Grid Flexibility Solutions 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

Grid Flexibility Solutions Training Course provides a practical, future-focused understanding of how modern power systems can manage variable renewable energy, distributed energy resources (DERs), battery energy storage systems (BESS), demand response, and rapidly changing electricity demand. As grids evolve toward decarbonization, electrification, smart grids, and digital energy systems, utilities, system operators, developers, regulators, and energy professionals need advanced capabilities to maintain grid stability, resilience, reliability, and affordability. The course explores how grid flexibility can unlock higher renewable-energy penetration while managing congestion, balancing supply and demand, improving ancillary services, and optimizing network assets through AI, advanced analytics, automation, digital twins, and real-time energy management.

Participants gain hands-on insight into designing, evaluating, and implementing flexibility solutions across transmission, distribution, and behind-the-meter environments. Through industry case studies, scenario-based exercises, technical workshops, market simulations, and practical problem-solving, learners examine solutions such as virtual power plants (VPPs), microgrids, flexible demand, vehicle-to-grid (V2G), advanced forecasting, and energy storage optimization. The training connects technical concepts with energy markets, regulatory frameworks, investment decisions, cybersecurity, and business models, enabling participants to develop actionable strategies for creating more resilient, renewable-ready, digitally enabled, and net-zero power grids.

Programme Curriculum

Grid Flexibility Solutions Training Course

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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 grid flexibility, power-system balancing, and renewable integration.
2. Assess flexibility requirements created by solar PV, wind power, electrification, and distributed generation.
3. Evaluate battery energy storage systems (BESS) for frequency regulation, peak shifting, congestion management, and ancillary services.
4. Design demand-response strategies that convert flexible electricity consumption into grid-support resources.
5. Analyze the role of virtual power plants (VPPs) in aggregating DERs and delivering grid services.
6. Apply AI, machine learning, forecasting, and advanced analytics to flexibility planning and operations.
7. Develop strategies for integrating electric vehicles, smart charging, and vehicle-to-grid (V2G) technologies.
8. Evaluate microgrids and distributed energy resources as tools for resilience and energy security.
9. Identify opportunities for grid digitalization, automation, smart-grid technologies, and digital twins.
10. Assess flexibility markets, ancillary-service markets, tariffs, and innovative energy business models.
11. Address grid congestion, transmission constraints, distribution constraints, and network optimization.
12. Incorporate cybersecurity, data governance, interoperability, and operational resilience into flexibility programs.
13. Develop an actionable grid flexibility roadmap supporting decarbonization, energy transition, resilience, and net-zero objectives.

Target Audience

1. Utility executives and managers responsible for grid modernization and energy transition.
2. Transmission system operators (TSOs) and distribution system operators (DSOs).
3. Renewable energy developers and independent power producers.
4. Energy storage, battery, and flexibility-service providers.
5. Grid planners, engineers, and system operators.
6. Energy regulators, policymakers, and government agencies.

7. Energy consultants, analysts, investors, and project-finance professionals.
8. Technology, digital-energy, smart-grid, and EV infrastructure professionals.

Course Modules

Module 1: Fundamentals of Grid Flexibility and the Energy Transition

- Understand grid flexibility, flexibility resources, ramping requirements, balancing, and system adequacy.
- Examine how renewable intermittency, distributed generation, and electrification are transforming grid operations.
- Explore the flexibility value of generation, storage, transmission, distribution, and flexible demand.
- Analyze the relationship between grid resilience, reliability, decarbonization, and renewable-energy integration.
- Case study: Assess a high-renewables power system and identify the flexibility resources required to maintain reliable operation.

Module 2: Renewable Integration, Forecasting, and Advanced Grid Operations

- Examine wind and solar forecasting, uncertainty management, ramp forecasting, and real-time dispatch.
- Learn how advanced analytics and AI-powered forecasting can improve operational decision-making.
- Evaluate curtailment, congestion, balancing costs, and renewable-energy utilization.
- Explore flexible generation, grid-forming technologies, and advanced inverter capabilities.
- Case study: Develop a flexibility strategy for a utility experiencing rapid growth in solar PV and wind penetration.

Module 3: Battery Energy Storage and Long-Duration Flexibility

- Understand BESS technologies, battery degradation, state-of-charge management, and operational constraints.
- Evaluate applications including frequency response, peak shaving, energy arbitrage, capacity support, and congestion relief.
- Compare short-duration and long-duration energy storage solutions for different grid requirements.
- Examine storage revenue stacking, ancillary services, and energy-market participation.
- Case study: Build a conceptual business and operating model for a grid-scale battery providing multiple flexibility services.

Module 4: Demand Response, DERs, and Virtual Power Plants

- Explore demand-side flexibility, dynamic tariffs, load shifting, load shedding, and automated demand response.
- Analyze aggregation of DERs, smart appliances, batteries, rooftop solar, and controllable loads.
- Understand virtual power plants (VPPs) and their role in balancing increasingly decentralized grids.
- Examine DER orchestration platforms, distributed intelligence, interoperability, and customer participation.
- Case study: Design a VPP that aggregates commercial loads, residential batteries, and rooftop solar to provide grid-balancing services.

Module 5: Electric Vehicles, Smart Charging, and V2G

- Examine the impact of EV adoption, charging infrastructure, and transport electrification on distribution networks.
- Explore smart charging, managed charging, time-of-use tariffs, and flexible EV demand.

- Understand vehicle-to-grid (V2G) and vehicle-to-building applications.
- Assess opportunities to use EVs for frequency regulation, peak management, and renewable-energy absorption.
- Case study: Develop an EV flexibility program for a city facing evening peak-demand growth caused by widespread electric-vehicle adoption.

Module 6: Microgrids, Distributed Energy, and Grid Resilience

- Understand microgrid architecture, islanding, black-start capabilities, and resilient energy systems.
- Evaluate combinations of solar, BESS, backup generation, controllable loads, and advanced energy-management systems.
- Examine flexibility solutions for critical infrastructure, campuses, industrial facilities, and remote communities.
- Explore grid-edge intelligence, decentralized control, and resilience planning.
- Case study: Design a resilient microgrid concept for a critical facility requiring continuity of power during extreme-weather and grid-outage events.

Module 7: Flexibility Markets, Grid Digitalization, and Cybersecurity

- Examine flexibility markets, ancillary services, capacity mechanisms, tariffs, and emerging market structures.
- Analyze how digital platforms, smart meters, IoT, cloud systems, and digital twins enable flexibility.
- Explore AI-driven optimization, automated dispatch, and real-time grid visibility.
- Identify cybersecurity risks associated with DER aggregation, connected devices, communications networks, and digital control systems.
- Case study: Evaluate a digital flexibility platform and recommend market, cybersecurity, data-governance, and interoperability improvements.

Module 8: Flexibility Planning, Investment, and Net-Zero Grid Strategy

- Develop integrated flexibility strategies across generation, transmission, distribution, storage, and demand.
- Evaluate investment options using technical, economic, environmental, and resilience criteria.
- Explore non-wires alternatives (NWA) for managing grid constraints without immediate conventional network expansion.
- Build strategic roadmaps aligned with net-zero, energy-transition, grid-modernization, and resilience targets.
- Case study: Create a 2030–2040 grid flexibility roadmap combining BESS, VPPs, demand response, EVs, microgrids, and network modernization.

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
21 Sep 2026	25 Sep 2026	Online	$1,000
21 Sep 2026	25 Sep 2026	Physical	$1,500
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0
21 Sep 2026	25 Sep 2026	Physical	$0

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