Virtual Training

THE ACADEMY
AMERICAN PUBLIC POWER ASSOCIATION

The Hope and the Hype: Making Sense of the Long-Awaited Hydrogen Economy

Tuesday, Sept. 14
8 a.m. – Noon Pacific *(two 10-min. breaks at 9:30 a.m. and 10:45 a.m.)*

Course Description
2020 witnessed a rapidly growing level of interest in hydrogen, with many new green hydrogen projects being announced. One analyst reports that in the year from August 2019 to 2020, the volume of green hydrogen projects jumped from 3.2 gigawatts to over 15 gigawatts of capacity. As these volumes increase, costs of producing green hydrogen continue to fall. Some estimates foresee these costs declining by as much as two-thirds by 2040. In some markets—where carbon is priced into the equation—green hydrogen could be cost-competitive with fossil fuels as early as 2035.

What does this mean for our future energy economy? What are the critical technological challenges, cost curves, and applications? And are we finally getting past the hype and navigating towards a long-awaited hydrogen economy?

This course will address those questions and provide a comprehensive overview of the key issues related to production and applications of hydrogen in the global energy economy.

Course Topics
- Why Now? The Case for Hydrogen: It's All About Carbon
    - Decarbonization of the Industrial Sector will Drive Scale that Will Eventually Apply to Utilities
        - Steel
        - Cement
    - Transportation Applications
        - Long-Haul Trucking
        - Rail
        - Maritime
    - Long-Term Energy Storage

- The Chemistry: The Promise and the Challenge
    - Density and Molecular Structure
    - Energy Density
    - Flame Speed
    - Other Essential Characteristics

- The Value of Hydrogen in the Electric Power Grid
    - Behind-the-meter generation for reliability and resilience: emerging use cases
    - Grid-scale inter-seasonal storage to decarbonize the grid
    - Carbon-light electricity generation: methane/hydrogen fuel mixtures: current turbine capabilities

- Necessary Price Points and Comparisons: Technology, Costs and Current Applications
    - Green Hydrogen (Electrolysis)
    - With a high-level overview of grey hydrogen (Steam Methane Reformation), glue hydrogen (Carbon Capture and Storage), and turquoise hydrogen (Pyrolysis)

- Green Hydrogen: From Creation to Consumption: Challenges Along the Entire Chain
    - Electrolyzer technologies, current costs and challenges
        - Solid Oxide
        - Alkaline
        - Polymer Electrolyte Membranes (PEMs)
        - Anion Exchange Membrane
        - Wright's Law and Future Cost Projections
    - Transportation
        - Compressed – Advantages and Disadvantages
        - Liquified - Advantages and Disadvantages
        - Liquid Organic Carriers
        - Inorganic Carriers, e.g., Amonnia
    - Storage
        - Caverns
    - "Well-to-wheel" efficiency losses in the chain

- Government Programs Driving Scale
    - Japan
    - China
    - Australia
    - EU
    - US

- Grid Applications and Proposed Projects: Utility Examples
    - Intermountain (LADWP)
    - New Fortress/GE - Hannibal Ohio
    - Florida Power and Light
    - San Diego Gas & Electric
    - Douglas County PUD No. 1

- A Review of Meaningful Hydrogen Production Projects Announced to Date
    - Australia
    - North Sea
    - United States

- What to Watch For in 2021/2022

Learning Objectives

Upon successful completion of this course attendees will be able to:

- Discuss the basics of hydrogen and the different uses and applications
- Examine the opportunities and challenges (technical, physical, and economic) facing hydrogen adoption
- Review efficiency losses related to the entire hydrogen supply chain
- Discuss the economic hurdles that need to be addressed for widespread applications
- Identify potential applications of hydrogen in power grids

- Identify actors, use cases, and projected investments
- Develop milestones and timelines to pay attention to

Course Level
Basic: No prerequisites, no advance preparation.

Recommended for
Utility staff and policymakers looking for an in-depth look at the hydrogen energy landscape (with a focus on green hydrogen) and its potential future impacts. This foundational course will provide a comprehensive overview for those who are relatively inexperienced in the industry and will provide a helpful update to those looking to advance their knowledge on these topics.

Instructor
Peter Kelly-Detwiler, Co-founder of NorthBridge Energy Partners

Peter draws on more than 25 years of experience in the energy industry focusing on the development of retail competitive markets, new trends, technologies, regulatory and market developments, and sustainable solutions that create value in the energy space. He is an active contributor at Forbes.com, covering a broad variety of topics, including the economics of natural gas supply and electricity generation, evolving supply and demand technologies, the evolution of renewables, and trends affecting the energy industry. His new book titled, "*The Energy Switch: How Companies and Customers are Transforming the Electrical Grid and the Future of Powe*r" focuses on innovation and disruption in the electric power industry.