



Request for Information: Heavy-Duty Fuel Cell Vehicle Market Development Strategy Information Session

November 8, 2024



How to Ask Questions

Click the Q&A button to ask questions.



Agenda

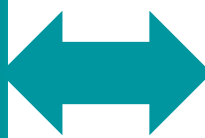
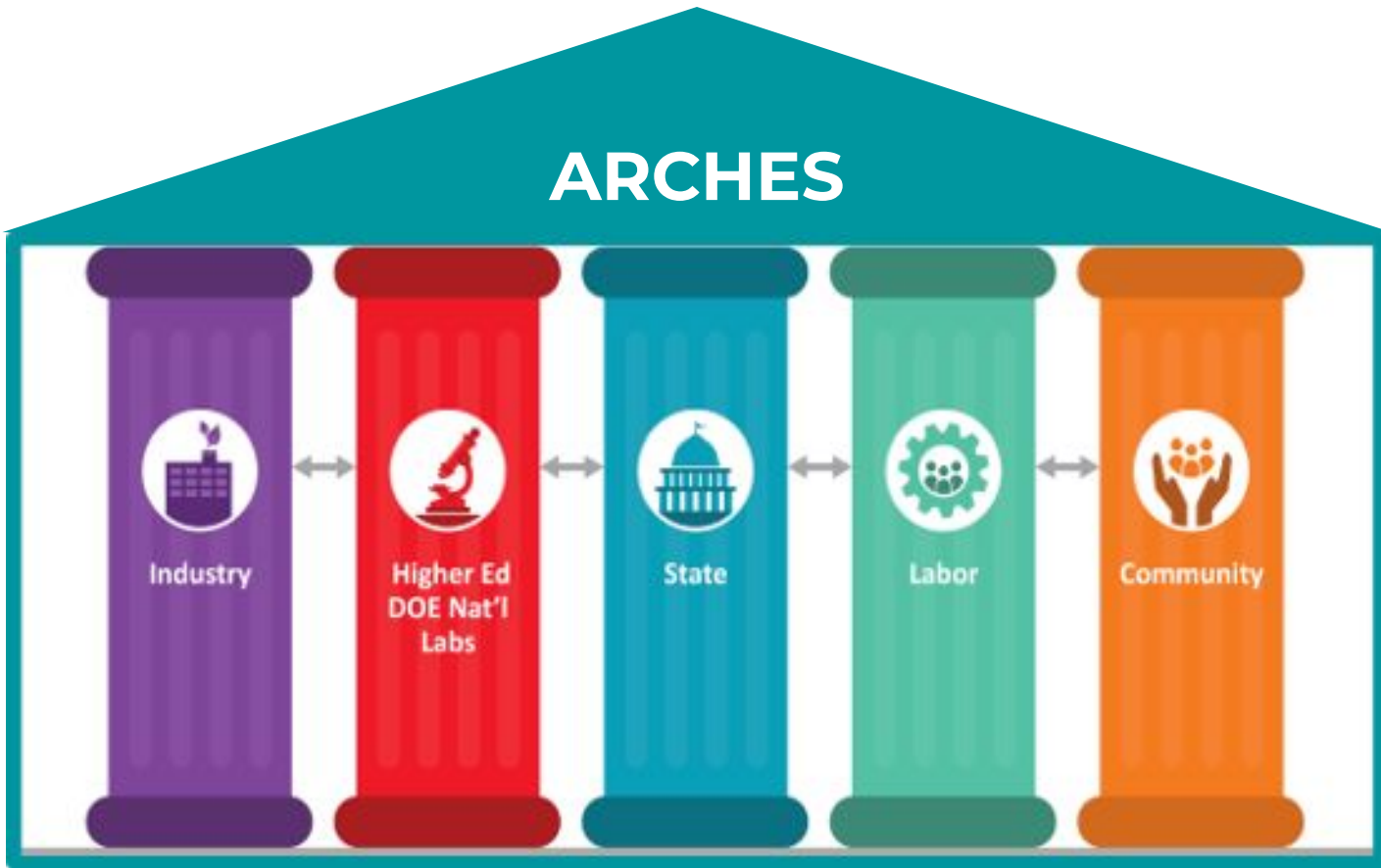
- I. ARCHES RFI: Heavy-Duty Fuel Cell Vehicle Market Development Strategy Overview
- II. What are We Looking For?
- III. RFI Logistics and How to Participate
- IV. Q&A

RFI Overview



ARCHES Mission

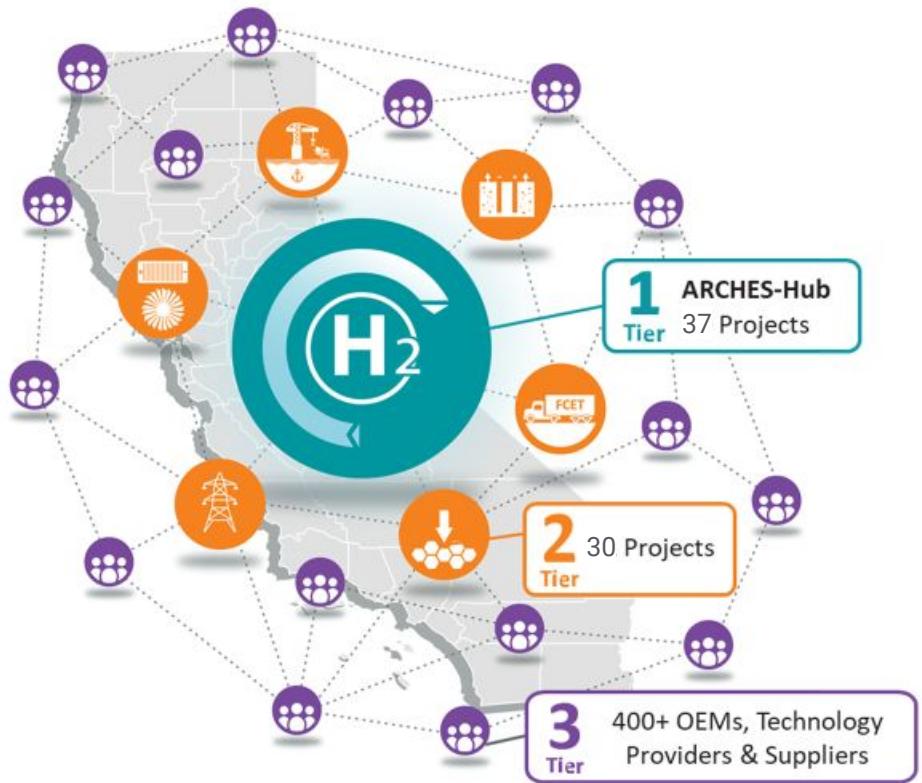
**Alliance for
Renewable
Clean
Hydrogen
Energy
Systems**



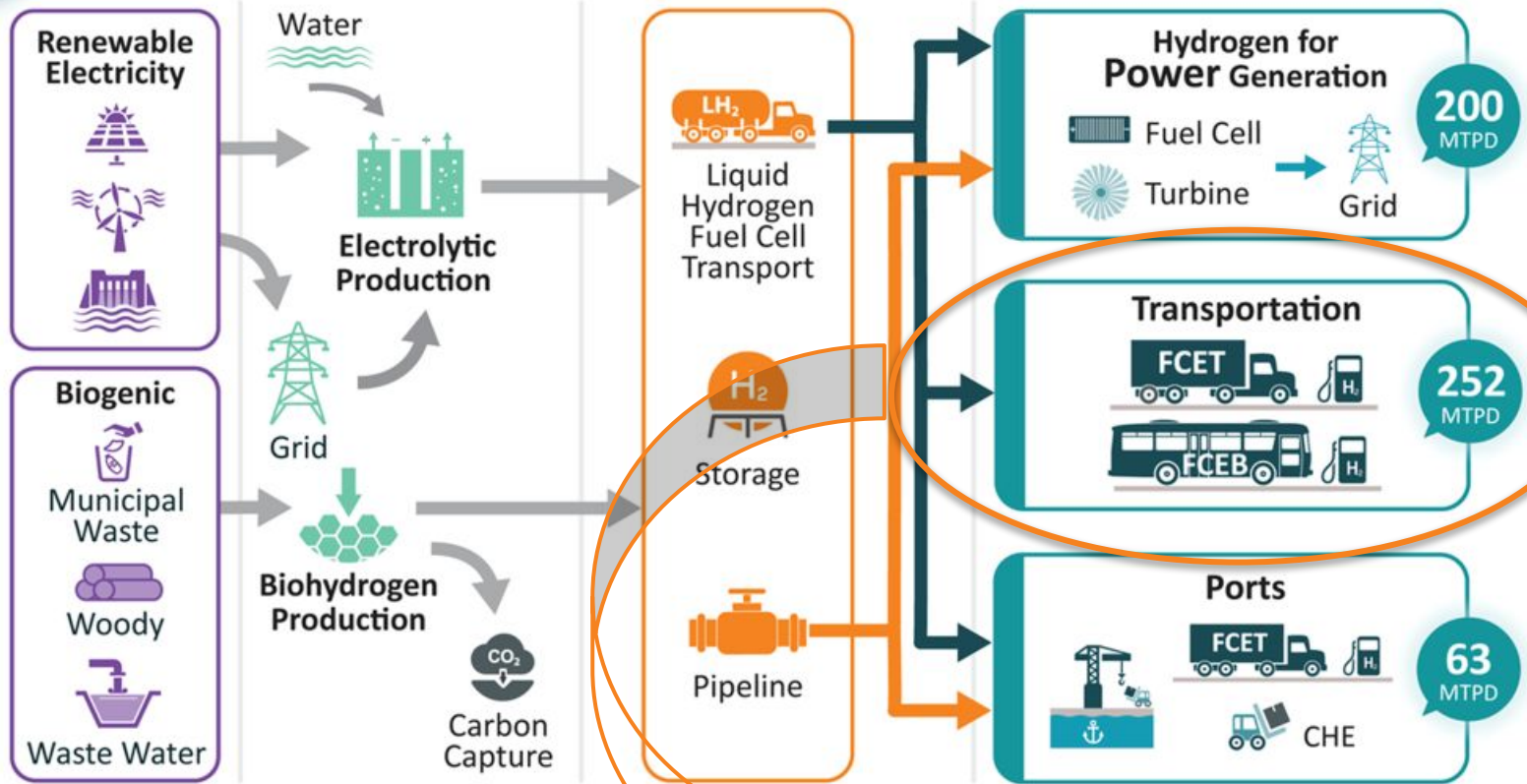
U.S. Dept
of Energy



ARCHES Projects



Tier 1 = w/DOE funding
Tier 2 = w/o DOE funding



Transportation - trucks and buses - will take about 50% of ARCHES planned clean hydrogen production.



ARCHES Goals

- Supply over 250 tons per day of clean, renewable hydrogen to 5,000 trucks and 1,000 buses by 2030
- Institute a coordinated approach to reduce the cost of fuel cell trucks and buses and the required fueling infrastructure for fleets
- Gather input from key stakeholders to get the approach right



RFI Overview

- Create market certainty for fuel cell trucks and buses
- Develop a heavy-duty fuel cell electric vehicle incentive structure
- Reduce complexity and costs

See the full RFI at
archesh2.org/hydrogen-proposals/



Request for Information: Heavy-Duty Fuel Cell Vehicle Market Development Strategy

November 5, 2024

Section 1: RFI Overview

The Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES) and its partners are uniquely positioned to capitalize on a range of federal, state, local, and private funding opportunities to accelerate the adoption of fuel cell buses and trucks. ARCHES aims to supply clean, renewable hydrogen for 5,000 fuel cell electric trucks (FCET) and 1,000 fuel cell transit buses (FCEB) in California by 2030. The proposed frameworks outlined in Appendix A: Fuel Cell Electric Truck Market Development Strategy and Appendix B: Fuel Cell Transit Bus Market Development Strategy are targeted approaches to achieving this transformation, building on the data-driven insights from ARCHES' initial U.S. Department of Energy application. Our collective mission is to provide the market certainty needed for manufacturers to attract sufficient investment in hydrogen production and distribution, hydrogen fueling stations, and fuel cell vehicles to expand product availability, reduce costs, and enable fleets to define a business case for choosing fuel cell vehicles. The strategy frameworks below are built on a foundational premise: *moving from a year-to-year, first-come, first-served incentive funding system to one that creates certainty that there will be long-term vehicle and hydrogen funding support for fleets and original equipment manufacturers (OEMs) will reduce complexity and costs for everyone.*

The market development strategies in Appendix A and B aim to provide fleet operators with a long-term, affordable total cost of ownership (TCO) to compete with incumbent technologies, taking into account the attributes unique to the value proposition of heavy-duty fuel cell electric vehicles, such as clean, quiet, and smooth operation. Initially, this will require capital incentives for trucks, buses, and fueling stations, and



Benefits to Participating in the RFI

- Inform a new, coordinated, long-term approach to incentivizing the transition to FCETs and FCEBs.
- Support effective public- and private-sector investment decisions.
- Help develop a robust and vital market for ARCHES clean, renewable hydrogen producers.

**What Are We
Looking For?**



Who Should Participate

- Fuel cell electric truck and bus manufacturers
- Truck fleet operators
- Transit agencies
- Hydrogen station developers
- Individuals and organizations familiar with these businesses or with transition strategies in general



Truck Strategy

- Issue RFP to deploy in 3 regions
- OEMs and fleets partner to propose up to 2,000 (+/-) FCETs
- Incentive access and step-down locked in under contract, with terms for pricing, timing, performance, etc.
- ARCHES deploys infrastructure plan to meet fleet needs, supports workforce and community engagement

Appendix A: Fuel Cell Electric Truck Market Development Strategy

ARCHES aims to supply clean, renewable hydrogen for 5,000+ Class 8 fuel cell electric trucks (FCETs) in California by 2030. For fleet operators to adopt this technology at scale, the TCO and operational capability must be comparable to diesel trucks including vehicle and fueling costs, maintenance and repairs, drivability, reliability, as well as resale prices, which ultimately impact the economics of shifting to any new technology. ARCHES will facilitate FCET market growth by coordinating truck OEMs, fleet operators, fueling station developers, and hydrogen supply and distribution in regional clusters to ensure the reliability and robustness of the hydrogen fueling ecosystem.

Proposed Framework:

1. **Regions:** ARCHES establishes 3 regions to focus ARCHES initial support of FCET deployment in California: areas surrounding the Ports of Los Angeles and Long Beach in Southern California, areas surrounding the Ports of Oakland and Stockton (including Sacramento) in Northern California, and the Central Valley goods movement ecosystem that provides critical connections to the Northern and Southern California markets. Within these regions, ARCHES will help connect the needs of logistics, warehousing, manufacturing, agriculture, fleets, independent vehicle operators, and fleet users operating along the state's interconnected freight corridors.
2. **OEM + Fleet Proposals:** ARCHES would issue an RFP for OEMs to propose production of up to 2,000+ FCETs each, to be deployed by fleet partners within the identified regions from 2025 through 2030. OEMs would develop joint proposals with their fleet partners for these projects (one OEM could have multiple fleet partners, and one fleet could partner with multiple OEMs). In this scenario, up to 5000 total orders would be selected from the proposals (more FCETs can be added if the incentives can be stretched further, or if funding is added).
3. **Truck Incentive Structure:** The RFP would signal ARCHES' intention to create a declining incentive structure to help bridge the gap between the cost of production and workable purchase price while rewarding early action. The incentive schedule and per-truck funding levels would be determined based on RFP responses.



Transit Bus Strategy

- 13+ transit agencies, 1,000+ buses
- Issue RFP for standard bus designs
- OEMs bid for up to 500+ buses
- Potential step-down incentive structure under contract, with pricing, performance, timing, etc.
- ARCHES support for transit agency infrastructure, workforce development, community engagement

Appendix B: Fuel Cell Transit Bus Market Development Strategy

Under ARCHES, 13 transit agencies aim to deploy 1,000 fuel cell electric buses (FCEBs) over 5-8 years. To date, transit agencies with FCEBs have benefited from programs run by federal, state, and local agencies. However, successful deployments often hinge on a transit agency's ability to patch multiple sources of competitive funding together. This reality creates uncertainty and risk, especially given that none of these programs are set up to invest in hydrogen supply. It also puts smaller transit agencies with limited grant writing staff at a disadvantage when competing for funds.

ARCHES has the opportunity to invest in a holistic approach—including hydrogen supply—with a clear focus on making the system work for transit agencies. Successfully making the program work for transit agencies should increase OEM confidence, enabling investments into their supply chains and manufacturing processes to drive down costs.

Key Issues to Address:

1. **High capital costs for buses.** Currently, there is only one manufacturer of FCEBs for the North American market², and the base price of a FCEB can range from as much as \$1.7 million for a 40' bus to \$2.3 million for a 60' bus, compared to the base price of a diesel or natural gas bus at approximately \$550,000-\$800,000. For comparison, there are over ten FCEB manufacturers in Europe, and FCEB prices are closer to \$1 million and \$1.5 million for 40' and 60' buses, respectively. A lack of competition and scale in the U.S. has contributed to keeping FCEB prices artificially high. Additionally, the customization of buses driven by variations in specifications among transit agencies has also contributed to higher prices. Adhering to a standard design for a large order of buses would significantly reduce the cost of production.
2. **Incentive uncertainty and complexity**, especially when fueling infrastructure is needed.
3. **Access to low-cost hydrogen.** ARCHES was established to specifically solve this problem and accelerate large-scale H2 production, but bringing on new supply and distribution at scale will take time.
4. **Workforce training.** Leading transit agencies have set up training systems to ensure the safe operation and maintenance of FCEBs—this training can be

² To be eligible for federal funding support, transit agencies must meet Buy America provisions which limit purchases to buses manufactured in North America.



Examples of Information Requested

- Effectiveness of the overall approach
- RFP structure, e.g. teaming between OEMs/fleets
- Vehicle manufacturing volumes, purchase plans
- Amount of incentive, structure of incentives etc.
- Vehicle designs, attributes, standardization, use cases
- Pricing transparency, moving toward cost parity
- Infrastructure needs of fleets, and perspectives of station providers
- Do you expect these approaches to drive cost out of the system?
Can you put a number on that?
- What have we not considered?

RFI Logistics and How to Participate



RFI Requirements

Required

- Submit in .docx or .pdf form
- Limited to 15 pages, 11-point font, and 1-inch margins
- Organization name, full address
- Point of contact email, phone number, and affiliation
- Label section, subsection, and question that each response corresponds to

Optional

- All RFI questions
- Labeling information that is business sensitive, proprietary, or confidential (strongly encouraged)



Timeline

RFI Opened	November 5, 2024
RFI Information Session	November 8, 2024 at 1:00 pm PST
RFI Submission Deadline	November 27, 2024 at 5:00 pm PST



Submit through the Box link at archesh2.org/hydrogen-proposals/

Contact strategy@arches.org if you have any questions

Q&A



Thank You

strategy@arches.org | archesh2.org/hydrogen-proposals/

Responses due by Wed, November 27, 2024 5:00 pm PST

(then go have a great Thanksgiving)