Virtual Power Plants (VPPs) 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

Virtual Power Plants (VPPs) are transforming modern energy systems by aggregating distributed energy resources (DERs) such as solar PV, battery energy storage systems (BESS), electric vehicles (EVs), smart loads, and flexible generation into intelligent, digitally coordinated power portfolios. Virtual Power Plants (VPPs) Training Course provides a practical and strategic understanding of VPP architecture, distributed energy resource aggregation, demand response, energy flexibility, grid-interactive technologies, energy markets, AI-driven optimization, IoT connectivity, and real-time energy management. Participants will explore how VPPs improve grid reliability, renewable energy integration, resilience, flexibility, and economic value.

Through practical exercises and real-world case studies, learners will examine how VPP platforms coordinate thousands of distributed assets and participate in ancillary services, frequency regulation, capacity markets, demand-side management, energy trading, and grid balancing. The course also addresses cybersecurity, interoperability, forecasting, regulatory frameworks, business models, and emerging VPP trends, enabling participants to evaluate, design, manage, and scale VPP projects in rapidly evolving electricity markets.

Programme Curriculum

Virtual Power Plants (VPPs) Training Course

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Course Duration

5 days

Course Objectives

1. Understand VPP architecture, DER aggregation, and grid flexibility.
2. Analyze distributed energy resources and their operational characteristics.
3. Design VPP strategies for renewable energy integration and grid balancing.
4. Apply AI, machine learning, and predictive analytics to VPP optimization.
5. Understand battery energy storage integration and optimization.
6. Evaluate demand response and flexible-load management strategies.
7. Explore EV charging, vehicle-to-grid (V2G), and EV flexibility.
8. Understand real-time energy management and digital grid technologies.
9. Evaluate participation in energy, capacity, and ancillary-service markets.
10. Develop VPP business models, revenue streams, and investment strategies.
11. Identify cybersecurity, data governance, interoperability, and resilience requirements.
12. Analyze international VPP regulations, policies, standards, and market frameworks.
13. Develop practical strategies for VPP deployment, scalability, decarbonization, and net-zero energy systems.

Target Audience

1. Energy utility and electricity-grid professionals
2. Renewable energy and solar PV professionals
3. Battery energy storage and BESS specialists
4. Power-system engineers and electrical engineers
5. Energy managers and sustainability professionals
6. EV, smart-charging, and V2G professionals
7. Energy-market, trading, and regulatory specialists
8. Project developers, consultants, investors, and technology providers

Course Modules

Module 1: VPP Fundamentals and Energy-System Transformation

- VPP concepts, definitions, evolution, and market drivers
- Centralized versus decentralized VPP architectures
- Distributed energy resources and flexibility aggregation
- Grid modernization, decarbonization, and energy transition
- **Case Study:** A utility-scale VPP integrating solar, batteries, and flexible loads

Module 2: VPP Architecture, Digital Platforms, and DER Aggregation

- VPP control layers and distributed asset orchestration
- IoT, smart meters, edge computing, and cloud platforms
- DER communication, interoperability, and data exchange
- SCADA, APIs, EMS, ADMS, and digital-grid integration
- **Case Study:** Multi-asset DER aggregation using a cloud-based VPP platform

Module 3: Renewable Energy, BESS, and Flexibility Management

- Solar and wind integration within VPP portfolios
- Battery energy storage sizing, dispatch, and optimization
- Energy flexibility and load-shifting strategies
- Forecasting renewable generation and energy demand
- **Case Study:** Battery-backed renewable VPP for peak-demand management

Module 4: Demand Response, Smart Loads, and EV Integration

- Demand-response program design and optimization
- Industrial, commercial, residential, and smart-building flexibility
- EV charging optimization and managed charging
- Vehicle-to-grid (V2G) and vehicle-to-home (V2H) concepts
- **Case Study:** EV fleet aggregation providing grid flexibility

Module 5: AI, Automation, Forecasting, and VPP Optimization

- AI and machine learning for VPP forecasting
- Automated dispatch and real-time optimization
- Predictive analytics for demand, generation, and prices
- Digital twins and advanced energy-management systems
- **Case Study:** AI-enabled VPP optimization for renewable intermittency

Module 6: Energy Markets, Ancillary Services, and VPP Revenue

- Wholesale electricity and flexibility markets
- Frequency regulation and ancillary services
- Capacity markets and demand-response participation
- Energy arbitrage and portfolio optimization
- **Case Study:** VPP participation in ancillary-service and flexibility markets

Module 7: Cybersecurity, Regulation, Resilience, and Risk

- VPP cybersecurity architecture and threat management
- Data privacy, identity management, and secure communications
- Grid codes, regulatory frameworks, and market access
- Reliability, resilience, contingency planning, and risk management
- **Case Study:** Cyber-resilient VPP architecture for critical energy infrastructure

Module 8: VPP Business Models, Implementation, and Future Trends

- VPP feasibility studies and implementation roadmaps
- Business models, investment, financing, and revenue stacking
- KPIs, performance monitoring, and portfolio scalability
- Net-zero strategies, energy communities, and transactive energy

- **Case Study:** Designing a scalable VPP for a renewable-energy community

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

Start Date	End Date	Location	Price
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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