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FRA Hydrogen and Fuel Cell Research
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!*
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.
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
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
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