BESS Grid 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

Battery Energy Storage System (BESS) Grid Integration Training Course is designed to provide industry professionals with advanced knowledge and practical skills required to deploy, operate, and optimize utility-scale energy storage solutions within modern power networks. As global energy markets accelerate toward renewable energy integration, grid decarbonization, smart grids, and energy transition, BESS technologies have become a critical enabler for improving grid flexibility, reliability, and resilience. This comprehensive program explores BESS architecture, grid-connected energy storage technologies, battery management systems (BMS), power conversion systems (PCS), energy management systems (EMS), grid codes, renewable hybridization, and advanced control strategies.

The course focuses on real-world applications of grid-scale battery storage projects, including frequency regulation, peak shaving, renewable energy smoothing, demand response, microgrid stability, ancillary services, and energy arbitrage. Participants will analyze global case studies from leading BESS deployments and develop expertise in designing integrated storage solutions that support net-zero targets, renewable penetration, distributed energy resources (DER), and future intelligent power systems.

Programme Curriculum

BESS Grid Integration Training Course

Introduction

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Course Duration

5 days

Course Objectives

By completing this BESS Grid Integration Training Course, participants will be able to:

1. Understand the fundamentals of Battery Energy Storage Systems (BESS) and their role in modern power grids.
2. Analyze grid integration challenges associated with large-scale energy storage deployment.
3. Develop knowledge of lithium-ion battery technologies, battery chemistries, and storage performance metrics.
4. Evaluate BESS system architecture, including battery racks, PCS, EMS, BMS, and thermal management.
5. Apply advanced concepts in renewable energy integration and grid flexibility solutions.
6. Understand international grid codes, compliance requirements, and interconnection standards.
7. Design BESS solutions for frequency control, voltage support, and ancillary grid services.
8. Explore energy management strategies, AI-driven optimization, and predictive analytics.
9. Evaluate BESS applications in solar-plus-storage and wind-plus-storage hybrid systems.
10. Assess battery safety, lifecycle management, degradation analysis, and sustainability practices.
11. Understand smart grid technologies, virtual power plants (VPP), and distributed storage networks.
12. Develop technical strategies for BESS project planning, feasibility studies, and investment decisions.
13. Apply global best practices for achieving resilient, reliable, and low-carbon energy systems.

Target Audience

1. Power System Engineers
2. Renewable Energy Professionals
3. Utility Managers and Grid Operators
4. Battery Storage Engineers
5. Electrical Engineers
6. Energy Consultants and Project Developers
7. Government Regulators and Energy Policymakers
8. Researchers and Academics

Course Modules

Module 1: Fundamentals of Battery Energy Storage Systems (BESS)

- Introduction to **grid-scale energy storage technologies**
- Role of BESS in renewable energy transition
- Battery chemistries-lithium-ion, LFP, sodium-ion, and emerging technologies

- BESS components-battery cells, racks, PCS, EMS, and BMS
- Energy storage performance parameters
- **Case Study: Hornsdale Power Reserve, Australia**

Module 2: BESS Architecture and System Design

- BESS electrical and control architecture
- Battery management system design principles
- Power conversion systems and inverter technologies
- Thermal management and safety systems
- Modular and containerized BESS solutions
- **Case Study: Moss Landing Energy Storage Facility, USA**

Module 3: Grid Integration and Interconnection Requirements

- Grid connection studies for BESS projects
- Transmission and distribution integration
- Grid stability and power quality considerations
- Voltage regulation and frequency response
- International grid codes and compliance standards
- **Case Study: UK National Grid Battery Storage Projects**

Module 4: Renewable Energy Integration with BESS

- Solar PV plus storage systems
- Wind energy storage integration
- Renewable energy smoothing techniques
- Hybrid renewable power plants
- Increasing renewable penetration using BESS
- **Case Study: Tesla Megapack Renewable Integration Projects**

Module 5: Energy Management Systems (EMS) and Smart Controls

- EMS architecture and operational strategies
- AI-based energy optimization
- Predictive energy management
- Automated dispatch and control systems
- Digital twins and smart grid applications
- **Case Study: Virtual Power Plant (VPP) Projects in Australia**

Module 6: BESS Applications and Revenue Models

- Frequency regulation services
- Peak shaving and load shifting
- Demand response applications
- Energy arbitrage strategies
- Ancillary services markets
- **Case Study: California Energy Storage Programs**

Module 7: Battery Safety, Lifecycle Management, and Sustainability

- Battery degradation mechanisms

- State of Charge (SOC) and State of Health (SOH)
- Fire protection and safety standards
- Battery recycling and circular economy
- Environmental impact assessment
- **Case Study: European Battery Storage Sustainability Initiatives**

Module 8: Future Trends in BESS and Energy Transition

- Next-generation battery technologies
- Artificial intelligence in energy storage
- Virtual power plants and decentralized grids
- Long-duration energy storage (LDES)
- Global BESS market growth opportunities
- **Case Study: China Grid-Scale Storage Expansion**

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

Ready to enroll or request a customized program? Book online or contact us:

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