-side management.
- **Case Study:** Solar-plus-storage commercial microgrid supporting resilience and improved renewable-energy utilization.

Module 6: Smart Grid and Grid-Interactive Buildings

- Fundamentals of **smart grids and grid-interactive efficient buildings**.
- Demand Response and automated load flexibility.
- Building-to-grid communication and distributed-resource coordination.
- Renewable variability, forecasting, and grid-support strategies.
- **Case Study:** Multi-building energy coordination using Digital Twin and AI concepts

Module 7: Cybersecurity, Interoperability, and Resilient Operations

- Cybersecurity fundamentals for connected building systems.
- **Data governance, privacy, identity, and access management**
- Interoperability between BMS, IoT platforms, renewable systems, and energy-management platforms.
- Edge computing, cloud platforms, and resilient system architectures.
- **Case Study:** Cyber-resilient smart-building architecture integrating BMS, IoT devices, cloud analytics, and renewable-energy assets.

Module 8: Net-Zero Buildings and Integrated Implementation

- **Net-Zero Energy Buildings (NZEBs)** and building decarbonization strategies.
- Energy-performance measurement, carbon accounting, and ESG indicators.
- Lifecycle thinking, retrofit strategies, and investment prioritization.
- Developing a phased **Smart Building + Renewable Integration Roadmap**.
- **Case Study:** Integrated commercial-building transformation combining energy efficiency, solar PV, storage, AI analytics, and grid interaction.

Training Methodology

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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