# ALTERNATIVE FUELS CORRIDOR



Wednesday, July 10, 2019 Providence Marriott Downtown, 1 Orms Street, Providence, RI 02904

**SUMMARY REPORT** 

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## Background

Section 1413 of the Fixing America's Surface Transportation (FAST) Act requires the Secretary of Transportation to designate national electric vehicle (EV) charging, hydrogen, propane, and natural gas fueling corridors. The Federal Highway Administration (FHWA) is working with other federal, state, and local officials, as well as private industry, to help plan and promote an interstate network of stations that will fuel vehicles powered by clean and domestically produced alternative fuels, so commercial and passenger vehicles can reliably travel between cities, regions, and across the entire nation. FHWA has completed three rounds of alternative fuel corridor designations, the first in 2016, the second in 2017, and the third in 2018. One of two designations have been assigned to each nominated highway segment:

- "Corridor-Ready" A sufficient number of facilities exist on the corridor to allow for corridor travel using one or more alternative fuels; and
- "Corridor-Pending" An insufficient number of facilities currently exist on the corridor to allow for corridor travel using one or more alternative fuels.

Designation status for each fuel type were based on the following criteria:

- EV charging: EV charging<sup>1</sup> facilities at 50-mile intervals along designated EV corridors.
- Hydrogen: Hydrogen fueling facilities at 100-mile intervals along designated hydrogen corridors.
- Propane: Propane fueling facilities at 150-mile intervals along designated propane corridors.
- Natural gas: Compressed natural gas (CNG) and liquefied natural gas (LNG) facilities at 150-mile intervals and at 200-mile intervals respectively, along designated corridors.

In 2018, FHWA initiated a series of regional convenings to encourage multi-state and regional coordination for the development and implementation of alternative fueling infrastructure along corridors. The convenings foster an important opportunity for states to evaluate the potential of shared infrastructure investments and improved collaboration for education/outreach efforts among and between the public and private sectors. The Northeast/Mid-Atlantic Alternative Fuel Corridor Convening was the fourth convening in the series and was held in Providence, RI on July 10, 2019. The convening facilitated meaningful engagement among stakeholders to identify key barriers and opportunities to expand the network of alternative fuel corridors in the Northeast and Mid-Atlantic regions. To support a regionally-tailored program on Northeast and Mid-Atlantic priorities, a planning committee was organized to help shape the goals and objectives of the convening's program and included stakeholders from state and city departments of transportation, state energy and environmental departments, metropolitan planning organizations (MPOs), and Clean Cities Coalitions.

## **Convening Summary**

The Northeast/Mid-Atlantic Alternative Fuel Corridor Convening was held in Providence, RI on July 10, 2019. 59 stakeholders and a team of organizers participated in the convening. States represented at the convening included Maine, Vermont, New Hampshire, Connecticut, New York, Massachusetts, Rhode Island, Delaware, Pennsylvania, New Jersey, Maryland, Virginia, West Virginia, and Washington, D.C. The day was held in partnership with the Northeast Diesel Collaborative (NEDC), a partner who has been collaborating closely with the Convenings Team ever since the Clean Corridors Meeting in Troy, New York in November 2016. Both the NEDC Partners Meeting and

<sup>&</sup>lt;sup>1</sup> FHWA's objective is to establish direct current fast charge (DCFC or Level 3) infrastructure at 50-mile intervals for corridor designations made in 2017, and later.

the Alternative Fuel Corridor Convening were planned in coordination to ensure the two days complemented each other on content for the key stakeholder attendees of both initiatives.

The day began with introductions by the NEDC and FHWA leadership, followed by an overview of the goals and objectives for the convening. Next, stakeholders went around the room and introduced themselves and their prior involvement with alternative fuel corridors. To help set the stage and focus participants on alternative fuel corridor activity in the Northeast/Mid-Atlantic region, the first session was a panel discussion on existing alternative fuel corridor initiatives in the Northeast/Mid-Atlantic region. To provide participants with useful tools for implementing alternative fuel corridors in their home states, the next session included the introduction of several tools developed by private and public entities, including presenters from the National Renewable Energy Laboratory (NREL) such as the Alternative Fuels Data Center (AFDC) Alternative Fueling Station Locator and the EVI-Pro Lite tool.

The following sessions focused on key aspects related to improving the regional network of alternative fuel corridors. The "Building Awareness and Leveraging Partnerships" session focused on strategies, partnerships, and resources that organizations use to build awareness around alternative fuel corridors. A presentation following the lunch break focused on the potential economic impacts of a fully-developed alternative fuel corridor that runs across the United States from the East to the West Coast. The "Filling the Gap" session featured alternative fuel infrastructure provider perspectives and breakout group discussions on solutions to the top challenges impeding alternative fuel infrastructure development, including best practices for the planning and implementation of alternative fuel corridors. The closing session focused on the action items that convening attendees and FHWA should prioritize moving forward.

#### Key Takeaways

The following are the key takeaways for enhancing and expanding alternative fuel corridors in the Northeast/Mid-Atlantic region that emerged throughout the day's presentations and discussions (Figure 1):

 FHWA announced a funding opportunity to support alternative fuel corridor planning which will fund three projects up to \$80,000 with at least 20% additional required state/local match. The focus of the opportunity is on further development of Interstates currently designated as "Corridor-Pending" and on forming public-private partnerships.



Figure 1. Convening attendees participate in discussions about alternative fuel corridors.

- In addition to the tools NREL has developed to support alternative fuel corridor planning, other tools developed by organizations within the Northeast/Mid-Atlantic region such as the Hydrogen Fueling Station Planning Tool and EV Infrastructure Location Identification Tools can also help with planning.
- Strategies to expand awareness of and secure funding for alternative fuel vehicles and infrastructure
  include talking to external stakeholders about sustainability and air quality goals; developing relationships
  with private sector parties or vendors who sell vehicles; having a target geographic area to focus efforts on;
  using web platforms to inform broader audiences, including social media influencers; partnering with local
  business hosts of alternative fuel infrastructure to ask them to advertise it; hosting ride and drives; securing

funding through cooperative agreements with U.S. Department of Energy (DOE); and working with Clean Cities Coalitions.

- Measuring the benefits of building out an alternative fuel corridor will help decision-makers understand corridor-level impacts. Benefits include jobs from station construction and operation, avoided damages related to emissions reductions, less money "exported" for gasoline, and others.
- The top barriers to further alternative fuel corridor development in the Northeast/Mid-Atlantic include consumer adoption of vehicles, station economics, lack of public awareness, lack of incentives and financing, low cost of conventional fuels, and low vehicle availability. Convening attendees identified several strategies regional stakeholders could pursue to overcome these barriers.

## **Convening Proceedings**

### Welcome

#### Gary Rennie, Environmental Protection Specialist, U.S. Environmental Protection Agency, Region 1

The day kicked off with a warm welcome provided by Gary Rennie. Mr. Rennie gave an overview of the work and mission of the Northeast Diesel Collaborative (NEDC).

- NEDC is a collaborative between the states in U.S. Environmental Protection Agency (EPA) Regions 1 and 2 (all New England states, plus New York, New Jersey, Puerto Rico and the Virgin Islands) which aims to reduce diesel emissions, improve public health, and promote clean transportation for on and off-road technologies. The NEDC is a public-private partnership that consists of state air and energy offices, Clean Cities Coalitions, environmental and community groups, technology and fuel providers and industry
- NEDC hosted a Partners Meeting the following day of Alternative Fuel Corridor Convening. The NEDC
  Partners Meeting included several discussions, including on the funding and the Volkswagen Settlement,
  alternative fuel corridor implementation challenges and successes, advanced technologies and fuels, and
  alternative fuel implementation at ports.

#### **Diane Turchetta**, Transportation Specialist, U.S. Federal Highway Administration <u>See presentation for more information</u>.

• Diane Turchetta welcomed everyone, thanked NEDC for hosting the convening, and presented on the National Alternative Fuel Corridor Program and FHWA's role (Figure 2).

• Under the FAST Act Section 1413, the U.S. Department of Transportation was authorized to designate

national corridors along major highways for the following fuels:

- Plug-in EV charging;
- Hydrogen fueling;
- Propane (liquefied petroleum gas [LPG]) fueling; and
- o Natural gas (CNG, LNG) fueling.
- There are several benefits of having a national system of designated alternative fuel corridors. These include:
  - Permitting inter-city, regional, and national travel using clean-burning fuels;
  - Reducing energy dependence;
  - Alleviating range anxiety;



Figure 2. Diane Turchetta provides an overview of FHWA's alternative fuel corridor initiative.

- Integrating corridor planning with existing transportation planning processes;
- o Increasing public interest and awareness of alternative fuel availability; and
- Accelerating the adoption of alternative fuel vehicle technologies.
- FHWA led three rounds of designations, in 2016, 2017, and most recently in 2018. Between the first and second rounds, FHWA made two changes to the designation process: (1) only direct current fast chargers (DCFC) sites will be considered for EV corridors and (2) non-road hydrogen stations can be included.
- The criteria for corridor designation were determined in conjunction with the DOE and NREL.
- Developing signage to correspond with the corridor designations is a priority for FHWA, as reflected in the memorandum on the Manual on Uniform Traffic Control Devices (MUTCD) issued by the agency. The MUTDC memorandum provides guidance to State Departments of Transportation (DOTs).
- The first corridor signs were installed along I-94 in Minnesota and I-26 in South Carolina.
- Combined results from rounds 1 through 3 of the FHWA designations include:
  - o 79 nominations;
  - Designations along portions/segments of 100 Interstates, along with 76 U.S. highways/state roads;
  - Designations within 46 states plus D.C.; and
  - Over 135,000 miles of the National Highway System (all fuels combined) designated.
- The convenings have served an important role in bringing stakeholders from neighboring states together. The convenings have strengthened coordination and collaboration to get more corridor designations on the map.
- Ms. Turchetta announced a funding opportunity to support alternative fuel corridor planning. With DOE and Clean Cities, FHWA is looking at existing pending corridors and assessing how to get those corridors to the status of Corridor-Ready. FHWA will be providing funding for three projects up to \$80,000 as long as

there is a minimum 20% match by states. The focus of this funding is on Interstates currently designated as "Corridor-Pending" and encourages public-private partnerships.

- Applications are due on September 9, 2019.
- Recipients will be announced in the fall of 2019.
- Final plans will be due on November 30, 2020.
- Ms. Turchetta then shared several maps of alternative fuel corridor progress in the Northeast and Mid-Atlantic region. There is significant progress on developing EV corridors and FHWA is hopeful for more progress on developing LPG, LNG, and hydrogen corridors on the map.
- FHWA developed a frequently asked questions page to address signage questions: <u>https://www.fhwa.dot.gov/environment/alternative\_fuel\_corridors/resources/faq/#toc494791843</u>.

Setting the Stage: Partnership Goals and Objectives

**Oana Leahu-Aluas**, Associate, Sustainable Transportation Practice, Cadmus *See presentation for more information*.

• Ms. Leahu-Aluas conveyed the types of stakeholders that were participating in the convening, reviewed the responses to poll questions attendees were asked prior to the convening, and presented a word cloud showing what attendees indicated they were hoping to get out of the meeting.



The breakdown of attendees at the convening is shown below (Figure 3).

Figure 3. Breakdown of Northeast/Mid-Atlantic Convening attendees by representative organization.

The results of the three questions posed to attendees before the convening are shown below (Figure 4, Figure 5, Figure 6).



Figure 4. Pie chart showing which alternative fuels attendees were most interested in advancing or deploying.



Figure 5. Bar graph showing the stakeholders whom convening attendees were most interested in connecting with.



Figure 6. Bar graph showing the top barriers for creating successful alternative fuel corridors based on convening attendee rankings.



Figure 7. Word cloud showing what attendees hoped to achieve during the convening, using one word.

#### Alycia Gilde, Director, CALSTART

#### See presentation for more information.

- Ms. Gilde outlined the goals and objectives for the day, including identifying key barriers to alternative fuel corridor development, evaluating needs, increasing awareness, developing a regional strategy, and building sustainable partnerships.
- She explained the importance of attendee engagement and participation throughout the day.

#### Alternative Fuel Corridor Initiatives: Progress to Date, Outreach, Funding

# Partners throughout the region presented on innovative programs currently advancing alternative fuel corridors in the Northeast/Mid-Atlantic U.S.

#### Moderator: Oana Leahu-Aluas, Associate, Cadmus

Abby Swaine, SmartWay and Clean Freight, U.S. Environmental Protection Agency, Region 1 See presentation for more information.

- The NEDC was established in 2005 by the EPA and Northeast States for Coordinated Air Use Management (NESCAUM) and consists of the New England states, New York, New Jersey, Puerto Rico and the US Virgin Islands. NEDC is a regional public-private collaborative initiative under the EPA's National Clean Diesel campaign to plan and promote the adoption of alternative fuels, efficiency, and idle reduction.
- In 2015, NEDC created the Northeast Clean Freight Corridor Workgroup (NECFC WG) focused on promoting the adoption of clean technologies, alternative fuels, and efficient strategies by freight carriers along corridors in the Northeast. The NECFC WG held a national Clean Corridors Meeting in 2016. The NECFC WG promoted meaningful coordination across state agencies, communities and industries to identify regional priorities, evaluate infrastructure needs and discuss partnership opportunities to expand clean freight corridors.
- The NEDC held several panels and webinars between early 2016 and late 2017 on funding, the value of clean corridors and partnerships, designating corridors, alternative fuel technologies, priority locations for idle reduction and alternative fueling, and more.
- Achieving ambient air quality standards, enforcing idling limits, and conducting outreach programs are part
  of NEDC's work. The main objectives of the EPA in participating in NEDC are to help states meet their air
  quality goals, assist with regulation compliance, and help to administer Diesel Emissions Reduction Act
  (DERA) grants and rebates.
- Some of EPA's public tools will help users with fuel savings and calculating emissions, operational and behavioral mechanisms, and engine and emissions controls.

#### Joshua Dziubek, Energy Program Specialist, Pennsylvania Department of Environmental Quality See presentation for more information.

- The Alternative Fuels Incentive Grant (AFIG) Program of the Pennsylvania Department of Environmental Protection was established by the Alternative Fuels Incentive Act in the early 1990s and revised in 2004.
- The intention of the AFIG program is to improve Pennsylvania's air quality, reduce use of conventional transportation fuels, and to create new markets for alternative fuels in Pennsylvania through deployment of alternative fuel vehicles, fleets, and technologies.

- There are three primary components of the AFIG program: an annual competitive grant, a FAST Act Competitive Program, and an Alternative Fuel Vehicle Rebate program.
- The AFIG Program is available throughout the year with two submission periods. The grants support refueling infrastructure, alternative fuel vehicles, and other technologies. In 2018, the AFIG program awarded 42 grants totaling \$5.7 million.
- There is also an Alternative Fuel Vehicle Rebate which is ongoing and supports individual purchases of alternative fuel vehicles. It provided about \$3.5 million in rebates in fiscal year 2018-2019. This is a significant jump in awards and shows that the EV and alternative fuel vehicle market has increased dramatically in Pennsylvania in the last three years.
- Once per year, \$1 million in grants are available for public-use electric, hydrogen, propane, and CNG refueling infrastructure under the AFIG FAST Act Corridor Infrastructure Grant. This grant is designed to promote the installation of alternative fuel infrastructure along Interstate highways in Pennsylvania and is focused specifically on corridors designated as Corridor-Ready or Corridor-Pending. The first program solicitation was in 2017, the second was in 2018, and the 2019 solicitation is currently under development and expected to reopen during the summer of 2019.

### Patrick Bolton, Senior Project Manager, New York State Energy Research and Development Authority See presentation for more information.

- The state of New York has worked with FHWA on alternative fuel corridors since FHWA's program began. Initial designations in New York were announced in 2016 and nominations have been successful in the state for the two years following. The state has installed signage for EV chargers and is currently developing signage for CNG.
- The New York State Energy Research and Development Authority (NYSERDA) functions as an energy office for the state of New York. NYSERDA offers incentives for plug-in EVs and has a ChargeReady New York program which brings chargers to public, workplace, and dwelling locations. NYSERDA will launch a truck voucher incentive program in the next few weeks, which will provide voucher incentives for battery EVs, CNG vehicles, LPG vehicles, and hybrid EVs.
- In 2013, NYSERDA launched the New York Truck Voucher Incentive Program which provided point-of-sale discount vouchers to end-users for the purchase of new alternative fuel vehicles. The NYTVIP successfully replaced 594 alternative fuel trucks and buses through the program which was administered by CALSTART.
- The addition of future EV charging stations in New York will likely be incremental because of the high cost of DCFC sites and due to the fact that most Interstate highways in New York have already been incorporated into FHWA's alternative fuel corridor program. The biggest gaps in EV infrastructure are in rural parts of New York.
- There are no designated corridors for hydrogen, LPG, or LNG in New York yet. LNG has been difficult to implement in the state of New York due to a moratorium on the siting of new LNG facilities, which ultimately was lifted. However, there are still regulations prohibiting the movement of LNG through the state.
- The New York Power Authority (NYPA) is working to install 200 DCFC stations at about 50 total sites. It aims to have DCFC stations every 50 miles along key Interstate corridors and in certain urban locations. NYPA is

also concentrating DCFC locations near major roadways and at popular locations such as malls and restaurants.

- Mr. Bolton shared feedback on behalf of New York DOT (Figure 8).
  - New York DOT requests that EV minimum distances between charging stations should be reviewed and revised to extend the distance to 60 miles to account for newer EV range capacities and help close gaps in rural parts of the state.
  - New York DOT also requests the development of standards for siting signs and for the minimum distance between them.



*Figure 8. Panelists share details on their alternative fuel corridor initiatives in the Northeast/Mid-Atlantic region.* 

During the discussion that followed, the following emerged as key takeaways:

- Pennsylvania has been considering evolving its AFIG corridor siting requirements for DCFC stations so it can
  possibly include traditional gas stations as DCFC station locations. This would expand available locations for
  its DCFC roadmap.
- SmartWay is an EPA program which assists transportation providers with benchmarking, measuring, and tracking their efforts to reduce their carbon footprint and improve efficiency though the availability of multiple online tools. SmartWay uses alternative fuel trucks for its emissions reduction and efficiency efforts. SmartWay is interested in regional uses for its trucks. Increasing regional use of alternative fuel trucks will compensate for modern diesel engines' emissions treatment systems which are less efficient due to stop and go traffic and short haul travel. Publicly-accessible infrastructure would help so that trucking groups can rely on that infrastructure when the vehicles are away from their home fleet.
- The NYSERDA Truck Voucher Incentive Program is a three-step process.
  - First, NYSERDA approves the types of fuel technology eligible to receive incentives. Then, vehicle manufacturers apply to the program.
  - Once approved, dealerships apply to NYSERDA for vouchers with a conditional purchase order from their fleet. NYSERDA holds onto their voucher for one year, though dealerships can apply for an additional six-month extension.
  - Once the vehicles are delivered, NYSERDA makes a payment to the vehicle seller.
- NYSERDA has not made truck stop standardization for fueling a requirement in the past.
- Maryland DOT has worked on building out infrastructure in rural areas of its state, primarily through participating in existing events (i.e., apple festivals). In terms of choosing rural locations to implement infrastructure, Maryland DOT has determined that places where people already congregate, such as

universities or public government agencies, is a good place to start. It has also found success working directly with local associations. NREL recommends looking for locations where there already are power upgrades (e.g., recreational vehicle parks).

• New York and Pennsylvania have found success with school districts adopting propane for school buses and being interested in continued propane use.

#### Alternative Fuel Corridor Planning Tools

Attendees learned about the variety of tools available to support states in planning for and mapping alternative fueling infrastructure.

**Moderator:** Mike Scarpino, Transportation Project Engineer, U.S. Department of Transportation Volpe Center

Alexander Barton, Manufacturing Applications Engineer, Connecticut Center for Advanced Technology See presentation for more information.

- The best applications for hydrogen technology are portable power, stationary heat and power, and motive power.
- The Hydrogen Fueling Station Planning Tool developed by the Connecticut Center for Advanced Technology (CCAT) was developed with the state of Connecticut in mind but is intended to be applicable for other states. It can also be used for a range of alternative fuels and multiple areas.
- The locations that CCAT looked at were warehouses, truck stops, existing alternative fueling stations, intermodal freight facilities (rail, air, truck, port), fleet clusters, along Interstates and routes, and in towns or transit districts.
- Objectives for the tool include connecting users with a geographic information systems (GIS) planning tool, coordinating transit and light duty hydrogen stations, leveraging Volkswagen Settlement funds, increasing transportation planner and utility engagement, and expanding electrochemical technologies for energy storage.
- The tool is available online at the following link: <u>http://chfcc.org/hydrogen-fueling-station-planning-tool/</u>.

#### Grace Van Horn, Energy and Environmental Policy Consultant, M. J. Bradley & Associates LLC

#### See presentation for more information.

- M. J. Bradley & Associates worked with the Transportation Climate Initiative and Georgetown Climate Center to develop EV Infrastructure Planning Tools to identify which locations may be suited for DCFC infrastructure, taking into account state and other stakeholder priorities.
- Currently, the tools covers 13 states, and the tool's planning team started with designated corridors and have since expanded to nominations coming from the states directly. The tools cover close to 12,000 miles of key corridors. The tools are focused on distance charging and corridor travel using metrics and combining data in Excel.
- The tools have a visualization map which combines available data including outputs with pre-loaded weighting methodologies that are customizable for the users. The tools accommodate scenario planning, allowing users to narrow down high priority locations. They pair nicely with tools developed by NREL.
- The tools assist users with comparing potential development locations, gaining support for public utilities commission EV proceedings, and scoping analysis for state infrastructure development initiatives.

• The tools are free and available online at <u>www.mjbradley.com</u> and <u>www.georgetownclimate.org</u>.

Johanna Levene, Manager, Transportation Data and Tools, National Renewable Energy Laboratory See presentation for more information.

- NREL's AFDC provides online interactive tools, maps and data, case studies, publications, explanations of laws and incentives, fuel conservation mechanisms, and assistance with alternative fuels, vehicles, and stations.
- The AFDC is funded by the DOE and uses data collected by industry to display federal and state laws and incentives, replicable case studies, and more. AFCD's Alternative Fueling Station Locator allows users to filter by location and fuel type. This tool also enables users to map driving routes. A new feature of the Station Locator is that it includes stations in Canada, and NREL is considering including stations in Mexico so that users can look up routes from Canada to Mexico.
- The AFDC's mapping tools can support the nomination process of alternative fuel corridors for agencies and help them plan to develop fueling infrastructure.
- EVI-Pro Lite is a tool to provide a simple way to estimate how much EV charging a user might need at a cityand state-level. In September 2019, the EVI-Pro Lite tool will be able to estimate load profiles for EV charging. In 2020, the AFDC will have data on more discreet areas, as well as towns and cities, which will provide more localized evaluations.
- NREL has also been working on a resilience analysis with FHWA and the Volpe Center. The team has been
  analyzing how to automatically refresh corridors between Rounds 1 and 2 and how to get more of those
  corridors from Pending to Ready. The team is looking more specifically at stations that have opened since
  2016. Corridors designated as Pending in rounds 1 and 2 are being reevaluated to determine if criteria are
  met for Ready status.
- Certain highway sections were designated with EV corridor status with Level 2 chargers but will need
  additional DCFC installations for future designation. When state planners are looking at highway sections
  with gaps, they should look at locations where there are already Level 2 chargers and consider putting a
  DCFC station there instead.
- EVs charge using specific connectors. An EV that uses either a Combined Charging System connector or CHAdeMO connector would have charging gaps along certain corridor segments.

### Matt Rahill, Alternative Fuels Data Center Lead, National Renewable Energy Laboratory See presentation for more information.

- Mr. Rahill shared some details on the AFDC tools (Figure 9). AFDC provides a wealth of data on fuels, with its target audience being fleets and transportation planners.
- The AFDC is primarily focused on alternative fuels and is fuel agnostic.

 FHWA recommends using existing infrastructure data provided by NREL through the AFDC for designation nominations. Data from other sources are incorporated into AFDC's Alternative Fueling Station Locator. Tesla charging stations are not considered public charging stations because they use proprietary

technology. The AFDC Station Locator is updated regularly with new stations added. The tool is synced daily.

- Users may apply filters when using the AFDC Station Locator to search by location, fuel type, and station type. Users may reach out to NREL if there are certain datasets they would like to collaborate on. Data is downloadable by comma-separated values file and shapefile for each state and fuel type. Shapefiles are a standard way to represent data visually.
- Basic interactive maps show existing corridors and station locations that meet FHWA corridor nomination process



corridors and station locations that meet Figure 9. Matt Rahill describes some of the NREL tools available online on the AFDC website.

requirements for Corridor-Ready or Corridor-Pending status. These maps allow users to look at where there are enough stations within five miles of a highway to consider designating a new corridor. They will also show users where adding one more station will increase eligibility. There are five map options, one for each fuel type. These maps are very user-friendly, even to those unfamiliar with GIS.

During the discussion that followed, the following emerged as key takeaways:

- In its next phase of tool development, NREL will begin considering how residential or workplace access
  affects the ability of individuals to purchase EVs, especially because a significant number of drivers move
  around within townships or cities rather than on corridors. Providence, Rhode Island, for example, has
  several multifamily apartment dwellings or dwellings without driveways, so users' charging needs look
  different in more dense locations than they would in suburban or rural places.
- NESCAUM has a great resource toolkit for cities thinking about developing EV infrastructure and increasing EV use more broadly.
- For when electricity grids get disrupted during storms, NREL is working to track how often stations go on or offline.
- NESCAUM is hosting an event in late August titled Pathways to Decarbonization in the Northeast. The event
  will focus both on buildings and the transportation sector. The event will be held August 27 -29 in New York
  and broadly focus on infrastructure needs in dense urban centers.

## Building Awareness & Leveraging Partnerships: Communicating Availability and Benefits of Alternative Fuels to Enhance Corridors

During this session, partners discussed the strategies, partnerships, and resources required to build awareness on the availability and benefits of alternative fuel corridors. Panelists shared experiences securing stakeholder support for alternative fuel infrastructure along corridors and discussed additional needs such as signage.

Moderator: Oana Leahu-Aluas, Associate, Cadmus Sarah McKearnan, Senior Policy Advisor, NESCAUM See presentation for more information.

- NESCAUM is an association of Northeastern climate and air agencies working closely with states to grow the market for EVs. Each of the member states have identified EV adoption as a top priority for addressing climate change.
- In a poll that NESCAUM recently conducted . about charging infrastructure availability and barriers to EV adoption in the Northeast, 83% of respondents agreed that there are not currently enough charging stations for EVs. 48% of respondents noticed more EV charging stations in their area over the past year, with 52% disagreeing.
- NESCAUM has a Multi-State Zero Emission Vehicle (ZEV) Task Force Action Plan which contains a set of recommendations intended to enable the EV market. It has also developed a Northeast Corridor Regional Strategy for EV Charging Infrastructure Figure 10. Panelists trade perspectives on signage. through 2021, which focuses on building out



a charging network across the Northeast through DCFC infrastructure and signage. Signage is featured in both plans because of its importance for EV drivers as well as its role in increasing awareness for the public.

There was a discussion on whether signage should include "general service signs" or "logo signs" for EV charging specifically (Figure 10). The potential advantages of investing in logo signs are that they provide information to motorists that they would not otherwise be able to get from general service signs, such as what kind of EV charging infrastructure it is. General service signs for EV chargers lack information about charging capacity and the type of port(s) available.

Colleen Turner, Assistant Director, Innovative Technologies and Regional Planning, Maryland Department of Transportation

#### See presentation for more information.

The State of Maryland has an Electric Vehicle Infrastructure Council comprised of state agencies, public utilities, original equipment manufacturers (OEMs), MPOs, and other local partners who identify their preferences for new EV infrastructure installation locations.

• Maryland DOT developed a Maryland Local Government Electric Vehicle Infrastructure Survey which

- collects input from counties and municipalities on their EVs, EV infrastructure, and EV charger experiences. The tool allows the public to drop pins on its maps so that users can indicate their location preferences.
- Maryland DOT is using an EV ownership density map to identify existing locations of signage and gaps without signage. The DOT also created a map showing all existing EV charging infrastructure in the state.
- Ms. Turner also shared helpful websites sites to find resources (Figure 11). Maps and the survey are available online at the following links:
  - o <u>www.mdot.maryland.gov</u>; and
  - o <u>www.marylandev.org</u>.



Figure 11. Colleen Turner shares her perspective on building awareness and leveraging partnerships in the state of Maryland.

# **Erin Russell-Story**, Clean Cities Northeast Regional Manager, National Energy Technology Laboratory *See presentation for more information.*

- Clean Cities Coalitions work to implement alternative fuel corridors across the country. In 2018, there were 40 Coalitions that elected to focus on corridor activities that support the FHWA initiative through the Coalition Cooperative Agreement and in 2019, that number grew to 52 Coalitions.
- Clean Cities Coalitions organize and facilitate alternative fuel infrastructure planning activities, alternative fuel corridor development, including support of the FHWA Alternative Fuel Corridor Designation initiative activities, research and preparation of alternative fueling readiness plans, and planning for future fueling infrastructure development where current corridor gaps exist.
- Some of the noteworthy activities that Clean Cities Coalitions have been involved in recently include the following:
  - Created maps for analyzing regional and state corridors for submittal, refueling needs, and potential signage locations;
  - Coordinated with businesses and various groups including utilities, electric cooperatives, and DOT staff, and work to connect with businesses interested in hosting DCFC stations;
  - o Led and/or assisted with the preparation of corridor nomination proposals; and
  - o Performed research on utility demand charges and DCFC station viability.

#### Susan McSherry, Director, Alternative Fuel Programs, New York City Department of Transportation See presentation for more information.

 New York City DOT (NYC DOT) is working to build regional awareness and develop more partnerships to achieve its goals of emissions reductions, improved public health, and adoption of green technology. It is focused on aggregating clean vehicles in certain target regions.

- NYC DOT is committed to helping New York City achieve an 80% reduction of greenhouse gas (GHG) emissions by 2050 compared to 2005 emissions levels. The mayor of New York City is also committed to fulfilling the city's role in meeting Paris Climate Accord goals.
- New York City has heat maps showing rates of cardiovascular hospitalization and asthma, and this motivates the DOT to target emissions and pollution reduction efforts in locations that are hardest hit. The DOT is looking at this issue in terms of air quality and environmental justice. This became the impetus for an air pollution control project for clean trucks in Hunts Point because it is an area heavily impacted by diesel pollution contributing to high rates of asthma and school absenteeism. NYC DOT has seen emissions reductions as a result of its vehicle replacement and retrofit efforts.
- The NYC DOT has replaced 600 trucks with newer technology. So far, it has only replaced older diesel trucks with newer diesel trucks.
- On July 10, 2019, the DOT was pleased to announce the grand opening of a new clean energy fueling station.

During the discussion that followed, the following emerged as key takeaways:

- An ideal location for signage along highways is near or at exits. Signage is also an important tool for addressing motorists' range anxiety and directing alternative fuel drivers towards the stations they need. It can also increase public awareness of alternative fuel vehicle existence and promote the market. Increased coordination between state agencies can make installing signage more feasible.
- States may consider alternative forms of awareness building for alternative fueling infrastructure, including more smartphone applications. This may help attract new audiences as well.
- EV networks such as EVgo are already connected to Google Maps, which may assist EV drivers with finding charging infrastructure along their routes.
- For corridor planning, working with local MPOs will help. Once connected on this issue, transportation planners may develop concrete steps for deploying alternative fuel vehicles and then work with the DOTs to try and secure funding opportunities.
- Each panelist shared what they have found most helpful in expanding awareness and attaining funding opportunities:
  - Talking to external stakeholders about sustainability and air quality goals;
  - o Developing relationships with private sector parties or vendors who sell vehicles;
  - Having a target geographic area to focus efforts on;
  - o Using web platforms to inform broader audiences, including social media influencers;
  - o Partnering with local business hosts of alternative fuel infrastructure to ask them to advertise it;
  - Hosting ride and drives;
  - o Securing funding through cooperative agreements with DOE; and
  - Working with Clean Cities Coalitions.

Case Study: Economic Impact of Fully-Developed Alternative Fuel Corridor **Jacob Lehr**, Senior Research Analyst, Industrial Economics, Inc. *See presentation for more information.* 

- Industrial Economics, Inc. (IEc) is working with FHWA to identify the potential benefits of building out an
  alternative fuel corridor, looking at Interstate 80 as an example. Measuring the benefits will help decisionmakers understand corridor-level impacts, such as station and infrastructure construction, station
  operations, avoided damages related to emissions reductions, and other benefits.
- To calculate potential impacts, IEc calculated economic impacts related to station construction and operations, estimated the total number of alternative fuel stations that would be required, estimated the total vehicle miles traveled (VMT) supported by these stations and total emissions reductions, and calculated total avoided emissions damages. IEc looked at potential impacts in 2030 compared to a baseline of I-80 today. Mr. Lehr presented some of these potential impacts (Figure 12).
- Projected impacts for 2019 were based on if 62 new stations were constructed along the I-80 corridor to achieve 100% EV readiness with 83 million electric VMT supported by the EV stations and 100% CNG readiness with 64 million CNG VMT supported by the CNG stations. To maintain 100% EV readiness on I-80 by 2030, three new EV stations would need to be constructed annually. IEc anticipates that there would be a spike in initial construction and operations impacts in the first few years and then a much more steady growth of jobs impacts through 2030. There are projected increases in health and air quality benefits from emissions reductions through 2030, which is a result of criteria pollutant and GHG emissions avoided. CNG implementation has more near-term effects and EVs account for more longer-term emissions benefits.
- In 2030, developing the I-80 corridor with EV and CNG stations could contribute to 1.2 billion electric VMT and 170 million CNG VMT. It could contribute to 753 ongoing construction and operations jobs and emissions benefits near \$24 million.



Figure 12. Jacob Lehr presented on potential impacts of building out an alternative fuel corridor along I-80.

 A CNG- and EV-ready corridor could contribute to increased revenue by drawing customers who would otherwise be using different fuel types, regional alternative fuel use, and reduced costs to electric utilities and ratepayers. Additional outcomes of the fully-developed corridor could include changes in revenue related to reduced operating costs to EV owners and changes in local economies due to less "exported" money for gasoline.

#### Filling the Gap: Strategy, Technology, and Partnership for Infrastructure Development

Technology and fuel suppliers shared perspectives on how to "fill the infrastructure gap" and discussed challenges and best practices for the planning and implementation of alternative fuel corridors.

Moderator: Alycia Gilde, Director, Fuels and Infrastructure, CALSTART

Barry Carr, Eastern Regional Manager, Trillium See presentation for more information.

• Trillium is a medium size company owned by a larger company named Love's that owns truck stops. Trillium also has a trucking business that transports fuels and a tire-selling business.

- Trillium offers services for any clean fuel, including EV charging, CNG, renewable natural gas, renewable diesel, biodiesel, and hydrogen. Trillium has fueling sites around the country, some of which host multiple fuels. Some of these locations can generate power and operate as a microgrid.
- Love's has invested in renewable energy generation, for example by purchasing properties surrounding its truck stops and installing solar there.

#### Marcy Bauer, Director, Program Operations, EVgo

#### See presentation for more information.

- EVgo is America's largest public fast charging network, with more than 1,200 DCFC stations in 34 states and 66 metro areas and 125,000 customers.
- EVgo's chargers are an open network and do not require a membership for use. EVgo's network is also the first public network to contract for 100% renewable energy. The company markets itself for its reliability, speed, and convenience.
- Barriers facing the industry are:
  - o **Permitting**;
  - o Utility interconnection;
  - o Operational expenses (utility rates); and
  - Low near-term utilization.
- Opportunities for the industry are the Volkswagen Settlement funds, fleet electrification, and rideshare electrification.
- EVgo recently finalized a high-power charger corridor from Monterey to Tahoe and is working on a final stretch of corridor between Boston and Washington, D.C.

## Chelsea Jenkins, Executive Director of Government Affairs, ROUSH Clean Tech

#### See presentation for more information.

- ROUSH Clean Tech is a privately held engineering company with about 5,000 employees around the world.
   ROUSH Clean Tech works on advanced clean energy solutions for propane, gasoline, CNG, hydrogen and electricity, and develops products for medium-duty vehicles in the commercial truck, school bus and transit markets. The company also develops capabilities for connected vehicles, fleet management software, and autonomous vehicles.
- A successful project that could be used as a model was the Southeast Propane Autogas Development Program (SPADP) which involved converting almost 1,200 public and private fleet vehicles from gasoline to propane autogas across ten southeastern states. SPADP installed more than 30 refueling stations in the mid-Atlantic and Southeast regions and displaces about 1.2 million gallons of gasoline annually. This amounts to about 6,000 tons of carbon dioxide eliminated. This project also created dozens of jobs.
- In order to understand both barriers and opportunities for growing the autogas market, it's important to
  understand that autogas adoption is much more fleet based than consumer based, it's best suited in
  medium-duty, heavy-duty and off-road road applications and the decentralized and highly competitive
  nature of supply differs greatly from the natural gas and electricity markets. Some specific barriers include
  lack of education about price volatility at fleet versus retail locations catering to residential markets,
  meeting volume requirements needed to grow retail locations and corridors, industry engagement and

adoption is inconsistent, emissions and other models use inaccurate or outdated source data to quantify benefits, infrastructure planning is often viewed through a short-term lens versus a longer-term/growthoriented lens. Opportunities for greater autogas adoption are to view the fuel as more fleet-oriented than consumer-based fuel, grow awareness of new near-zero propane engines and renewable propane that allow for extremely cost-effective solutions to reduce criteria pollutants and greenhouse gases today, and most of the duty-cycle needs of most any medium-duty vocation can't be met with propane today while electrification in the medium- and heavy-duty sector continues to evolve technically and price-points come down.

#### **Roy Bant,** Hydrogen Energy Business Development Manager, Northeast, Air Liquide *See presentation for more information.*

- Air Liquide focuses on hydrogen fuel technology. Hydrogen is a safe, clean, and versatile energy carrier. It can be transported over long distances and stored long-term, produced without a carbon footprint to create clean power and heat, and is required as a clean feedstock when recycling captured carbon dioxide. Air Liquide has partnered with Toyota to form a network of 12 hydrogen fueling stations across the Northeast.
- Hydrogen can be used in a variety of markets and is ready to scale today for light- and heavy-duty vehicles, trains, airplanes and drones, a variety of ships, bicycles and scooters, and material handling vehicles.
- Hydrogen is a fuel considered in the nine-state ZEV Action Plan which includes California, Oregon, Maryland, New York, Vermont, Massachusetts, New Jersey, Connecticut, and Rhode Island. This Action Plan is committed to by the governors in each of the nine states who are pushing ZEV adoption.
- Major barriers for fuel cell adoption include lack of awareness and outreach, lack of consistency in the permitting process, and obtaining approval from Massachusetts DOT and the New York City Port Authority to transport hydrogen in their tunnels.

After the panelist presentations, attendees broke up into three groups to discuss solutions to top barriers



Figure 13. Attendees break out into groups to discuss barriers to alternative fuel implementation and adoption.

to filling in the alternative fuel infrastructure gap in the Northeast/Mid-Atlantic region (Figure 13). Each breakout group was provided with two of the top six barriers that emerged from the pre-convening survey questions. Discussions focused on the corresponding actions that private sector organizations and local, state, or federal government can take to overcome these top barriers. Attendees then presented discussion results (Figure 14). Each barrier is listed below with key action items for addressing it.

#### **Consumer Adoption of Vehicles**

• Host on-going training for salespeople on the benefits of driving an EV so that they can relay those benefits to customers. Often salespeople at dealerships are unaware.

- Offer sales incentives. These can be directly for the salespeople to learn more about EVs. Connecticut has an incentive program for this.
- <u>PlugStar</u> is an online platform that provides training on EVs. The state of New Jersey is supporting this
  program with funding. There is another online platform used in Washington, D.C. called <u>EZ-EV</u> which
  provides education on incentives and EV user guides.
- Increase professional research and development.
- Work with utilities to provide incentives such as workplace use benefits.
- Work with Clean Cities Coalitions to offer ride and drives and find EV investors to sponsor these events.
- Distribute more educational materials to the public.

#### Station Economics

Utilize government resources to support long-term station ownership models. Governments may own
stations or pay for initial station costs but make the real estate available at a later time for alternative
fueling use. For example, some entities have a Department of General Services which in some cases
compiles lists of all the properties that are too small for most buildings and could therefore be potential

sites for alternative fuel infrastructure. This could open an inventory of properties. Governments may also help support reductions in soft costs, such as permitting, time, and engineering services.

- Taxes can be structured to incentivize the utilization of gas stations as alternative fueling sites.
- Streamline the permitting process.
- Advocate for regulatory reform.
- Work with governments and investors to provide funding for conducting alternative fuel readiness plans.
- Governments can collect more data on costs so there is more publicly-available data on station costs. Governments can also aggregate the data on station loads.
- Work with utilities to advocate for their use of time-of-day rates.
- Update building codes.

#### Lack of Public Awareness

- Finding opportunities for people to access alternative fuel technologies, such as ride and drives or ridesharing.
- Increasing peer to peer communications can be an effective way to reach new audiences. Hearing about
  alternative fuel technologies from peers can be effective for changing behavior (e.g., the "Tesla effect" of
  increased purchases of Tesla vehicles in the same neighborhoods).
- Get information on alternative fuel technologies into schools. This can happen through access to school boards or through student clubs. This can positively impact the next generation of drivers.
- Educate OEMs on the mechanics of alternative fuel vehicles and alternative fueling options.



from the breakout discussions during the

Filling the Gap session.

- Take focused approaches and target audiences in campaigns to make effective use of resources and avoid trying to achieve everything at once.
- Leverage and borrow more from relevant existing research such as behavioral economics. A lot of research has been done on energy efficiency adoption, so drawing from existing research and expanding it to the transportation sector can help.

#### Lack of Incentives and Financing

- Ensure that already available funding incentives are being deployed using best practices. Use funding wisely.
- Incorporate financing and incentives into packages.
- Communicate success of incentives to policy makers.
- Provide information on alternative fuels to fleets through peer fleet groups or Clean Cities. Information through these channels is perceived as coming from respected authorities rather than as a sales pitch from corporate alternative fuel or technology providers. Providing real-time data on costs will help make a convincing case.
- Any policy program that delivers more fleet adoption will help reduce total costs by taking advantage of economies of scale, even if it is not an incentive or financing tool.
- Fleets can conduct aggregated procurement which will reduce upfront purchase prices and pool funds. Fleet purchases function by economies of scale which will drive down costs.
- Include financial officers and other executives in discussions about total cost of ownership and cost savings.
- Conduct more advocacy at the state and national legislative levels to get incentives and other financing options instated or preserved.
- Utilize green bank opportunities.
- Leverage utility funding to help support EV initiatives.

#### Low Cost of Conventional Fuels

- Create incentives for alternative fuels to compete with the prices of conventional fuels.
- Discuss the costs to health from air pollution due to conventional fuel use.
- Publicize the soft costs and benefits associated with alternative fuel vehicle use. These include highoccupancy vehicle lane access, preferential parking, and several local incentives.
- Advertise the convenience and accessibility of driving an alternative fuel vehicle by skipping the typical gas station lines and going straight home to charge an EV instead.
- Educate the public on price comparisons of charging EVs at peak vs. non-peak times based on time-of-use incentives.
- Alternative fuel vehicle or technology rebates are often available.
- When governments set deadlines, timelines, or requirements, it drives more vehicle adoption.

#### Low Vehicle Availability

• To make the case for increasing sales of truck or OEMs, aggregate sales data.

- Transit agencies in California have ambitious policies for ZEV adoption. Such policies increase vehicle demand, which spurs production. Increased production in California can impact other states because it is bringing the price point down and increasing vehicle volumes, which drives the market. Similar policy options can stimulate market development and help overcome low vehicle availability.
- Educating dealerships about why they should be purchasing, investing in, selling, and promoting alternative fuel vehicles will help significantly. Car dealers are often unaware about alternative fuel vehicle rebates. Having dealership support for alternative fuel vehicles will help.

#### Our Path Forward: Sustaining Partnerships for Corridor Growth

Partners summarized convening outcomes, evaluated opportunities to improve regional coordination, committed to partnership, and put forth actions to expand alternative fuel corridors and the marketplace for advanced vehicle technologies in the Northeast/Mid-Atlantic U.S. During this session, attendees also provided suggestions for ways FHWA and Clean Cities could help states meet their corridor goals.

During this session, participants were asked for the key action items that resulted from the Convening, both for themselves and their organizations (Figure 15). Participants were also asked to suggest ways FHWA and Clean Cities could continue supporting corridor efforts. The responses included the following:

- Review and understand the tools presented during the convening better in order to use them and communicate about them to others.
- Develop a white paper of EV charging best practices and present it to municipalities.
- Promote the NESCAUM "Drive Change. Drive Electric." campaign to stakeholders.
- Encourage regional collaboration efforts such as the convenings and diesel collaboratives.
- Continue advocating for funding for alternative fuel vehicle programs and couple them with infrastructure programs.
- Work with the FHWA Division Office and State DOT to place alternative fuel corridor signage.

*Figure 15. Attendees report out on key action items they will take following the Convening.* 

- Make progress toward goals related to alternative fuel vehicle counts and infrastructure.
- Solicit suggestions on where infrastructure should be placed. Collect data on the cost of alternative fuel stations and share that information with others.
- Collect alternative fuel corridor signage policies from states through NESCAUM. Have FHWA release notification of the next round of corridor designations as soon as possible.
- Determine who to share the resources discussed during the convening with and keep the momentum going on alternative fuel corridor progress in the state.

- Work with partner agencies to establish a single, unified vision for carbon pollution reduction and mobility. Understand the big picture of where alternative fuels and mobility are going in the future.
- Apply peer to peer learning concepts by talking to others about alternative fuel vehicles.
- Collaborate with partners to integrate the tools presented during the convening into MPO plans and State DOT long-range plans.
- Explore whether Wikimaps or MetroQuest could be used by the freight sector to specify where alternative fuel infrastructure stations would be helpful.
- Look into the funding opportunity for corridor planning that FHWA announced.
- Work on signage for the new Hunts Point natural gas station and help establish an alternative fuel corridor through New York City.
- Participate in Clean Cities events to continue alternative fuel education and outreach.
- Inform product development plans and policy agendas based on needs discussed during the convening. Connect FHWA with industry consortium groups to incorporate more fleet perspectives into the corridor program.
- Connect with State DOT and other partners to better understand the challenges they are experiencing related to alternative fuels.
- Encourage state fleets to lead by example.
- Update plans for EV charging infrastructure to consider corridors in the region.
- Emphasize importance of signage when installing charging infrastructure near highways.
- Maximize public funding for electrification. Encourage others to set up National Drive Electric Week events locally.
- Encourage State DOTs to work with Clean Cities and environmental agencies on alternative fuel corridors. Highlight alternative fuel corridor program during the next American Association of State Highway and Transportation Officials Committee on Environment and Sustainability meeting.
- Highlight and share alternative fuel corridor success stories.
- Develop a matrix of alternative fuel corridor signage efforts across the country.

## Summary of Convening Evaluations

An online survey was distributed to attendees on July 15, 2019. The survey was intended to assess the effectiveness of the convening, as well as inform the development of future convenings. A total of 22 attendees responded to the survey. Their answers are summarized below.



*Figure 16. Breakdown of survey respondents by role in alternative fuel corridor implementation.* 

Out of those that responded to the survey, most were Clean Cities Coalition or state energy or environmental office representatives.



*Figure 17. Pie chart showing respondents' satisfaction with the overall content and organization of the convening.* 

All respondents (100%) were either satisfied or very satisfied with the overall content and organization of the convening. No one responded that they were "somewhat satisfied" or "not satisfied."



Figure 18. Bar graph showing the most valuable aspects of the convening, according to attendees (each attendee received multiple votes).

Survey respondents noted that the Northeast/Mid-Atlantic Alternative Fuel Corridor Initiatives panel was the most valuable portion of the convening. The next most popular portions of the day included the Our Path Forward: Sustaining Partnerships for Corridor Growth session and the networking opportunities. No respondents selected "Other." Respondents could select more than one answer to this question.



*Figure 19. Pie chart of respondents' understanding of the alternative fuel policy and infrastructure landscape in the Northeast/Mid-Atlantic region, as a result of the convening.* 

More than half of the respondents (64%) felt they developed a solid understanding of the alternative fuel policy and infrastructure landscape in the Northeast/Mid-Atlantic region, as a result of the convening. 32% noted that they developed a better, but not quite solid understanding. No respondents selected "No, I do not feel familiar with the policy and infrastructure landscape," and one person responded "N/A, I was fully familiar with it before the convening." No respondents selected "Other."



Figure 20. Scatter plot showing the degree to which the convening helped establish, maintain, or strengthen partnerships, rated from 0 to 100.

This question presented respondents with a slider that they could shift along a numbered spectrum, with 100 indicating a response of "very much so," 50 indicating a response of "somewhat," and zero indicating a response of

"not so much." All respondents indicated a 41 or higher for the degree to which the convening helped establish, maintain, or strengthen partnerships for promoting and enhancing alternative fuel corridors in the Northeast/Mid-Atlantic region. The average rating among all 22 respondents was 79.



Figure 21. Bar graph showing FHWA steps to improve alternative fuel corridors in the Northeast/Mid-Atlantic region (each respondent received multiple votes).

Survey respondents most commonly selected "Continue hosting regional convenings" as an additional step that the FHWA could take to help improve alternative fuel corridors in the Northeast/Mid-Atlantic region. One respondent selected "Other," and elaborated by writing "If possible, involve State lawmakers in the process." Respondents could select more than one answer to this question.

The last four questions in the survey were open-ended. The first of these asked "What was your key takeaway or action item from the discussion at the end of the day on Sustaining Partnerships for Corridor Growth?" Several responses (8) referenced continuing regional engagement and partnership as their biggest takeaway. Some responses are captured below:

- Continuing to communicate and collaborate with a variety of partners working to develop clean corridors.
- Collaboration is key, funding coordination is still needed.
- Ideas for potential DOE alt fuel funding opportunity announcement topics.
- Need to stay engaged with those I met.
- Importance of relationships with key stakeholders in developing a path forward.
- Coordination amongst agencies is necessary.
- Go back and update our regional EV supply equipment plan with a focus on corridors.
- Build out the necessary infrastructure fast.
- I walked away with a better view of what an EV owners deals with.

- More public education on corridors is needed for gap-filling.
- We are all in this together! Let's keep collaborating and communicating.
- Working with our State DOT representative along with the other people at the event.
- I left with a greater understanding of the Alternative Fuels Corridor program and plan on connecting with my State DOT to understand their experience and the challenges they have related to infrastructure investments.
- To provide state specific information to a number of states on their corridor resiliency situation.
- Becoming familiar with who the stakeholders are.
- Data pools that exist already are much more vast than I realized. We have a lot of well-informed opportunities ahead of us.
- To verify that CT's alternative fuel corridors that are signage ready for EVs have enough DC fast chargers to keep their status under current FHWA selection criteria.
- To review the new toolkit information and helpful tools from NREL.

The second open-ended question asked, "Were there any stakeholders who were missing from the discussion?" Respondents replied with the following:

- Utilities.
- Too bad more utility reps didn't attend
- More DOTs, utilities.
- No.
- Not that I saw.
- My DOT representatives (MassDOT).
- Utilities.
- I did not see my State DOT (Virginia) there.
- Independent System Operators (ISOs) (ISO-New England) would be a great addition for future power planning.
- It would have been nice to have DOTs represented from MA, VT and NH to talk more about regional corridor planning.
- New York Metropolitan Transportation Council and all the other MPOs not present.

The third open-ended question asked, "Were there any topic areas that were not covered or that should have received more focus?" Respondents replied with the following:

- Engaging with utilities.
- No.
- No.
- Discussion of alternative fuel vehicles that fall under Buy America.
- None.

- Gaps in the grid that will need to be addressed.
- I would have liked to learn more about the economic value to a state that has alternative fuel corridors. That type of information makes it easier to convince upper management to get behind alternative fuel corridors.

The final question allowed respondents to provide additional open-ended feedback or suggestions for future convenings. Respondents replied with the following comments:

- Keep up the great work!
- Very well done. Thank you.
- Great meeting and presentations. The planning team did a great job.
- Great session!
- Great convening, looking forward to the future.
- I enjoyed learning more about NRELs tools at the conference. It would be nice if FHWA sent out a newsletter 2 times a year that listed alternative fuel corridor contacts from each state, gave updates on what states are doing to promote/make alternative fuel corridors, lessons learned....etc. I spend so much time trying to figure out what other states are doing...it would be good to have a central place to go to get this information.
- This was a really excellent meeting and I am looking forward to building on next steps...

## Appendix I: Convening Agenda

7:45 AM	<u>Registration and Networking</u> Sign in, introduce yourself to new partners, and participate in a short interactive poll.			
8:30 AM	Host Welcome and Alternative Fuel Corridors Overview Gary Rennie, Environmental Protection Specialist, U.S. Environmental Protection Agency, Region 1 Diane Turchetta, Transportation Specialist, U.S. Federal Highway Administration			
	Northeast Diesel Collaborative leadership and the Federal Highway Administration's (FHWA's) lead on alternative fuel corridors provide welcome and introductory remarks on the importance of regional coordination and partnerships to support the development of alternative fuel corridors and a sustainable transportation network.			
8:50 AM	<u>Partnership Goals and Objectives</u> Oana Leahu-Aluas, Associate, Cadmus Alycia Gilde, Director, Fuels and Infrastructure, CALSTART			
	Get ready to "roll up your sleeves" for day-long, results-driven discussions as meeting hosts present convening objectives to enhance multi-state collaboration, evaluate key barriers, and find solutions to advance alternative fuel corridors in the Northeast/Mid-Atlantic U.S.			
9:00 AM	Around the Room Partner Introductions Each attendee briefly introduces themselves by providing name and organization.			
9:30 AM	Alternative Fuel Corridor Initiatives: Progress to Date, Outreach, Funding Moderator: Oana Leahu-Aluas, Associate, Cadmus Abby Swaine, SmartWay and Clean Freight, U.S. Environmental Protection Agency, Region 1 Joshua Dziubek, Energy Program Specialist, Pennsylvania Department of Environmental Quality Patrick Bolton, Senior Project Manager, New York State Energy Research and Development Authority			
	Partners throughout the region present on innovative programs currently advancing alternative fuel corridors in the Northeast/Mid-Atlantic U.S. Hear first-hand about the partners, technologies, and funding that are making it possible.			
10:20 AM	<ul> <li><u>Alternative Fuel Corridor Planning Tools</u></li> <li>Moderator: Mike Scarpino, Transportation Project Engineer, U.S. Department of Transportation Volpe Center</li> <li>Alexander Barton, Manufacturing Applications Engineer, Connecticut Center for Advanced Technology</li> <li>Grace Van Horn, Energy and Environmental Policy Consultant, M. J. Bradley &amp; Associates LLC Johanna Levene, Manager, Transportation Data and Tools, National Renewable Energy Laboratory Matt Rahill, Alternative Fuels Data Center Lead, National Renewable Energy Laboratory</li> </ul>			
	Learn about the variety of tools available to support states in planning for and mapping alternative fueling infrastructure. Hear about the types of analyses necessary to identify and fill infrastructure gaps along the corridors, including the National Renewable Energy Laboratory's Alternative Fuels			

Data Center alternative fueling station locator, a corresponding corridor tool, and additional tools developed by the Transportation and Climate Initiative and the Connecticut Center for Advanced Technology.

11:10 AM Break

11:25 AM Building Awareness & Leveraging Partnerships: Communicating Availability and Benefits of **Alternative Fuels to Enhance Corridors** Moderator: Oana Leahu-Aluas, Associate, Cadmus Sarah McKearnan, Senior Policy Advisor, Northeast States for Coordinated Air Use Management (NESCAUM) Colleen Turner, Assistant Director, Innovative Technologies and Regional Planning, Maryland Department of Transportation Erin Russell-Story, Clean Cities Northeast Regional Manager, National Energy Technology Laboratory Susan McSherry, Director, Alternative Fuel Programs, New York City Department of Transportation During this session, partners discuss the strategies, partnerships, and resources required to build awareness on the availability and benefits of alternative fuel corridors. Panelists will share experiences securing stakeholder support for alternative fuel infrastructure along corridors and discuss additional needs such as signage. 12:30 PM Lunch 1:30 PM Case Study: Economic Impact of Fully-Developed Alternative Fuel Corridor Jacob Lehr, Senior Research Analyst, Industrial Economics, Inc. 1:40 PM Filling the Gap: Strategy, Technology, and Partnership for Infrastructure Development Moderator: Alycia Gilde, Director, Fuels and Infrastructure, CALSTART Barry Carr, Eastern Regional Manager, Trillium Marcy Bauer, Director, Program Operations, EVgo Chelsea Jenkins, Executive Director of Government Affairs, ROUSH Clean Tech Roy Bant, Hydrogen Energy Business Development Manager, Northeast, Air Liquide Technology and fuel suppliers share perspectives on how to "fill the infrastructure gap" and discuss challenges and best practices for the planning and implementation of alternative fuel corridors. 3:10 PM Break 3:20 PM Our Path Forward: Sustaining Partnerships for Corridor Growth Partners summarize convening outcomes, evaluate opportunities to improve regional coordination, commit to partnership, and put forth actions to expand alternative fuel corridors and the

4:00 PM Adjourn

session, FHWA seeks feedback on how it can help states meet their corridor goals.

marketplace for advanced vehicle technologies in the Northeast/Mid-Atlantic U.S. During this

## Appendix II: Convening Participant List

State	Contact Name	Title	Organization	Contact Email
			Contacts	
CA	Chris Nihan	Infrastructure Deployment Manager, High Speed Charging	ChargePoint	christopher.nihan@chargepoint.com
CO	Johanna Levene	Manager, Transportation Data and Tools	National Renewable Energy Laboratory	Johanna.Levene@nrel.gov
СО	Matt Rahill	Alternative Fuels Data Center Lead	National Renewable Energy Laboratory	<u>Matt.Rahill@nrel.gov</u>
CO	Wendy Dafoe	Senior Project Manager	National Renewable Energy Laboratory	Wendy.Dafoe@nrel.gov
СТ	Craig Peters	Coordinator	Capitol Clean Cities of Connecticut	<u>craig.peters@manchesterhonda.com</u>
СТ	Alexander Barton	Manufacturing Applications Engineer	Connecticut Center for Advanced Technology	abarton@ccat.us
СТ	Kate Knight	Environmental Analyst	Connecticut Department of Energy and Environmental Protection	Kathleen.Knight@ct.gov
СТ	Jennifer Reilly	Transportation Planner	Connecticut DOT	Jennifer.Reilly@ct.gov
СТ	Daphne Dixon	Coordinator	Connecticut Southwestern Area Clean Cities	daphne@livegreennetwork.org
СТ	Lee Grannis	Coordinator	Greater New Haven Clean Cities	grannis@nhcleancities.org
DC	Ira Dorfman	Executive Director	Greater Washington Region Clean Cities	iradorfman@gwrccc.org
DC	Grace Van Horn	Consultant	M. J. Bradley & Associates	gvanhorn@mjbradley.com
DC	Kate McCormick	Law Fellow	Transportation and Climate Initiative	<u>kmm383@georgetown.edu</u>
DC	Faye Swift	DERA Grants & Policy Team Leader	U.S. Environmental Protection Agency	swift.faye@epa.gov
DC	Nora Hassan	Environmental Protection Specialist	U.S. Environmental Protection Agency	hassan.nora@epa.gov
IL	Marcy Rood	Clean Cities Team Lead, Energy Systems	Argonne National Laboratory	mrood@anl.gov
MA	Gary Rennie	Environmental Protection Specialist	U.S. Environmental Protection Agency	Rennie.Gary@epa.gov
MA	Mike Manning	Director	Massachusetts Clean Cities	mm@avsglp.com
MA	Stephen Russell	Clean Cities Coordinator	Massachusetts Clean Cities	stephen.russell@state.ma.us
MA	Chris Timmel	Community Planner	Massachusetts FHWA Division Office	Chris.Timmel@dot.gov
MA	Haidee Janak	Branch Chief, Transportation Programs	Massachusetts Department of Environmental Protection	<u>haidee.janak@state.ma.us</u>
MA	Sarah McKearnan	Senior Policy Advisor	Northeast States for Coordinated Air Use Management (NESCAUM)	smckearnan@nescaum.org
MA	Sara Secunda	Geographer	USDOT – Volpe Center	Sara.Secunda@dot.gov
MA	Abby Swaine	SmartWay & Clean Freight	U.S. Environmental Protection Agency	swaine.abby@epa.gov

State	Contact	Title	Organization	Contact Email
	Name			
MD	Colleen Turner	Assistant Director, Office of Planning & Capital Programming	Maryland DOT	<u>cturner@mdot.state.md.us</u>
ME	Kaylei Coombs	Program Associate	Maine Clean Communities	kcoombs@gpcog.org
ME	Lynne Cayting	Chief, Mobile Sources Section, Bureau of Air Quality	Maine Department of Environmental Protection	lynne.a.cayting@maine.gov
ME	Joyce Taylor	Chief Engineer	Maine DOT	Joyce.taylor@maine.gov
ME	Taylor S. Labrecque	Senior Environmental Planner	Maine DOT	Taylor.S.Labrecque@maine.gov
NC	Marcy Bauer	Director, Program Operations	EVGo	marcy.bauer@evgo.com
NH	Jessica Wilcox	Coordinator & Grants Manager	Granite State Clean Cities	Jessica.Wilcox@des.nh.gov
NH	Drew Drummond	Regional Sales Manager, New England	Greenlots	ddrummond@greenlots.com
NJ	Chuck Feinberg	President	New Jersey Clean Cities	<u>chuck.feinberg@gmail.com</u>
NJ	Melissa Evanego	Bureau Chief	New Jersey Department of Environmental Protection	Melissa.Evanego@dep.nj.gov
NJ	Sutapa Bhattacharjee	Planning and Program Development Manager	New Jersey FHWA Division Office	<u>Valeriya.Remezova@dot.gov</u>
NJ	Sudhir Joshi	Section Chief	New Jersey DOT	sudhir.joshi@dot.nj.gov
NY	Jennifer Ceponis	Coordinator & Senior Planner	Capital District Clean Communities	jceponis@cdtcmpo.org
NY	Barry Carr	Eastern Regional Manager	Clean Communities of Central New York	<pre>coordinator@ccofcny.com</pre>
NY	Joy Gardner	Clean Cities Coordinator	Empire Clean Cities	joy@empirecleancities.org
NY	Christina Ficicchia	Business Development Manager, Eastern USA	Flo	<u>cficicchia@flo.com</u>
NY	Rita D. Ebert	Program Coordinator	Greater Long Island Clean Cities	rebert@gliccc.org
NY	David Keefe	Coordinator	Greater Rochester Clean Cities	dlkeefe@rochester.rr.com
NY	Susan McSherry	Director, Alternative Fuel Programs	New York City DOT	smcsherry@dot.nyc.gov
NY	Patrick Bolton	Senior Project Manager	New York State Energy Research and Development Authority (NYSERDA)	Patrick.Bolton@nyserda.ny.gov
NY	Hannah Greenberg	Physical Scientist	U.S. Environmental Protection Agency	greenberg.hannah@epa.gov
PA	Roy Bant	Hydrogen Energy Business Development Manager, Northeast	Air Liquide	roy.bant@airliquide.com
PA	Adam Beam	Research Analyst	Delaware Valley Regional Planning Commission	abeam@dvrpc.org
PA	Tony Bandiero	Executive Director	Eastern Pennsylvania Alliance for Clean Transportation	tbandiero@ep-act.org
PA	Erin Russell- Story	Clean Cities Northeast Regional Manager	National Energy Technology Laboratory	Erin.Russell-Story@NETL.DOE.GOV
РА	Ngani Ndimbie	Policy Specialist	PennDOT	nndimbie@pa.gov

State	Contact	Title	Organization	Contact Email
	Name			
PA	Josh Dziubek	Energy Program Specialist	Pennsylvania Department of Environmental Protection	JDziubek@pa.gov
PA	Keith Jack	Manager of Facilities Operation	Pennsylvania Turnpike Commission	Llack@paturnpike.com
RI	Barbara Cesaro	Coordinator	Ocean State Clean Cities	Barbara.Cesaro@energy.ri.gov
RI	Allison Archambault	Supervising Air Quality Specialist	Rhode Island Department of Environmental Management	<u>Allison.Archambault@dem.ri.gov</u>
RI	Julia Gold	Chief, Sustainability, Autonomous Vehicles, and Innovation	Rhode Island DOT	Julia.Gold@DOT.RI.gov
VA	Chelsea Jenkins	Executive Director of Government Affairs	Roush Cleantech	Chelsea.Jenkins@roush.com
VA	Alleyn Harned	Executive Director	Virginia Clean Cities	aharned@hrccc.org
VA	Ronique Day	Deputy Director	Virginia DOT	ronique.day@oipi.virginia.gov
VA	Richard Duran	Community Planner	Virginia FHWA Division Office	richard.duran@dot.gov
VT	Peggy O'Neill- Vivanco	Vermont Clean Cities Coordinator	Vermont Clean Cities	Peggy.ONeill-Vivanco@uvm.edu
			Organizers	
MD	Elise Emil	Analyst	Cadmus	elise.emil@cadmusgroup.com
MD	Oana Leahu- Aluas	Associate	Cadmus	Oana.Leahu-Aluas@cadmusgroup.com
CA	Alycia Gilde	Director, Fuels and Infrastructure	CALSTART	agilde@calstart.org
DC	Diane Turchetta	Transportation Specialist	Federal Highway Administration	<u>Diane.Turchetta@dot.gov</u>
MA	Mike Scarpino	Transportation Project Engineer	USDOT – Volpe Center	Michael.Scarpino@dot.gov
MA	Stephen Costa	Technical Analyst	USDOT – Volpe Center	<u>Stephen.Costa@dot.gov</u>
MA	Jacob Lehr	Senior Research Analyst	Industrial Economics, Incorporated	JLehr@indecon.com
NY	Benjamin Mandel	Northeast Regional Director	CALSTART	bmandel@calstart.org