Joint Office of
Energy and
Transportation

Discover the National Zero-Emission Freight Corridor Strategy

6/25/2024

driveelectric.gov

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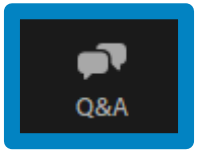

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Agenda

Introduction from the Joint Office

Presentations from panelists

Audience Q&A

Panelists

Kevin George Miller
Joint Office of Energy and Transportation

Jean Chu
Joint Office of Energy and Transportation

Alycia Gilde
Vehicle Technologies Office, DOE

Michael Laughlin
Vehicle Technologies Office, DOE

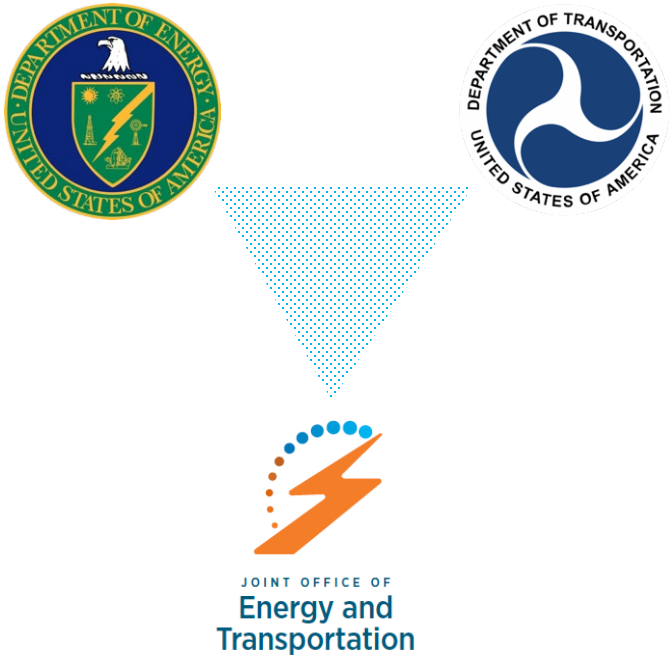
Ben Gould
Hydrogen Fuels Technology Office, DOE

Polling Questions

Kevin Miller and Jean Chu

Joint Office of Energy and Transportation

Mission and Vision



Mission

To accelerate an electrified transportation system that is affordable, convenient, equitable, reliable, and safe.

Vision

A future where everyone can ride and drive electric.

BIL Programs Supported by the Joint Office

The Joint Office provides unifying **guidance**, **technical assistance**, and **analysis** to support the following programs:

National Electric Vehicle Infrastructure (NEVI) Formula Program (U.S. DOT)
$5 billion for states to build a national electric vehicle (EV) charging network along corridors, including **$148 million** awarded to repair and replace non-operational chargers.

Charging & Fueling Infrastructure Discretionary Grant Program (U.S. DOT)
$2.5 billion in community and corridor grants for EV charging, as well as hydrogen, natural gas, and propane fueling infrastructure

Low-No Emissions Grants Program for Transit (U.S. DOT)
$5.6 billion in support of low- and no-emission transit bus deployments

Clean School Bus Program (U.S. EPA)
$5 billion in support of clean school bus deployments

Clean Bus Planning Awards (CBPA) Program

Free technical assistance for comprehensive and customized fleet electrification transition plans.

- Fleets eligible for FTA Low or No Emission Grant Program funding, with some exceptions, can apply now for CBPA assistance.
- Deployment assistance also available at the completion of the plan.
- Funded by the Joint Office and managed by the National Renewable Energy Laboratory (NREL).
- Applications open on a rolling basis.

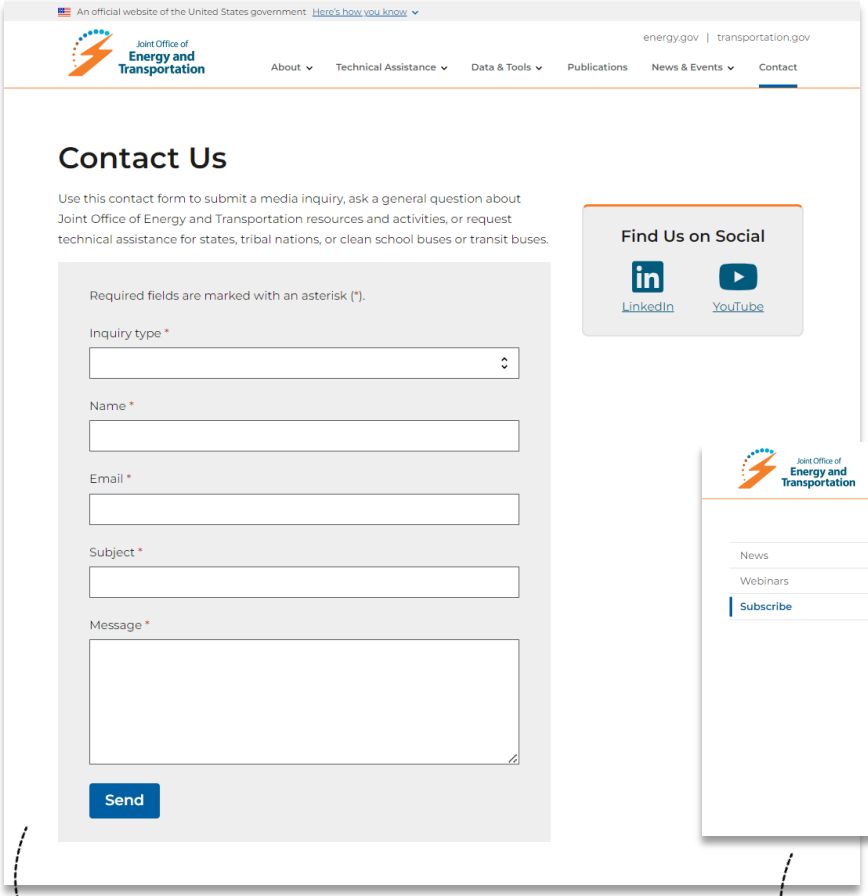
Learn more and apply

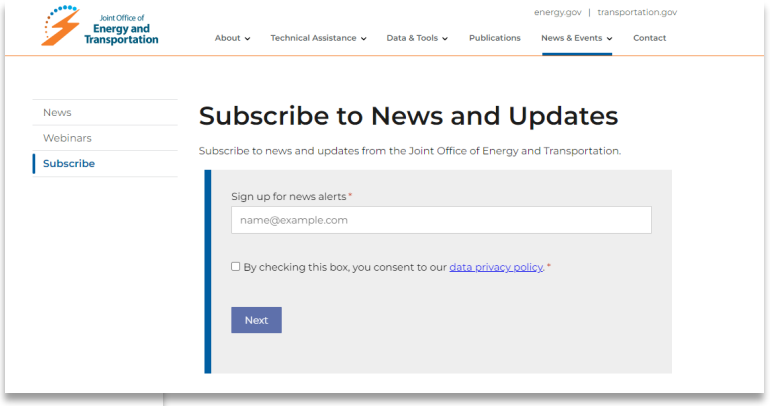
Joint Office of Energy and Transportation

NREL Transforming ENERGY

driveelectric.gov/clean-bus-planning-awards

- Request assistance via online form
- Initial response within 48 hours
- General questions and feedback welcome!





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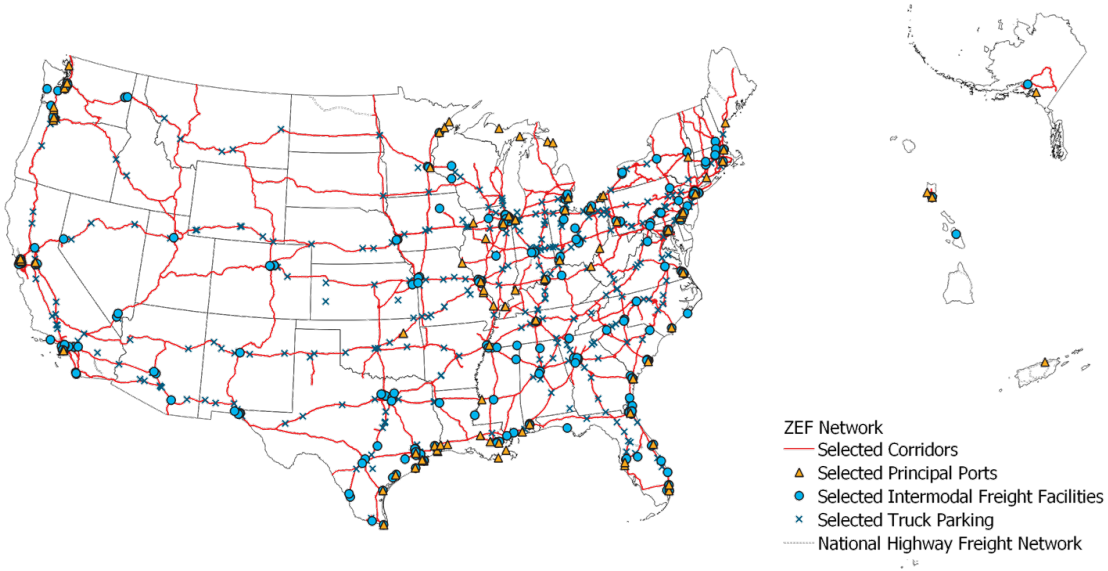
Overview

Zero-Emission Freight Corridor Strategy

Goal

The *National Zero-Emission Freight Corridor Strategy* seeks to **align and accelerate cross-sector investments** in zero-emission medium- and heavy-duty vehicle (ZE-MHDV) infrastructure and **clearly signal the need to bolster electric grid and hydrogen planning** to achieve a zero-emission freight network by 2040.



Background

An **interagency** initiative between the Joint Office of Energy and Transportation (JO), U.S. Department of Energy (DOE), U.S. Department of Transportation (DOT), and the Environmental Protection Agency (EPA) to **develop a national strategy for MHD freight corridors for electric and hydrogen vehicles** by:

1) Identifying **key characteristics** of a zero-emission freight corridor for electric charging and hydrogen fueling infrastructure

2) **Prioritizing and strategically sequencing** federal investments that will help achieve **a national zero-emission freight network by 2040.**

Joint Office of Energy and Transportation

Approach

To catalyze public and private investment in zero-emission freight (ZEF) and fully build out a ZEF corridor network by 2040, we will **prioritize** and **sequence** federal investments:

Prioritize

Approach

- Determine deployment factors.
- Apply factors to map.
- Establish focus and cadence of a multi-phase corridor plan to scale growth along freight corridors by 2040 for a fully built out national network.

Outcomes

- Allows federal grant program administrators to prioritize applications by assigning criteria/bonus points to projects in priority locations.
- Enables utilities & regulators to plan and approve infrastructure investments.
- Aligns policy across jurisdictions, sequences public & private action, ensures hubs and corridors support environmental justice.

Deployment Factors to Identify Priority ZEF Corridors

1. Segments of the NHFN with highest freight volumes.

2. Highest percentage of ports by annual tonnage, all intermodal freight facilities, and key truck service & parking.

3. Areas that bear disproportionate environmental and air quality burden from MHDV emissions.

4. States with policies that enable zero-emission vehicle deployment.

5. Areas projected to demonstrate better total cost of ownership for ZE-MHDV compared to ICE.

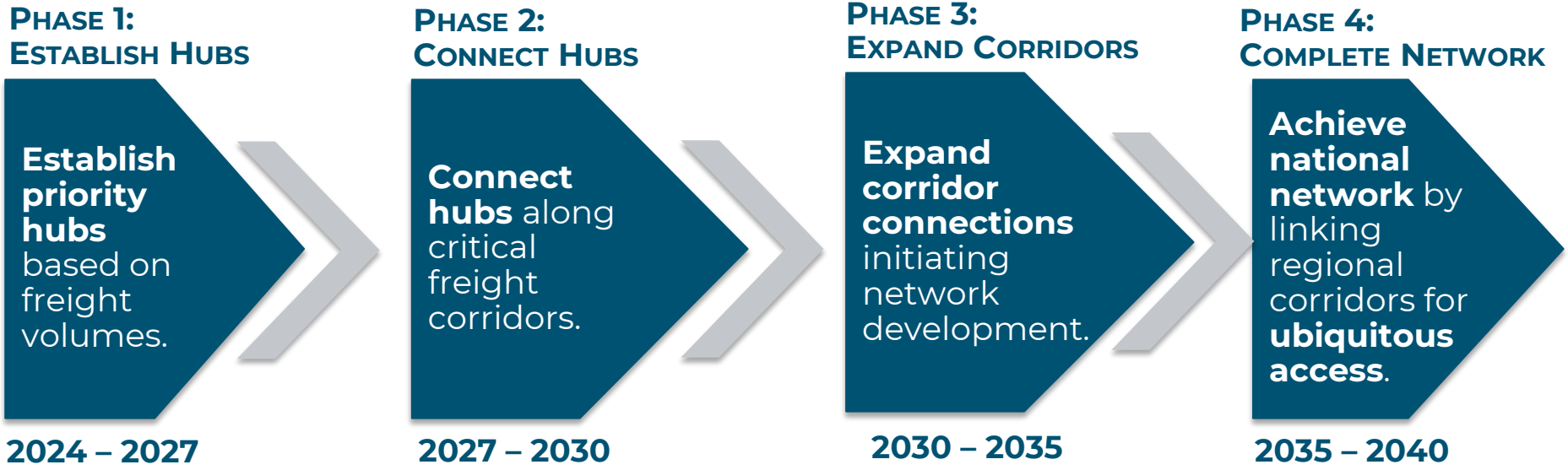
6. “On-the-ground” planning through Department of Energy commercial zero-emission vehicle corridor planning grants.

Michael Laughlin

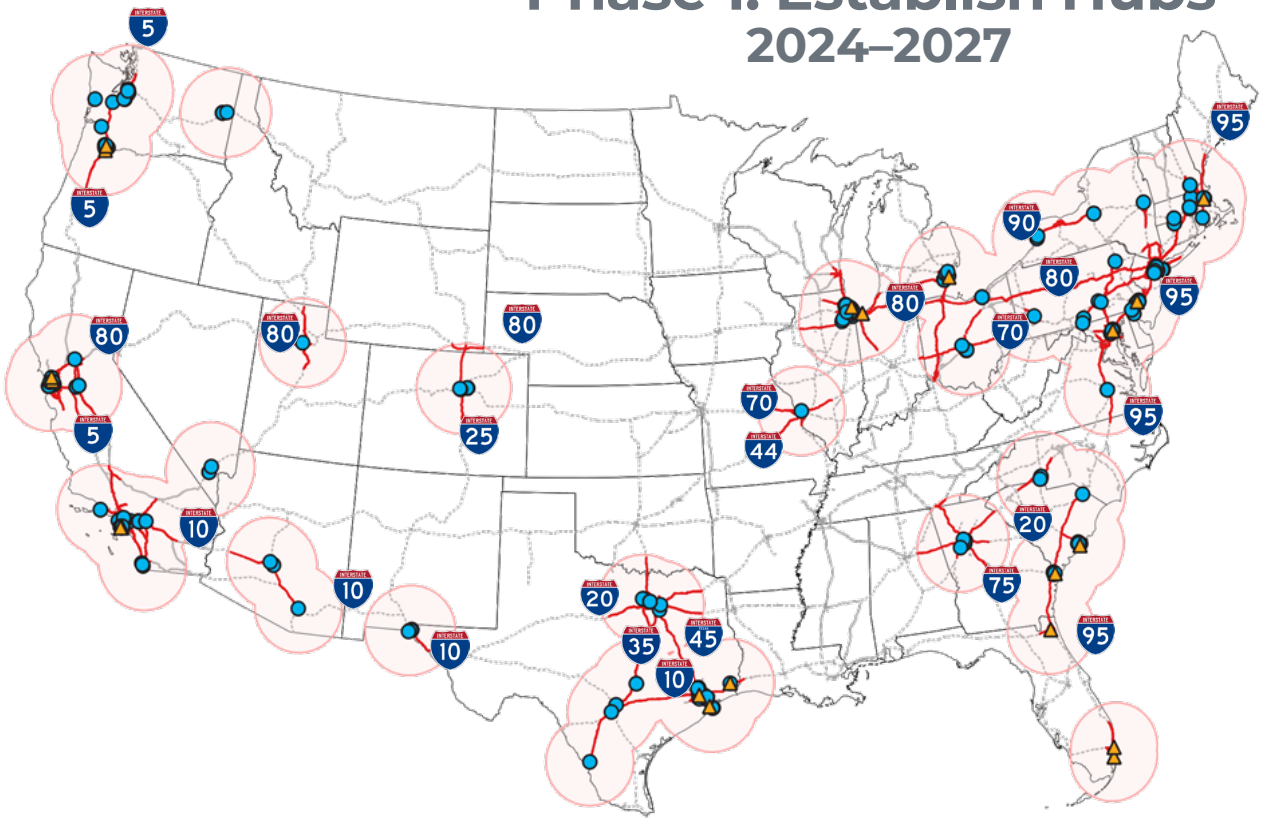
Vehicle Technologies Office

A Four-Phased Strategy for a National ZEF Network

The **ZEF Corridor Strategy will accelerate infrastructure deployment** along key corridors and hubs in four phases to achieve a **national ZEF network by 2040**.

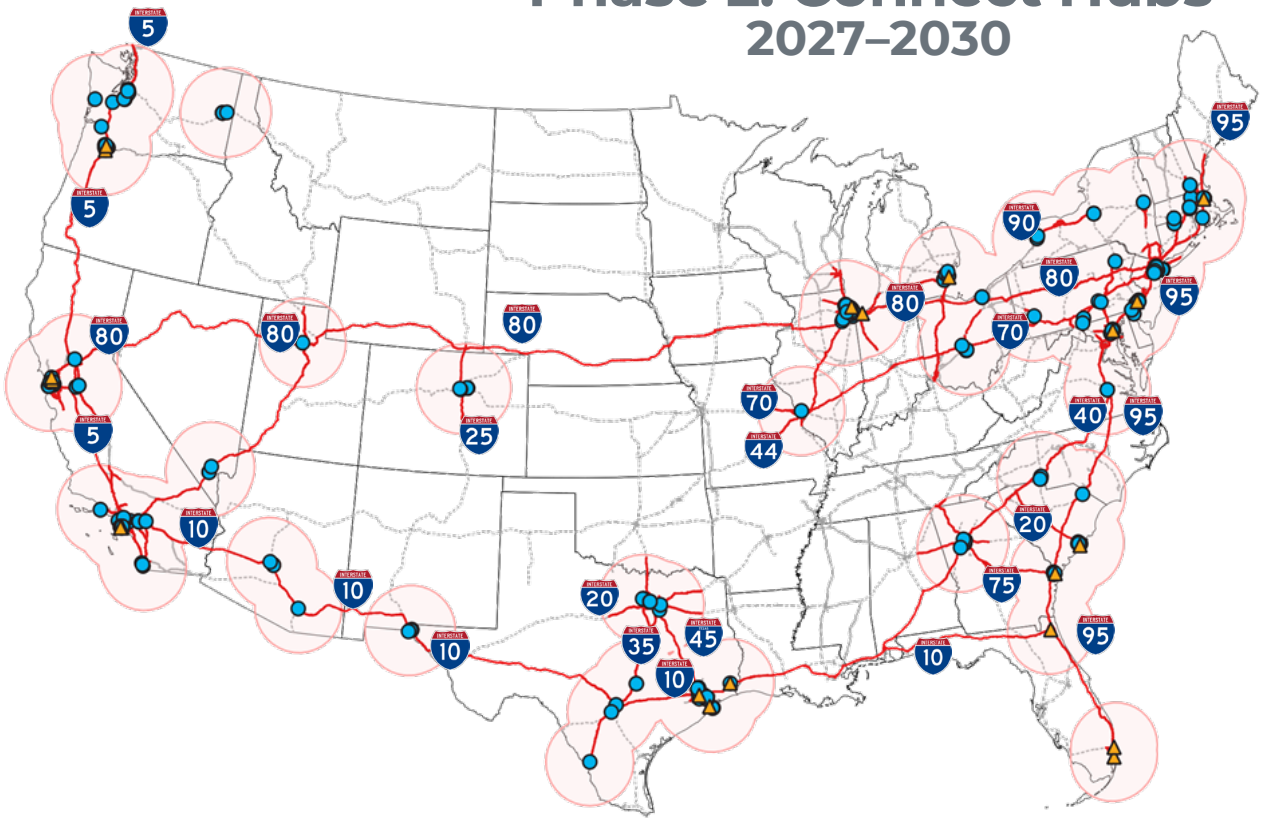


Phase 1: Establish Hubs
2024–2027



ZEF Network
- Selected Corridors
- Selected Principal Ports
- Selected Intermodal Freight Facilities
- Selected Truck Parking
- Selected Hubs
- National Highway Freight Network

Phase 2: Connect Hubs
2027–2030



ZEF Network
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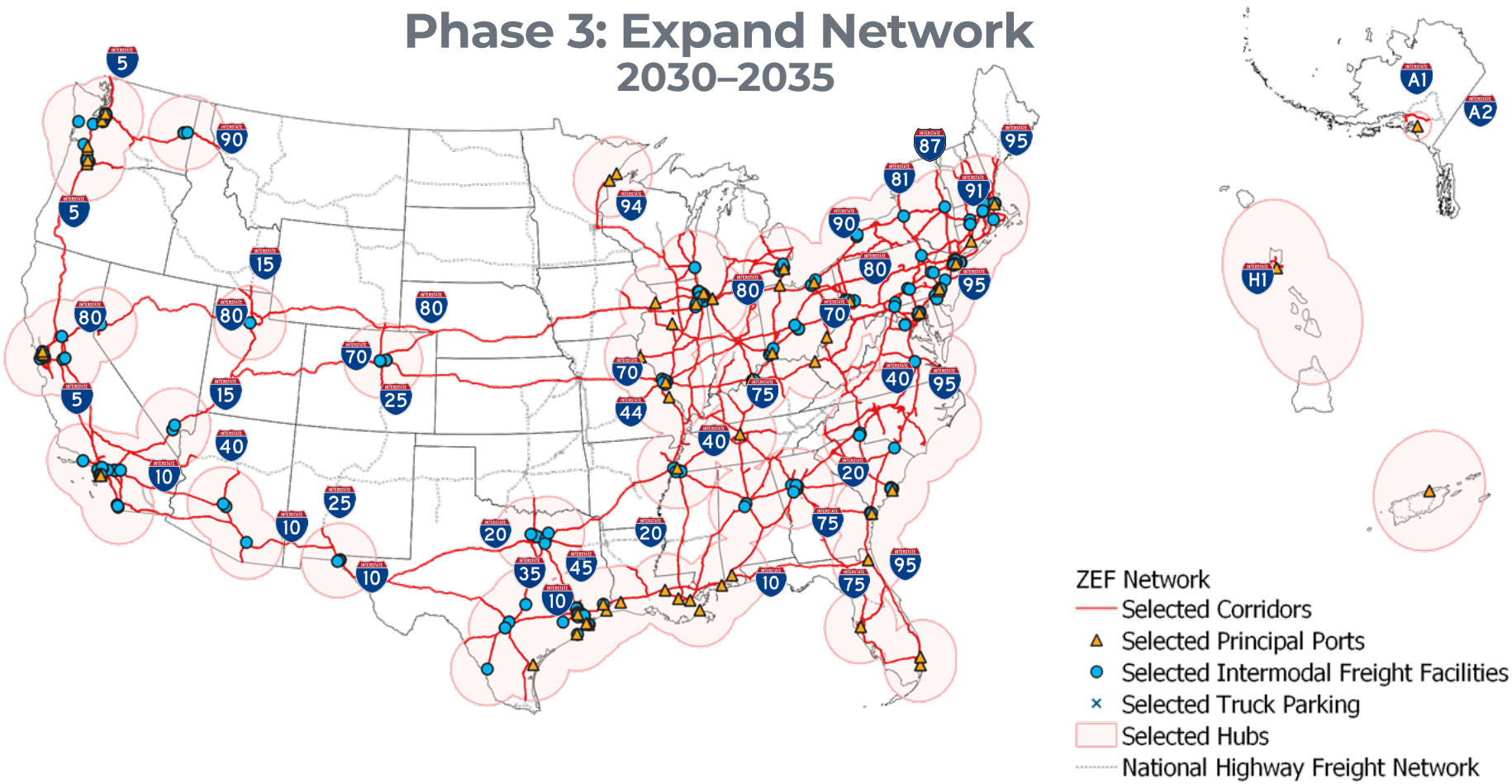
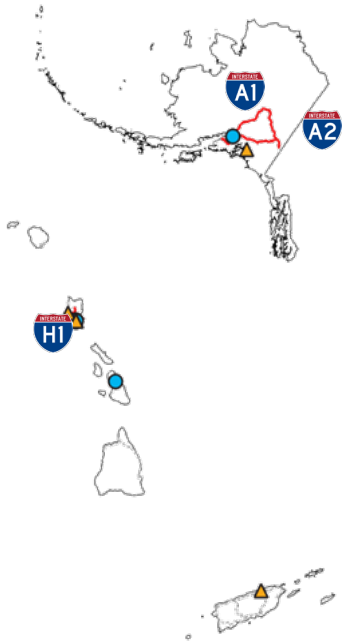
Phase 3: Expand Network
2030–2035



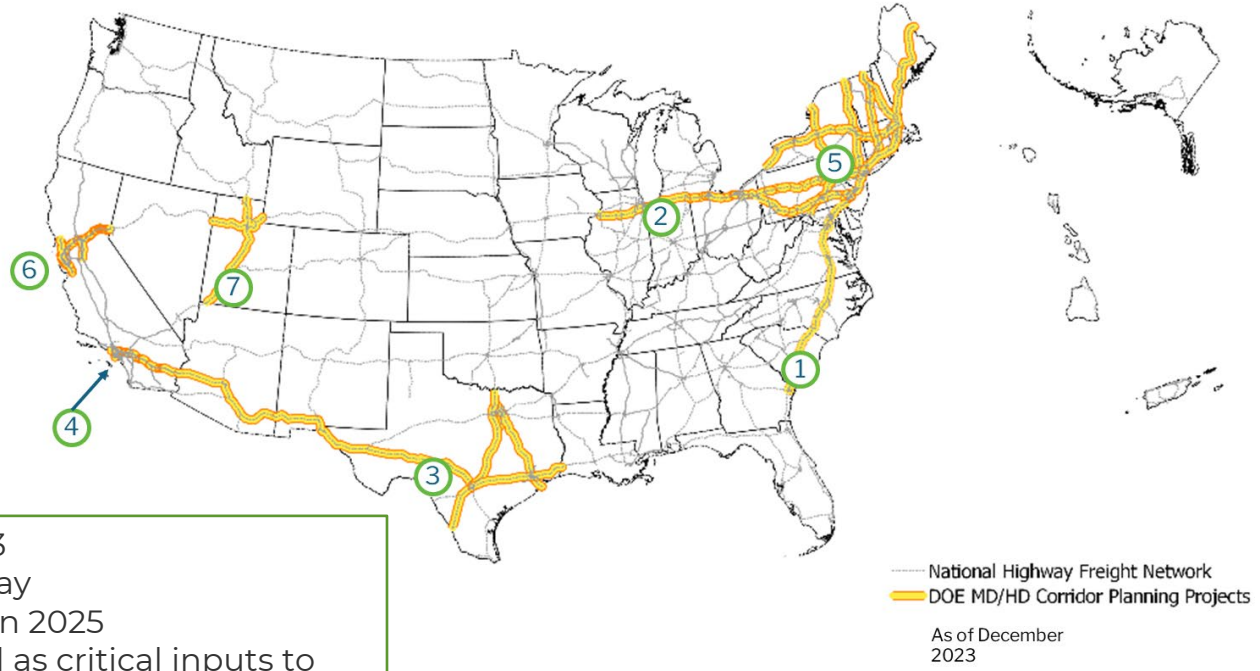
Phase 4: Complete Network
2035–2040



ZEF Network
- Selected Corridors
- Selected Principal Ports
- Selected Intermodal Freight Facilities
- Selected Truck Parking
- National Highway Freight Network

DOE Vehicle Technologies Office Corridor Planning Projects

1. CALSTART
2. Cummins
3. GTI
4. LACI
5. National Grid
6. RMI
7. Utah State



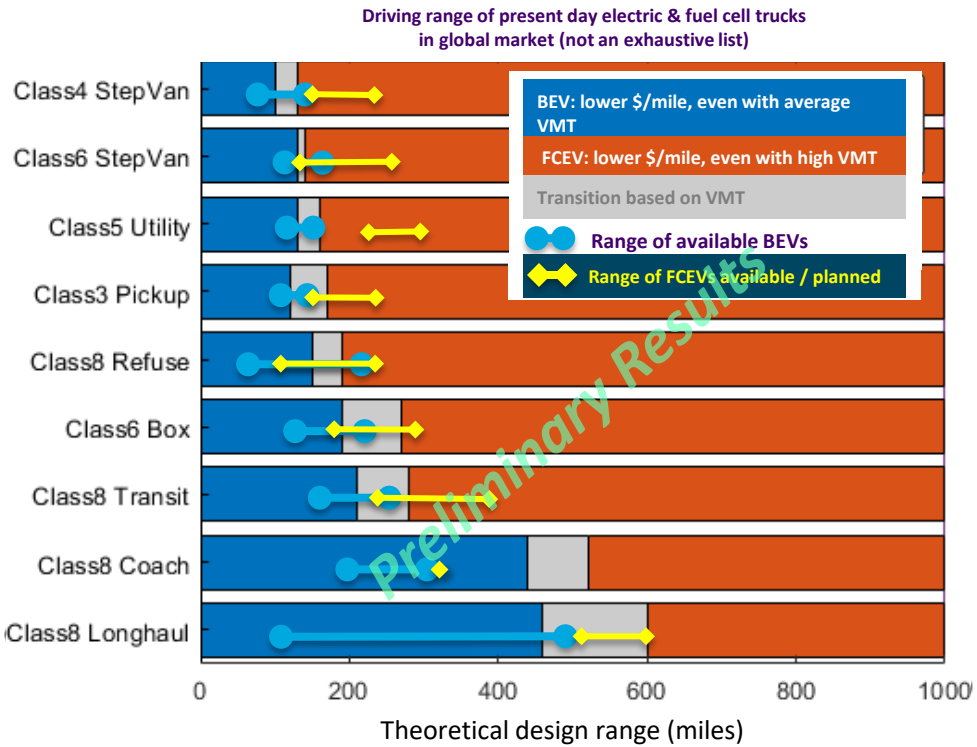
- Awarded in early 2023
- Projects now underway
- Planned completion in 2025
- Project corridors used as critical inputs to corridor strategy

Ben Gould

Hydrogen and Fuel Cell Technologies Office

Multiple Solutions will be Required to Decarbonize Commercial Trucks

ANL – Medium-Duty TCO and Target Development (TA059)



- VMT: vehicle miles travelled (daily VMT is estimated from reported average annual miles assuming 250 days of vehicle usage)
- VIUS: vehicle inventory and use survey

Argonne NATIONAL LABORATORY

Scenario:

Cost of ownership estimated based on vehicle price, fuel/energy expenses for average & high levels of VMT

- Assumes all HFTO/VTO 2030 targets are met
- Fuel/Energy costs: \$4/kg H_2, \$0.15/kWh

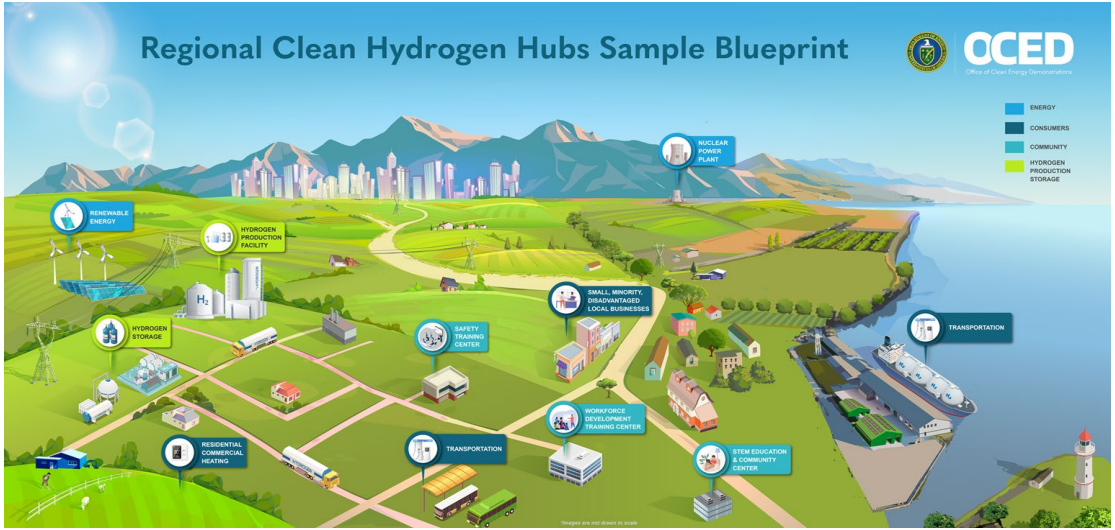
Conclusions:

- BEVs are competitive for short range designs. Beyond a certain 'designed range' FCEVs become economically attractive.
- The 'breakeven' range depends on vehicle class, purpose, usage and energy costs
  - Incremental cost of adding a kWh of H_2 storage (\$9/kWh) is far lower than the cost of adding a kWh of usable battery energy (\$125/kWh)

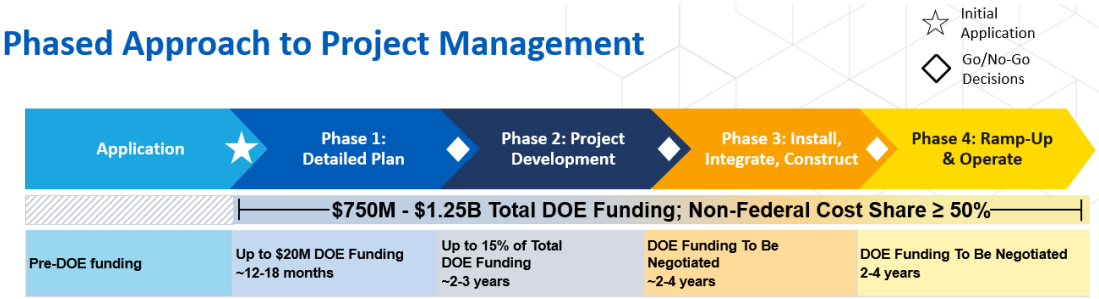
Note: VIUS shows averaged daily driving. Fleets must plan for the variations in day-to-day operation & impact of extreme real-world conditions as well.

DOE is using TCO analysis & VIUS Data to Identify MD Vehicles / Vocations Best Suited for Fuel Cells

H2Hubs: Summary



Phased Approach to Project Management



Led by DOE's Office of Clean Energy Demonstrations (OCED) in collaboration w/ HFTO & DOE H_2 Program

- Unprecedented Investment in America's H_2 Infrastructure
  - Federal investment of $7 billion (Federal investment will be matched by recipients to leverage a total of nearly $50 billion)
- Accelerating adoption of H_2 technologies:
  - Approximately 3 Million Metric Tons of clean H_2 Production per Year
- Providing tangible benefits for Americans:
  - Dedicated Dollars for Community Benefits
  - Tens of Thousands of Jobs
  - GHG Reduction of 25 million Metric Tons / Yr.
- Current Status
  - H2Hub selections announced October 2023
  - Awards under negotiation

Selected Regional Clean Hydrogen Hubs (H2Hubs)

Demand side strategy for Hubs announced

DOE selects consortium to bridge demand for clean H_2 providing market certainty and unlock private capital
Jan 2024

H2 Hubs managed by OCED: See https://www.energy.gov/oced/office-clean-energy-demonstrations

H2Hub Deployments that Supports Zero-Emission Freight Strategy

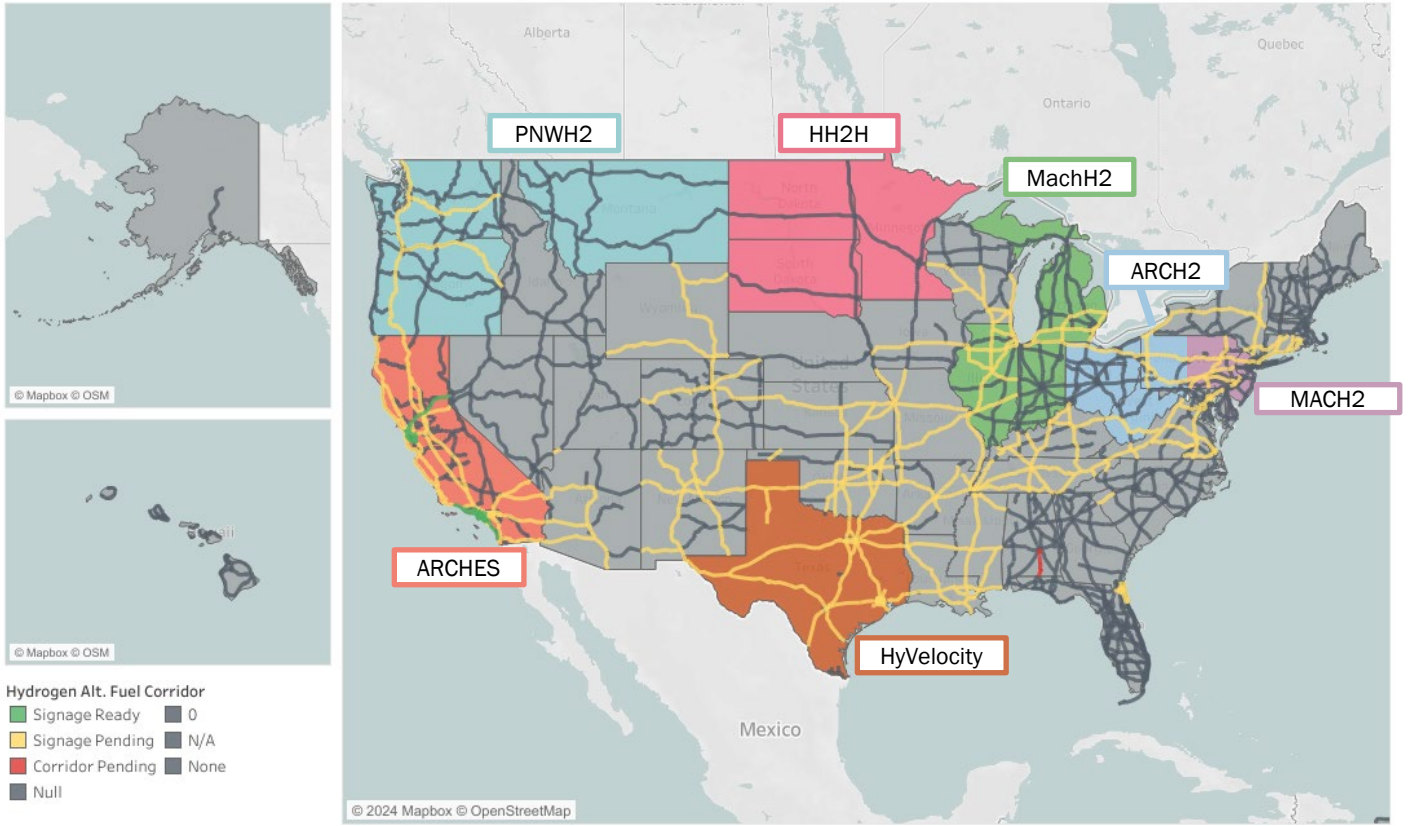
Focus Areas		ARCH2	ARCHES	HyVelocity	Heartland	MACH2	MachH2	PNW H2
Production	Electrolysis (from Renewable and/or Nuclear Energy)	✓	✓	✓	✓	✓	✓	✓
	Thermal reforming with carbon capture and storage	✓		✓	✓		✓	
	Biomass gasification with carbon capture		✓			✓		
Connective Infrastructure	Hydrogen pipelines	✓	✓	✓	✓	✓	✓	✓
	Hydrogen refueling stations	✓	✓	✓		✓	✓	✓
	Geologic Hydrogen Storage	✓			✓			
End Uses	Electric power generation	✓	✓		✓	✓	✓	✓
	Industrial (e.g., iron refining/steelmaking, ammonia production, synthetic fuel production, process heat)	✓		✓	✓	✓	✓	✓
	Residential and commercial heating					✓		
	Transportation (e.g., MD/HD vehicles, marine, cargo handling)	✓	✓	✓		✓	✓	✓

Note: the proposed activities are subject to change based on award negotiations and during the detailed planning phases (Phases 1 & 2)

Key deployments that support zero-Emission Freight in H2Hubs

Hydrogen Corridors and Hydrogen Hubs

Source: https://hepgis-usdot.hub.arcgis.com/datasets/usdot::altfuels-rounds1-7-2023-11-07/about



Whole-of-Government Approach

$90+M from DOT-FHWA Funding for H_2 Stations

North Central Texas Council of Governments
$70M
- 5 MD/HD H_2 fueling stations in TX triangle
- Created H_2 corridor from Southern CA to TX

California's Victor Valley Transit Authority
$12M
- Build a H2 fueling station and 6 DC fast charging stations for fleet and public fueling

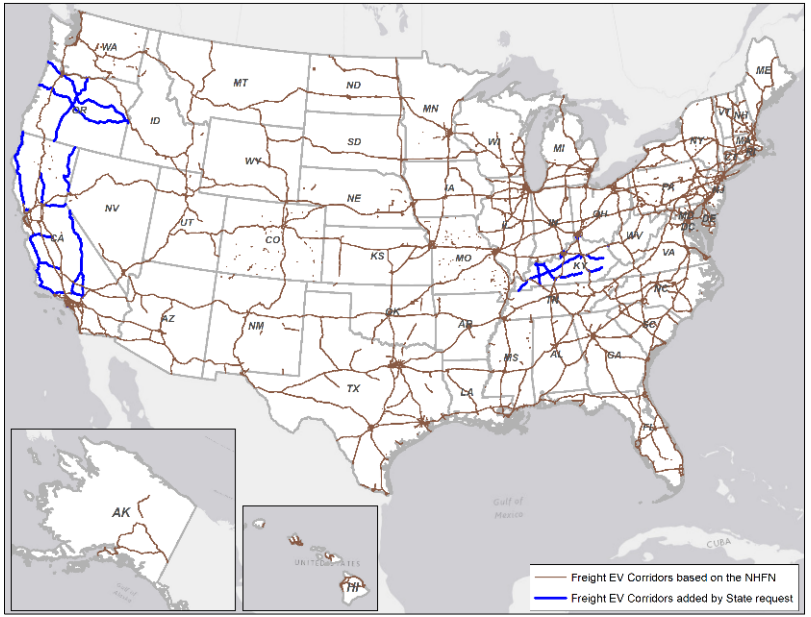
California State University, Los Angeles
$7M
- Transform H_2 Research Fueling Facility into high-capacity, multi-modal (light- to heavy-duty) H_2 fueling station

Colorado State University (CSU)
~$9M
- Build 3 public H_2 fueling stations near CSU campuses in Fort Collins, Denver, and Pueblo for truck fleets and potential vehicles along I-25

EPA Clean Ports Program: $3B for Grants

At least 25% ($750M) to be spent in nonattainment areas

Federal Highway Administration (FHWA) announced the designation of National EV Freight Corridors – includes H2 stations



https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/freight_ev_corridors/

FHWA station & charging in collaboration with Joint Office of DOT, DOE

Alycia Gilde

Vehicle Technologies Office

How the Strategy is being used to prioritize Funding

Clean Ports Program

$3 Billion
Applications due: 5/28

Clean Heavy-Duty Vehicle Program

$1 Billion
Applications due: 7/25

Charging & Fueling Infrastructure Program

$1.3 Billion
Applications due: 8/28

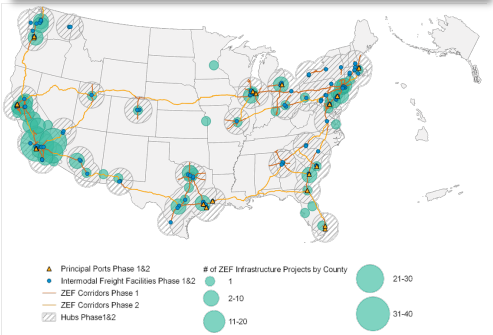
...perhaps your next program?

White House Roundtable on Zero-Emission Freight Infrastructure

Held on National Transport Day during Earth Week, April 24, 2024

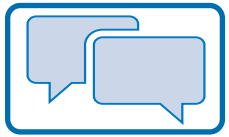
Roundtable Highlights:

- **White House Fact Sheet –** Focused on a National Zero-Emission Freight Strategy across modes, $1.5B in funding announcements, and Roundtable partnership.
- **Roundtable Stakeholder Partnership** – 100 participants representing fleets, truck OEMs, utilities, infrastructure providers (charging/H2), and environmental organizations.
- **Progress Against Phase 1** – Over 10 day-of public announcements made and 171 infrastructure deployments presented showcasing real progress against Phase 1 of the National ZEF Corridor Strategy.
- **Advancing Strategy Implementation –** Input from 5 breakout sessions informed next steps for cross-sector collaboration, tracking progress, and informing ongoing Strategy updates and improvements.



ZEF Corridor Strategy Phase	Total Investment
Phase 1 (2024-2027)	$ 914,509,365
Phase 2 (2027-2030)	$ 573,125,696
Project Schedule Undetermined	$ 52,277,680
Total	**$ 1,539,912,741**

White House Roundtable Outcomes



Launching an engagement series to tackle freight emissions by planning, investing and deploying a national zero-emission freight corridor network.

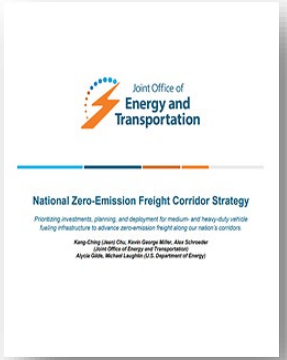
Tracking real time progress in collaboration with public and private-sector leaders on infrastructure deployment in key freight hubs and corridors.

Mobilizing action to implement the ***National Zero-Emission Freight Corridor Strategy***, catalyze investment and job creation, and protect people's health

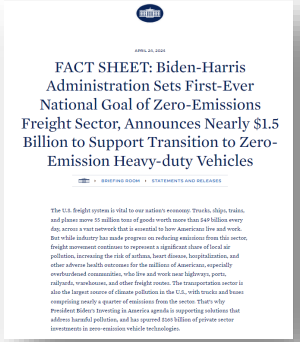
Regularly updating the Strategy to reflect the best available data, represent and anticipate market needs, and support long-term sustainability.

Panel Discussion and Audience Q&A

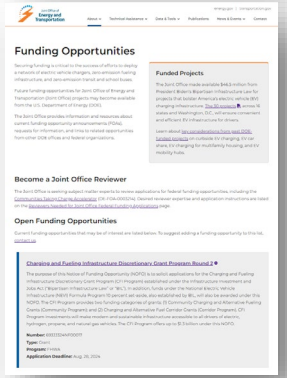
Resources



[National Zero-Emission Freight Corridor Strategy]



[White House Zero-Emission Freight Fact Sheet]



Funding Opportunities

- Charging and Fueling Infrastructure Discretionary Grant Program Round 2
- Clean Heavy-Duty Vehicles Grant Program
- Notice of Intent: R&D Funding for Charging Solutions for Heavy-Duty Electric Vehicles

[Hot Weather Impacts on Battery-Electric Transit Buses]

[Cold Weather Impacts on Battery-Electric Transit Buses]

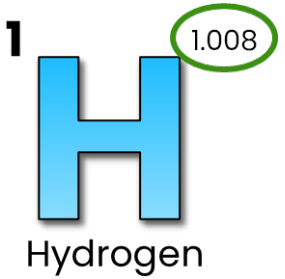
Resources and Opportunities for Engagement

Key Publications

www.hydrogen.energy.gov

Hydrogen and Fuel Cells Day
October 8

- Held on hydrogen's very own atomic weight-day



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Thank you!

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Discover the National Zero-Emission Freight Corridor Strategy

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