



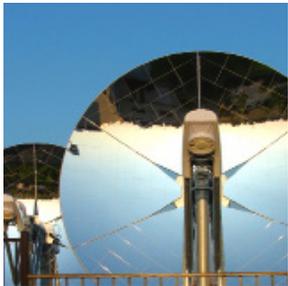
Course length: One day

Prerequisites: None, although a basic understanding of the electricity business as learned in Electric Industry Basics (seminar), Electric Industry Overview (online course), Understanding Today's Electric Business (book) is useful.

CPE credits: 8

An in-depth study of the fast-growing renewable electric generation industry

Renewable power is the fastest growing segment in the electric generation industry, and emerging technologies are being developed and implemented at record speed. Fueling this growth is government policy which has mandated renewable energy portfolio standards in more than half of the U.S. states. Renewable Energy: Sources, Technologies, and Economics introduces participants to each renewable generation technology in commercial use today. The seminar explores how each technology works and its operating characteristics and economics; challenges and solutions for integrating renewables into the physical grid; how government policy and markets are combining to enable rapid growth in renewables; and a vision of what the future may hold for renewables.



WHO WILL BENEFIT FROM THIS SEMINAR?

- Utility and retail marketer procurement professionals and energy buyers for large electric users
- Utility account representatives and department managers
- Employees of ISOs/RTOs needing a vision of the current and future impact of renewables
- Professionals in the legal, finance, accounting, PR, and communications fields who are working for an industry participant or providing services to the energy industry
- Technical employees such as engineers and information technology professionals needing a fundamental overview of renewables and their integration issues
- Professionals from the advocacy community who want to learn the business aspects of renewable power

WHAT PARTICIPANTS WILL LEARN

- What renewable energy is
- The different types of renewable energy
- Various technologies used to generate renewable electricity
- Costs and tradeoffs of various renewable generation options
- Key issues associated with integrating renewables into the grid
- The key role of government policy and various government initiatives that foster renewables growth
- The role and structure of markets for renewable energy
- The role of the smart grid and storage in renewables growth
- The possible future for renewable generation

COURSE AGENDA

Introduction to Renewables

- What renewable electricity is
- Why the interest in renewables?
- Renewables as an environmental policy tool
- Renewables as an investment and economic opportunity
- Renewables in the U.S. and world electric supply mix
- Where renewable resources are located in the U.S.
- Obstacles to increasing use of renewable energy (economics, institutional barriers, physical grid issues, lack of understanding)
- The role of government policy in renewables
- The role of markets and individuals in renewables

The Technologies and Grid Integration

- Key factors to consider with each technology (definition, potential resources, costs, applications, grid integration issues, environmental considerations)
- Wind
- Solar (photovoltaic or PV, concentrated solar power or CSP)
- Geothermal
- Biomass
- Biogas
- Hydro
- Issues with integrating renewables onto the grid
 - Dispatchability
 - Variability
 - Predictability
 - Reserves requirements
 - Transmission requirements
 - Distributed renewable generation
- Tools for integrating renewables





- Forecasting
- Pairing with flexible generation (hydro, gas, storage)
- Scheduling rules
- Geographical dispersion with regional scheduling
- Electronic interconnection technology such as smart inverters
- The future (smart grid, smart house)
- What happens when PVs become cost-competitive with coal and gas?
- Economics, technology, policy, and the potential future for renewables

The Role of Government Policy

- Government and its goals
- Mechanisms for the government to encourage growth of renewable generation
 - Tax benefits
 - Renewable Portfolio Standards (RPS) programs
 - Direct incentive programs
 - Rebate programs
 - Net metering
 - Feed-in tariffs
- Government as a consumer
- Renewables as part of carbon regulation

The Role of Markets

- Individuals and green business early adopters
- Producers of renewable electricity (goals and mechanisms)
- Providers of green energy services (goals and mechanisms)
- Purchasers of green energy services (goals and mechanisms)
- Typical deal structures (bilateral power purchase agreements, renewable energy credits or RECs, self-ownership of projects, self-ownership of onsite generation)

The Future

- Overcoming the challenge of grid integration
- The smart grid and real-time pricing
- Storage

