



Course length: One day

Prerequisites: None

CPE credits: 8

An in-depth look at changing grid technologies and design practices and how they are affecting the future of consumers and energy companies

The electrical grid is experiencing a radical transformation. What was designed as a one-way system to deliver power to consumers from central power plants is rapidly becoming a two-way Smart Grid. Adding even more complexity, the grid is now also being asked to integrate new sources of power, including renewables, distributed generation, storage, and active demand side management resources. This seminar covers key concepts in grid evolution such as communications, control, distributed intelligence, and asset/resource management as well as the evolving and new services that these technologies will enable. Lastly the seminar considers case studies from first movers in implementing Advanced Grid applications.



WHO WILL BENEFIT FROM THIS SEMINAR?

- Technical professionals including IT, system operations, and field operations needing a big picture overview of grid changes
- New engineers not familiar with the concepts of the advanced grid
- Business professionals who interact with technical professionals involved in grid design and operations
- Regulatory professionals who need to explain advanced grid concepts to stakeholders
- Technology vendors who want to understand the big picture to develop marketing strategies

WHAT PARTICIPANTS WILL LEARN

- How grid design and operation concepts are changing
- Smart technologies available to consumers and how they are changing consumer behavior
- Advanced distribution technologies and how they are changing distribution system design and operation
- Advanced generation and transmission technologies and how they changing bulk power system design and operations
- Steps needed to implement advanced grid technologies and concepts
- Examples of states that are leaders in implementing the Advanced Grid

COURSE AGENDA

Introduction

- Overview of grid changes over time
- Factors currently driving changes to the grid
- Changing load shapes
- What the "Advanced Grid" is
- Why grid changes are needed
- Evolution to a "two-way" grid network

- The parallel grid – a communications network
- Activity: Ongoing list of what is needed to implement the Advanced Grid

20th Century Grid

- Generation following load curves
- Key fundamentals of running a power system
 - Maintaining frequency
 - Maintaining voltage
 - Managing power quality
- How "20th Century" grids were designed and operated to provide key fundamentals
- Activity: What are issues that may require changes to the "20th Century" grid?

The Advanced Customer

- How customers are changing to desire more choices and more control
- Advanced Meter Infrastructure (AMI)
- Usage information portals
- Controllable consumer devices
- Electric vehicles (EVs)
- Gateways, Home Area Networks (HANs), and decision support systems
- Industrial control systems
- Aggregation of DSM
- Distributed generation
- Distributed storage
- Advanced inverters
- Microgrids
- Integrating loads into markets
- Pricing
- Customer opportunities
- Activity: What grid needs can consumer-owned devices address?





The Advanced Distribution System

- Substation automation
- Expanded SCADA systems
- Intelligent Electronic Devices (IEDs)
- Distribution automation
- Distributed energy resources as a distribution asset
- Advanced Distribution Management Systems (ADMS)
- Data analytics
- Distribution resource planning
- Activity: What grid needs can be solved through advanced distribution systems?

The Advanced Bulk Power System

- Phasor Measurement Units (PMUs)
- Data visualization
- Power quality and flow control devices
- Transmission level storage (including substitution for gas peaking units)
- Integration of renewables
- The evolving bulk power system
- Activity: What grid needs can be solved through advanced bulk power systems

Making it Happen

- Who will build and own assets and how they will be compensated
- New markets enabled by advanced grid
- Smart grid standards
- Communications systems
- Cyber security
- Data management
- Workforce issue
- Activity: Biggest issues for advanced grid implementation

Case Studies

- Arizona
- California
- New York
- Illinois

The Future

- Summary of what the Advanced Grid may look like
- Activity: Key benefits to consumers and utilities and critical factors for success

