Federal Railroad Administration
Alternative Fuels Research Program

Presented by

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FRA's Office of Research, Development & Technology

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To enable the safe, reliable, and efficient movement of people and goods for a strong America, now and in the future.
**FRA: Office of Railroad Policy & Development**

**U.S. Department of Transportation**

<table>
<thead>
<tr>
<th>SAFETY •</th>
<th>INFRASTRUCTURE •</th>
<th>INNOVATION •</th>
<th>ACCOUNTABILITY</th>
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<td>The Federal Railroad Administration’s mission is to enable the safe, reliable, and efficient movement of people and goods for a strong America, now and in the future.</td>
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**FRA’S OFFICE OF RAILROAD POLICY AND DEVELOPMENT (RPD)**

**FY 2018-2020 FOCUS AREAS**

<table>
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<tr>
<th>Safety Innovation</th>
<th>Infrastructure Investments</th>
<th>Amtrak Reform</th>
<th>Project Delivery Streamlining</th>
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<td>Transformative research, technology development, pilot investment, regulatory reform</td>
<td>Grant &amp; loan programs, PPPs, regional and service planning, legislative/policy initiatives, technology deployment</td>
<td>Grant oversight, long-term planning, financial transparency, safety improvements</td>
<td>Engineering support, environmental streamlining, program and project management</td>
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**Workforce Development and Stakeholder Engagement**

**RPD Expertise**

- Business Operations
- Northeast Corridor Development
- Environmental Analysis
- Project Management
- Rail Planning
- Freight Rail Policy
- Rolling Stock Research
- Human Factors Research
- Strategic Communications
- Grants Management
- Railroad Engineering
- International Cooperation
- Passenger Rail Policy
- Track Research
- Train Control and Communications Research
FRA RD&T’s Mission

• **RD&T’s mission** is 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 activities.
  
  • Other drivers include DOT’s strategic goals of innovation and accountability.
Rail Energy, Environment & Engine Technology Research Program

Advance the modernization of rail transportation through research, development, and demonstration efforts that emphasize:

• Safety of new innovative energy and engine efficiency technologies
• Emissions reduction technologies and environmentally sustainable procedures and investments
**Alternative Fuels Research**

- **2009-2014: Biodiesel Research Activities**
  - Collaboration with Amtrak on passenger locomotive revenue service test on B20 biodiesel
  - Evaluation of engine durability on various blends of biodiesel
  - Evaluation of engine emissions on various blends of biodiesel

- **2012-Present: Natural Gas Research Activities**
  - Collaboration with Association of American Railroads (AAR), DOE National Laboratories, and US railroads on safety evaluation of natural gas (liquid and compressed)
    - Research Needs Workshop
    - Safety evaluation methodologies
    - FMEA of legacy liquefied natural gas (LNG) tenders
    - Crashworthiness of LNG fuel tender
    - Risk criteria for LNG transportation
    - Support in development of AAR specification for natural gas fuel tender cars
Alternative Fuels Research

- 2014-2016: Solid Oxide Fuel Cell For Rail Applications
  - Feasibility study and prototype design for locomotive propulsion
- 2018-Present: Hydrogen and Fuel Cell for Rail Applications
  - Impact study on applicability of hydrogen for rail
RD&T Hydrogen & Fuel Cell Research

- **Objective:** Conduct assessment of hydrogen and fuel cell technology for rail applications
  - Safety, energy efficiency, and environmental impacts

- **Initial Research**
  - Prototype design of 250kW SOFC-Gas Turbine system for locomotive power supply
  - Define metrics to evaluate the introduction of hydrogen fuel cell technology to rail transportation
    - Apply these metrics to rail operations: long haul, switcher and passenger
    - Identify most appropriate rail applications where hydrogen fuel cell usage would be most appropriate

- **Future Research**
  - Safety research on hydrogen fuel tenders and locomotives
Questions?

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