Advanced Grid Planning Training Course

Professional Development Training Course Outline

Category	Renewable Energy	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Advanced Grid Planning Training Course is designed to equip energy professionals with advanced knowledge and practical skills in modern power system planning, smart grid optimization, renewable energy integration, and future-ready electricity infrastructure development. As global energy systems transition toward decarbonization, distributed energy resources (DERs), grid digitalization, and intelligent energy management, utilities and energy organizations require experts capable of designing resilient, flexible, and sustainable grid networks. This course provides comprehensive insights into transmission and distribution planning, grid reliability analysis, power system modeling, renewable integration strategies, energy storage planning, and advanced grid analytics.

This training program focuses on emerging trends such as smart grids, artificial intelligence (AI)-driven grid planning, grid modernization, advanced forecasting, microgrid development, electric vehicle (EV) integration, cybersecurity resilience, and climate-adaptive infrastructure planning. Participants will explore real-world planning challenges through industry case studies and practical applications, enabling them to develop optimized grid expansion strategies, improve operational efficiency, and support the transition toward net-zero energy systems and sustainable power networks.

Programme Curriculum

Advanced Grid Planning Training Course

Introduction

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Course Duration

10 days

Course Objectives

By completing the Advanced Grid Planning Training Course, participants will be able to:

1. Understand advanced concepts in power system planning, grid modernization, and energy transition strategies.
2. Apply advanced methodologies for transmission and distribution network expansion planning.
3. Develop expertise in renewable energy integration and grid flexibility management.
4. Utilize AI, machine learning, and predictive analytics for grid planning decisions.
5. Analyze grid reliability, resilience, and security enhancement techniques.
6. Design strategies for smart grid deployment and digital transformation.
7. Evaluate the impact of distributed energy resources (DERs) on future electricity networks.
8. Apply advanced tools for load forecasting and demand-side management.
9. Understand energy storage planning and grid balancing solutions.
10. Develop approaches for electric vehicle charging infrastructure planning.
11. Implement strategies for microgrid design and decentralized energy systems.
12. Improve decision-making through data-driven grid optimization techniques.
13. Prepare future-ready strategies aligned with net-zero targets and sustainable energy development goals.

Target Audience

1. Power System Engineers
2. Electrical Engineers
3. Grid Planning Specialists
4. Transmission and Distribution Professionals
5. Utility Managers and Executives
6. Renewable Energy Engineers
7. Smart Grid Consultants
8. Energy Policy Makers and Regulators

Course Modules

Module 1: Fundamentals of Advanced Grid Planning

- Evolution of traditional grids into intelligent energy networks
- Key principles of modern grid planning frameworks

- Grid reliability, flexibility, and resilience concepts
- Strategic planning approaches for future electricity systems
- Overview of global grid modernization trends
- **Case Study:** Transformation strategies implemented in modernized European power grids.

Module 2: Power System Expansion Planning

- Long-term transmission and distribution expansion strategies
- Generation capacity planning methodologies
- Network reinforcement planning techniques
- Investment optimization for grid infrastructure
- Planning under uncertain energy scenarios
- **Case Study:** Transmission expansion planning for renewable energy zones.

Module 3: Smart Grid Architecture and Digital Transformation

- Smart grid technologies and intelligent infrastructure
- Advanced monitoring and automation systems
- Digital substations and grid communication networks
- IoT applications in energy systems
- Data-driven grid management
- **Case Study:** Smart grid deployment initiatives in advanced utility networks.

Module 4: Renewable Energy Integration Planning

- Grid impact assessment of renewable generation
- Solar and wind integration challenges
- Renewable forecasting techniques
- Grid flexibility requirements
- Renewable energy penetration strategies
- **Case Study:** High renewable penetration management in Australia’s electricity market.

Module 5: Distributed Energy Resources (DER) Planning

- DER impact on distribution networks
- Distributed generation planning models
- Prosumer-based energy systems
- Virtual power plant concepts
- DER optimization strategies
- **Case Study:** Community energy systems using distributed generation.

Module 6: Advanced Load Forecasting and Demand Planning

- Modern electricity demand forecasting methods
- AI-based forecasting applications
- Consumer behavior analytics
- Demand response planning
- Future energy demand scenarios
- **Case Study:** AI-powered demand forecasting used by major utilities.

Module 7: Grid Reliability and Resilience Planning

- Reliability assessment methodologies
- Grid vulnerability analysis
- Climate-resilient infrastructure planning
- Disaster preparedness strategies
- Reliability improvement investments
- **Case Study:** Grid resilience upgrades after extreme weather events.

Module 8: Energy Storage Planning and Grid Flexibility

- Battery energy storage system (BESS) applications
- Storage sizing and optimization
- Grid balancing solutions
- Renewable energy storage integration
- Future storage technologies
- **Case Study:** Utility-scale battery storage supporting renewable grids.

Module 9: Microgrid Planning and Development

- Microgrid architecture and applications
- Grid-connected and islanded operation
- Microgrid control strategies
- Renewable microgrid design
- Community energy resilience
- **Case Study:** Remote area renewable microgrid implementation.

Module 10: Electric Vehicle (EV) Grid Planning

- EV charging infrastructure requirements
- Grid impact assessment of EV adoption
- Smart charging strategies
- Vehicle-to-grid (V2G) applications
- Future mobility-energy integration
- **Case Study:** National EV charging network planning strategies.

Module 11: Artificial Intelligence and Advanced Analytics for Grid Planning

- AI applications in energy planning
- Machine learning-based optimization
- Digital twins for grid simulation
- Predictive maintenance analytics
- Automated planning decision systems
- **Case Study:** Digital twin technology for power network optimization.

Module 12: Grid Cybersecurity and Risk Management

- Cybersecurity challenges in smart grids
- Critical infrastructure protection
- Data security frameworks
- Risk assessment methodologies
- Secure grid communication systems
- **Case Study:** Cyber resilience strategies for intelligent power networks.

Module 13: Advanced Grid Modeling and Simulation

- Power system modeling techniques
- Network simulation approaches
- Scenario-based planning
- Grid optimization software applications
- Simulation-based decision-making
- **Case Study:** Large-scale grid simulation for renewable integration.

Module 14: Sustainable Grid Planning and Net-Zero Strategies

- Carbon-neutral electricity planning
- Energy transition pathways
- Sustainable infrastructure development
- Green grid investment strategies
- Climate-focused planning approaches
- **Case Study:** Net-zero grid roadmap development by global utilities.

Module 15: Future Grid Technologies and Strategic Planning

- Next-generation grid technologies
- Autonomous grid management
- Blockchain applications in energy systems
- Hydrogen integration opportunities
- Future trends in global electricity networks
- **Case Study:** Future energy systems supporting 100% renewable scenarios.

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	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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