MELISSA SHURLAND
Program Manager, FRA's Office of Research, Development & Technology

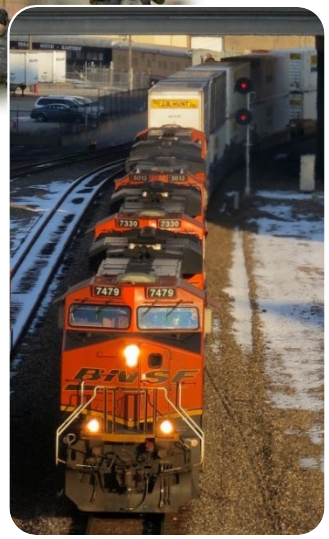
FRA Hydrogen and Fuel Cell Research

U.S. Department of Energy Hydrogen & Fuel Cells Program
2019 Annual Merit Review Meeting
Crystal City, VA • April 29, 2019 – May 1, 2019

U.S. Department of Transportation
Federal Railroad Administration

FRA Research, Development & Technology's (RD&T) Mission

- To ensure the safe, reliable, and efficient movement of people and goods by rail through basic and applied research, and development of innovations and solutions.
- **Safety** is the principal driver of FRA's RD&T program, while other drivers include DOT's other Strategic Goals of:
  - Infrastructure
  - Innovation
  - Accountability



FRA RD&T Approach – Collaboration

- FRA Alternative Fuels Research projects are executed through successful collaborations with the industry, academia, and other Federal agencies:
  - Innovators of Rail Industry
  - US Railroads
  - Association of American Railroads (AAR)
  - American Public Transportation Association (APTA)
  - Original Equipment Manufacturers (OEM)
  - US DOT Modal Agencies
  - US DOE National Laboratories

- Partnership with US DOE offers FRA access to world-renowned experts and research that is cross-pollinated with our own expertise to advance the science of rail transportation safety and efficiency.

Why Hydrogen & Fuel Cell Technologies?

- Hydrogen and fuel cell technologies presents the next frontier of alternative fuels for rail that can:
  - Reduce rail dependence on fossil fuel
  - Improve emission of rail transportation

- *FRA must ensure such technologies are safe!*

FRA RD&T Collaboration with US DOE

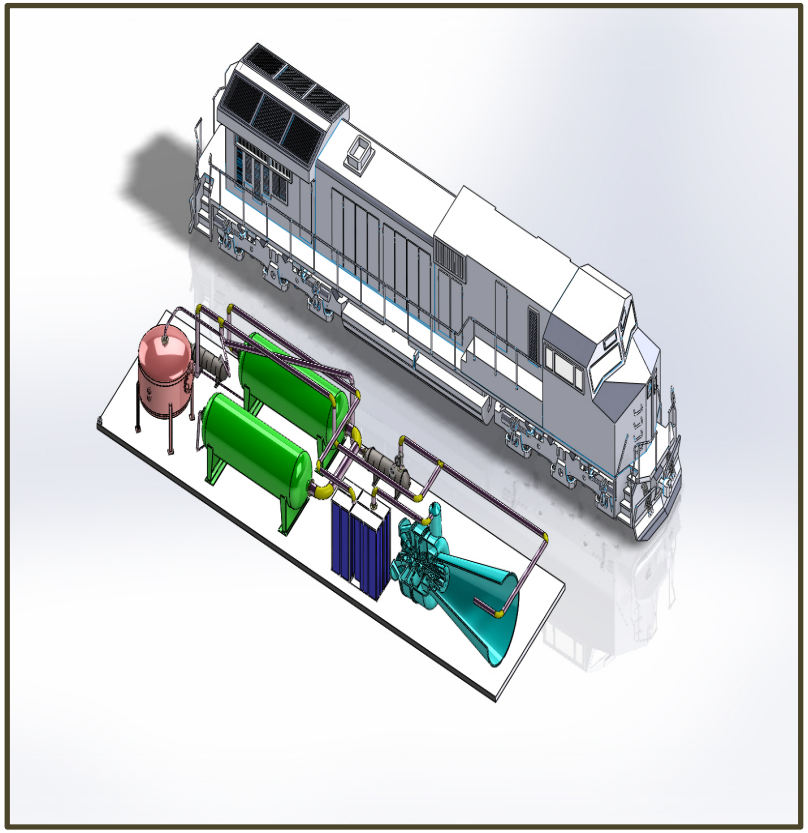
H2@Rail Workshop: March 26 - 27, 2019, Michigan State University

- Over 70 experts from Europe, Asia, and North America participated.
- Rail and fuel cell industry participants described projects in Europe, Canada, and South Korea.
  - Alstom Coradia iLint's hybrid hydrogen fuel cell (HFC) train started passenger service in Germany in September 2018.
  - Canada completed an in-depth study for Toronto light rail, concluding that HFC passenger train power is economically competitive with all electric power.
  - The North Carolina Department of Transportation will conduct a feasibility study of using HFC technology to power trains on the Piedmont Passenger Rail route.

FRA RD&T Collaboration with US DOE

Hydrogen and Fuel Cell Research for Rail Application

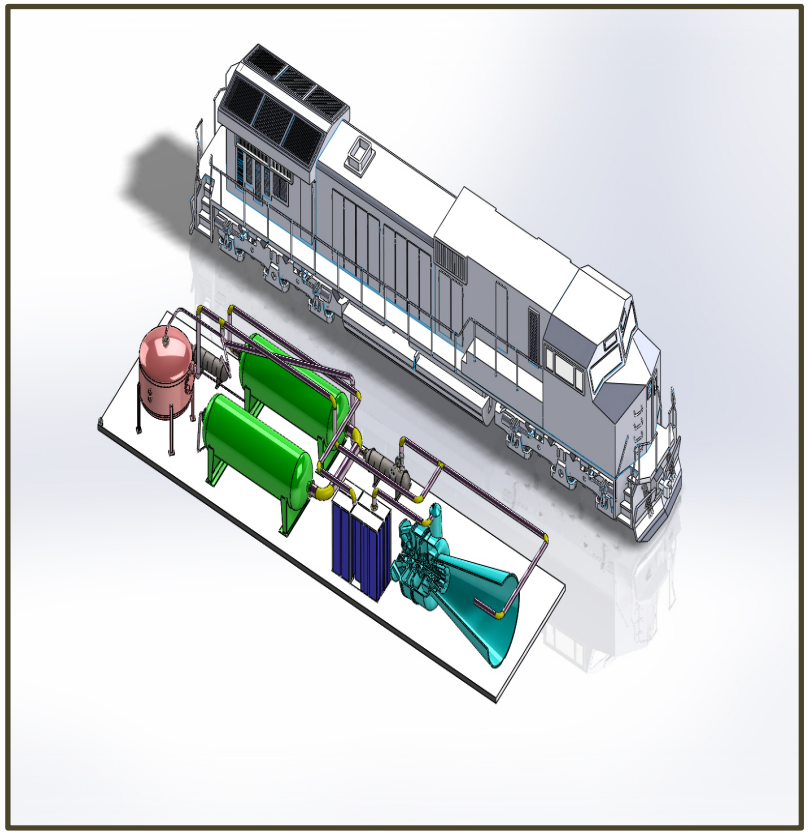
- Objective: Conduct an assessment of hydrogen and fuel cell technology for rail applications:
  - Establish feasibility of solid oxide fuel cell technology
  - Estimate technical and economic potential of HFC technology for rail propulsion
  - Evaluate at least three application scenarios where the use of HFC powered trains are expected to be favorable: long haul, switcher, intercity passenger rail
  - Obtain a rough estimate for safety risk for each technology



FRA RD&T Collaboration with US DOE

Future research will potentially investigate the following:

- Safety of current liquid hydrogen fueling technologies
  - Applicability of such equipment for rail
- Identifying important physical considerations (i.e., flowrate, heating, pressures, venting) for liquid hydrogen on-board fueling systems
- Identifying current regulations, codes, and standards applicable to liquid hydrogen on-board fuel storage



Contact Us

Federal Railroad Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

For more information visit us at
www.fra.dot.gov

Connect with us **USDOTFRA**

Melissa Shurland
melissa.Shurland@dot.gov
202-493-1316

U.S. Department of Transportation
Federal Railroad Administration