Alternative Fuel Corridors and Signage

Speakers:
• **Stephen Costa**, Technical Analyst, U.S. DOT Volpe Center
• **Charles Griffith**, Climate and Energy Program Director, Ecology Center
FAST Act Section 1413 – Alternative Fuels Corridor Designations

NGA NORTH/CENTRAL REGIONAL TRANSPORTATION ELECTRIFICATION WORKSHOP

APRIL 30, 2019
KANSAS CITY, MO

STEPHEN COSTA | U.S. DEPARTMENT OF TRANSPORTATION - VOLPE CENTER
To improve the mobility of alternative fuel vehicles, the U.S. Department of Transportation (DOT) has designated national corridors in strategic locations along major highways for:

- Plug-in electric vehicle charging
- Hydrogen fueling
- Propane (LPG) fueling
- Natural gas (CNG, LNG) fueling
Benefits of a National System

- Allows for inter-city, regional, and national travel using clean-burning fuels
- Addresses range anxiety
- Integrates with existing transportation planning processes
- Accelerates public interest and awareness of alternative fuel availability
### Corridor-Ready Criteria

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Distance Between Stations</th>
<th>Station Distance from Highway</th>
<th>Station Type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EV</strong></td>
<td>DCFC only</td>
<td>50 miles between stations</td>
<td>5 miles from highway</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>CNG</strong></td>
<td>150 miles between stations</td>
<td>5 miles from highway</td>
<td>5 miles from highway</td>
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<tr>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>LNG</strong></td>
<td>200 miles between stations</td>
<td>5 miles from highway</td>
<td>5 miles from highway</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Hydrogen</strong></td>
<td>100 miles between stations</td>
<td>5 miles from highway</td>
<td>5 miles from highway</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Propane</strong></td>
<td>150 miles between stations</td>
<td>5 miles from highway</td>
<td>5 miles from highway</td>
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</tbody>
</table>
FY 2018 Request for Nominations

- Round 3 request for nominations - October 2018
- Distributed through FHWA Division Offices
- Nominations due the end of January 2019
- Designations made in Spring 2019
- No change in designation criteria
- Some changes in shapefile submissions
Combined Results
Rounds 1-3

- Designations....
  - 79 nominations
  - Includes portions/segments of 100 Interstates, along with 76 US highways/state roads
  - Comprise 46 states plus D.C.
  - Covers approximately 135,000 miles of the National Highway System (all fuels combined)
Rounds 1-3 EV Map – Corridor Ready & Pending
Rounds 1-3 EV Map – Corridor Ready & Pending
Highway Signage

- MUTCD Memorandum – Signing for Designated Corridors
  - Provides guidance to State DOTs
  - First corridor signs installed on I-94 and I-26
  - FHWA developed FAQs to address commonly asked questions (see AFC website)

I-94 (Minnesota)

I-26 (South Carolina)

Pictured from left, Louisiana Department of Natural Resources Secretary Tom Harris, Louisiana Department of Transportation and Development (DOTD) Secretary Shawn Wilson, Gov. John Bel Edwards and #LDEQ Secretary Chuck Carr Brown.
Alternative Fuels Data Center

afdc.energy.gov

The premier information resource for alternative fuels and advanced vehicles
Partnering/Collaborations with Department of Energy

- Vehicle Technologies Office/Clean Cities:
  - Technical/Program support
  - Fund Clean Cities coalition support
  - MotorWeek

- National Renewable Energy Lab
  - Maintains database of fueling stations
  - Develop corridor specific tools & resources

- Fuel Cells Technologies Office
  - Coordinating station deployment/corridor efforts on West Coast and Northeast

[Map showing fueling stations across the United States]
Embeddable Application

afdc.energy.gov/corridors

1. **Alternative Fuels Data Center**
   The corridor mapping tool will be available as a third tab on the Alternative Fueling Station Locator.

2. **Federal Highway Administration**
   The corridor mapping tool can be embedded as a standalone application on the FHWA website or any other website.
Resources for Nominating Corridors
afdc.energy.gov/corridors

Alternative Fuels Data Center

Station Data for Nominating Alternative Fuel Corridors

The table below provides station data and shapefiles by state and fuel type. These datasets include public stations with the following filters applied to meet the criteria for nominating alternative fuel corridors:

- **EV charging** — only DC fast electric vehicle (EV) charging stations, excluding Tesla
- **Hydrogen** — only retail stations (Non-retail stations may be used in corridor nominations if the stations are compliant with SAE J2601 standards and meet all of the criteria for a hydrogen corridor.)
- **Propane** — only “primary” liquefied petroleum gas (LPG) stations, which have fuel for vehicles and vehicle-specific fueling services that are consistently offered during business hours
- **CNG** — only fast-fill compressed natural gas (CNG) stations that offer a fill pressure of 3,600 psi
- **LNG** — all liquefied natural gas (LNG) stations

The data downloads are CSVs with current station data pulled automatically from the Alternative Fueling Station Locator. The shapefiles are ZIP downloads with a static snapshot of the stations as of Sept. 5, 2018, including stations outside state borders within 25 miles.

Learn more about corridor designations from the Federal Highway Administration.

<table>
<thead>
<tr>
<th>State</th>
<th>EV Charging</th>
<th>Hydrogen</th>
<th>Propane</th>
<th>CNG</th>
<th>LNG</th>
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<tbody>
<tr>
<td>Alabama</td>
<td>data</td>
<td>shapefile</td>
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<tr>
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<tr>
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<tr>
<td>California</td>
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<tr>
<td>Colorado</td>
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<td>data</td>
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<tr>
<td>Connecticut</td>
<td>data</td>
<td>shapefile</td>
<td>data</td>
<td>shapefile</td>
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</tr>
</tbody>
</table>

Shapefiles
Interactive maps
CSV downloads
Interactive Map
afdc.energy.gov/corridors
Stations Layer – North Central

afdc.energy.gov/corridors
Northeast, Southeast, & West Coast Diesel Collaboratives are promoting corridors for Medium – and Heavy-Duty Alternative Fuel Vehicles

- Regional Multistate Public and Private Partnerships
- Discuss Regional Air Quality & Transportation Priorities
- Facilitate Educational Webinars on Advanced Techs
- Evaluate Opportunities for Infrastructure Development
- Explore State, Federal and Private Funding Sources
- Develop Roadmaps to “Fill in the Infrastructure Gap”
- Regularly Convene Partners to Evaluate Progress
Federal Highway Administration Regional Alternative Fuel Corridor Convenings

- Team to hold 5 regional convenings:
  - To Date: Midwest (MN), Southeast (SC), South-Central (TX)
  - Next Up: Northeast/Mid-Atlantic (RI), and REV West (Salt Lake City)

- Strengthen coordination b/w states, public and private partners

- Evaluate regional priorities & needs, programs, and resources to expand corridors

- Identify critical infrastructure gaps

- Discuss a regional strategy to promote clean vehicle adoption and corridor growth

- Foster partnership development

3 Regional Convenings Held to Date

Midwest AFC
St. Paul, MN
June 12, 2018

Southeast AFC
Charleston, SC
September 25, 2018

South-Central AFC
Arlington, TX
April 9, 2019
Future of AFC Program

► Request for Nominations on an annual basis under life of FAST Act

► Possible inclusion in the next transportation reauthorization bill or other legislation

► Enhanced coordination efforts with Clean Cities Program/NREL and other Federal/State agencies

► Enhanced collaboration with stakeholders including industry
For More Information

DOT Alternative Fuel Corridor Team Contact Information

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Resources

FHWA Alternative Fuel Corridor website:  
http://www.fhwa.dot.gov/environment/alternative_fuel_corridors/

MUTCD Memorandum – Signing for Designated Alternative Fuel Corridors:  

DOE/NREL Alternative Fueling Station Locator & Corridor Tools:  
https://afdc.energy.gov/stations/  
https://afdc.energy.gov/corridors

Motorweek Video Segment on Corridors:  
https://www.youtube.com/watch?v=QZhLFqTXb-g
Rounds 1-3 CNG Map – Corridor Ready & Pending
Rounds 1-3 LPG Map – Corridor Ready & Pending
Rounds 1-3 H2 Map – Corridor Ready & Pending
Alternative Fuel Corridors and Signage

Charles Griffith, Climate and Energy Program Director, Ecology Center

#WeTheStates
Opportunities for Regional Collaboration on EV Corridors

NGA North/Central Regional Transportation Electrification Workshop
April 30, 2019
Charles Griffith, Ecology Center, Charge Up Midwest
Midcontinent Transportation Electrification Collaborative

- Formed in 2017
- Participants: automakers, state government, electric utilities and cooperatives, charging companies, and NGO’s
- Whitepaper on utility roles
- EV Summit and Road Map report in January
- Convened state agency staff on corridor collaboration
EV Corridors – Landscape

- Federal Highway corridor designation process
- VW funded EV charging programs
- Utility funded programs
- Potential legislative programs
EV Corridors – Missouri
EV Corridors - Minnesota
Multi-Phase Project for EV Charger Placement.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase I:</strong> Intercity EV Trips (Highways)</td>
<td>December 2018</td>
</tr>
<tr>
<td>• Phase 1 Supplements</td>
<td>Spring 2019</td>
</tr>
<tr>
<td>• Full Tourism Analysis</td>
<td></td>
</tr>
<tr>
<td>• Economic Impacts Analysis</td>
<td></td>
</tr>
<tr>
<td><strong>Phase II:</strong> Urban EV Trips (Select Cities)</td>
<td>Fall 2019</td>
</tr>
</tbody>
</table>
Mixed scenario considered: 70 kWh battery, 150 kW charger

- Vehicles with smaller batteries or degraded batteries will be on road.

<table>
<thead>
<tr>
<th>Scenario Specification</th>
<th>Low-tech</th>
<th>High-tech</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV market share (%)</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Charging power (kw)</td>
<td>50</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Battery energy (kwh)</td>
<td>70</td>
<td>100</td>
<td>70</td>
</tr>
</tbody>
</table>

**Optimum Charger Placement**

- Number of charging stations: 43, 24, 35
- Number of charging outlets: 600, 131, 196

**Investment Cost**

- Charging station cost (Million dollars): 6.64, 4.37, 6.47
- Land cost (Million dollars): 1.13, 0.25, 0.37
- Charging outlet cost (Million dollar): 20.3, 9.99, 15.0
- Total cost (Million dollar): 28.0, 14.6, 21.8
EV Corridors – Need for coordination

Challenges:

• Lack of coordination between charging infrastructure programs, and among states in our region

• Potential for inconsistent user experience (e.g. payment systems, tech.)

• Lack of comprehensive venue for states to collaborate
EV Corridors – Regional Collaboration

- **REV West** - Regional Electric Vehicle Plan for the West
- MOU signed by bi-partisan group of **8 Governors**
- Initial focus on **voluntary minimum standards** for EV charging stations across the region, to ensure interoperability
- Other elements include **promoting best practices** for enhancing EV adoption and **consumer awareness**, increasing **EV availability**, and collaborative pursuit of **funding opportunities**
EV Corridor Collaboration – other regions

Northeast Corridor Regional Strategy for Electric Vehicle Charging Infrastructure 2018 – 2021
Goals for Midwest-Central Region Corridor

Collaborate to:

• Capture the full benefits of the EV technology to increase economic development, save energy, and reduce air pollution.

• Pursue opportunities around EV infrastructure to make it easier to travel throughout the region by EV and promote EV adoption by consumers and public and private fleets.
Actions for Midwest-Central Region Corridor

• Share information and best practices.
• Develop and implement a regional vision for EV charging corridors.
• Share data and lessons learned to improve future decision-making.
• Develop voluntary/template standards for charging infrastructure and interoperability standards for chargers and payment systems.
• Coordinate on shared consumer education campaigns and highway signage to improve the experience for EV drivers.
• Work with businesses to create a charging networks for both public and fleets.
• Identify opportunities to increase funding for EV charging infrastructure.
• Help communities to be EV ready.
• Address barriers to allow everyone access to EVs and EV charging.
Midwest-Central Regional Corridor Participants?

- Up to the states, but . . .
- Bi-partisan participation strongly preferred
- Include rep’s from range of agencies with role on EV corridors
- MOU between Governors, or some other approach?
Midwest-Central Regional Corridor - Next Steps

- Build buy-in for Corridor approach
- Recruit additional states who might be interested
- Convene face-to-face meeting to refine proposal and workplan
Thank you:

charlesg@ecocenter.org

https://www.ecocenter.org/charge-midwest