Renewable Energy Operations Excellence 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

Renewable Energy Operations Excellence Training Course is designed to equip energy professionals with the practical capabilities required to manage high-performing, reliable, digital, and sustainable renewable energy operations. As solar PV, wind, hydropower, battery energy storage systems, and distributed energy resources become increasingly integrated into modern power systems, operational excellence is moving beyond conventional O&M toward AI-enabled monitoring, predictive maintenance, digital twins, advanced analytics, automation, grid flexibility, energy storage optimization, and data-driven decision-making. Current industry and research developments highlight the growing role of AI and digitalisation in renewable forecasting, fault detection, asset optimization, predictive maintenance, and grid operations.

This course provides a structured framework for improving asset performance, availability, reliability, safety, operational efficiency, lifecycle value, and sustainability across renewable energy portfolios. Participants explore how SCADA, IoT, machine learning, digital twins, condition-based maintenance, intelligent automation, cybersecurity, forecasting, energy management systems, and flexible operations can be translated into practical operational improvements. The program uses realistic industry scenarios and case studies covering renewable generation, storage, grid integration, predictive maintenance, demand-side flexibility, and digital operations. These themes align with recent industry evidence emphasizing monitoring, forecasting, operational optimization, automation, flexibility, and data ecosystems as important components of modern renewable-energy operations.

Programme Curriculum

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Course Duration

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Course Objectives

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

1. Develop renewable energy operational excellence strategies aligned with business and sustainability objectives.
2. Optimize asset performance, availability, reliability, and lifecycle value across renewable portfolios.
3. Apply AI and machine learning concepts to renewable-energy operations and decision-making.
4. Implement predictive maintenance and condition-based maintenance strategies using operational data.
5. Use SCADA, IoT, real-time monitoring, and advanced analytics to improve asset visibility.
6. Apply digital twin concepts for simulation, diagnostics, optimization, and operational planning.
7. Improve renewable generation forecasting and manage intermittency through data-driven approaches.
8. Optimize battery energy storage systems (BESS) and other flexibility resources.
9. Strengthen grid integration, demand response, distributed energy resource (DER) management, and flexibility.
10. Improve operational resilience, climate resilience, business continuity, and risk management.
11. Integrate automation, remote operations, robotics, and intelligent inspection into O&M strategies.
12. Establish meaningful KPIs, performance dashboards, benchmarking, root-cause analysis, and continuous improvement systems.
13. Develop practical roadmaps for digital transformation, cybersecurity, sustainability, and Net-Zero operations.

Target Audience

1. Renewable Energy Operations Managers
2. Plant Managers and Site Managers
3. O&M Managers and Engineers
4. Asset Managers and Portfolio Managers

5. Solar PV and Wind Farm Professionals
6. Hydropower and Battery Storage Specialists
7. Grid, Energy Management and System Operations Professionals
8. Energy Executives, Consultants and Sustainability Leaders

Course Modules

Module 1: Renewable Energy Operations Excellence Framework

- Principles of operational excellence, reliability, productivity, and continuous improvement
- Renewable-energy operating models for solar, wind, hydro, BESS, and hybrid assets
- Operational KPIs-availability, capacity factor, performance ratio, MTBF, MTTR, and energy yield
- Lean operations, root-cause analysis, Six Sigma, and performance management
- **Case Study:** Improving performance across a multi-site solar and wind portfolio through standardized operational KPIs

Module 2: Digital Renewable Energy Operations and Industry 4.0

- **Digital transformation** of renewable-energy operations
- SCADA, IoT sensors, edge computing, cloud platforms, and real-time asset monitoring
- **AI-enabled operations, automation, advanced analytics, and remote-control centers**
- Data governance, interoperability, digital workflows, and operational data ecosystems
- **Case Study:** IRENA examples of digital solutions for grid optimization, predictive maintenance, flexible connections, and energy management.

Module 3: AI, Machine Learning and Predictive Maintenance

- AI/ML applications for **fault detection, anomaly detection, diagnostics, and remaining useful life**
- Condition-based and **predictive maintenance** versus reactive and preventive maintenance
- Using SCADA, vibration, thermal, weather, and equipment data for predictive insights
- Maintenance prioritization, work-order optimization, and downtime reduction
- **Case Study:** AI-supported renewable O&M using asset data to identify emerging equipment degradation and optimize maintenance interventions.

Module 4: Digital Twins and Intelligent Asset Performance

- Digital Twin architecture and **real-time asset synchronization**
- Virtual modeling of solar plants, wind turbines, hydropower systems, grids, and BESS
- **AI-driven simulation, what-if analysis, predictive diagnostics, and optimization**
- Digital Twin maturity, deployment challenges, data quality, and scalability
- **Case Study:** AI-enabled Digital Twins for renewable grids supporting forecasting, predictive maintenance, DER coordination, voltage/frequency management, and operational optimization.

Module 5: Renewable Forecasting, Grid Integration and Flexibility

- Solar and wind **power forecasting** using weather and operational data
- Managing intermittency, ramp events, curtailment, congestion, and balancing requirements
- **Grid flexibility, demand response, DER orchestration, and virtual power plants**
- Energy management systems and advanced grid-control strategies
- **Case Study:** Digital flexibility solutions that unlock grid capacity, reduce curtailment, and support higher renewable integration.

Module 6: Energy Storage and Operational Optimization

- BESS fundamentals, operating strategies, and **state-of-charge/state-of-health management**
- Storage dispatch for renewable integration, peak management, and grid flexibility
- Battery monitoring, degradation management, thermal-risk awareness, and lifecycle optimization
- Hybrid renewable-plus-storage operational strategies
- **Case Study:** Combining storage with digital control to increase renewable-system flexibility and optimize operational decisions.

Module 7: Reliability, Resilience, Safety and Cybersecurity

- Reliability-centered operations and **asset criticality management**
- Operational risk assessment, resilience planning, and extreme-weather preparedness
- Cybersecurity principles for SCADA, IoT, OT, cloud, and connected renewable assets
- Business continuity, emergency response, incident management, and recovery
- **Case Study:** Resilient digital power-grid operations addressing climate hazards, cybersecurity risks, distributed resources, and rapid restoration requirements.

Module 8: Performance Optimization, Sustainability and Future-Ready Operations

- **Operational dashboards, benchmarking, KPIs, predictive analytics, and performance improvement**
- Lifecycle cost optimization and **total cost of ownership**
- ESG, carbon reduction, circularity, resource efficiency, and sustainable O&M
- Building a **Renewable Operations Excellence Roadmap** and digital maturity plan
- **Case Study:** AI-supported O&M optimization combining conventional operational levers with advanced analytics to unlock additional value from large renewable portfolios.

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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