Strategic Power System Planning with Distributed Energy Resources Training Course

Ref: #ERE7997

Course Introduction / Overview:

The modern electric power grid faces unprecedented challenges and opportunities, driven by the integration of distributed energy resources (DERs), such as solar, wind, and energy storage. This training course, offered by BIG BEN Training Center, provides a strategic and technical framework for professionals involved in the planning of power generation and transmission systems. It moves beyond traditional centralized models to address the complexities of a decentralized grid. The curriculum is built on the foundational principles of power system analysis and is informed by the work of prominent academics like Dr. Hossein Ranjbar, a leading researcher in resilient and sustainable power system planning. The course references key concepts discussed in texts like "Planning of Power Systems with Distributed Generation and Storage." Participants will gain a comprehensive understanding of how to conduct strategic planning that accounts for the variability and location-specific challenges of DERs. The program covers capacity expansion planning, transmission system upgrades, and the use of modern software tools to optimize system reliability and efficiency. By the end of this course, professionals will be equipped with the skills to develop robust plans that navigate regulatory requirements, economic factors, and the technical complexities of a grid in transition, ensuring a reliable and sustainable energy future.

Target Audience / This training course is suitable for:

- Power system planning engineers.
- Transmission and distribution network managers.
- Energy policy and market analysts.
- Utility executives and strategic planners.
- Renewable energy developers and consultants.
- Regulators and government officials.
- Researchers in electrical engineering and power systems.

Target Sectors and Industries:

- Power and utility companies.
- Electric grid operators.
- Renewable energy industry.
- Engineering consulting firms.
- Government agencies and regulatory bodies.
- Energy research institutions.

Target Organizations Departments:

- System planning and engineering.
- Grid operations.
- Asset management.
- Business strategy and development.
- Compliance and regulation.
- Research and development.

Course Offerings:

By the end of this course, the participants will have able to:

- Formulate comprehensive power generation and transmission plans.
- Assess the technical and economic impacts of integrating DERs.
- Utilize modern planning software to model future grid scenarios.
- Develop strategies for enhancing grid resilience and stability.
- Analyze the role of energy storage in grid planning.
- Understand the regulatory and market drivers of DER adoption.
- Evaluate different transmission expansion options.
- Integrate demand-side management into long-term planning.
- Forecast future load growth and its implications.

Course Methodology:

This training course is designed to be highly interactive and case-study-driven, allowing participants to apply complex theoretical concepts to practical, real-world scenarios. The methodology is centered on collaborative workshops where attendees will use industry-standard planning tools to model a variety of power system scenarios, including high-penetration DER integration. Participants will engage in group projects focused on developing strategic plans for generation and transmission projects, considering factors like cost, reliability, and environmental impact. The course includes interactive discussions and feedback sessions with subject matter experts to ensure a deep understanding of the material. This approach goes beyond a simple overview of concepts, providing hands-on experience in strategic decision-making and problem-solving. By simulating real-life planning challenges, BIG BEN Training Center ensures that every participant leaves with a robust and practical skill set, ready to tackle the complexities of modern grid planning and contribute to a more resilient and efficient power system.

Course Agenda (Course Units):

Unit One: Foundations of Power System Planning

- Principles of traditional generation and transmission planning.
- Load forecasting and demand-side management.
- Reliability metrics and standards.
- Introduction to integrated resource planning.
- Economic principles of power system investment.
- Regulatory frameworks and market structures.
- The shifting paradigm from centralized to decentralized grids.

Unit Two: Distributed Energy Resources and Their Impacts

- Types of DERs: solar, wind, storage, and combined heat and power.
- Technical impacts of DERs on the distribution and transmission networks.
- Challenges of DER variability and intermittency.
- Locational benefits and value of DERs.
- Modeling DERs in power system planning software.
- Hosting capacity analysis.
- Interconnection studies and their implications.

Unit Three: Strategic Transmission Planning in a New Era

- Transmission system planning goals and objectives.
- Assessing the need for new transmission lines.
- Congestion analysis and management.
- The role of transmission in enabling renewable energy.
- Non-wires alternatives: using DERs to defer transmission upgrades.
- Resilience planning for extreme weather events.
- Evaluating the economic viability of transmission projects.

Unit Four: Generation Capacity Expansion and Portfolio Optimization

- Long-term generation planning methodologies.
- Optimizing the generation mixes with renewables and storage.
- Stochastic planning for resource uncertainty.
- Economic dispatch and unit commitment with high DER penetration.
- The role of energy storage in providing grid services.
- Case studies in generation portfolio planning.
- Integrated planning for a low-carbon future.

Unit Five: Advanced Planning Tools and Future Trends

- Introduction to power system planning software.
- Modeling and simulation of complex grid scenarios.
- Using optimization techniques for large-scale planning problems.
- Future trends in grid technology and planning.
- The role of artificial intelligence and machine learning in planning.
- The concept of the flexible and autonomous grid.
- Final project: a comprehensive strategic plan for a modern utility.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

As distributed energy resources continue to proliferate, what innovative planning methodologies are necessary to ensure the long-term economic viability and technical stability of a grid that is no longer centrally controlled?

What unique qualities does this course offer compared to other courses?

This training course provides a truly integrated and forward-thinking perspective on power system planning, which sets it apart from traditional offerings. Most programs focus on either generation or transmission planning in isolation, but our curriculum unites these topics with the modern complexities of distributed energy resources. We teach participants how to move beyond static, historical planning models and instead use dynamic, data-driven approaches that account for the changing nature of the grid. Our focus on non-wires alternatives and the strategic use of DERs for grid support offers unique insights into optimizing investments and enhancing system resilience. The course is not just about tools or models, but about the strategic mindset required to lead planning efforts in a rapidly evolving energy landscape. By combining academic rigor with practical, hands-on exercises and real-world case studies, BIG BEN Training Center delivers a comprehensive and relevant learning experience that prepares professionals for the challenges of tomorrow's grid.