

## Hydrogen Applications in a Low-Carbon Economy

### Course Description

This course is part of an educational library of short courses developed and offered by the Hydrogen Education for a Decarbonized Global Economy (H<sub>2</sub>EDGE) program to address the emerging hydrogen industry. If the hydrogen industry is going to have workers that can provide the production, delivery, storage, and use of hydrogen in a safe manner, it will need to train and educate that workforce. This course offers an overview of hydrogen and its end uses. Additionally, the course covers the end use devices and provides information on the basic economics and safety considerations, and future needs. The main learning objectives that you will know after taking this course include:

- Identify the end use sectors where hydrogen could potentially have an impact.
- Explain the current status of those sectors.
- Discuss the other pathways to decarbonize those end uses.
- Identify the end use devices that could come into play in the growing hydrogen economy.
- Identify the core safety and economic considerations.
- Discuss the current status of the regulations, codes, standards, and legislations.

This course is being offered in a virtual format. It will be a two-day course for a total of 4 hours.

**Acknowledgment:** This material is based upon work supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) under the Hydrogen and Fuel Cell Technologies Office's FY2020 H<sub>2</sub>@Scale New Markets FOA, Award Number DE-EE0009253.

### Who Should Attend?

This course is intended for engineers, administrators, or other industry professionals from utilities or other organizations looking to increase their understanding of hydrogen end uses and their associated devices, as well as those who are preparing themselves for career opportunities in the hydrogen economy.

### Registration Information

#### Dates and Times:

- Wednesday, October 9, 2024
  - Section 1: 2 pm – 3 pm ET
  - Break: 3 pm – 3:15 pm
  - Section 2: 3:15 pm – 4:15 pm
- Thursday, October 10, 2024
  - Section 3: 2 pm – 3 pm ET
  - Break: 3 pm – 3:15 pm
  - Section 4: 3:15 pm – 4:15 pm

**PDHs Available:** 4 Hours (80% participation is required to receive PDHs, no partial PDHs)

**Registration Fee:** No fee

[Click Here to Register](#)

#### Course Contacts:

Krystal York, [kyork@epri.com](mailto:kyork@epri.com), 269-391-4580

Eladio Knipping, [eknipping@epri.com](mailto:eknipping@epri.com), 650-799-7088

**This course is part of a series of courses on hydrogen that can either be taken together or separately. The series covers several pieces of the hydrogen value chain and includes: An Introduction to the Basics of Hydrogen Science, Trends in Electrolyzer Technology, Hydrogen Storage and Delivery, Hydrogen Applications in a Low-Carbon Economy, and Hydrogen in Power Generation. More courses may be added to this series as H<sub>2</sub>EDGE progresses.**

## Meet the Instructors



**Perry Stephens** is a Principle Technical Leader, Electric Power Research Institute where he assists utilities to evaluate, develop and implement electric end-use technologies for residential, commercial, and industrial customer segments. Previously, Mr. Stephens worked for Duke Energy and The Timken Company and is considered an expert in manufacturing, thermal processing, energy efficiency, energy business strategies and engineering project management. Mr. Stephens is a Certified Energy Manager and holds a BSME from Rose-Hulman Institute of Technology in Terre Haute, IN and an MBA from Gardner-Webb University in Boiling Springs, NC.



**Tatum Auvil** is a Research Analyst for the Low-Carbon Resources Initiative at the Electric Power Research Institute (EPRI). Her current research activities focus on end-use applications of low-carbon fuels such as hydrogen and ammonia. Prior to joining the LCRI team, Auvil supported technology scouting and thought leadership efforts in EPRI's Technology Innovation program after first joining EPRI as an intern for the Advanced Nuclear Technology program. She holds a B.S. in Physics from the University of North Carolina at Chapel Hill.



**Sudeshna Pabi** is a Senior Technical Leader for the Low-Carbon Resources Initiative at the Electric Power Research Institute (EPRI). She is currently supporting LCRI's End Use Technical Subcommittee and upcoming government opportunities. She has previously supported EPRI's Technology Innovation (TI) program. Before joining the TI program, Sudeshna was an Energy Institute Fellow at UT-Austin and also worked in EPRI's PDU sector focusing on the deployment of decarbonization technologies. She holds a Ph.D. from Stanford University in Earth Energy and Environmental Sciences.



**Alex Gupta** is EPRI's Low-Carbon Fuel Safety Specialist, focusing on hydrogen and ammonia. He leads research on cutting-edge sensor and big data technologies, contributes safety expertise to infrastructure and demonstration initiatives, conducts landscape reviews, and spearheads efforts to quantify and mitigate risks. Dr. Gupta is a Ph.D. Chemical Engineer with prior experience in hydrogen electrocatalysis and nuclear process safety.

## Course Outline

### Section 1 – Introduction

- Economy-Wide Fossil Fuel Usage in Final Energy
- Overview of Final Energy Decarbonization Pathways

### Section 2 – Safety Considerations

- Hydrogen Safety Considerations for End Use Applications

### Section 3 – The Hydrogen Value Chain

- Overview of the Hydrogen Value Chain
- Overview of Hydrogen Production
- Overview of Hydrogen Delivery and Storage

### Section 4 – End Use Markets and Applications

- Overview of Hydrogen End-Use Devices
- Existing Applications
- Key Opportunities for Low-Carbon Hydrogen and Hydrogen-Based Fuels
- Industry
- Hydrogen-enabled Microgrids
- On-road Transport
- Non-road Transport

### Section 5 – Economic Considerations

- Hydrogen Demand Potential and Energy System Impacts
- Hydrogen Economic Considerations for End Use Applications

July 2024

**Disclaimer:** This was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

### Electric Power Research Institute

3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA 800.313.3774 • 650.855.2121 • [askepri@epri.com](mailto:askepri@epri.com) • [www.epri.com](http://www.epri.com)