In this training, we address the opportunities and promise of energy storage. We examine the various use cases for storage across the entire utility ecosystem—from the grid edge, to the distribution utility, to the bulk power system run by grid operators. We look at the different energy storage technologies and discuss where each fits into the larger picture as the grid continues to evolve.

During the course, we discuss the reasons for the primacy of lithium ion batteries in today's storage markets and the performance characteristics of lithium-ion compared with other technologies. Finally, we will discuss the likely migration path from today's predominantly short-duration storage technologies to longer duration applications—including flow batteries, thermal storage, iron-air, and hydrogen.

Hour 1: Explaining The Basics

Making a Case for Energy Storage

- Setting the Context—a brief overview of competitive markets and vertically integrated utilities.
  - Energy—day ahead and real time—with a focus on how energy markets work.
  - Capacity/resource adequacy.
  - Ancillary services.
  - Frequency regulation.
- The Distribution Grid—current inefficiencies and challenges.
  - Issues relating to meeting peak demand (load factor).
  - Regulatory models, (e.g. NY REV, MA SMART).
- How Storage Address Multiple Needs—with illustrative use cases.
  - Residential storage integrated into grid operator and utility programs
  - Distribution utilities "Non-Wires Alternatives"
  - Competitive bulk power opportunities

The Storage Technologies: Advantages and Attributes

- Types of energy storage and chief characteristics
- Lithium ion batteries, and why they are winning
  - Technical fundamental - how each battery chemistry works
  - Lithium ion supply chain dynamics
  - Balance of system costs
Hour 2: Valuing Storage as a Resource in Utility Portfolio Planning Practices

Determining optimal levels and values for storage applications as the grid evolves

- What problem are you solving for?
  - Megawatt hours vs megawatts - optimal energy to capacity ratios
  - Growing renewables populations need to address Resource Adequacy

Addressing safety concerns and best practices

- The case of Arizona Public Service
- Deployment of other more stable technologies

Current and future use cases

Regulatory Framework: policy, subsidies, and rate structure

- IRA Investment tax credit (ITC)
- FERC Orders
  - 841 and integration or storage into wholesale energy markets
  - 2222 and distributed energy resources
- State-specific storage initiatives and mandates
  - Utility grid modernization proceedings

Future trends and developments to watch for

SEPA Basic Training Courses

Interested in learning more? We offer four other Basic Training courses to help you fortify your knowledge:

Now Available On Demand:

- **Electric System Basics**—In this training we discuss the four basic elements of the electric system, the evolution of the power grid, the growing role of distributed energy resources, and the future of the electric system.
- **Distributed Energy Resource Basics**—In this training we examine the rapid ascent of DERs; the various types of DERs and the services and value streams they can provide; and how to identify, evaluate, and optimize the use of DERs to address various challenges.

Upcoming Live Virtual Events:

- **September 19, 2023: Electrification of Transportation Basics**—In this training, we discuss the rapid electrification of the transportation sector and the challenges and changes necessary to efficiently and safely integrate EVs into our power grids.
- **October 10, 2023: Hydrogen Basics**—In this training we take a look at why there is so much interest in hydrogen, which industrial sectors hydrogen may be applied, the challenges of developing a hydrogen economy, and where the hydrogen future might take us.

Questions?

Contact learning@sepapower.org