Session 1: How the Electric Grid and Energy Markets Function and the Key Drivers for Change

How the Electricity Industry Works: Understanding Regulated and Restructured Markets

- Vertically integrated utilities.
- Competitive markets and how they work.
  - Products & prices (capacity, grid balancing services, energy).
  - General cost structures.
  - Regulatory bodies and responsibilities.

Electric Generation Assets

- Operating characteristics
  - Nuclear.
  - Coal.
  - Gas.
  - Wind.
  - Solar.
  - Other resources.
- Capital vs. operating costs and levelized costs of energy.
- Understanding the dispatch resource stack—which resources are dispatched first and in what order.
Session 2: Challenges of Decarbonizing Energy: Growing Grid, Changing Supply/Demand Mix, Integrating Renewables, and Energy Storage

Critical Issues Related to Beneficial Electrification and the Growth of the Grid

- Drivers for increased electricity consumption.
  - Heat pumps.
  - Electric vehicles.
  - Hydrogen.
- Potential impacts on the future grid.
- Addressing uncertainties in energy planning, especially with recent federal subsidy programs.

The Challenge of Decarbonization and the Evolution of the Generation Fleet

- The impact of fracking on power markets and prices.
- Challenges of integrating renewables: Managing variability and negative co-variance of renewable resources.
- The growing role for energy storage, both short- and long-duration.
- The increasing role of distributed generation resources (DERs) and how they can aid in decarbonization strategies.


The Growing Tension Between Centralized and Distributed Resources

- The increasing role of distributed generation resources (continued).
  - Examples and business models pointing the way forward.
  - Distributed solar and the critical issue of net metering.
  - Coordination challenges and architectures.
  - Challenges related to the “electrification of everything”.

A Possible Roadmap for the Evolution of the Grid

- Where we stand today.
- Where we may be by mid-decade.
- 2030 and beyond: going the last mile to a cleaner grid.
  - Hydrogen.
  - Small modular nuclear.
  - Fusion.

Questions?

Contact learning@sepapower.org