In this training, we explore the rapid electrification of the transportation sector, comparing the benefits and drawbacks of electric vehicles with their internal combustion counterparts. We discuss the reasons behind the accelerating growth rates and the evolution of the underlying technologies, including alternative approaches like hydrogen.

We delve into the lithium-ion battery chemistries and the challenges of integrating EVs with the power grid, covering topics such as different types of charging, vehicle-to-facility, and vehicle-to-grid capabilities. Finally, we examine the planning challenges and institutional changes required to safely and efficiently incorporate the increasing number of EVs into our power grids.

Hour 1: EV Growth, Technology Issues, and Customer Concerns

The Rise of Electric Vehicles

- Adoption rates—historic and projected growth.
  - Passenger vehicles.
  - Fleets and buses.
  - Trucks.
- Critical issues related to customer adoption.
  - Charging speeds.
  - Charging standards and interoperability.
  - Vehicle limitations and concerns, including battery capacity, technologies, chemistries, cycle lives, and implications for the grid.

Implications of EVs for Utility Planning

- Load growth and energy use—implications for bulk power system.
  - Projected future energy use.
  - Resource adequacy.
- Challenges at the distribution level.
  - Hosting capability.
  - Potential for increased infrastructure utilization.
- Approaches to grid connections.
  - Managed charging.
  - Wireless charging combined with storage.
  - Vehicle-to-facility.
  - Vehicle-to-grid.
Hour 2: Optimizing EVs: Policies and Planning Models

Maximizing EV Potential for an Efficient Grid

- Aggregation of EV Assets
  - Coordinating multiple vendors and EV types
  - Monitoring stationary vehicles and assessing readiness
  - Managing dispatch and portfolios
- Valuing EVs in DER planning
  - Forecasting challenges at macro and granular levels
  - Evolving vehicle use and charging behavior
  - Setting appropriate incentives
  - Limitations and creating portfolio approaches

Effective Program Design

- Importance of integrating EV management across utility departments
  - Potential impacts on multiple utility departments
  - Coordination challenges among multiple entities

- Program design elements
  - Setting rates and motivating participation
  - Appropriate pricing strategies
  - Integration with other DER programs
  - The need for timely, accurate and granular market-based locational information

Regulatory Policies

- Policy and rate structures
  - The importance of the policy and regulatory landscape
  - Federal policy drivers (e.g., FERC 2222)
  - EV tax incentives and other subsidies
  - State and local policy drivers

Other Critical Concerns

- The need for an evolving and secure grid architecture
  - Bi-directional flows/transactive power challenges
  - Monitoring and power quality concerns
- Cybersecurity—potential impacts and countermeasures

SEPA Basic Training Courses

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.

Energy Storage Basics—In this training we review energy storage opportunities and use cases across the utility ecosystem, as well as different storage technologies and their role in the evolving grid.

Upcoming Live Virtual Events:

- 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