Dallas-Fort Worth CLEAN CITIES

GTI ENERGY
solutions that transform

Houston to Los Angeles (H2LA) Local Project Advisory Group (LPAG)

Public Health and Safety

November 6, 2024

Agenda

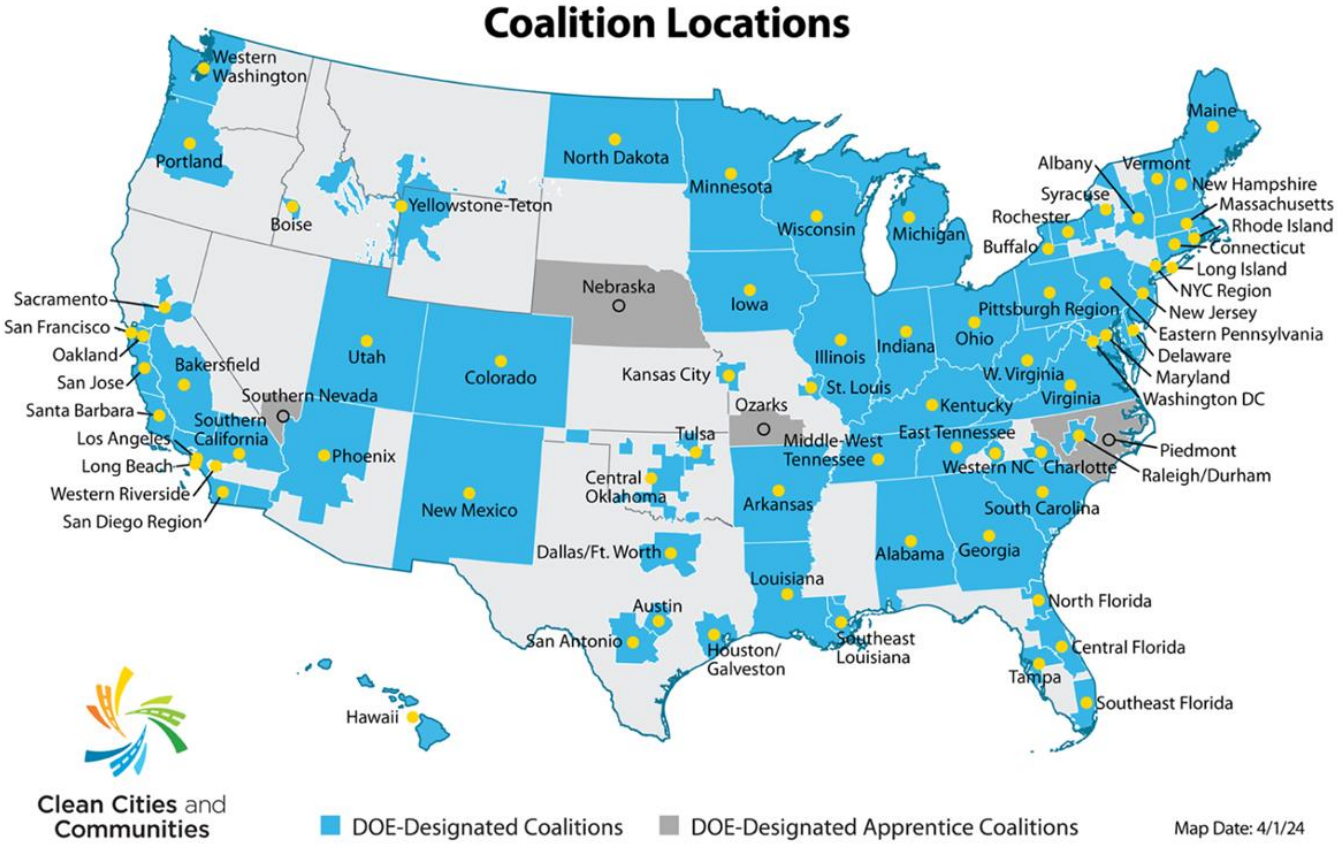
- Welcome and Roundtable Introductions
- Brief Project Overview
- Previous Meeting Recap
- Hydrogen Safety Resources
- Topic-specific Discussion of Hydrogen Safety
- Wrap-Up and Next Steps

Practices for Productive Meetings

- Respect when others have the floor.
- Keep feedback relevant and concise.
- Listen to other points of view and try to understand other interests.
- Share information openly, promptly, and respectfully.
- Remain flexible and open-minded and actively participate in meetings.

Clean Cities and Communities

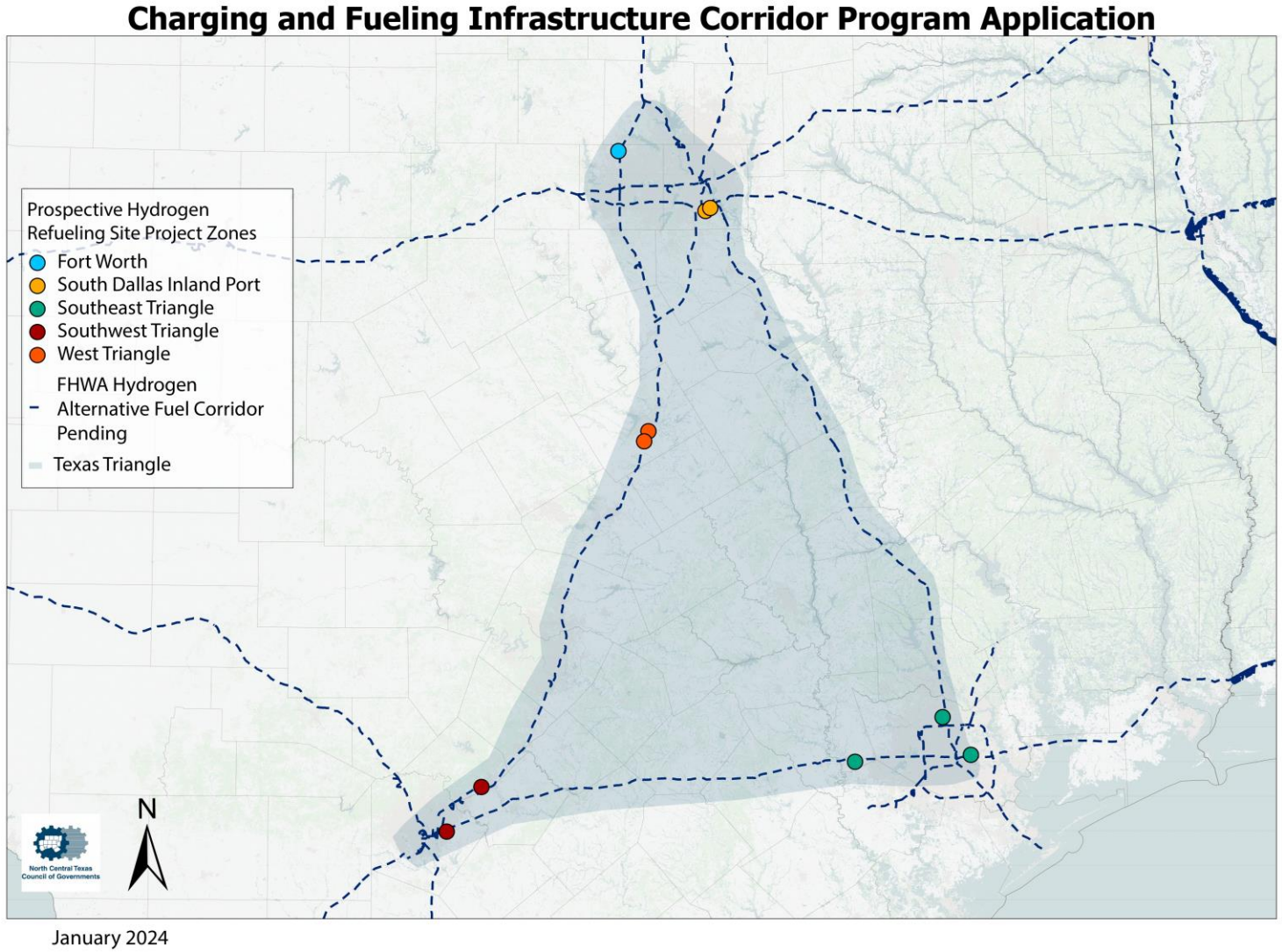
- U.S Department of Energy, Vehicle Technology Office (VTO)
- More than 75 active coalitions
- Goal: Help local decision-makers and fleets understand and implement alternative fuels



Texas Hydrogen and Electric Freight Infrastructure Project (Tx-HEFTI)

Construct up to 5 publicly accessible medium/heavy-duty hydrogen refueling stations

Project Zone	Potential Locations (Existing Truck Stops)
Dallas	City of Dallas
Fort Worth	City of Fort Worth
West Triangle	City of Waco City of Robinson
Southwest Triangle	City of San Antonio City of New Braunfels
Southeast Triangle	City of Brookshire City of Houston



DFWCC Hydrogen Webpages

- New "Hydrogen in North Texas" webpage on the Dallas-Fort Worth Clean Cities website
- General hydrogen information, hydrogen projects, and state/federal funding for hydrogen projects

dfwcleancities.org/hydrogen-in-north-texas

H2LA Project webpage with past meeting materials also now available

Project Overview

Objectives

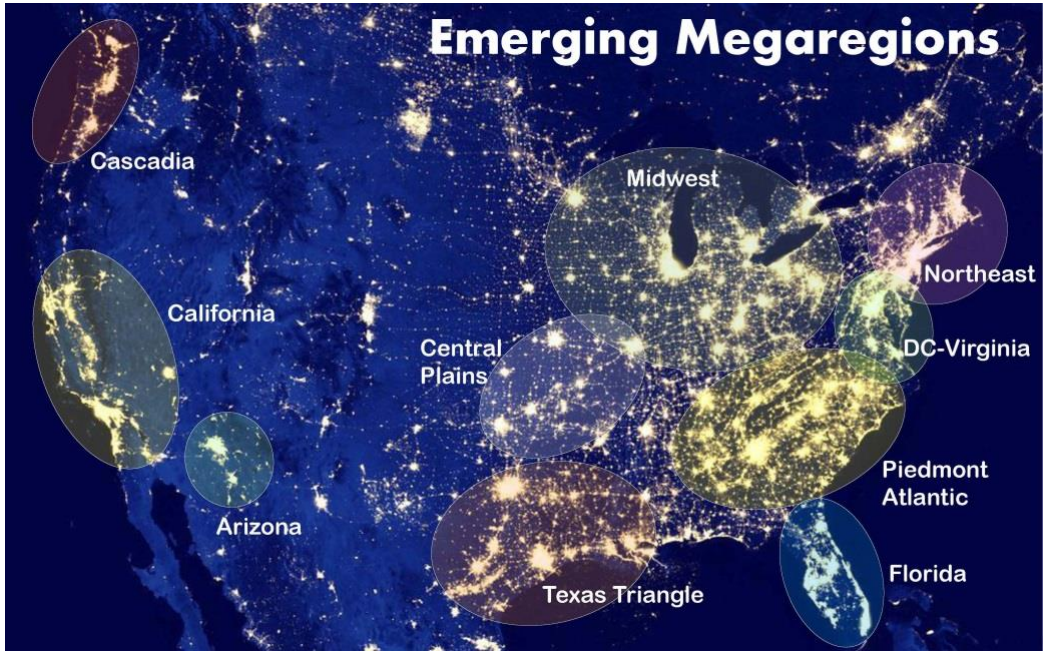
- Build computer models for vehicle, fueling infrastructure, and operational data
- Establish a hydrogen fueling and heavy-duty freight truck network leveraging this fueling infrastructure in the Texas Triangle and I-10 corridor from Houston to Los Angeles

This material is based upon work supported by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) under the Vehicle Technologies Office (VTO) Fiscal Year 2022 Vehicle Technologies Office Program Wide Funding Opportunity Announcement Award Number DE-EE0010650.

Project Overview

Objectives

- Assess community needs and benefits through Diversity, Equity, Inclusion and Accessibility (DEIA), Energy Equity (EE) and Workforce Implications (WI) effort
- Engage impacted communities to gather input and conduct outreach
- Develop a replicable and catalytic blueprint for other corridors and megaregions
- Disseminate findings to relevant stakeholders
- Q3 2025 completion



Community Benefits Plan

GTI ENERGY

GTI Energy

Community Benefits Team with expertise in community and stakeholder engagement, planning, and environmental engineering to successfully address environmental, societal and economic needs during the energy transition.

- North Central Texas Council of Governments (NCTCOG)
- Alamo Area Council of Governments (AACOG)
- Western Riverside Council of Governments (WRCOG)

SMART Goals

1. Local Project Advisory Group (LPAG) to identify concerns and priorities of community organizations and stakeholders
   a. Plan community efforts, both rural and urban
   b. Community benefits and disbenefits

2. Develop community and public safety guidelines
   a. Identify updates to safety and health protocols
   b. Identify needed skills training, credentialing, and educational curricula to meet workforce needs

3. Public dissemination of information about the project
   a. Accessible information with minority serving institutions

Community Concerns and Priorities – July 2024

- Hydrogen and alternative fuel corridor recap
- Discussion of concerns and priorities for the project
- What we heard:

Hydrogen Safety	Workforce Training
• Concern about workforce safety regarding hydrogen refueling stations • Concern about co-locating with existing conventional fueling sites due to volatility of existing fuels • Clarification of required certifications to operate hydrogen refueling stations	• Need for accurate job forecasting to ensure an adequate amount of students are trained without flooding the job market • Concern that training may need OEM support and collaboration for proprietary components similar to electric vehicles

Hydrogen Safety Resources

H2Tools
- DOE Office of Energy Efficiency and Renewable Energy's (EERE) Hydrogen and Fuel Cell Technologies Office resource that provides comprehensive database of hydrogen tools, codes, and resources

NREL Hydrogen Technologies Safety Guide (HTSG)
- Provides hydrogen background context to give project developers, code officials, and other interested parties the information needed to put hydrogen safety in context

California Fuel Cell Partnership Fact Sheet
- Addresses common misconceptions and provides helpful links to additional resources

Air Products Safetygrams
- Featured by DOE as a summary of safety standards from the world's largest supplier of merchant hydrogen

Safe Hydrogen Project
- Provides hub of hydrogen safety information

General Hydrogen Safety Points

Flammable (NREL HTSG, pg. 3)

- Hydrogen is a flammable material
- Wide flammability range and relatively low ignition energy
- The ease of ignition and high-pressure storage creates a large portion of the risk associated with hydrogen
- Hydrogen fires are almost invisible to the naked eye

Embrittlement (NREL HTSG, pg. 3)

- Hydrogen can damage to the point of leakage certain materials that are used for the construction of storage containers, piping, and valves
- Can escape through certain materials because of its small molecule size

Dispersion & Buoyancy (NREL HTSG, pg. 3)

- Hydrogen is much lighter than air, so when released, it disperses quickly
- This is beneficial for outdoor hydrogen systems and spaces with ventilation, because in the event of a leak, hydrogen will typically not build up to dangerous and explosive levels

Public Health – Trucking

Hydrogen Trucking Safety Standards

Existing Trucking Guidelines (DOT Hydrogen Commercial Vehicles, pg. 64-65)

- If an operator suspects a hydrogen gas leak or fire of any kind, they should stop the vehicle in a safe place away from potential ignition sources and overpasses
  - Leaks from high-pressure hydrogen gas will likely make a whistling sound, and leaking liquid hydrogen will likely be accompanied by fog/frost
- The operator should shut off the vehicle and evacuate all passengers (shutting down vehicle will close valves and isolate hydrogen in storage tanks, stopping the flow of hydrogen to leaks)
- Commercial vehicles may have an emergency shutdown switch, which should isolate hydrogen in the storage tanks
- Call 911 for assistance

Hydrogen Trucking Safety Standards

Existing Station Operations Guidelines

- System siting includes a review of zoning requirements, transportation of hydrogen, method of transfer of hydrogen from vehicle/pipeline to storage system, and must follow DOT hazardous material requirements
- Operating permit issued to facility requires data collection and recordkeeping of safety, including: (H2Tools Station Permit Guide, pg. 6)
  - Emergency response plan
  - Written operating procedures
  - Staff training
  - Equipment maintenance
  - Ongoing documentation of safety checks
  - Compliance records

Hydrogen Trucking Safety - Discussion

- Are there issues or concerns about the skills and safety of operating and maintaining hydrogen fueling **stations and equipment**?
- Are there issues or concerns about the skills and safety of operating and maintaining hydrogen **vehicles**?
- Are there specific **resources or certifications** that exist or should exist to address safety issues? If so, how can awareness and access to these be increased?
- Are there other health and safety policies or **mitigation strategies** that can support workforce health and safety for those working with hydrogen?

Public Health – First Responders

First Responder Safety

General First Responder Safety

- Current safety standards emphasize the importance of providing local emergency responders with a facility overview / tour and a copy of the facility's Emergency Response Plan (H2Tools)
- Emergency Response Plan should identify an on-site individual and back-up individual who will initially lead response (H2Tools)
- When first responders arrive, the senior emergency response official will become the individual in charge of the incident. (H2Tools)
- Basic training principles for first responders: (H2Tools)
  - Stay upwind
  - Listen for venting gas
  - Watch for heat waves (signifying hydrogen flames)

First Responder Safety

Existing Fire Response Guidelines

- Current safety standards recommend that only properly trained and equipped firefighters should attempt to manage hydrogen fires (H2Tools)
  - Training courses are offered online at DOE H2Tools website
- Hydrogen fires **are not typically extinguished** until the supply of hydrogen has been cut off or has exhausted itself (H2Tools)
- Priority for first response is evacuating and assisting affected persons (H2Tools)

First Responder Safety

Existing EMT/Injury Guidelines (H2Tools)

- Cryogenic-induced injuries from direct contact with liquid hydrogen or cold vapor are important to treat as soon as possible
- Treatment of frozen tissue requires medical supervision – incorrect first aid practices can aggravate the injury
- Education about the risks of cold injury as well as preventative and emergency care should be incorporated into training programs for operations where liquid hydrogen will be used on site

First Responder Safety - Discussion

- Are there issues or concerns about the **skills and safety of first responders** in hydrogen-related emergencies?
- Are there specific **resources or certifications** that exist or should exist to address first responder safety issues? If so, how can awareness and access to these be increased?
- Are there other health and safety policies or **mitigation strategies** that can support health and safety for hydrogen first responders?
- What other considerations should be made for the **safety of first responders and community members**?

Public Health – Fuel Transport Safety

Fuel Transport Safety

Pipeline Guidelines (H2Tools)

- Piping material should be selected for robustness, low permeability, and fire resistance
- Underground piping should consider external corrosion, protection from inadvertent excavation, and preventing hydrogen from entering an enclosed space in the event of a leak
- Alternatives to pipeline burial include routing in open trenches with removable grating for regular inspection and maintenance
- Piping should be routed outdoors wherever possible to assure dispersal of small leaks, but should not be left open to the atmosphere (pipeline systems should have connections for venting, purging, and leak testing)

Fuel Transport Safety

Hydrogen Trucking Guidelines

- Both liquid and gaseous hydrogen tankers / trucks must adhere to applicable Dangerous Goods regulations, which describe the marking, labeling, and shipping papers required
- Tanker vehicles are basically of the same design as stationary tanks and must adhere to similar regulations plus the additional regulations of the DOT
  - Must include pressure release valves in case of need to purge hydrogen with an inert gas and avoid a flammable atmosphere (mixture of hydrogen/oxygen)
  - Tankers include thermal pressure relief devices, which are temperature-sensitive valves that vent the fuel to the atmosphere when activated

Fuel Transport Safety - Discussion

- Are there issues or concerns about community health and safety around **hydrogen pipelines**?
- Are there issues or concerns about community health and safety around **hydrogen tanker trucks**?
- Are there other health, safety, or equity concerns about the **transportation of hydrogen fuel**?
- What considerations should be made to address these concerns?

Public Health – Environmental Monitoring and Services

Environmental Monitoring & Services

Environmental Impact Monitoring Guidelines

- Uncontained hydrogen leaks can contribute to climate change and have negative air quality effects by indirectly increasing the potency of other atmospheric gases, like methane, water vapor, and ozone (Environmental Defense Fund)
- Switching to heavy hydrogen fuel use in the energy sector with uncontrolled leaks (high leak rates) could **increase** near-term global warming (Environmental Defense Fund)
- Operators should recalibrate or replace instruments such as leak detectors, flame detectors, and flow controllers on a regular basis, following the guidance provided by the manufacturer

Environmental Health- Discussion

- Are there issues or concerns about community health and safety around **hydrogen impacts on the environment?**

- What environmental policies or **mitigation strategies** might help support health and safety?

- How can we reduce the risk of unintended **negative environmental consequences** with the use of hydrogen fuel?

General Discussion Points

Public Health and Safety

- What concerns do you have with hydrogen safety for these occupations?
- What concerns do you have with hydrogen safety for public health?
- What suggestions do you have to make hydrogen fueling safer for the workforce and communities in this region?
- What are your priorities with hydrogen safety? How can we reduce the risk of unforeseen negative consequences?

Wrap-up and Next Steps

- Next Meeting: February 20, 2025 2:00pm – 3:00pm
- Next Meeting Topic: Workforce, Training, and Education

Future Meeting Dates and Topics:

Date	Topic
June 5, 2024	Introduction and Overview
August 28, 2024	Community Perspectives and Priorities
November 6, 2024	Public Health & Safety
February 20, 2025	Workforce, Training, and Education
May 7, 2025	Update on Community Identified Priorities and Modeling
July 2, 2024	Site-Specific Considerations
August 21, 2024	Wrap up

Contact Us

Lori Clark
Senior Program Manager
& DFWCC Director
lclark@nctcog.org

Jared Wright
Senior Air Quality Planner
jwright@nctcog.org

Maggie Quinn
Air Quality Planner
mquinn@nctcog.org

Dallas-Fort Worth CLEAN CITIES

dfwcleancities.org

@NCTCOGTrans

cleancities@nctcog.org

linkedin.com/showcase/dfwcleancities/