

Memorandum

TO: Leslie Fordjour, NYMTC

FROM: Ben Mandel, CALSTART; Chris Lamm, Cambridge Systematics, Inc.

DATE: January 26, 2022

RE: Clean Freight Corridors Planning Study Task 5D Draft Deliverable:
Implementation Considerations for Clean Freight Corridors

INTRODUCTION

NYMTC has initiated a Clean Freight Corridors Planning Study to advance high-efficiency, low-emission alternative transportation technologies in the region's freight fleet.

Part of the Regional Freight Plan component in NYMTC's Plan 2045 Regional Transportation Plan, the study will develop a strategic plan to support alternative fuel technologies for goods movement by identifying roadway corridors suited to be designated as Clean Freight Corridors for future investment in alternative fueling/electric charging infrastructure.

A previous memo described the methodology and results of a new Clean Freight Corridor designation process, developed in partnership with NYMTC, the study's Technical Advisory Committee (TAC), and industry and public sector stakeholders. The purpose of this memo is to outline policies and strategies for implementation of Clean Freight Corridors, including the process of designating and marking the corridors, as well as developing alternative fuel infrastructure along the designated corridors.

IMPLEMENTATION CONSIDERATIONS FOR CLEAN FREIGHT CORRIDOR DESIGNATION**FINALIZE LIST OF DESIGNATED CLEAN FREIGHT CORRIDORS AND PRIORITY DEVELOPMENT CORRIDORS**

While the Clean Freight Corridors Planning Study has identified an optimal mix of new clean freight corridors, work remains to refine this list based on strategic priorities and the context of the broader freight network. In particular, NYMTC should align with adjacent state and regional agencies to ensure cross-jurisdiction continuity of clean fuel infrastructure. Some sections of I-95, as well as I-78, are examples of highway segments that did not rank highly in the designation exercise but may be significant in providing consistent fueling opportunities for long-haul drivers. As such, they have been included in the analysis results as priorities for future development.

Similarly, entities such as the Port Authority of New York and New Jersey that are developing their own clean fueling infrastructure should be consulted to ensure connectivity, and state-specific or multi-state trucking associations (e.g., Bi-State Motor Carriers) as well as stakeholder groups such as the Northeast Diesel Collaborative should be engaged to better understand driver needs.

Additionally, the proposed network should be vetted against the location of environmental justice (EJ) communities (for example, areas defined as Disadvantaged Communities in New York State). While diesel particulate matter concentration was one of the major criteria for determining a segment's need for alternative fuel infrastructure in this study's analysis, this only provides a rough proxy for EJ community locations. Moreover, NYMTC's Communities of Concern designations are only defined for the counties in the NYMTC planning area, and are not in place throughout the broader Study Area. Prioritizing clean freight corridor designation and priority development in EJ communities emerged as a key next step during stakeholder outreach.

Finally, NYMTC and partner agencies should determine which fuel types should be developed along which corridors. Factors such as projected demand, policy trends, and safety issues should be taken into account in this decision. For example, the projected future demand for LPG is low, and may not warrant further development.

Additionally, current policy trajectories favor electrification above LPG, CNG and hydrogen (see Task 3.3 memo). These latter fuel types also face regulatory hurdles in locations such as New York City, where the transportation of compressed gas is restricted for safety reasons. For these reasons, the role of LPG, CNG, and hydrogen along designated Clean Freight Corridors should be carefully evaluated.

DEVELOP A SIGNAGE AND COMMUNICATION PLAN

Once the designated network is finalized, a signage plan should be developed, also in coordination with contiguous transportation and planning agencies. Other means of communication with drivers and industry stakeholders should be explored, such as integration with driver navigation apps, to increase awareness of clean fuel infrastructure development and to route truck drivers to the appropriate fueling stations. Proactive communications regarding Clean Freight Corridors can also serve to induce demand for alternative fuel vehicles by increasing operator confidence that their duty cycles can be met reliably using a diesel alternative.

IMPLEMENTATION CONSIDERATIONS FOR CLEAN FUEL INFRASTRUCTURE DEVELOPMENT

CORRIDOR-SPECIFIC CONSIDERATIONS

While many of the recommendations outlined in this memo are consistent region-wide, there are some considerations specific to each corridor, particular in siting fuel stations to support the overall network. Table 1 outlines these considerations for the Clean Freight Corridors and Priority Development Corridors recommended in Memo 5C. For reference, station locations for each fuel type can be viewed on the project webmap: <https://arcg.is/0abSWK0>.

Table 1. Corridor-Specific Implementation Considerations

	High way	Segment	Implementation Considerations
Clean Freight Corridor (High Readiness, High Need)	I-278	Total length	As described in the Task 3.2 Visual Gap Analysis Tech Memo, there are several EV charging stations within 5 miles of this corridor, resulting in no major coverage gaps. However, because existing EV stations are not directly adjacent to the highway, they are likely inconvenient to reach for drivers as they must traverse congested city streets, and this also creates issues for local communities. Further, it is not clear whether these existing stations are accessible for heavy duty vehicles. A detailed inventory of EV stations near I-278 should be conducted including routing from the highway and heavy duty accessibility. From this inventory, 1-2 optimal locations for additional EV charging stations should be identified. Locations that also serve the intersecting I-495 and NY 27 corridors should be prioritized. CNG coverage is strong in northern Brooklyn and the Bronx. There is only one hydrogen station, located in the Bronx. An additional combined hydrogen and CNG station in Staten Island would improve total coverage.
	I-495	Queens	I-495 has fairly strong EV charging coverage in Queens and Nassau counties, as the Task 3.2 Visual Gap Analysis Tech Memo showed, but existing stations should be evaluated for heavy-duty accessibility. EV coverage is weaker in Suffolk county, where there may be opportunity to develop new stations for heavy-duty EV charging. CNG coverage is fairly strong, but hydrogen coverage is lacking. A hydrogen fueling site should be identified west of Medford. All fuel station development along I-495, NY 25, and NY 27 should be planned in tandem as these are parallel highways with similar service areas.
	I-495	Suffolk	
	I-678	Total length	I-678 has fairly strong EV station coverage, as the Task 3.2 Visual Gap Analysis Tech Memo showed, but existing stations should be evaluated for heavy-duty accessibility. There is one CNG station on the north end of the corridor, and there are no hydrogen stations. Adding combined EV, CNG, and hydrogen fueling at or near JFK airport for trucks connecting

	High way	Segment	Implementation Considerations
			to air cargo services should be prioritized, as well as locations that also serve the intersecting I-495, NY 27 and NY 25 corridors.
	I-80	New Jersey (east of 287)	The section of I-80 between I-287 and I-95 has no hydrogen or CNG stations. While there are several EV charging stations within a 5-mile radius, only one is located in immediately adjacent to the highway. The existing station should be evaluated to determine whether CNG and hydrogen infrastructure can be added, and an additional 1-2 locations for combined fueling stations should be identified. Priority should be given to sites that could also serve I-287 and I-95.
	I-87	Westchester and Bronx	I-87 has fairly strong EV charging station coverage, but an additional station immediately adjacent to the highway in Westchester would enhance the network. There are no CNG stations immediately adjacent to I-87; 1-2 new CNG sites should be identified.
	I-95	New Jersey (north of Exit 10)	This section of I-95 has fairly strong EV charging coverage, but existing stations should be evaluated for heavy-duty accessibility. High-volume sites such as the Vince Lombardi Service Plaza should be evaluated to determine how well the existing EVSE supply is meeting the demand.
	I-95	Manhattan and Bronx	There is one existing CNG station, and one hydrogen station, both in the Bronx. Existing EVSE sites should be evaluated to determine if CNG and hydrogen fueling could be added. New sites that also serve I-80, I-87, I-678 and I-278 should be prioritized. The ability to develop hydrogen stations will be limited due to regulations in New York City.
Priority Development Corridor (High Need, Low Readiness)	NY 25	Queens	NY 25 and NY 27 have fairly strong EV charging coverage in Kings and Queens counties, but existing stations should be evaluated for heavy-duty accessibility. EV coverage is weaker in Suffolk county, where there may be opportunity to develop new stations for heavy-duty EV charging. CNG coverage is fairly strong along NY 27 but weak along NY 25. There are no hydrogen facilities immediately adjacent to either highway. All fuel station development along NY 25, NY 27, and I-495 should be planned in tandem as these are parallel highways with similar service areas.
	NY 27	Kings and Queens	
	NY 27	Suffolk	
Priority Development Corridor (Connectivity)	I-95	New Jersey (south of Exit 10)	EV charging infrastructure is minimal between Edison and Newark, NJ, and in Connecticut south of Bridgeport, and CNG and hydrogen stations are limited across these segments. Existing stations should be evaluated for heavy-duty accessibility, and new sites for combined EV, CNG and Hydrogen fueling should be identified along the entirety of I-95, particularly where they also serve intersecting highways and other high-demand areas such as ports.
	I-95	Westchester	
	I-95	Fairfield County	
	I-95	New Haven County	

	High way	Segment	Implementation Considerations
	I-495	Nassau	This short segment of I-495 should be planned in tandem with the Queens and Suffolk segments as well as NY 25, NY 27 and I-678.
	I-78	Pennsylvania	Development of fueling sites on I-78 should align with FHWA's Alternative Fuels Deployment Plan for I-81 and I-78 in Pennsylvania. ¹ This document identifies potential sites in Pennsylvania; New Jersey locations should be planned in tandem.
	I-78	New Jersey (east of 287)	
	I-78	New Jersey (west of 287)	
	NY 27	Nassau	This short segment of NY-27 should be planned in tandem with the Kings, Queens and Suffolk segments as well as I-495, NY 25, and I-678.
Other High Readiness Segments (not designated)	I-84	Connecticut	These segments were identified as having high alternative fueling readiness, but lower anticipated need. There are no recommendations for development at this time.
	I-287	New Jersey (east of 78)	
	I-287	Rockland and Westchester	
	I-91	Connecticut	

POLICY CONSIDERATIONS

FEDERAL POLICY

Federal policy will impact the development of clean fuel infrastructure in two ways: through funding opportunities, and through regulatory hurdles.

NYMTC partner agencies should be prepared to capitalize on federal funding opportunities for clean fuel infrastructure planning and development built into the Infrastructure Investment and Jobs Act (IIJA).² The IIJA directs the U.S. Department of Transportation (DOT) to coordinate and consult with other federal agencies to develop guidance for new programs relating to decarbonization of on-road vehicles. One such program is the Charging and Fueling Infrastructure Program, intended for the strategic deployment of publicly accessible EV charging infrastructure and

¹ [Final \(ver7-12-21\) PennDOT I81-I78 AFC Deployment Plan Report.pdf](#)

² For state-by-state opportunities associated with implementation of the IIJA, see <https://www.transportation.gov/briefing-room/usdot-releases-state-state-fact-sheets-highlighting-benefits-bipartisan>

hydrogen, propane, and natural gas fueling infrastructure in designated alternative fuel corridors.³ However, the design of IIJA ties funding to current FHWA corridor designations. For example, the designated “signage pending” network in each state must be built out before funding can be allocated to fueling infrastructure outside of that network. This may pose a challenge as some designated “signage pending” segments have limited economic viability and/or local interest in development. These low-viability segments could become obstacles to directing IIJA funding to high-viability segments that are not currently designated “signage pending” by FHWA. Additional guidance from FHWA on this matter, including a definition of what it means for the network to be “built out”, is expected in February 2022.

Additional funding streams for alternative fuel corridor development could become available through prospective legislative actions. On the other hand, some federal regulations designed before the availability of clean fuel technology could stand in the way of clean fuel infrastructure development. For example, one regulation (23 U.S.C.A. §111(a)) prohibits states from permitting automotive service stations or other commercial establishments to be located on interstate rights-of-way. This prevents states from capitalizing on existing assets (e.g., safety rest areas) to expand the clean fuel network. This regulation should be revised to enable the greatest penetration of clean fuel infrastructure along interstate highways.

STATE AND REGIONAL POLICY

New York, New Jersey, Connecticut and Pennsylvania have all signed on to the Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Memorandum of Understanding (MOU) and should continue to contribute to the development and implementation of recommended actions, including those outlined in the forthcoming Multi-State Medium- and Heavy-Duty Zero-Emission Vehicle Action Plan, which will be released for public comment in early 2022.

Among measures expected to be explored in the Action Plan is the adoption of California regulations on vehicle sales by manufacturers. In December 2021, New Jersey and New York State adopted California’s Advanced Clean Trucks rule,

³ FHWA has issued a request for information (RFI) relating to new IIJA programs to be coordinated by U.S. DOT: <https://www.energy.gov/eere/articles/new-national-electric-vehicle-programs-release-requests-information>

which will accelerate the adoption of electric trucks in these states by requiring manufacturers to participate in a credit/deficit program to increase the percentage of electric truck sales beginning in model year 2025. The adoption of ACT in these states will increase the demand for electric charging infrastructure not only in New York and New Jersey, but in neighboring states along key regional corridors.

The emergence of structures for utility involvement and investment in fleet electrification, such as the Medium- and Heavy-Duty EV Make-Ready Pilot offered by electric utilities in New York,⁴ lays a groundwork for expanding EV infrastructure and can be replicated by other utilities and states in the region. In particular, the expansion of “make-ready” infrastructure programs lays the groundwork for utilities to prepare sites for large-scale electric system expansion and reinforcement without burdening site hosts with the full upgrade costs. The New Jersey Board of Public Utilities released an initial straw proposal on the infrastructure ecosystem supporting electrification of medium- and heavy-duty vehicles in August 2021, which included preliminary proposals for fleet make-ready assistance; an updated straw proposal is expected in early 2022.⁵ Likewise, the Connecticut Public Utilities Regulatory Authority in September 2021 initiated a new proceeding for Medium- and Heavy-Duty Electric Vehicle Infrastructure, which is the forum through which a fleet make-ready program would be developed for Connecticut fleets.⁶

Hydrogen fuel cell technology is not as mature as electric vehicle technology in the Northeast region, and its growth may face regulatory challenges such as New York City’s prohibitions on the transportation of compressed gases and the ban on operation of fuel cell vehicles for certain regionally important crossings such as the Hugh L. Carey tunnel connecting Lower Manhattan and Western Brooklyn. Similarly, both hydrogen and compressed natural gas fueling may require expensive HVAC upgrades to meet ventilation requirements for if deployed in indoor facilities in some jurisdictions.

⁴ <https://jointutilitiesofny.org/ev/make-ready/mhd-pilot-program>

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<https://www.nj.gov/bpu/pdf/publicnotice/Notice%20Medium%20Heavy%20Duty%20EV%20Straw%20Proposal.pdf>

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<http://www.dpuc.state.ct.us/DOCKCURR.NSF/60903cc7b9de44728525746b006e8ffb/bade076b20f0a90a85258752005efc87?OpenDocument&scrollTop=2256.800048828125>

While there are also measures in place to support the adoption of hydrogen, compressed natural gas and propane use for M/HD vehicles in the study region, these fuels share some of the same regulatory hurdles as hydrogen fuel cell technology. As with hydrogen fuel, New York and Pennsylvania have programs to incentivize CNG and propane M/HD vehicles and Pennsylvania also incentivizes refueling infrastructure. In addition, New Jersey and Connecticut have tax incentives for these fuel types. Still, moratoriums on new facilities and prohibitions on the transportation of these fuels (namely propane in New York City) pose challenges to their adoption at scale. Perhaps more importantly, despite being significantly cleaner burning than diesel, these fuels systems still involve combustion of fossil fuels. As such, these combustion alternative fuels are not receiving the same beneficial policy emphasis as energy sources that do not require direct combustion. In New York, for example, natural gas and propane trucks can qualify for incentive funding, but at a significantly lower amount than zero-emission trucks. In New Jersey, the forthcoming truck funding program will focus exclusively on zero-emission technologies. Taken together, natural gas and propane are viable fuel types in the near-term but appear unlikely to receive sufficient policy support to reach critical mass in the years ahead as zero-emission technologies receive the bulk of policy attention.

LOCAL POLICY

As described above, local regulations in New York City pose a challenge for hydrogen, CNG, and LPG fuel site development there, but also through the wider network as fleets seek to adopt technologies where fuel availability is widespread and reliable.

Additionally, local zoning, permitting regulations, and other local policies are critical issues for siting and developing specific fuel stations. Zoning in particular may preclude the development of fuel infrastructure from otherwise optimal locations. Many of these restrictions were developed to address problems specific to diesel fuel, and should be revisited and updated to reflect the growth of near-zero and zero-emission fuels.

FUEL STATION SITING

A number of factors must be considered when selecting fuel station locations on a given corridor.

At a network level, fuel stations should be adequately spaced to ensure reliability and ease range anxiety, but also maximize the utility of the investment. Sites should also be selected for redundancy, either by developing sites on a detour route parallel to the main corridor, or by designing fuel stations to be accessible both from the corridor and from parallel roadways. This provides a measure of resilience to the system and allows drivers to access fuel even if a clean freight corridor is temporarily closed.

As mentioned above, existing assets should be leveraged where possible, for example by siting clean fuel infrastructure on existing rest stops, fueling stations, and truck parking locations where possible. Large-format sites should also be prioritized for their ability to host fueling infrastructure for a greater quantity of freight vehicles, improving site redundancy and improving the user experience by increasing the fueling stations available to truck operators.

Finally, local utilities should be engaged early in the site selection process to ensure adequate fuel capacity can be provided (e.g., sufficient electrical supply) and that as applicable, demand charges can be managed and mitigated.

TRUCK-COMPATIBLE DEVELOPMENT

During site selection and design, it is critical to understand the unique needs and specifications of heavy-duty vehicles. Whether a site is developed for use by freight vehicles only, or by a mix of light-, medium-, and heavy-duty vehicles, the ingress and egress points should be designed with adequate turning radii to accommodate the target design and control vehicles. Fueling station dimensions must also be designed to accommodate heavy vehicles, and the site should account for the safe and efficient flow of vehicles throughout (for example, how and where to separate heavy duty vehicles from light-duty).

While there are not many examples of public, high-capacity, truck-compatible fueling stations throughout the country, the Electric Island project designed, developed, and

built by Black & Veatch in Portland, Oregon in partnership with Portland General Electric and Daimler Trucks North America (DTNA) offers precedent for truck-centered public charging (see Figure 1). This station provides up to one megawatt of power to charging stalls designed specifically for heavy-duty form factors of tractor-trailers, large school buses, and more.⁷ Electric Island is located across the street from DTNA's headquarters in a district of Portland that contains a cluster of warehouses and other industrial buildings.

As NYMTC continues industry engagement to develop fueling sites on priority corridor segments, engagement with truck companies in addition to utilities is critical to ensure that the sites are not only located in areas convenient to trucking routes but also in a way that ensures a smooth and positive user experience based on the way trucks will navigate to and use fueling stations.

Figure 1. Electric Island Heavy Duty Vehicle Charging Station, Portland, Oregon



Source: Daimler Trucks North America

⁷ <https://www.bv.com/news/black-veatch-leads-design-construction-electric-island-first-its-kind-high-capacity-public>

ENGAGING LOCAL COMMUNITIES

Working with local stakeholders, including residents and the business community, is an essential step in overcoming local regulatory issues, and a best practice even in the absence of these hurdles. Providing education about the local air quality improvements that come with clean fuel development, as well as the potential economic benefits of siting a new fuel station in a given community, can prepare communities for the new development, minimize opposition, and secure buy-in for changing zoning and permitting rules. Additionally, stakeholders from the communities surrounding preferred infrastructure development sites can provide information to inform and improve the project, such as opportunities to collaborate with local businesses to increase truck drivers' access to local services while fueling.

FINANCING INFRASTRUCTURE DEVELOPMENT

Funding alternative fuel infrastructure development along corridors will require a combination of public and private resources, particularly for sites where demand is initially projected to be low. For sites with high traffic and demand estimates, private capital will likely be the main source of funding. Businesses centered around retail (such as rest areas on highways) also invest in fueling infrastructure and provide fueling services to attract clients to their existing business activities. Increasingly, third-party ownership structures are available that can relieve the site host of potentially significant development costs as well as utilization risk while generating passive revenues (i.e., rent) for site hosts.

For sites where traffic and demand estimates are low, which characterizes most sites in the near-term while alternative fuel truck adoption remains low, federal and state governments can support the business case for infrastructure deployment through incentive programs—such as New York State's Direct Current Fast Charging (DCFC) program⁸—and public-private partnerships (PPPs). Under PPPs, the private sector is typically tasked with financing, developing, and managing the site, and the

⁸ *NYSDERDA's DCFC Program covers up to 80% of the costs of DCFC purchase, installation and some operation items. This program has emphasized sites catering to light-duty passenger vehicles to date, but future funding rounds could expand this focus. For more, see:* <https://portal.nyserda.ny.gov/servlet/servlet.FileDownload?file=00Pt000000YDm19EAD>

public sector supports the project through cost and risk sharing. Public funds can be used to pay the private developer to install and operate the site; subsidize a portion of the fees charged to users by the developer, or as viability gap funding (covering the funding gap between the expected project revenues and costs).⁹ If authorized, utilities are also well positioned to buy down site development costs by utilizing rate payer dollars to cover the costs of make-ready electrical infrastructure.¹⁰ Achieving the scale and coverage needed for robust alternative fueling networks will likely require a combination of mechanisms and capital providers in the years to come.

⁹ <https://www.hindawi.com/journals/ace/2018/9061647/>

¹⁰ See, for example, the utility make-ready program authorized by the New York Public Service Commission: <https://jointutilitiesofny.org/ev/make-ready>