Alternative Fuel Corridors and Signage

• Speakers:
  • Diane Turchetta, Transportation Specialist, U.S. DOT Federal Highway Administration
  • Casey Langford, Ph.D., Planning Manager, Long Range Planning Division, Tennessee Department of Transportation
Alternative Fuel Corridors

NATIONAL GOVERNORS ASSOCIATION
TRANSPORTATION ELECTRIFICATION WORKSHOP
MARCH 11 & 12, 2019
NASHVILLE, TN

DIANE TURCHETTA | U.S. DEPARTMENT OF TRANSPORTATION
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>EV</th>
<th>CNG</th>
<th>LNG</th>
<th>Hydrogen</th>
<th>Propane</th>
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<tbody>
<tr>
<td></td>
<td>DCFC only</td>
<td>150 miles between stations</td>
<td>200 miles between stations</td>
<td>100 miles between stations</td>
<td>150 miles between stations</td>
</tr>
<tr>
<td></td>
<td>50 miles between stations</td>
<td>5 miles from highway</td>
<td>5 miles from highway</td>
<td>5 miles from highway</td>
<td>5 miles from highway</td>
</tr>
<tr>
<td></td>
<td>5 miles from highway</td>
<td>Public stations only</td>
<td>Public stations only</td>
<td>Public stations only</td>
<td>Public stations only</td>
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<tr>
<td></td>
<td>Public stations only only (no Tesla)</td>
<td>Fast fill, 3,600 psi</td>
<td>Public stations only</td>
<td>Public stations only</td>
<td>Primary stations only</td>
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</table>
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)
Combined Results
Rounds 1&2

- Designations....
  - **58** nominations
  - Includes portions/segments of **84** Interstates, along with **43** US highways/state roads
  - Comprise **44 states plus D.C.**
  - Covers **over 100,000** miles of the National Highway System (all fuels combined)
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
Federal Highway Administration
Regional Alternative Fuel Corridor Convenings

- Team to hold 5 regional convenings:
  - To Date: Midwest (MN), Southeast (SC)
  - Next Up: South Central (TX) 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

Midwest AFC
St. Paul, MN
June 12, 2018

Southeast AFC
Charleston, SC
September 25, 2018
Convening Results

MIDWEST – St. Paul, MN (June 12, 2018)

- 9 States: ND, SD, MN, WI, MI, OH, IL, IN, IA
- 52 stakeholders
- Fuels of Interest: EV, CNG and H2
- # of Designated Corridors: 26 (SD none)

SOUTHEAST – Charleston, SC (Sept. 25, 2018)

- 8 States: KY, TN, NC, SC, AL, MS, GA, & FL
- 45 stakeholders
- Fuels of Interest: EV, CNG, LNG and LPG
- # of Designated Corridors: 30 (MS none)
Alternative Fuels Data Center

afdc.energy.gov

The premier information resource for alternative fuels and advanced vehicles
The corridor mapping tool will be available as a third tab on the Alternative Fueling Station Locator.

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

- **Shapefiles**
- **Interactive maps**
- **CSV downloads**

### 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 included 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 Fuels 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](https://www.fhwa.dot.gov).

#### Stations by State and Fuel Type

<table>
<thead>
<tr>
<th>State</th>
<th>EV Charging</th>
<th>Hydrogen</th>
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<th>CNG</th>
<th>LNG</th>
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<td><a href="#">shapefile</a></td>
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<tr>
<td>Connecticut</td>
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<td><a href="#">shapefile</a></td>
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<td><a href="#">shapefile</a></td>
</tr>
</tbody>
</table>
Interactive Map

afdc.energy.gov/corridors
Stations Layer - FL
afdc.energy.gov/corridors
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
- 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:  
https://www.afdc.energy.gov/locator/stations/
Rounds 1 & 2 EV Map – Corridor Ready and Pending
Rounds 1 & 2 EV Map for HI - Corridor Ready and Pending
Rounds 1 & 2 CNG Map – Corridor Ready and Pending
Rounds 1 & 2 LNG Map – Corridor Ready and Pending
Rounds 1 & 2 LPG Map – Corridor Ready and Pending
Rounds 1 & 2 HYD Map – Corridor Ready and Pending
Alternative Fuel Corridors in Tennessee: Partnerships and Programs

Casey Langford, Ph.D.
TDOT Long Range Planning Division

March 12, 2019
Tennessee Alternative Fuel Corridors - Ready

• I-40 – Electric vehicles (EV) - Dandridge to Nashville
• I-24 - EV entire length
• I-24 - Compressed natural gas (CNG) entire length
• I-75 - EV Knoxville to Tennessee/Georgia border
• I-75 - CNG entire length
• I-65 - EV Madison to Franklin
• I-65 - CNG Nashville to Tennessee/Alabama border
• Partners - TDOT, TDEC, TN Clean Fuels, TVA, ORNL, ChargePoint and others
Alt Fuel Corridor Designations

- Electric (DC Fast Charging) Stations along I-24
- Electric (DC Fast Charging) Stations along I-65
- Electric (DC Fast Charging) Stations along I-75

- CNG Stations along I-24
- CNG Stations along I-65
- CNG Stations along I-75

Legend:
- US Department of Energy - Alternative Fuel Station Locator
- Tennessee Department of Environment and Conservation
- East Tennessee Clean Fuel Coalition
- Out of Service Fuel Charging Stations
- ChargePoint
- EVgo
- Electrify America
- Gasoline Pumps
- Signage Present
- Signage Ready
- Exit

 TN
TDOT
Department of Transportation
<table>
<thead>
<tr>
<th>ID</th>
<th>Fuel Type</th>
<th>Station Name</th>
<th>Street Address</th>
<th>City</th>
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<th>Distance off I-29 (Miles)</th>
<th>Level (ELEC)</th>
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<td>BD</td>
<td>TBDT District H</td>
<td>3213 N Atha St</td>
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<td>19</td>
<td>1.0 miles</td>
<td>1.5 miles</td>
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<tr>
<td>3</td>
<td>ELEC</td>
<td>Tri-Cities Nissan</td>
<td>3002 Bristol Hwy</td>
<td>Johnson City</td>
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<tr>
<td>4</td>
<td>LPG</td>
<td>City of Kingsport - Parking Garage</td>
<td>229 W Center St</td>
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<td>2.6 miles</td>
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<td>208/20</td>
<td>2.4 miles</td>
<td>2.6 miles</td>
<td>2</td>
<td>[772]</td>
<td>Private - Gov't, only</td>
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</table>
### Alternative Fuel Corridor I-81

<table>
<thead>
<tr>
<th>ID</th>
<th>Fuel Type</th>
<th>Station Name</th>
<th>Street Address</th>
<th>City</th>
<th>ESK #</th>
<th>Distance off I-81 (Miles)</th>
<th>Distance off I-81 (Miles)</th>
<th>Level (ELEC)</th>
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<tbody>
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<td>1</td>
<td>LPG</td>
<td>U-Haul</td>
<td>2575 W Stone St</td>
<td>Bristol</td>
<td>T4A</td>
<td>3 miles</td>
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<td>Public</td>
<td>N/A</td>
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<tr>
<td>2</td>
<td>LPG</td>
<td>U-Haul</td>
<td>2575 W Stone St</td>
<td>Bristol</td>
<td>T4A</td>
<td>2.9 miles</td>
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<td>Wallace Nolan Oilmobile</td>
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<td>4</td>
<td>ELEC</td>
<td>Bill Clinton Oilmobile</td>
<td>230 Century Blvd</td>
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<td>Bill Clinton Oilmobile</td>
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<td>7.8 miles</td>
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<td>7</td>
<td>ELEC</td>
<td>Bill Clinton Oilmobile</td>
<td>230 Century Blvd</td>
<td>Kingsport</td>
<td>69</td>
<td>7.0 miles</td>
<td>7.8 miles</td>
<td>Level 2</td>
<td>Public</td>
<td>[772]</td>
</tr>
<tr>
<td>8</td>
<td>ELEC</td>
<td>Woodland Conference Resort and Convention Center</td>
<td>2733 E Stone Dr</td>
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<td>Woodland Conference Resort and Convention Center</td>
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<td>2733 E Stone Dr</td>
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<td>7.3 miles</td>
<td>7.2 miles</td>
<td>Level 2</td>
<td>Public</td>
<td>[772]</td>
</tr>
</tbody>
</table>

**Tennessee AFS**

- **BO**: Biofuel
- **CNG**: Compressed Natural Gas (CNG)
- **EBIS**: Ethanol (EBIS)
- **ELEC**: Electric (ELEC)
- **LNG**: Liquid Natural Gas (LNG)
- **LP**: Liquefied Petroleum Gas (LP)

**TN AFS within 5 mile buffer**

- **ELEC**: Electric
- **LPG**: LPG

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**Map of Alternative Fuel Corridor I-81 in Tennessee**

Map showing the locations of alternative fuel stations along I-81, with markers indicating the distance from the interstate and the types of alternative fuels available at each station. The map covers a region in Tennessee, with markers indicating the cities and locations of the stations.
TN Alternative Fuel Initiatives

• **Present**

• **Drive Electric Tennessee** - a stakeholder collaboration to make Tennessee an electric transportation leader in SE

• **Goal** – Increase EVs in TN from <5,000 to 200,000 by 2028

• In 2018, a core team developed shared vision, goals and guiding principles
  – State agencies, electric utilities, cities, universities and electric vehicle OEMs

• Developing roadmap to achieve goals in 5-10 years

• Partners - TVA, TDOT, TDEC, TN Clean Fuels, others
TN Alternative Fuel Initiatives

- Present
- VW Court Settlement
  - Tennessee will invest maximum 15% of NOx funds in electric charging stations
  - Electrify America charging stations (Five (5) today)
- CMAQ priority for alternative fuel infrastructure
- Interstate signage
Lessons Learned

- **Refueling infrastructure** – maintenance of equipment essential
- **Recruiting new hosts for EV charging is a challenge**
  - Why would a property owner want to be a host?
  - Requests for proposals may not produce sufficient applicants
- **Only EV fast charging stations for corridor infrastructure**
  - Level 2 charging simply takes too long
- **Amend Randolph Sheppard Act to explicitly allow electric charging infrastructure in interstate rest areas**
- **Are there opportunities for states/U.S. to work together to reduce costs of EV fast charging infrastructure?**
TennSmart Consortium

• In 2017, 20 public and private partners formed nonprofit to capitalize on state’s status as automotive sector leader.
  – GM, Nissan and Volkswagen plus suppliers in Tennessee
  – Working together increases ability to take advantage of intelligent mobility opportunities

• Goals:
  – Accelerate development and use of technologies for CAVs and smart infrastructure
  – Develop technology roadmap to integrate intelligent mobility advances into long-range plans for state’s transportation system
TennSmart Focus Areas

- **Connected and automated vehicles** – Technologies for vehicle-to-vehicle and vehicle-to-grid interactions
- **Electric vehicles** – Wireless charging technologies, automate the charging process, and share energy between vehicles, buildings and the grid
- **Cybersecurity** – Technologies to validate trustworthiness of messages from vehicles and infrastructure, and address identity and privacy needs
- **Freight efficiency** – Hybrid electric heavy-duty powertrains, truck platooning technologies, automated multimodal freight delivery, and unmanned aerial systems
- **Multimodal commuting** – Mode shifts to make passenger commutes more energy efficient with technologies that increase connectivity between modes
Founding Members of TennSmart

- TN Dept. of Transportation
- Oak Ridge Natl. Laboratory
- Bridgestone Americas
- Cummins Filtration, Inc.
- DENSO Manufacturing TN
- FedEx Corporation
- GRIDSMArt Technologies, Inc.
- Local Motors
- Lyft
- Miovision
- Nissan North America
- Stantec Consulting Svcs. Inc.

- TN Dept. of Environment & Conservation
- TN Dept. of Labor & Workforce Development
- Tennessee Tech University
- Tennessee Valley Authority
- Top Five Inc.
- University of Memphis
- University of Tennessee
- Vanderbilt University
Tennessee CAV Initiatives

- State law in 2017 authorized autonomous vehicles
- Nine states approved commercial use of driver-assisted truck platooning
  - Arkansas, Georgia, Michigan, Nevada, North Carolina, Ohio, South Carolina, **Tennessee** and Texas
  - Truck platooning authorized in TN in April 2017
  - Platooning - linking two or more vehicles in a convoy using wireless communications and sensor technology
  - Interested parties must provide a plan for the operation of the platoon to TDOT and the Department of Safety
Thank you

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