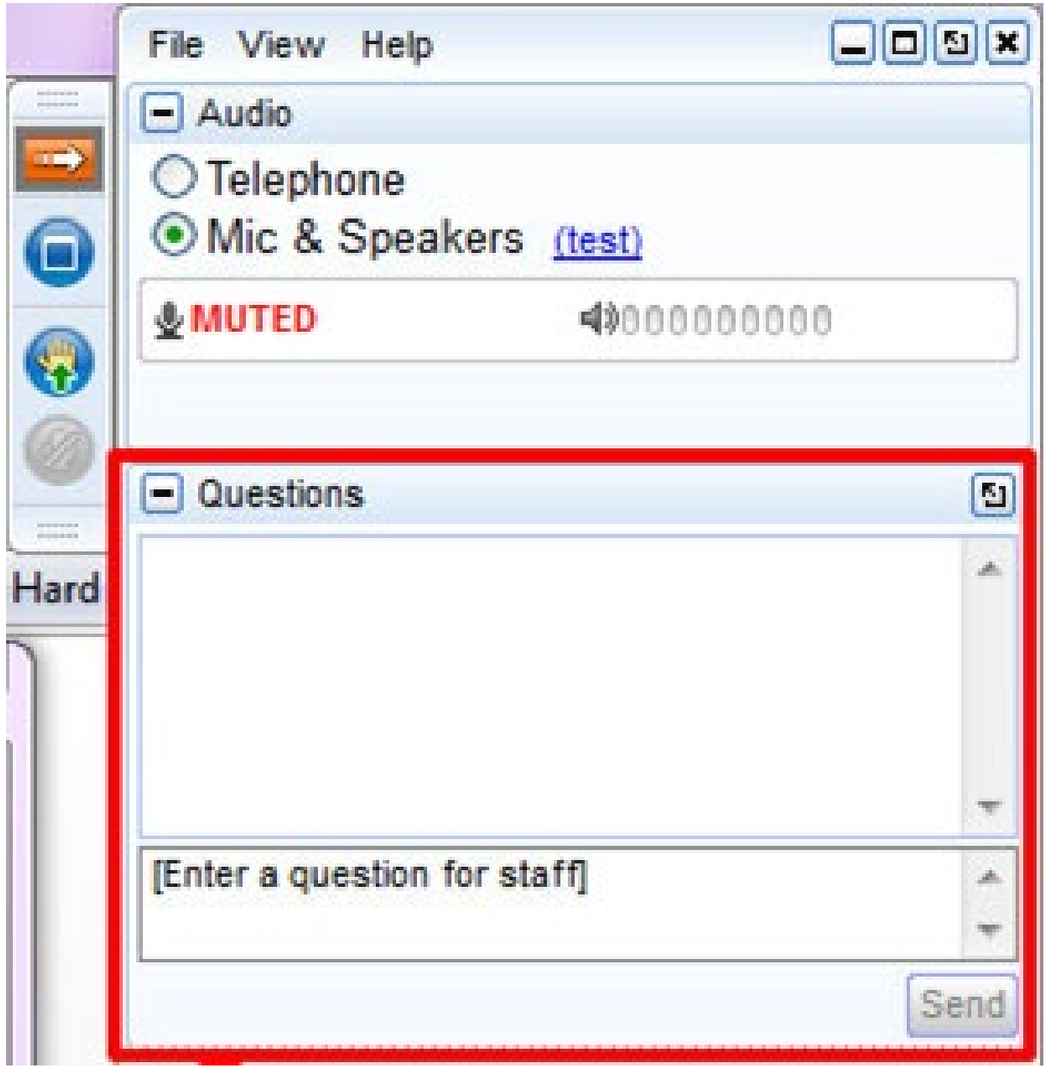

HYDROGEN FUEL CELL PARTNERSHIP®

# State of the Hydrogen Market

*October 7, 2025*

# Housekeeping Items

- 10:00-11:00 a.m. PRESENTATION
- 10:45 a.m. Q&A
- Blog with YouTube link (@fuelcellpartnership)
- Q&A will be posted at h2fcp.org



# Welcome & Agenda

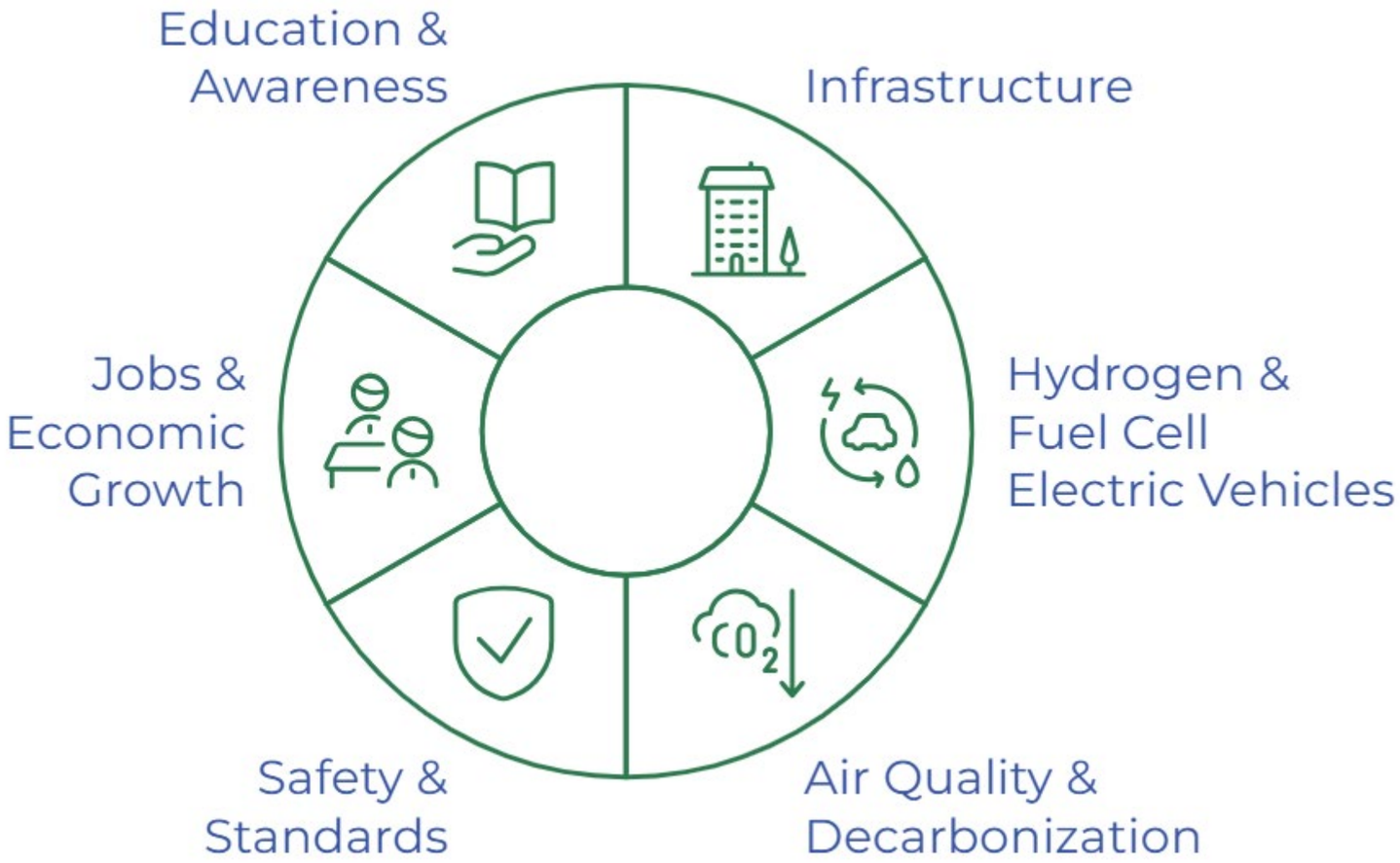
*Welcome*
**JENNIFER HAMILTON**
Operations & Technical Director

*Moderator*
**BEN XIONG**
Program Manager - Online Communications Manager

*Speaker*
**DAVID PARK**
Director of Industry Affairs

# Our Strategic Priorities

*Win Hearts & Minds | Be the Trusted Expert | Drive Market Success*



# Members

*Nonvoting advisor*

Alameda-Contra Costa Transit District *(AC Transit)*
Atlas Copco
Burkhardt Compression
California Department of Food and Agriculture
California State University - Los Angeles
The Center for Energy Efficiency and Renewable Technologies *(CEERT)*
Center for Environmental Research and Technology *(CE-CERT)*, UC Riverside
Center for Transportation and the Environment *(CTE)*
Choshu Industry Corporation
City of San Francisco
Compressed Gas Association
CSA Group
CW Clean Cities
Electus Energy
FASTECH
Faurecia
Fiedler Group
First PublicH2
Gen H2
HERE Technologies
Hexagon
Institute of Transportation Studies, UC Davis
Linde North America, Inc.
Luxfer Gas Cylinders
Look, Inc.
Modern Hydrogen
National Fuel Cell Research Center, UC Irvine
National Renewable Energy Laboratory *(NREL)*
Nikkiso Clean Energy
OPMobility
Powertech USA
RE+
RHA
Sandia National Laboratories
Shasta Regional Transportation Agency
Sirius XM
Suburban Propane
SunLine Transit Agency
SYMBIO North America Corporation
Tatsuno North America, Inc.
TLM Petro Labor Force, Inc.
University of California, Berkeley
Wolftank Group
Woodside Energy

# Reimagined Website

## Audience Navigation

Tailored navigation for policymakers, fleets, businesses, and the public.

## Resource Center

Improved resource center with advanced search capabilities.

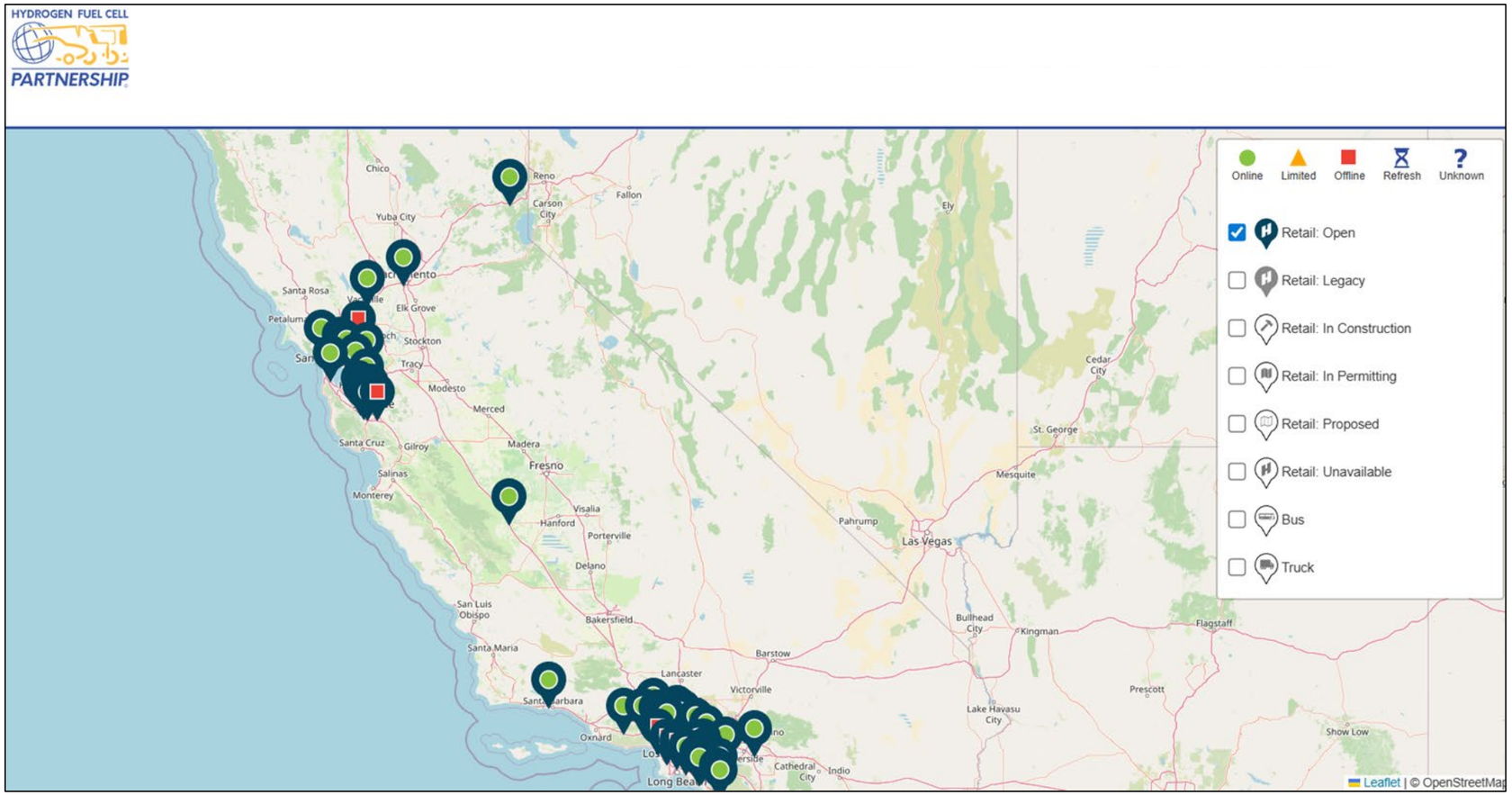
## Real-Time Data

Access to real-time SOSS data and infrastructure maps.

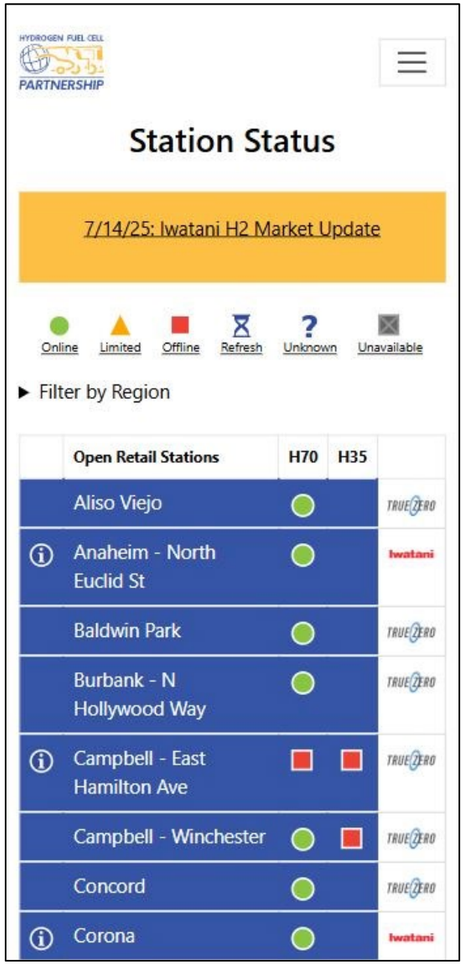
## Member Portal

Personalized dashboard for members with relevant information.

# H2FCP Station Map & SOSS




https://h2fcp.org/stationmap




https://m.h2fcp.org

# Retail Hydrogen Stations & Network Health

## Latest Stations to Open

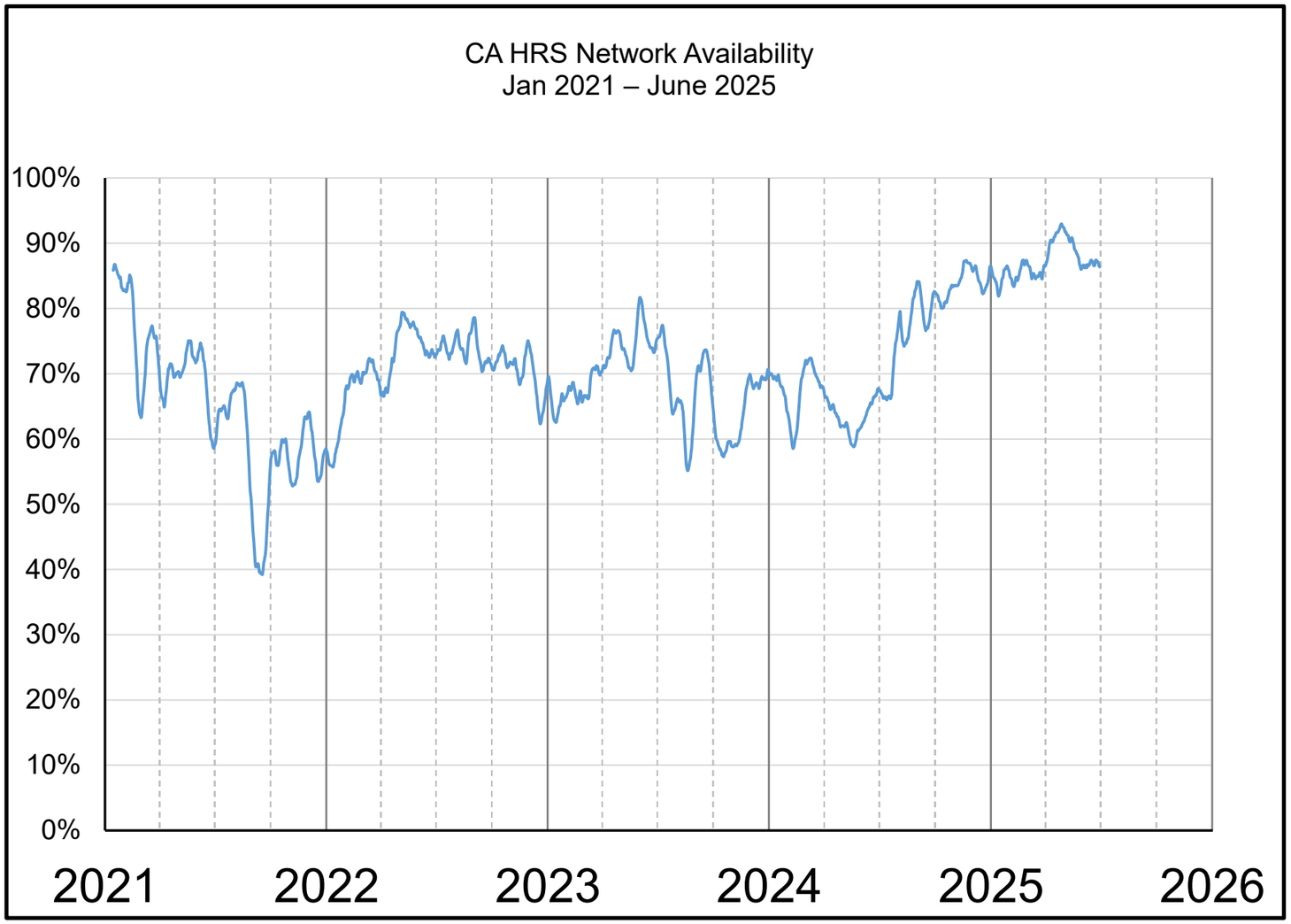
- Chevron Moreno Valley (April 2025)
- Chevron Vacaville (June 2025)

## In Commissioning

- Chevron Carson
- Iwatani La Mirada
- SunLine Thousand Palms

## Stations Currently Unavailable

- CalState LA
- Emeryville
- Fairfax-LA
- Hawaiian Gardens
- Lawndale
- Ontario
- Riverside

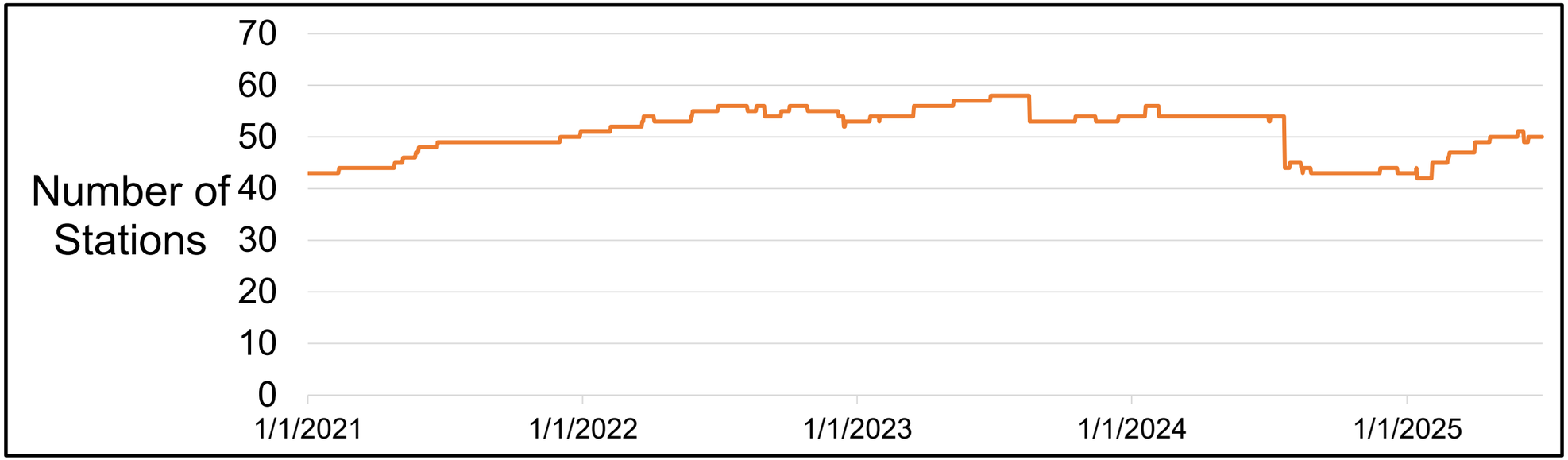


# California Retail FCEV & Hydrogen Market Numbers

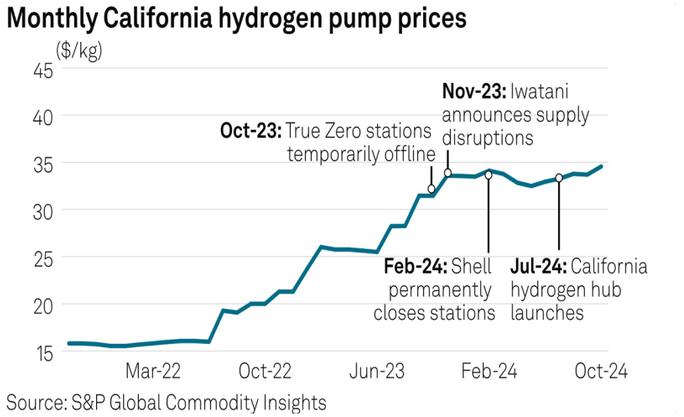
**18,772** Fuel Cell cars sold or leased in the US

**51** Stations available

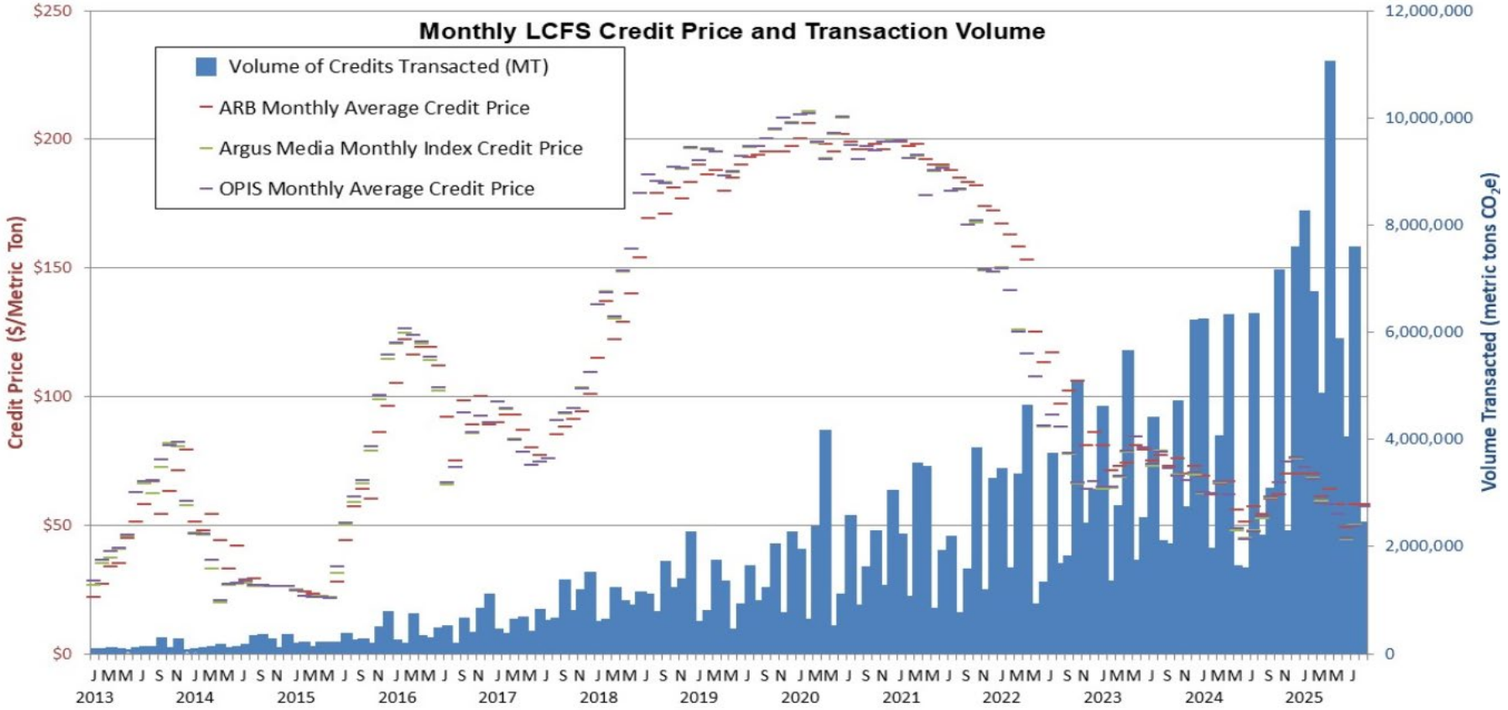
**30** Stations in development



# Consumer Market Conditions




Source: S&P Global Commodity Insights

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# Common Vision & Strategy

*Hydrogen Market Development Phases & Targets*

| California Draft Planning Targets for 100% ZEV Success | | | |
|---|---|---|---|
| | Market % | # FCVs | # HRS |
| HDV | 40-80% | 128,000 | 900 |
| MDV | 15-50% | 714,000 | 1600 |
| LDV | 10-35% | 5,157,000 | |

**Develop a California Hydrogen Mobility Vision and Strategy**

… to align and enable coordinated stakeholder investments and actions

… that leads to a sustainable California hydrogen ZEV market

… and enables North American hydrogen ZEV market expansion

## Success

- *Commercial self-sustainability, market-driven conditions*
- Parity or better with traditional systems
- **100% ZEV transition**

## Commercial Scaling (Run)

- Fuel, vehicle, and infrastructure *reach scale and cost tipping points*
- Significant growth of robust, reliable station network (in & beyond CA)
- Critical mass: ***50,000 HD FCETs + 200 HRS / 500,000 LMD FCEVs + 1,000 HRS***

## Pre-Commercial Launch (Walk)

- Initial *deployments and market launch*
- Market preparation phase, minimal viable networks
- Launch: ***5,000 HD FCETs + 50 HRS / 50,000 LMD FCEVs + 200 HRS***

## Demonstrations (Crawl)

- A *common vision & purpose* for market development
- Demonstrations, prototypes, R&D learning phase
- *Stakeholder commitment to market success* and *to each other*

# Hydrogen & FCEV Market Snapshot

## California Commercial Hydrogen Fueling Stations Count

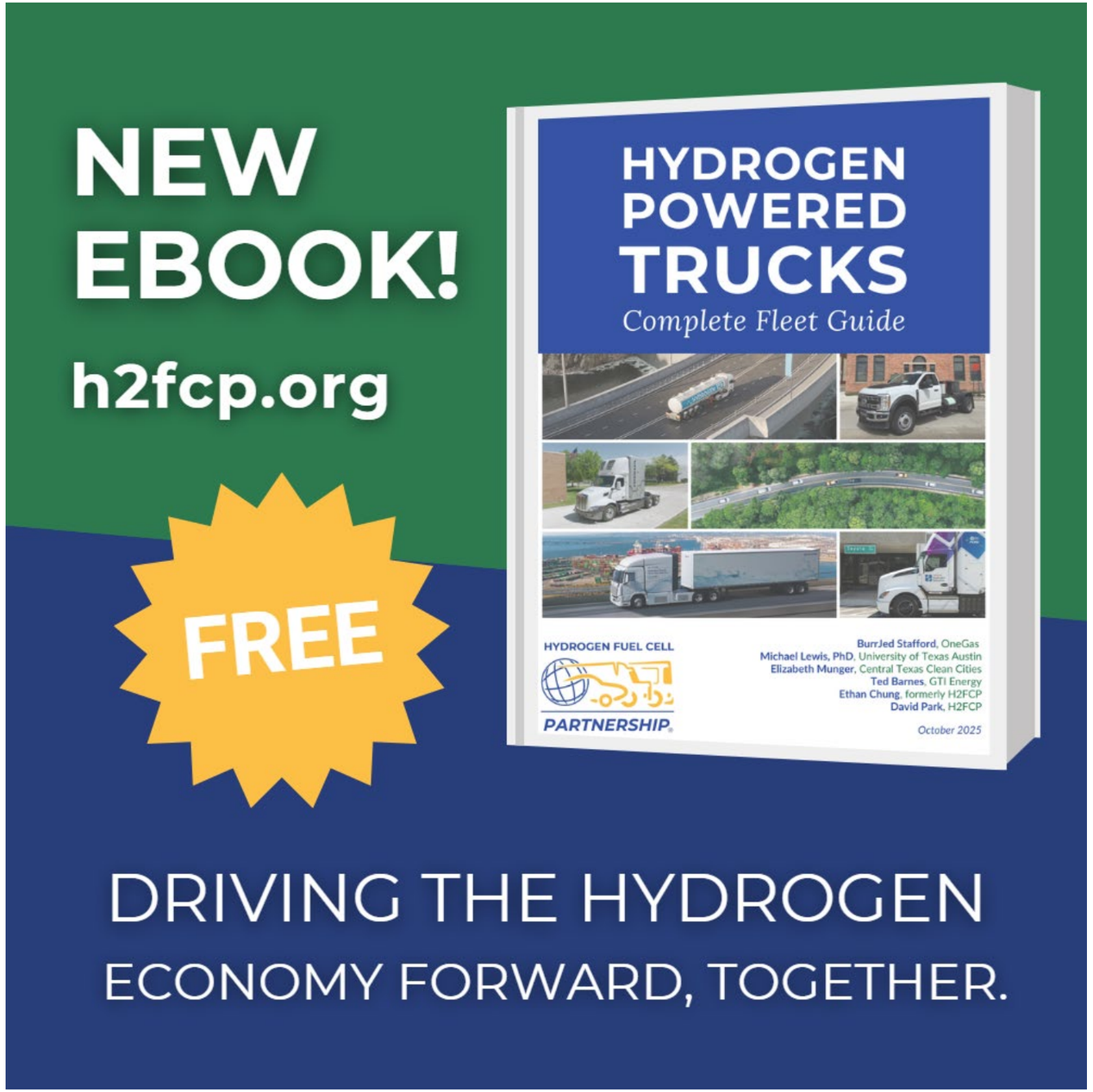
**4** Truck stations available

**17** Truck stations funded


First Element Fuels

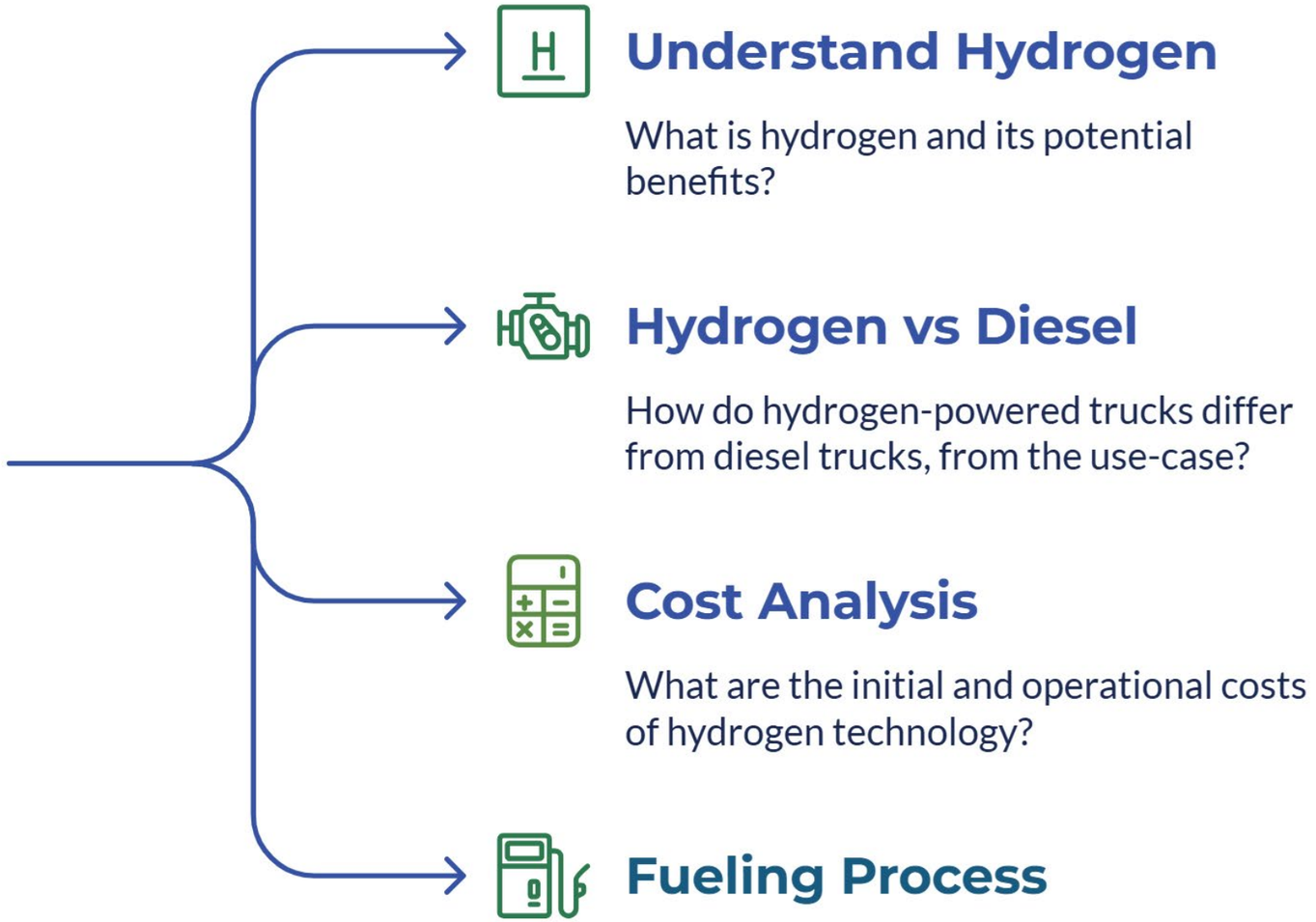
# Co-Authors

- BurrJed Stafford, OneGas
- Elizabeth Munger, Central Texas Clean Cities
- Michael Lewis, UT Austin, CEM
- Ted Barnes, GTI Energy
- Ethan Chung, H2FCP
- David Park, H2FCP



# Why Hydrogen-Powered Trucks?

*Answering the real questions fleets are asking:*



## Understand Hydrogen

What is hydrogen and its potential benefits?

## Hydrogen vs Diesel

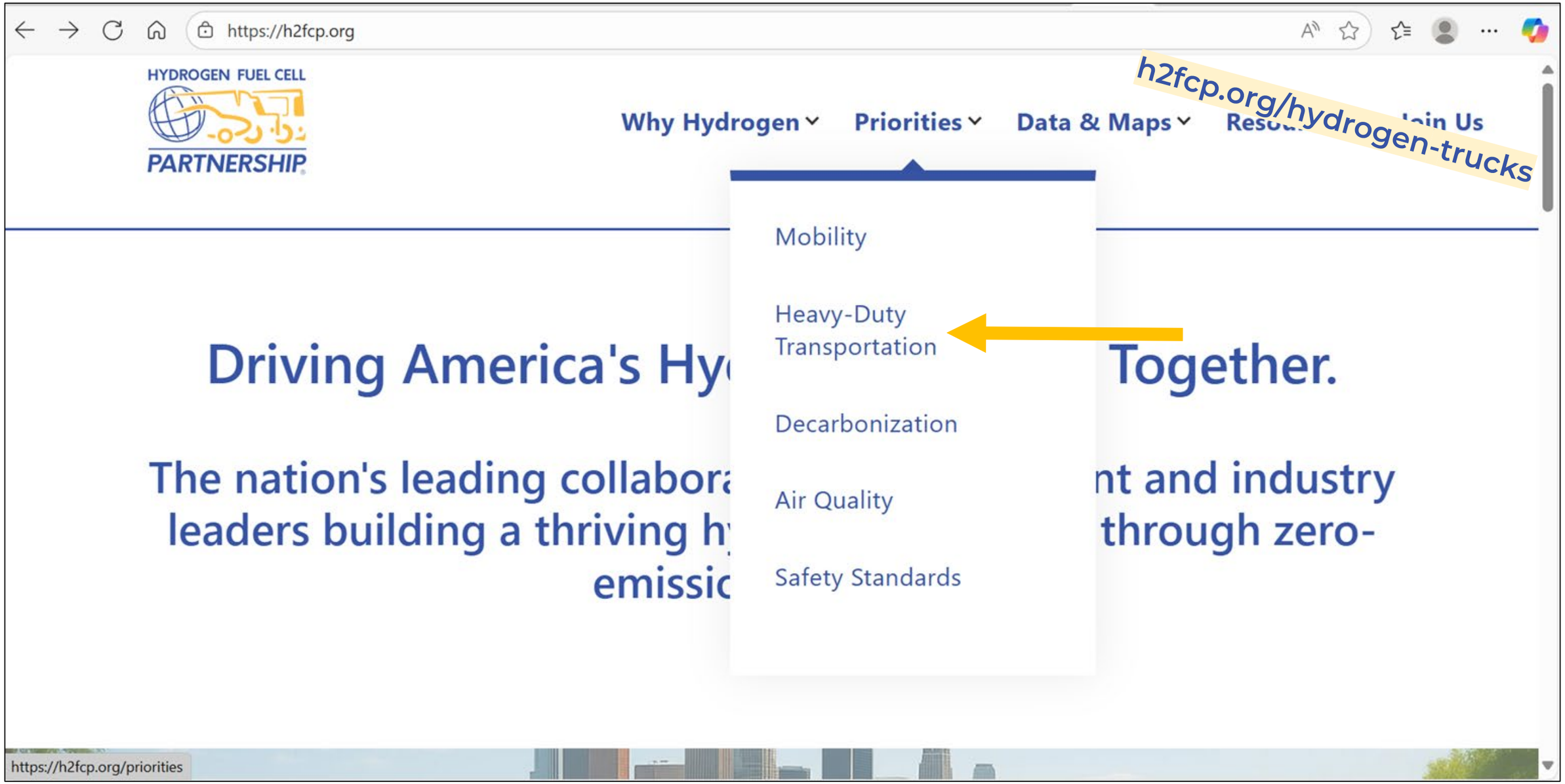
How do hydrogen-powered trucks differ from diesel trucks, from the use-case?

## Cost Analysis

What are the initial and operational costs of hydrogen technology?

## Fueling Process

What is involved in fueling a truck with hydrogen?


https://h2fcp.org
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h2fcp.org/hydrogen-trucks
Why Hydrogen
Priorities
Data & Maps
Join Us
Mobility
Heavy-Duty Transportation
Decarbonization
Air Quality
Safety Standards
Driving America's Hy
Together.
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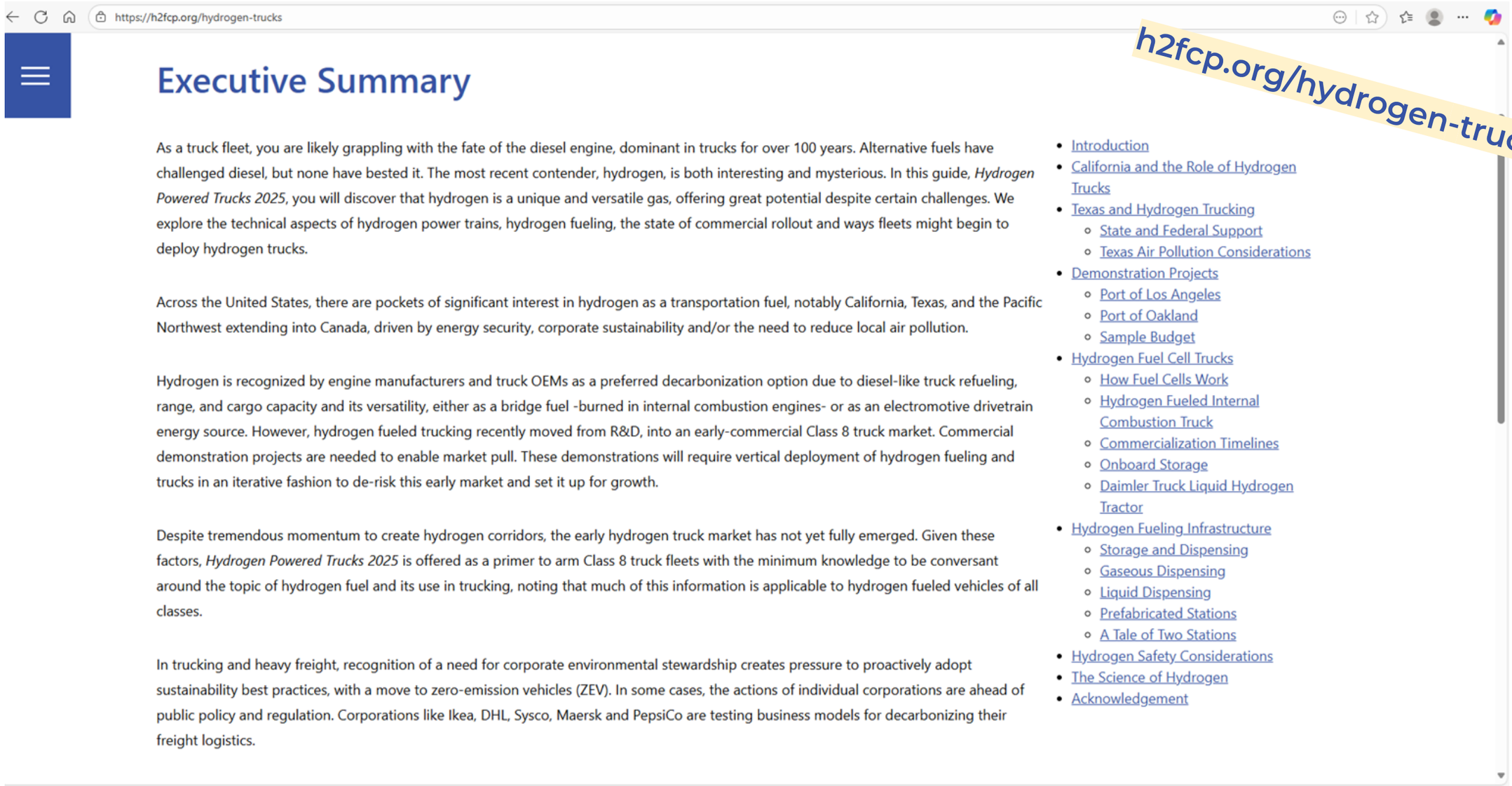

https://h2fcp.org/hydrogen-trucks
h2fcp.org/hydrogen-trucks
Executive Summary
As a truck fleet, you are likely grappling with the fate of the diesel engine, dominant in trucks for over 100 years. Alternative fuels have challenged diesel, but none have bested it. The most recent contender, hydrogen, is both interesting and mysterious. In this guide, *Hydrogen Powered Trucks 2025*, you will discover that hydrogen is a unique and versatile gas, offering great potential despite certain challenges. We explore the technical aspects of hydrogen power trains, hydrogen fueling, the state of commercial rollout and ways fleets might begin to deploy hydrogen trucks.
Across the United States, there are pockets of significant interest in hydrogen as a transportation fuel, notably California, Texas, and the Pacific Northwest extending into Canada, driven by energy security, corporate sustainability and/or the need to reduce local air pollution.
Hydrogen is recognized by engine manufacturers and truck OEMs as a preferred decarbonization option due to diesel-like truck refueling, range, and cargo capacity and its versatility, either as a bridge fuel -burned in internal combustion engines- or as an electromotive drivetrain energy source. However, hydrogen fueled trucking recently moved from R&D, into an early-commercial Class 8 truck market. Commercial demonstration projects are needed to enable market pull. These demonstrations will require vertical deployment of hydrogen fueling and trucks in an iterative fashion to de-risk this early market and set it up for growth.
Despite tremendous momentum to create hydrogen corridors, the early hydrogen truck market has not yet fully emerged. Given these factors, *Hydrogen Powered Trucks 2025* is offered as a primer to arm Class 8 truck fleets with the minimum knowledge to be conversant around the topic of hydrogen fuel and its use in trucking, noting that much of this information is applicable to hydrogen fueled vehicles of all classes.
In trucking and heavy freight, recognition of a need for corporate environmental stewardship creates pressure to proactively adopt sustainability best practices, with a move to zero-emission vehicles (ZEV). In some cases, the actions of individual corporations are ahead of public policy and regulation. Corporations like Ikea, DHL, Sysco, Maersk and PepsiCo are testing business models for decarbonizing their freight logistics.
Introduction
California and the Role of Hydrogen Trucks
Texas and Hydrogen Trucking
State and Federal Support
Texas Air Pollution Considerations
Demonstration Projects
Port of Los Angeles
Port of Oakland
Sample Budget
Hydrogen Fuel Cell Trucks
How Fuel Cells Work
Hydrogen Fueled Internal Combustion Truck
Commercialization Timelines
Onboard Storage
Daimler Truck Liquid Hydrogen Tractor
Hydrogen Fueling Infrastructure
Storage and Dispensing
Gaseous Dispensing
Liquid Dispensing
Prefabricated Stations
A Tale of Two Stations
Hydrogen Safety Considerations
The Science of Hydrogen
Acknowledgement

# The Science of Hydrogen

h2fcp.org/hydrogen-trucks

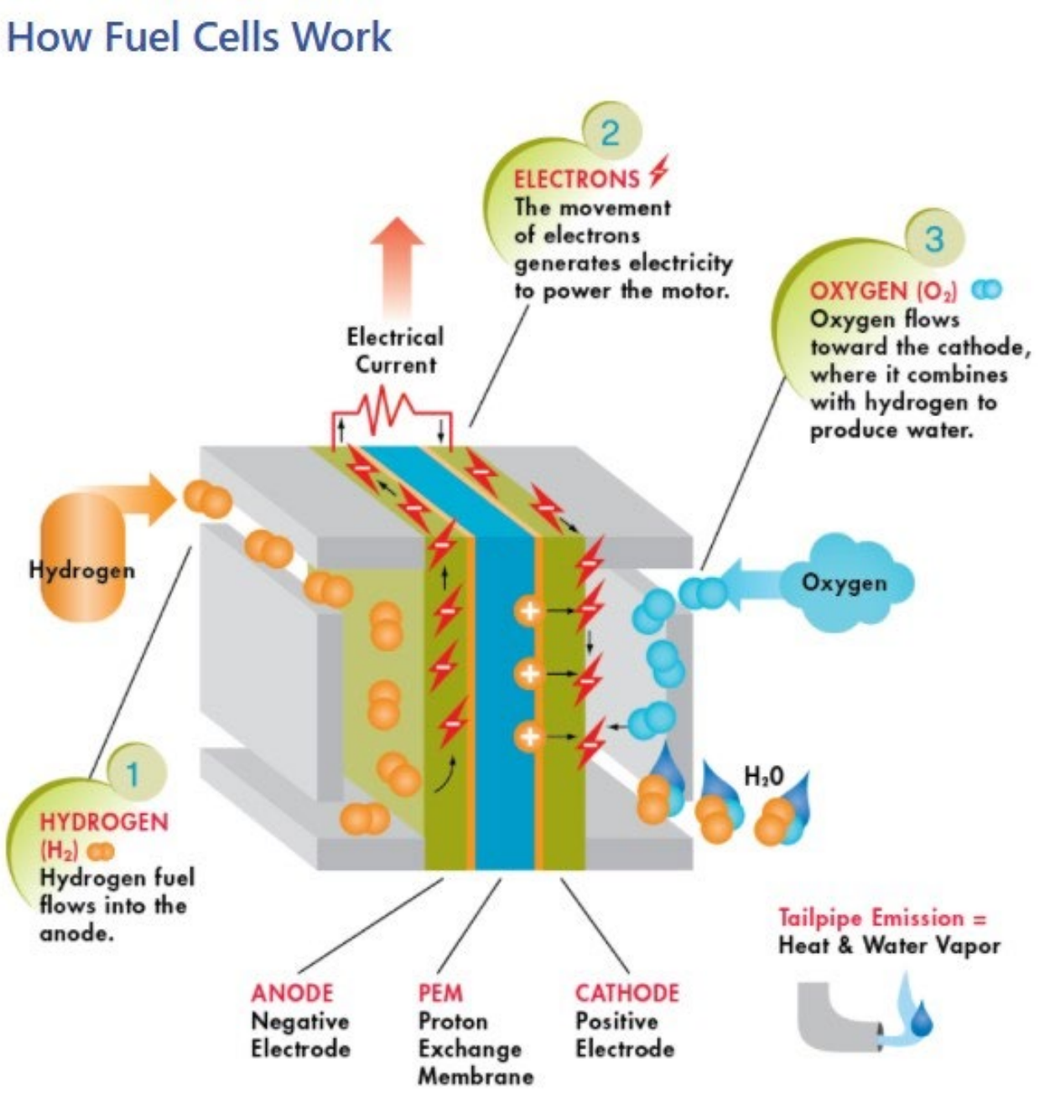


## Hydrogen Basics. Chemical and Physical Properties

Hydrogen is valued because of its versatility. It can be used directly as a truck fuel, or it can be used as a building block to make other fuels and products. Understanding the chemical and physical properties of hydrogen provides insights into how it is utilized as a truck fuel and the systems required to store, distribute, and dispense it.

Hydrogen's unique chemical and physical properties make it a double-edged sword—offering both vast potential and distinct challenges. Hydrogen ($H_2$) is diatomic in nature (two hydrogen atoms bonded to one another). It is the smallest and lightest molecule yet is high in energy. It is the most common element, yet it is typically bound to other elements for form compounds including water ($H_2O$) and hydrocarbon fuels (methane ($CH_4$) is the simplest hydrocarbon).

# What is a Fuel Cell?

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# How much does a demo project cost?

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## Sample Budget

| Project Line Item | Suggested Budget |
|---|---|
| Two Mobile Hydrogen Fueling Station, 1000 kg H2 capacity* | $5,200,000 |
| 10-Fuel Cell-Electric Truck Tractors | $6,000,000 |
| Fuel Cell Truck Operations (12- months) | $3,000,000 |
| Data Collection & Analysis | Approximately 10% of demonstration project cost |
| Project Management | Approximately 10% of demonstration project cost |
| Contingency (e.g., construction cost overrun, hydrogen fuel price volatility, station OpEx overrun) | This can be highly variable depending on project specifics |

*Can support up to 10 trucks with fills of 80 kg/truck/day

**Sample Texas-based Hydrogen Powered Truck Demonstration Project**

Hypothetically, a 12-month project that demonstrates a fleet of ten hydrogen-powered trucks might include the following elements and costs.

- Ten hydrogen fuel cell-electric Class 8 truck tractors
- Two mobile hydrogen fueling stations

Additional costs include the truck fleet operational budget which are incurred by the fleet. In the demonstration project, these would include hydrogen fuel, vehicle maintenance, vehicle operations, infrastructure maintenance, insurance, etc.

Typically, these projects are partially funded using grants and there are little to no upfront cost to the fleet.-

# How does a fueling station work?

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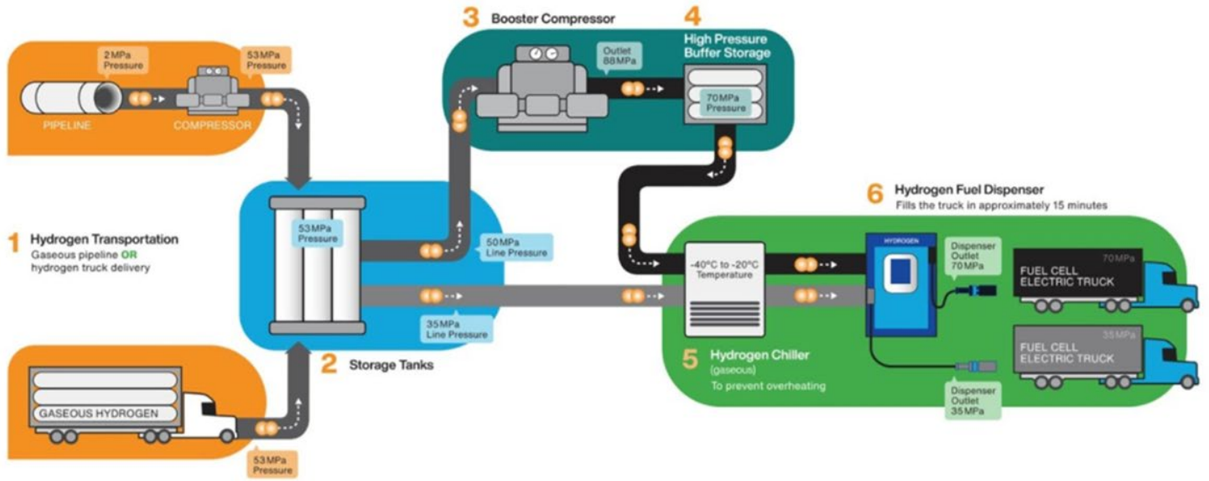
## H35 Trucks

These trucks store hydrogen in gas cylinders at 35 MPa. This lower pressure is easier to accommodate, and hydrogen stations, which have storage at 50 MPa push the fuel directly into the vehicles, without the need for a booster compressor (see figure).

## H70 Trucks

Trucks that have 70 MPa on-board storage require that the station dispense hydrogen at very high-pressure, which is dispensed out of a high-pressure buffer storage system (see figure). The method of accomplishing this very high-pressure is dependent on whether the hydrogen is stored as a gas or a cryogenic liquid (see figures).




**Hydrogen fueling stations that store hydrogen as a gas and dispense hydrogen as a high-pressure gas.**

# Q & A with H2FCP

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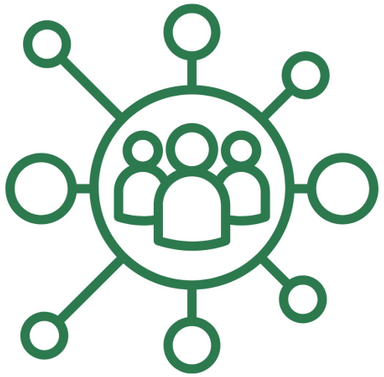
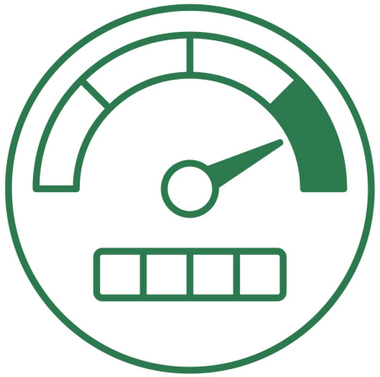
# Join the Movement

**h2fcp.org/join**



Multiply Your Impact Without Doubling Your Workload



Membership: Champion Level (Board or Steering Team), Associate Level


Access to exclusive data, resources, and working groups

Collaborative solutions that benefit the entire value chain

# Thank You!

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