



PB INSTITUTE OF RESEARCH AND TECHNOLOGY

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Nairobi - Kenya

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Distributed Energy Resource Aggregation Training

Duration: 10 days

On-Site

01 Who Should Attend

- This course is ideal for;
- 1.???? Utility Strategists and Grid Planning Engineers
- 2.???? Distributed Energy Resource (DER) Developers
- 3.???? Energy Management Software and Platform Vendors
- 4.???? Regulatory and Policy Analysts in the power sector
- 5.???? Grid Operations and System Operators
- 6.???? Investment Analysts focused on clean energy and flexibility markets

02 About the Course

This specialist course offers an in-depth exploration of how to successfully design, operate, and monetize Distributed Energy Resource (DER) aggregation systems, forming what are known as Virtual Power Plants (VPPs). It focuses on the crucial technical and commercial challenges involved in coordinating diverse assets—such as residential solar, battery storage, and electric vehicles—to provide essential services back to the electric grid and wholesale markets. Participants will master the software and optimization algorithms required for Real-Time Control, forecasting, and value stacking across multiple revenue streams. The curriculum is essential for professionals looking to transition centralized grid models toward a flexible, decentralized, and highly resilient energy future.



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03 Workshop Objectives

- Design and deploy effective Virtual Power Plants (VPPs).
- Master real-time optimization and control of heterogeneous DER fleets.
- Navigate wholesale market participation for aggregated resources.
- Implement robust cybersecurity and data management protocols.
- Analyze the business case for DER aggregation and value stacking.

04 Module Topics

Module 1:

- The rise of distributed energy resources
- The impact on the traditional power grid
- The need for aggregation and coordination
- The concept of a Virtual Power Plant (VPP)
- The role of a VPP in the energy transition

Module 2: Key DER Technologies

- An overview of solar PV and battery storage
- The role of electric vehicles and smart charging
- Demand response and energy efficiency
- The importance of a clear and focused research question
- Integration with other clean technologies

Module 3: The Virtual Power Plant (VPP)

- The architecture of a VPP
- The core components: DERs, a central management system, and communication
- The role of a "risk and mitigation" plan
- The difference between a VPP and a microgrid
- Real-time control and dispatch



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Module 4: Grid Services from DERs

- The concept of ancillary services
- Frequency regulation and voltage support
- The importance of a simple scorecard and a dashboard
- Capacity and peak demand management
- The role of a VPP in black start services

Module 5: The Aggregation Platform

- The software and hardware for aggregation
- The role of a "data story map"
- Communication protocols and standards (e.g., OpenADR)
- The use of a simple scorecard and a dashboard
- Data management and security

Module 6: Business Models and Markets

- The revenue streams for a VPP
- The importance of a clear and consistent reporting style
- Participation in wholesale energy markets
- The role of a clear and compelling KPI
- The business case for DER aggregation

Module 7: Data Analytics and AI

- Using data to forecast DER availability and demand
- The role of a "stakeholder analysis"
- The use of machine learning for optimization
- The importance of a clear and focused research question
- Predictive maintenance for DERs

Module 8: Interoperability and Standards



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- The importance of a common communication standard
- The role of a "data story map"
- Interoperability challenges between different vendors
- The role of a "program's theory of change"
- The future of open-source protocols

Module 9: Policy and Regulatory Frameworks

- The role of government policy in enabling aggregation
- The importance of a "risk and mitigation" plan
- Regulatory frameworks for VPP participation
- The importance of a clear and compelling KPI
- The evolution of market rules

Module 10: Cybersecurity for VPPs

- The unique security vulnerabilities of VPPs
- Securing the communication network
- The role of a "stakeholder analysis"
- Protecting the central management system
- Best practices for a secure VPP ecosystem

Module 11: Case Studies

- Case study: A successful VPP in a residential community
- Case study: An industrial VPP for demand response
- Case study: A VPP for grid stability
- Lessons learned from global projects
- The future of VPPs

Module 12: Project Management



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- The lifecycle of a DER aggregation project
- Managing a team and a budget
- The importance of a clear and consistent reporting style
- The role of a "risk and mitigation" plan
- The use of a simple scorecard and a dashboard

Module 13: Financial Modeling

- The financial components of a DER aggregation project
- The importance of a "data story map"
- The role of a program's theory of change
- Return on Investment (ROI) and payback period
- The financial viability of different business models

Module 14: Customer Acquisition and Engagement

- The importance of a "stakeholder analysis"
- The role of a clear and compelling KPI
- The business case for homeowners and businesses
- Customer onboarding and management
- The importance of a clear and focused research question

Module 15: The Future of Aggregation

- The role of blockchain and DLT
- The impact of EVs on VPPs
- The future of peer-to-peer energy trading
- The evolution of energy markets
- The role of aggregation in a decarbonized grid