



THE OFFICE OF CLEAN ENERGY DEMONSTRATIONS



Regional Clean Hydrogen Hubs Mid-Atlantic Regional H2Hub Community Briefing

10/25/2023

Office of Clean Energy Demonstrations
U.S. Department of Energy



Welcome!



Welcome & Meeting Objectives

- The Office of Clean Energy Demonstrations (OCED) at DOE recently announced the selection of seven Regional Clean Hydrogen Hubs (H2Hubs)
- We at DOE wanted to connect to help clarify our process and the opportunities to plug in and help shape your community's energy future
- Engage with DOE and the partners involved in these H2Hubs



Introductions



Emmanuel Taylor
Facilitator



Todd Shrader,
Director,
Project Management,
OCED



Suzy Baker,
Stakeholder
Engagement Lead –
H2Hubs, OCED



**Lydia Kubiak-
Cardona,**
Community
Engagement
Specialist –
H2Hubs, OCED



Collin O'Mara
Mid-Atlantic
Regional
Hydrogen Hub,
MACH2





Opening Remarks

Agenda

- Welcome
- Opening Remarks
- OCED Overview
- H2Hubs Overview
- Community Benefits and Engagement
- Mid-Atlantic Regional H2Hub Project Overview
- Next Steps & Resources
- Feedback Session
- Wrap-up & Close

OCED Overview



OCED Mission

Deliver clean energy technology **demonstration projects at scale** in partnership with the **private sector** to **accelerate deployment, market adoption**, and the **equitable transition** to a decarbonized energy system.



OCED Mandate



SCALE EQUITABLE, CLEAN ENERGY

Help enable 100% clean electricity by 2035 and net zero emissions by 2050 through an equitable energy transition



UNLOCK NEW INVESTMENT

Unlock and scale trillion-dollar clean energy follow on investment from the private sector and other sources of capital



DE-RISK TECHNOLOGY

Maintain risk-based, balanced, and defensible portfolio of investments



SERVE AS CENTER OF EXCELLENCE

Serve as primary DOE office to deliver full scale clean energy demonstration projects and project management oversight excellence



ENGAGE & COLLABORATE

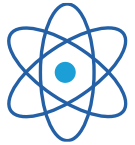
Leverage private sector and broader energy ecosystem to inform OCED and DOE technology commercialization efforts



OCED Scope



Regional Clean Hydrogen Hubs (\$8 billion)



Advanced Reactor Demonstrations (\$2.5 billion)



Carbon Management (\$7 billion)



Industrial Demonstrations (\$6.3 billion)



Long-Duration Energy Storage Demonstrations (\$505 million)



Energy Improvements in Rural or Remote Areas (\$1 billion)



Clean Energy Demonstrations on Mine Land (\$500 million)



Other Initiatives (\$133 million)

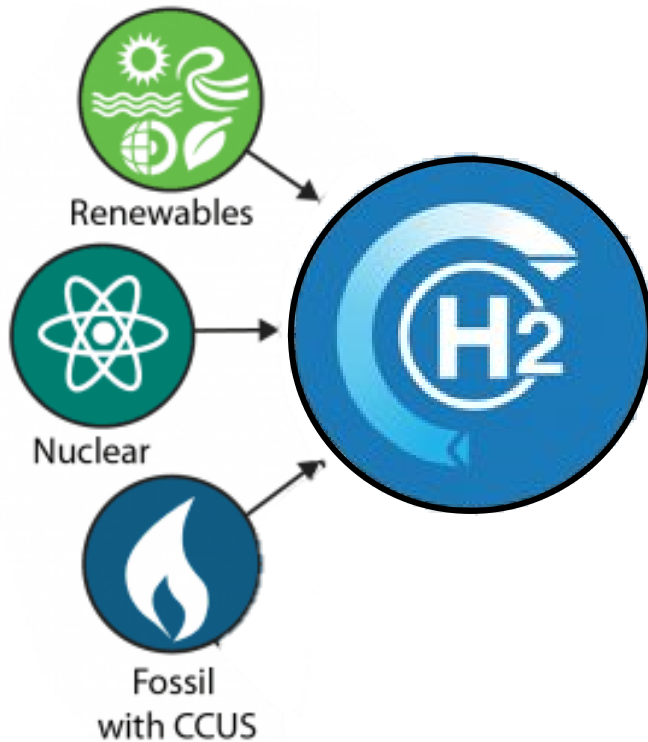


H2Hubs Overview



What is Hydrogen?

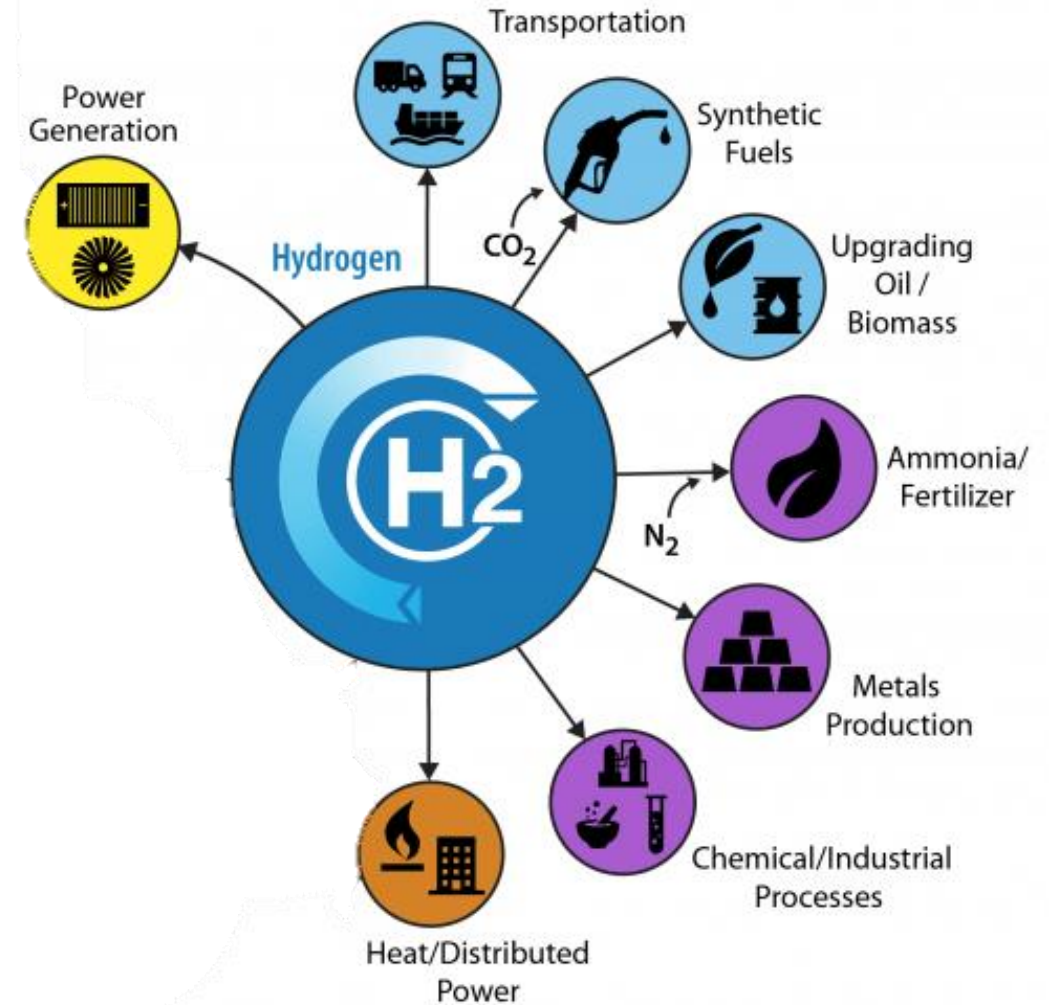
- **Hydrogen (H_2)** is the simplest and most abundant element known.
 - You might recognize it from the chemical formula for water – H_2O !



- **Hydrogen can be made using a variety of domestic energy resources.**
- Hydrogen can be produced through several processes, including:
 - Electrolysis; Direct Solar Water Splitting
 - Steam Methane Reforming
 - Biological (e.g., algae)
- **Currently, the U.S. produces 10 million metric tons of hydrogen each year.**

What Can Hydrogen Do?

- Hydrogen is **part of a suite** of solutions that can help our nation achieve its net-zero goals.
- Helps hard-to-decarbonize sectors such as **heavy-duty transportation**, **steel and chemicals** manufacturing, and production of **liquid fuels**.
- Supports **increased integration of renewable energy** into the grid and offers multiple revenue streams for clean power generation.



Whole of Government Approach to Clean Hydrogen



U.S. National Clean Hydrogen Strategy and Roadmap



Hydrogen Shot
(*\$1/kg by 2031*)



Clean Hydrogen Standard



H2Hubs Demand-Side Support Initiative



IRA tax incentives



Clean Hydrogen Pathways to Commercial Lift-Off Report



Coordination with Canada and Mexico
on building out the clean hydrogen supply chain and economy across North America



Additional DOE funding:
Clean H2 Electrolysis
Clean H2 Manufacturing and Recycling
(*additional \$1.5B*)

AND...





H₂

Regional Clean Hydrogen Hubs

Build regional clean H2Hubs across the country to create networks of clean hydrogen producers, consumers, and local connective infrastructure to accelerate use of clean hydrogen.

H2Hubs Demand-Side Support Initiative

- Sept 2023: Announced \$1B RFP. Responses are due on October 26, 2023.
- Learn more about the initiative here:
https://www.youtube.com/watch?v=QgOL_Xg7K1Q

H2Hubs Current Status

- October 2023: DOE announced 7 projects selected for award negotiations.

What is a Regional Clean Hydrogen Hub?



Selected Regional Clean Hydrogen Hubs



Selected H2Hubs Overview

**Unprecedented
Investment in America's
Hydrogen Infrastructure**

Federal investment of
\$7 billion

**To accelerate adoption of
hydrogen technologies**

Approximately 3
Million Metric Tons of
Hydrogen Production
per Year

**Providing tangible
benefits for Americans**

Dedicated Dollars for
Community Benefits

Tens of Thousands of
Jobs

Greenhouse Gas
Reduction of 25 million
Metric Tons Per Year



Community Benefits

Prioritizing Community Benefits in OCED Projects

OCED **requires** applicants to include a Community Benefits Plan (CBP) to help ensure broadly shared prosperity in the clean energy transition.

By **prioritizing community benefits**, we can ensure the next chapter in America's energy story is marked by greater justice; equity; security; and resilience.

Community & Labor Engagement



Diversity, Equity, Inclusion, & Accessibility



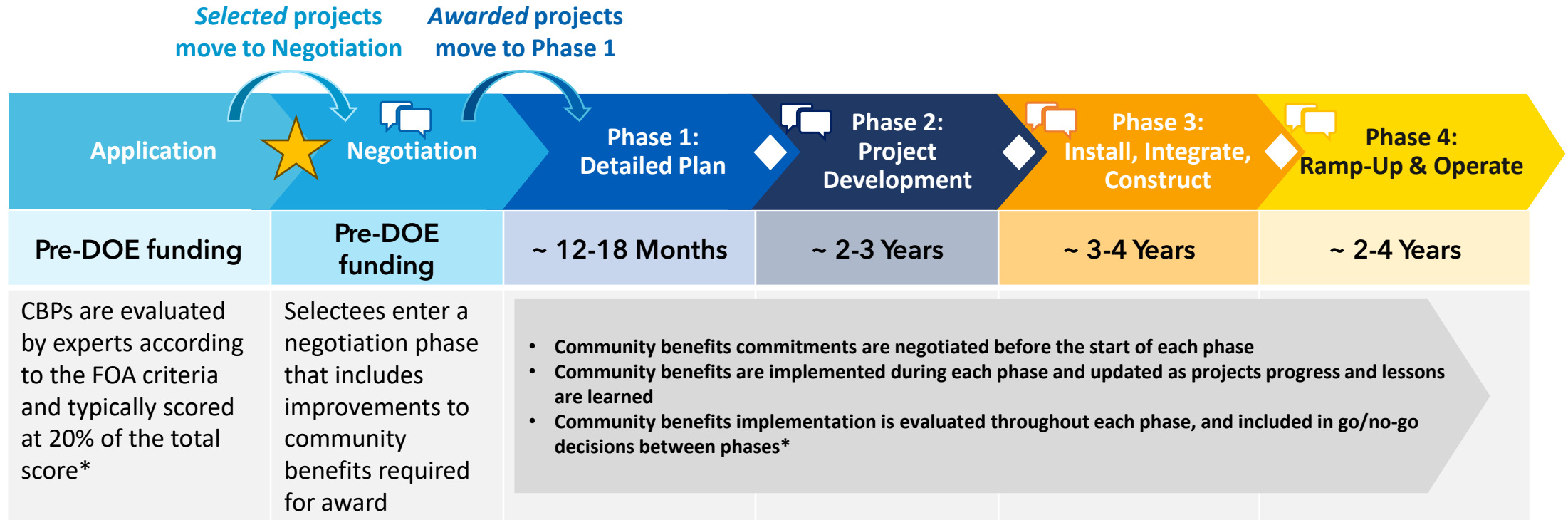
Investing in the American Workforce



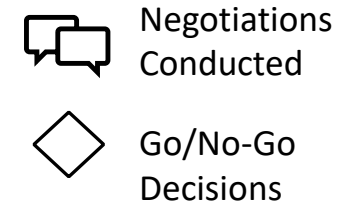
Justice40 Initiative



Community Benefit Commitments - Implementation Requirements per Phase

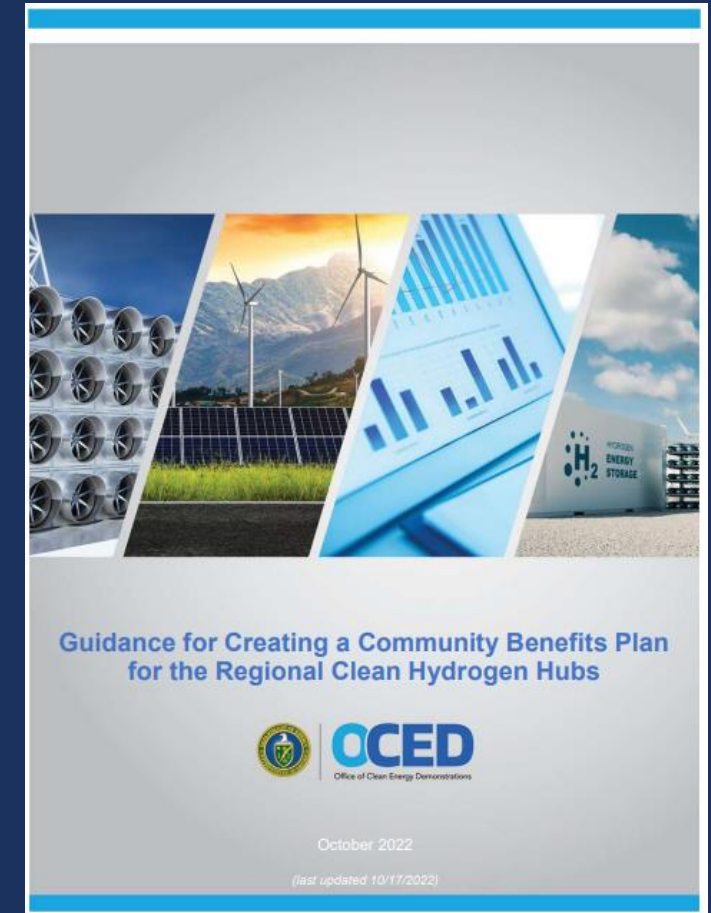


**CBPs are considered alongside assessments of engineering, procurement, and construction; business development and management; permitting and safety; and technical data and analysis.*



Strong Community Benefits Commitments

- Demonstrate moving beyond a vision or assessment into **actionable goals, outcomes, and implementation steps** supported by adequate money, people, and time resources
- Include mechanisms for **accountability to and transparency with** impacted communities
- Propose clear **metrics** to measure success
- Match proposed actions to the **needs and priorities** of impacted communities
- **Robustly address** all four topic areas
- **Minimize and mitigate negative impacts** and harm, especially to already overburdened communities
- **Create quality jobs**, equitable access, and invest in workforce development
- **Evolve** to incorporate community and worker feedback
- **Build** toward lasting and enforceable Community and Labor Agreements



**OCED FOA CBP Guidance docs
available with each FOA at:**
<https://oced-exchange.energy.gov/>



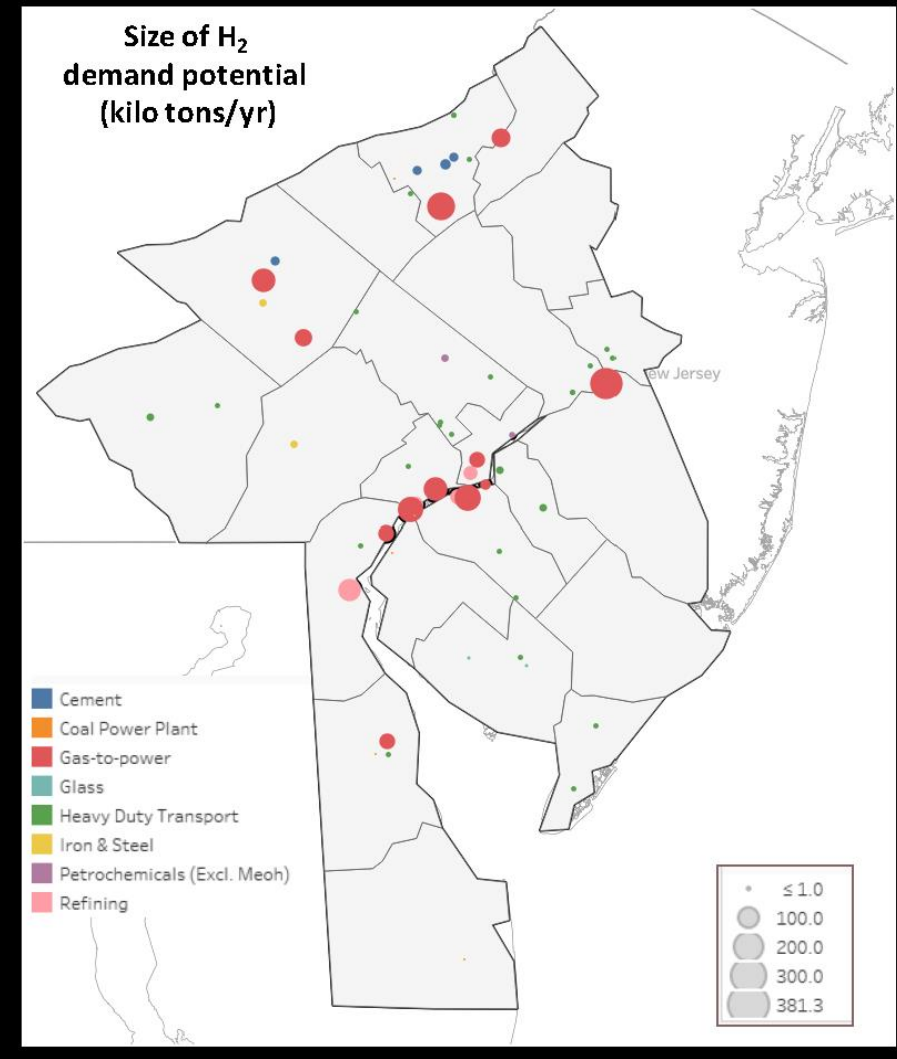
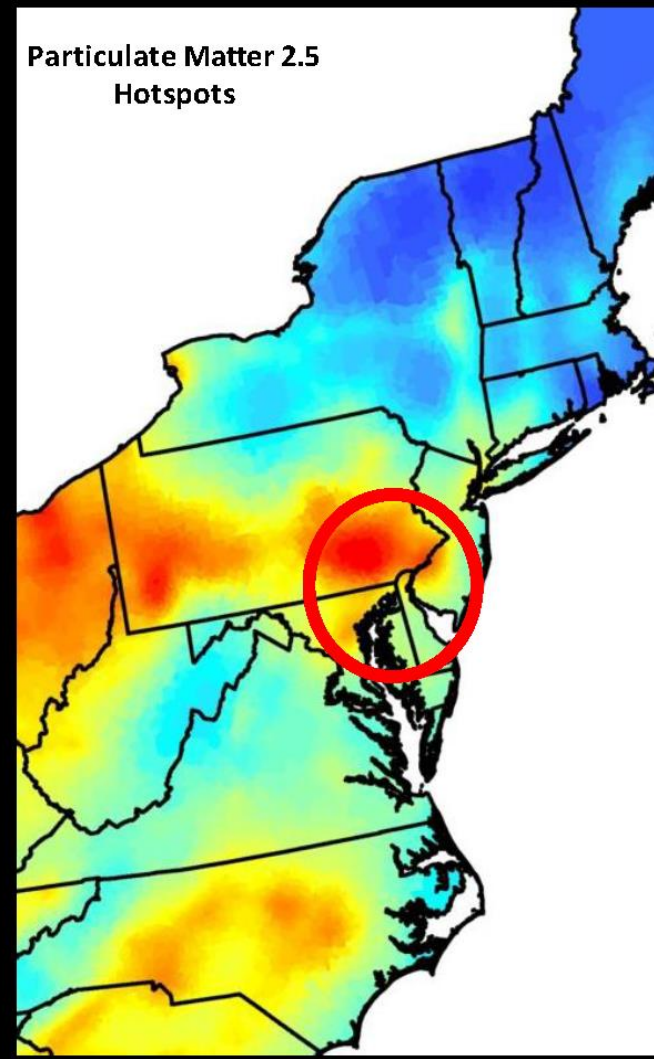
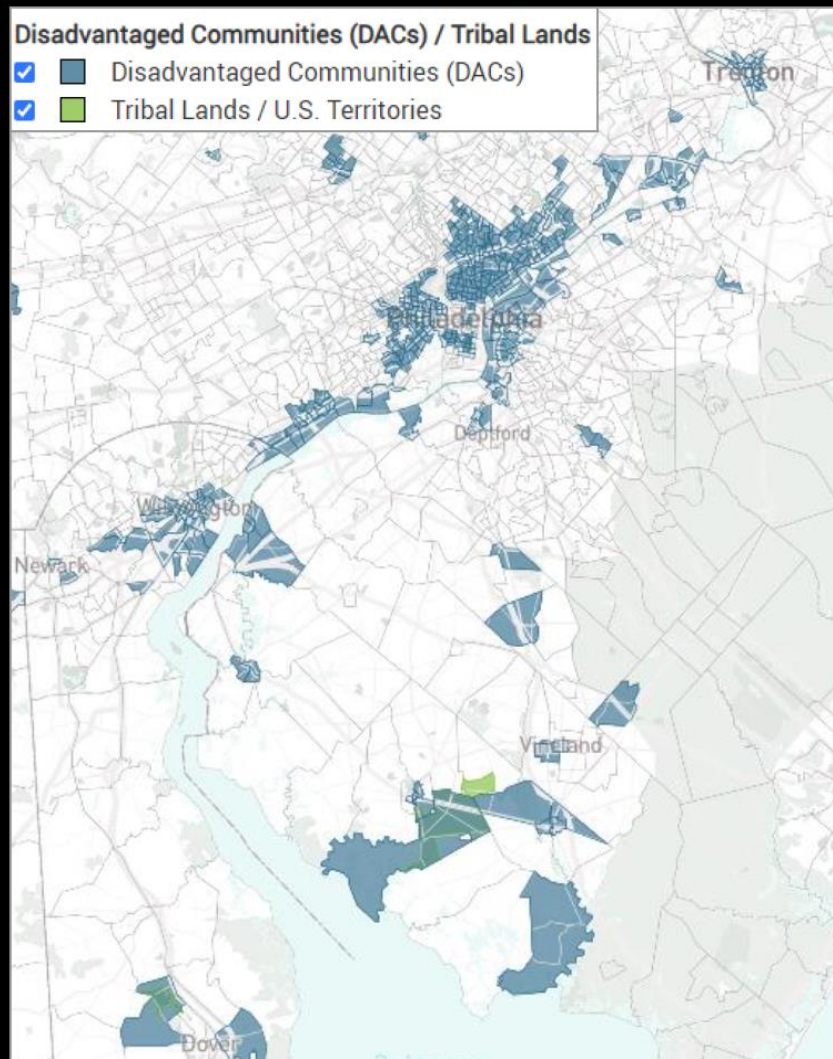
Mid-Atlantic Regional Clean Hydrogen Hub

WHY GREEN/PINK HYDROGEN FOR MID-ATLANTIC?

- Only use energy solutions that reduce both GHG & criteria pollutants
- Seize opportunities to create good, union jobs in clean energy economy
- Reduce emissions in sectors that have high levels of pollution and are difficult to decarbonize/electrify :
 - Industrial Facilities (23% of GHG): chemical manufacturing, steel, cement, logistics facilities
 - Transportation (28% of GHG) : Heavy-duty trucking, transit buses, ports, marine vessels, aviation
- Focus renewable energy electrification in sectors that make most sense: residential, light-duty vehicles, commercial buildings, etc.

Justice40: MACH₂ will significantly reduce air pollution

Large emitters in hub area are sources of H₂ demand



Source: EIA AEO, EPA 2019 Emission Inventory, DOE AFDC

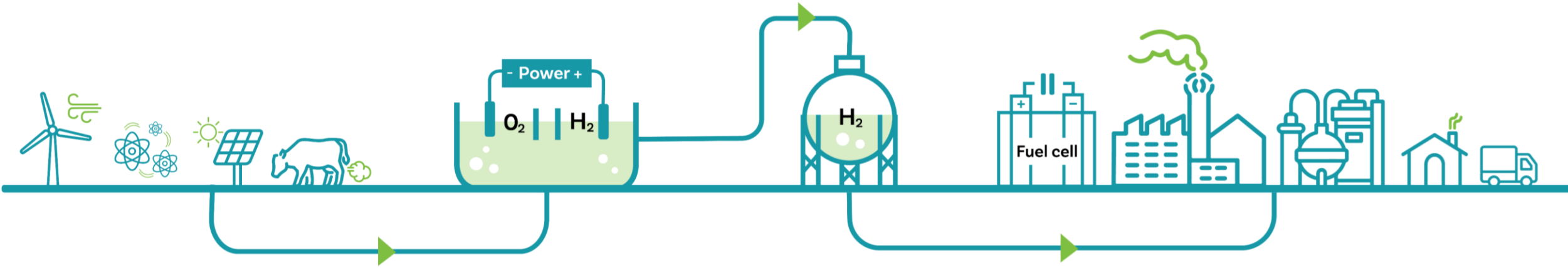
HOW WILL MACH₂ PRODUCE HYDROGEN?

Using energy produced by clean energy sources like wind, solar, nuclear

...Low to zero carbon electricity could produce hydrogen from water through electrolysis.

Hydrogen is stored safely for when needed.

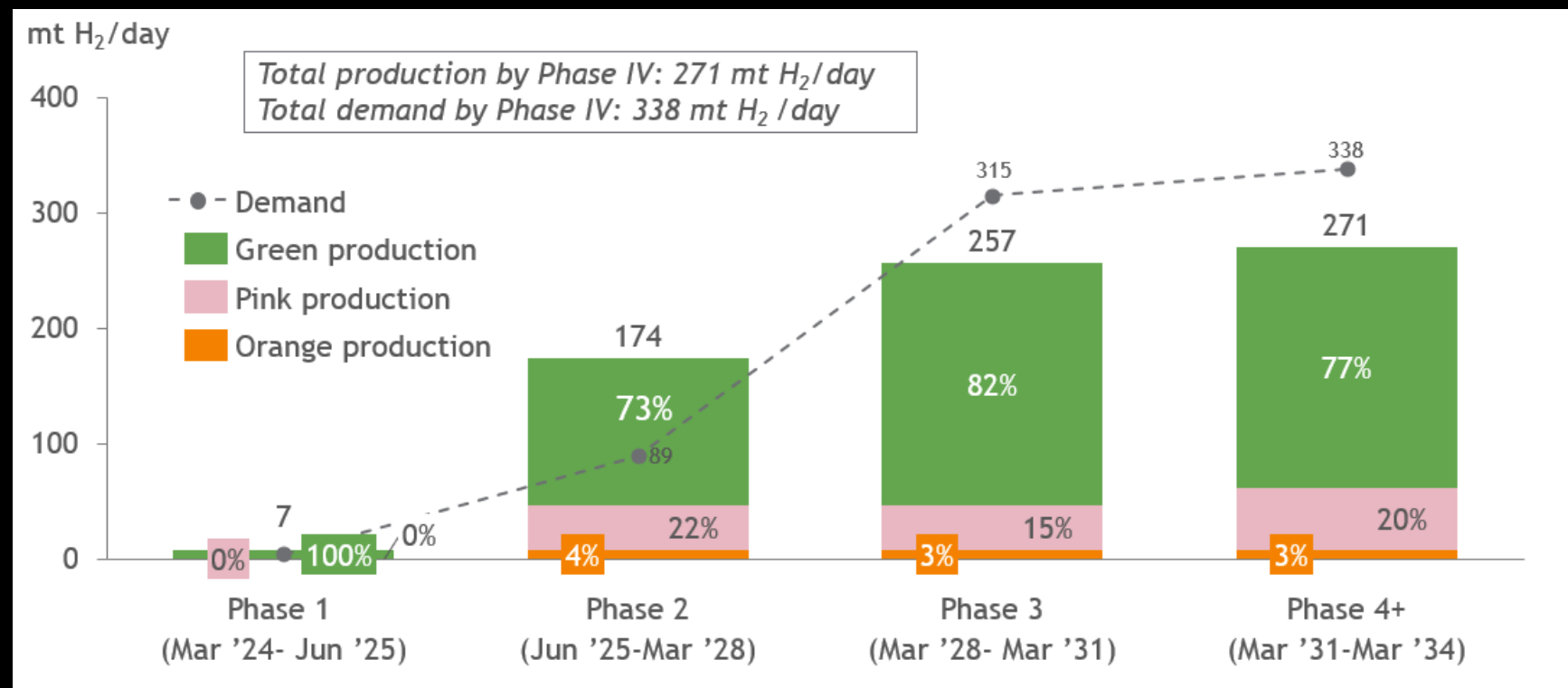
Clean hydrogen could be used for power generation, transportation fuel, refining and other industrial processes.



MACH₂ IS A FOSSIL
FUEL-FREE HUB

POWERED BY
RENEWABLE &
NUCLEAR ENERGY

LEVELIZED H₂
COST: \$3.86/KG



Green

Pink

Orange

Definition:

Solar or Wind powered
electrolyzer

Nuclear powered
electrolyzer

Biogas or biomethane in
SMR (e.g., RNG)

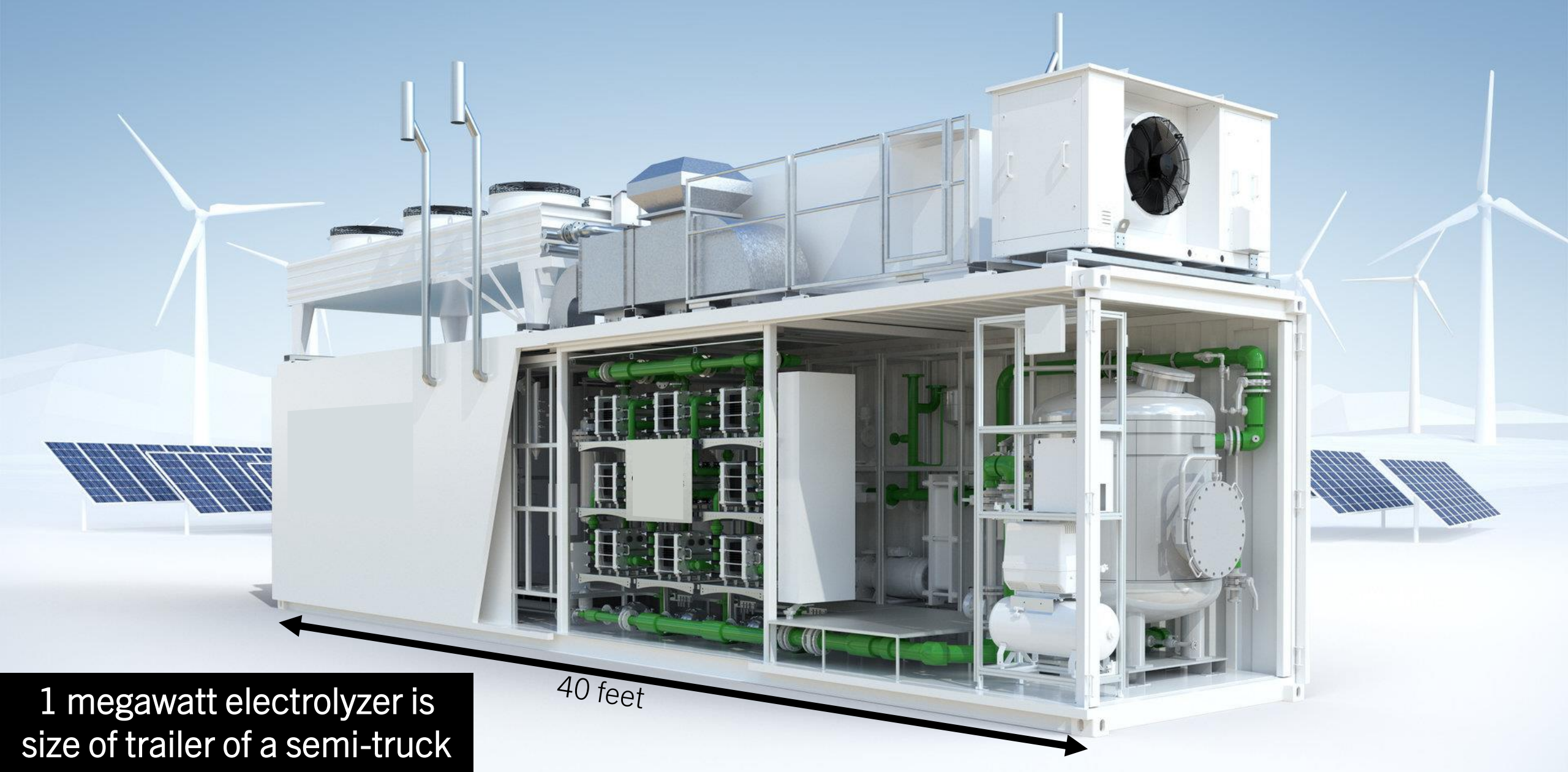
Carbon intensity:

0 kg CO_{2e}/kg H₂

0.2 kg CO_{2e}/kg H₂

0.2 kg CO_{2e}/kg H₂

WHAT DO ELECTROLYZERS LOOK LIKE?



1 megawatt electrolyzer is
size of trailer of a semi-truck

40 feet

MACH₂

Labor, Workforce & Community Outreach

- PA AFL-CIO
- DE AFL-CIO
- Building Construction Trades
- Pipefitters & Steamfitters
- Delaware Prosperity Partnership
- DESCA
- DE Workforce Development Board
- Philadelphia Works
- University of Delaware
- Cheyney University
- Rowan
- UPenn
- Drexel
- Delaware State University

Industrial & Commercial Applications

- Monroe Energy
- Braskem
- DuPont Experimental Station
- Vicinity Energy
- PSE&G
- Enbridge
- Hilco
- HyAxiom
- Amazon
- Ameresco

H₂ Producers & Innovators

- Air Liquide
- PBF Energy
- Bloom Energy
- PGW
- Monroe Energy
- Enbridge
- Versogen
- Holtec
- PSE&G
- Chesapeake Utilities
- sHYp
- Hydropore
- First State Hydrogen

Transportation Applications

- SEPTA
- DART
- NJ Transit
- Philadelphia Municipal Fleets

Education, Research & Development

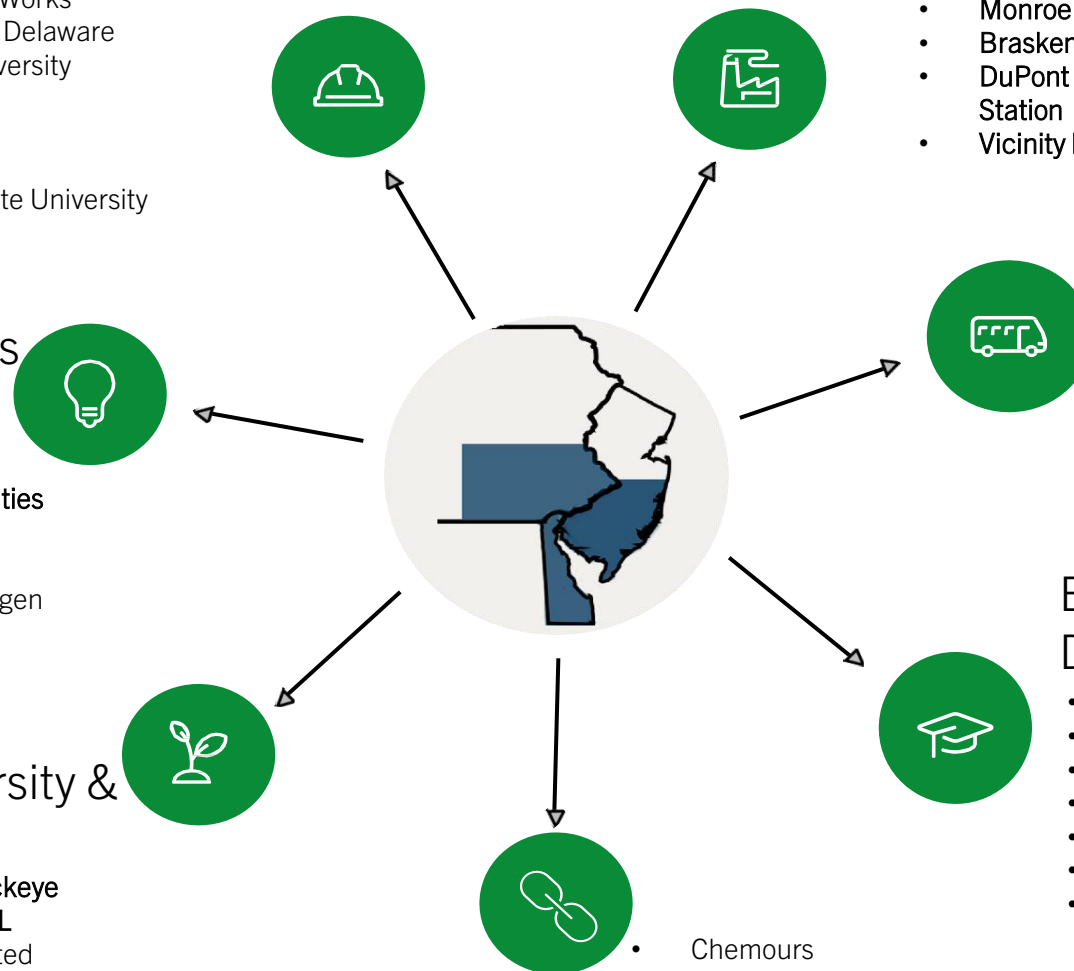
- University of Delaware
- Cheyney University
- Rowan
- UPenn
- Drexel
- Delaware State University
- DESCA

Feedstock Diversity & Infrastructure

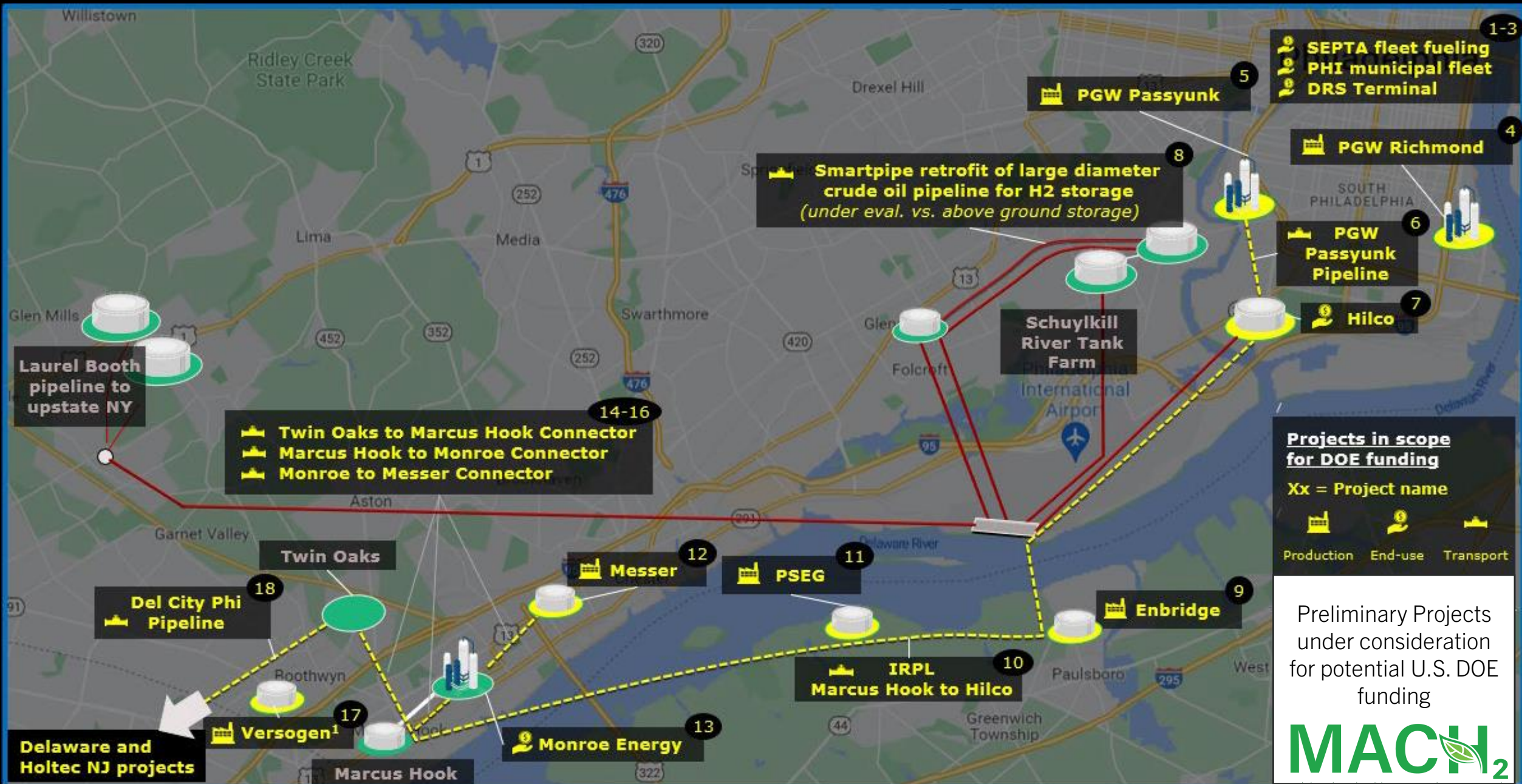
- PECO
- PSE&G
- US Wind
- Buckeye
- IRPL
- Orsted

H₂ Supply Chain

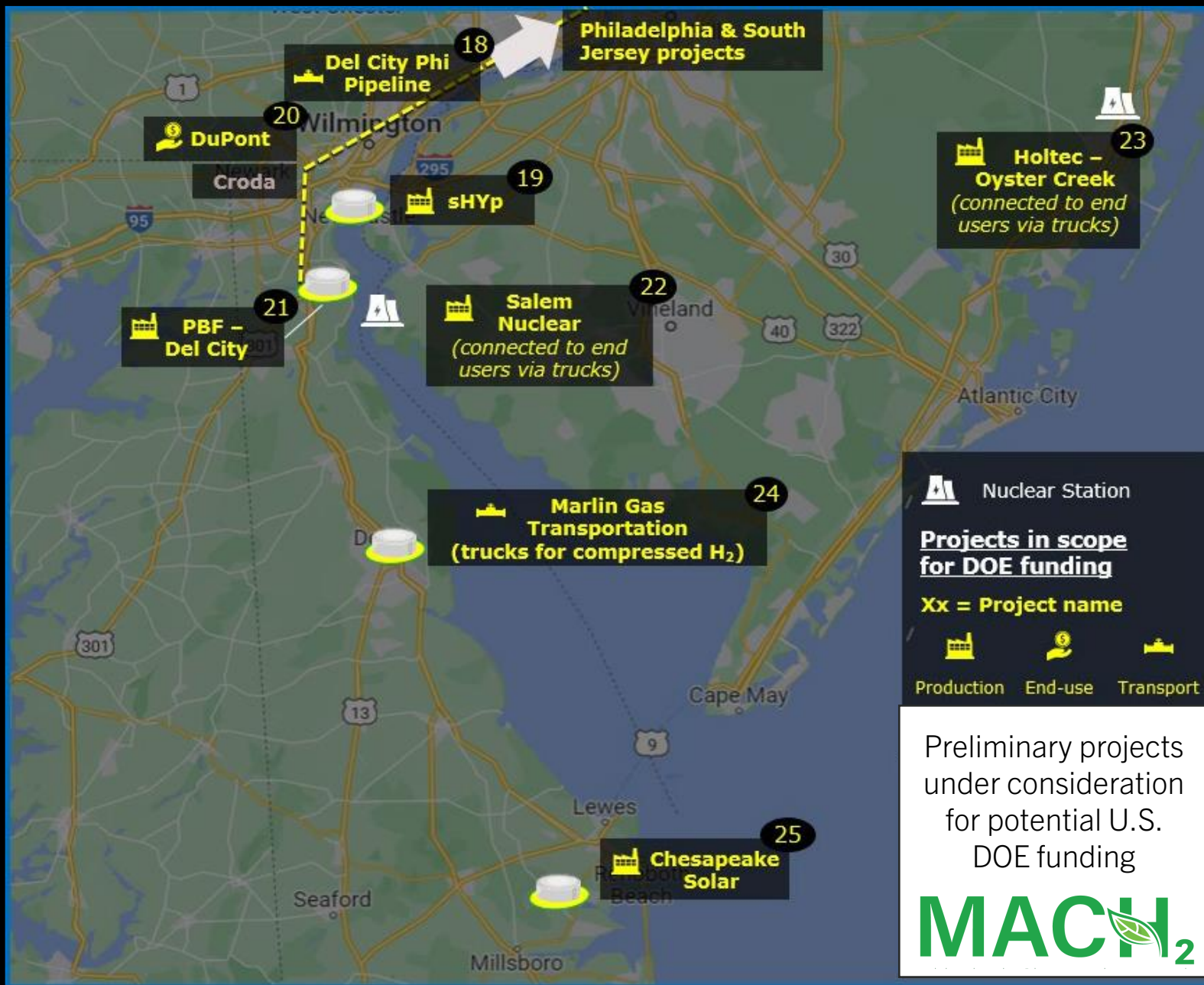
- Chemours
- DuPont
- WL Gore
- Compact Membrane Systems



PRELIMINARY DRAFT CONCEPT FOR DISCUSSION



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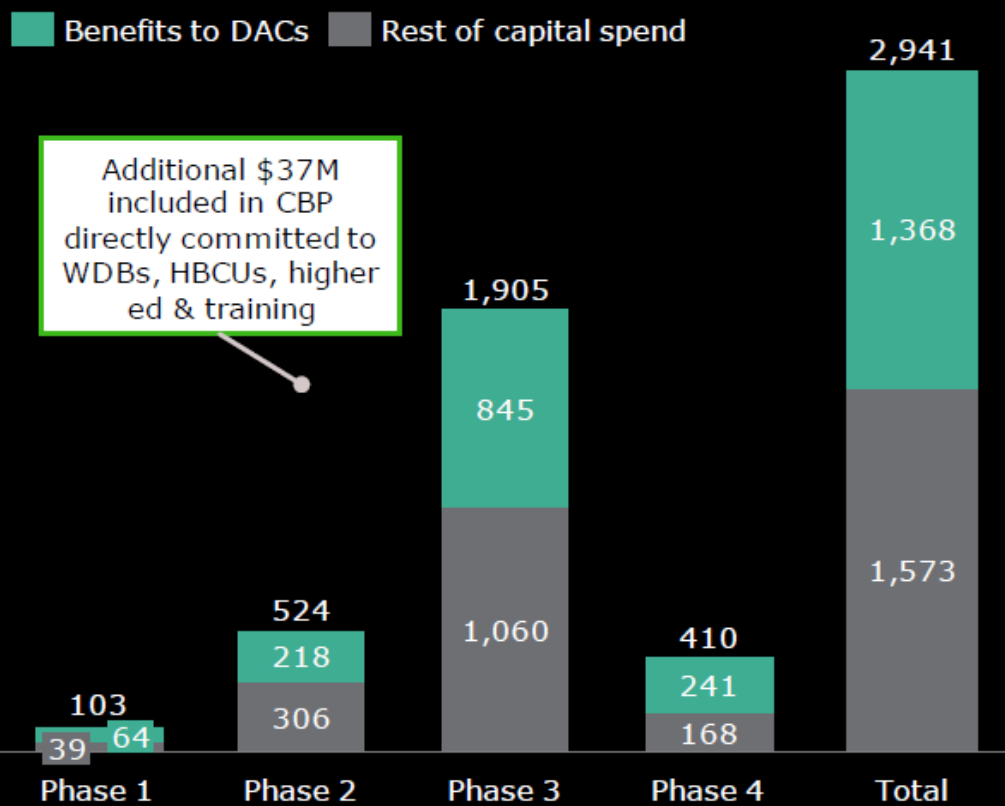
WORKFORCE DEVELOPMENT & JOBS



- MACH₂ will create 20,800 well-paying jobs in the clean energy economy, including 13,400 union construction jobs
- The regional Building Trades and AFL-CIO helped lead MACH₂ from the start. Every project will be constructed with project labor agreement
- MACH₂ will coordinate equitable access to next-generation job training opportunities, especially historically underserved communities
- Key workforce partners: Labor, Cheyney University, Delaware Tech, the Collegiate Consortium, Philadelphia Works, DE Workforce Development Board, NJ State Employment and Training Commission, FAME, Inc., LEEP

MACH2 Community benefits | Investing in America's workforce & engaging DACs & underrepresented groups

Estimated benefits flowing to DACs in line with Justice40 criteria (\$ million)

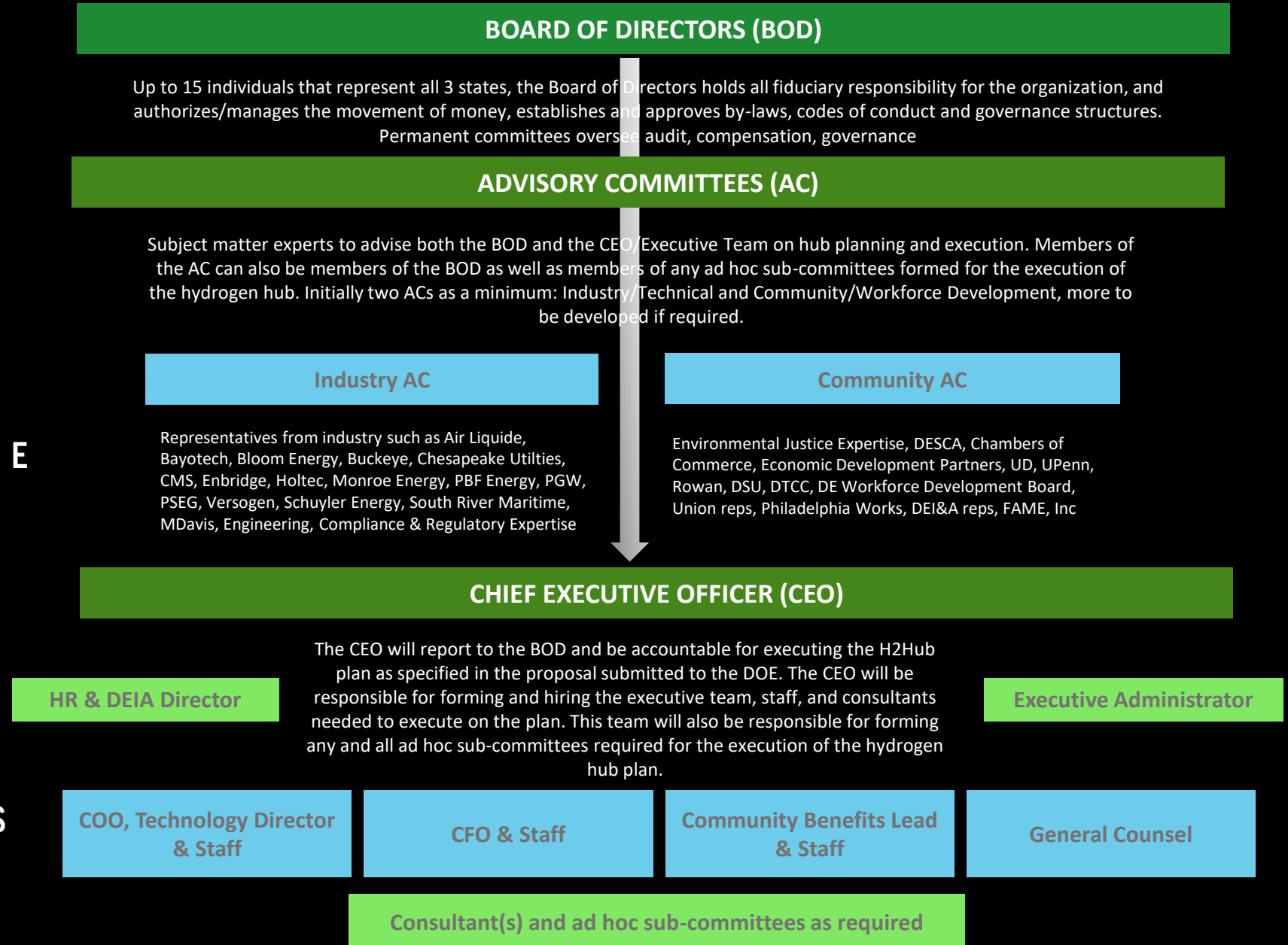


Select highlights include:

- **Significant portion of project partner spend taking place in regions with high DAC density** allows us to estimate direct benefit of \$1.2-1.5B flowing to DACs in line with Justice40 benefits criteria¹
- **Investing in America's Workforce** | ~\$14M committed to regional Workforce Development Boards to serve as MACH2 anchor partners for community college training, pre-apprenticeships
- **DEIA, EJ and J40** | \$10M commitment to technical and professional development initiatives for programs to overcome barriers in higher-ed to entry-level & professional careers for underrepresented groups – including Cheyney University, the country's first HBCU, U Penn and others

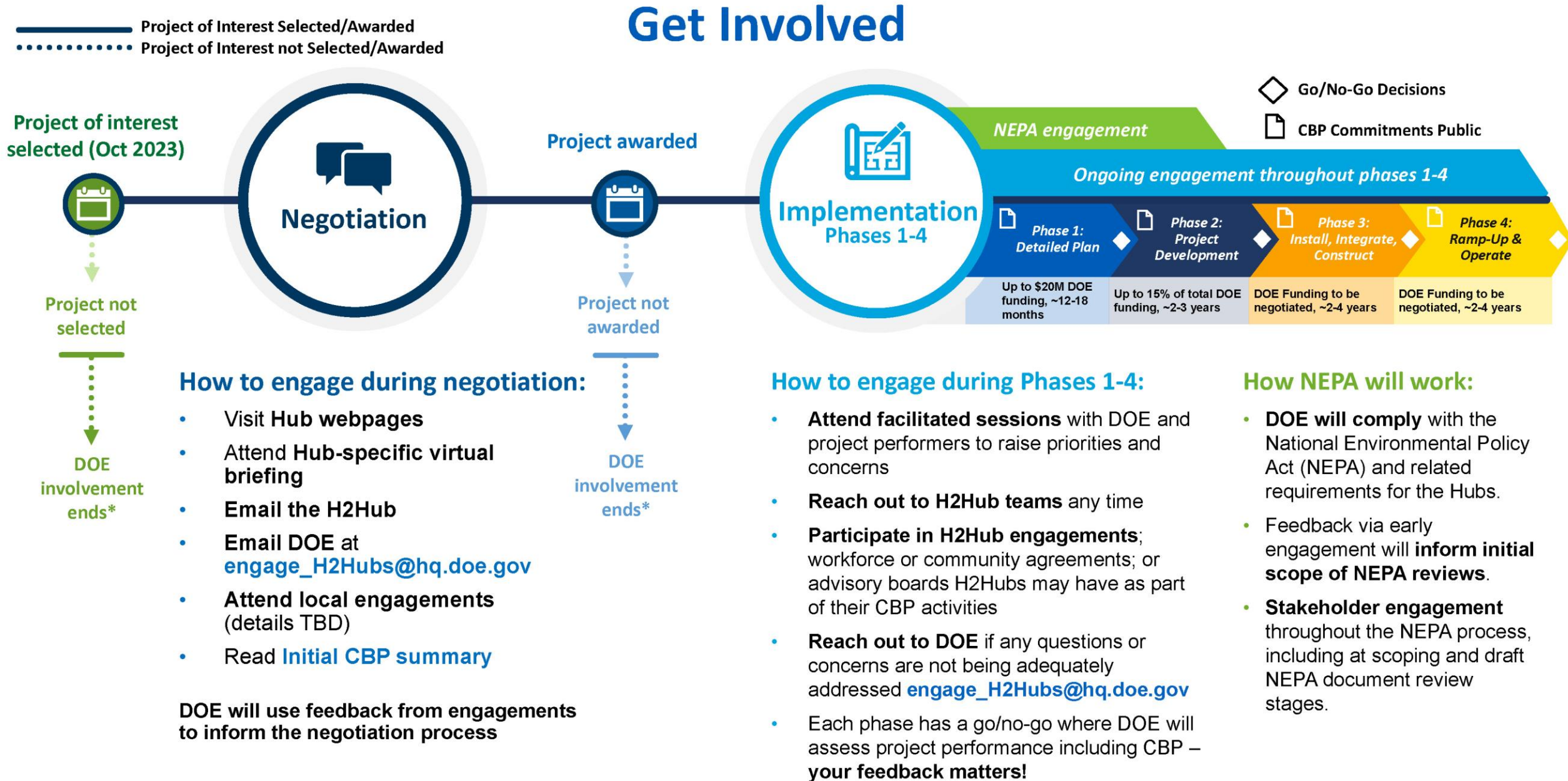
1. Ranges of spend flowing to DACs vary by project with 20-70% per project flowing to DACs, detail can be found in appendix. This estimate is built in our best understanding of how federal match on MACH2 partner projects will align with the policy priorities as defined under the "What Justice40 Benefits should be considered?" [FAQ on the DOE Community Benefits Plan](#). 2. Includes University of Delaware, Cheyney University, U Penn, Rowan University across higher-ed & technical training

POST AWARD
ORGANIZATIONAL
STRUCTURE
EMBEDS COMMUNITY
BENEFITS, WORKFORCE
DEVELOPMENT & EJ40
ACTIVITIES AT ALL
LEVELS INCLUDING
BOARD, ADVISORY
COMMITTEES,
EXECUTIVE TEAM &
COMMUNITY BENEFITS
STAFF





Next Steps & Resources



*Communities and labor can still engage with the applicant based on the information they released to date to explore a path forward without this specific source of federal funding.

OCED Engagement

OCED aims to support meaningful **community-awardee-OCED** engagement through the life of the awarded H2Hub. **How?**

Local Engagements



Small community dialogues



Deliberative forum

Outcomes



Establish process for long-term engagement



Co-develop priorities

Next Steps – Virtual H2Hub Community Briefings

OCED will hold seven community briefings to share information with the communities hosting H2Hubs.

Information and to register: <https://www.energy.gov/oced/h2hubs-local-engagement-opportunities>

Appalachian Hydrogen Hub
Tuesday, October 24, 2023
6:00-7:30 p.m. ET

Mid-Atlantic Hydrogen Hub
Wednesday, October 25, 2023
6:00-7:30 p.m. ET

California Hydrogen Hub
Wednesday, October 25, 2023
8:00-9:30 p.m. ET

Gulf Coast Hydrogen Hub
Monday, October 30, 2023
6:00-7:30 p.m. ET

Pacific Northwest Hydrogen Hub
Monday, October 30, 2023
8:00-9:30 p.m. ET

Midwest Hydrogen Hub
Wednesday, November 1, 2023
6:00-7:30 p.m. ET

Heartland Hydrogen Hub
Wednesday, November 1, 2023
8:00-9:30 p.m. ET

*Subject to change based on negotiations. Negotiations may take several months.

Next Steps – Negotiations

Award Negotiations: OCED will commence negotiations with project selectees.

After Award: *IF the projects receive an award (successful negotiations)*

- Selectees enter into cooperative agreement with OCED
- Detailed Project Plan begins
- OCED will work with selectees to ensure compliance with the National Environmental Policy Act (NEPA)
- Significant engagement with OCED and awardee



Selectee Webpages

Appalachian Hydrogen Hub

<https://www.arch2hub.com/>

California Hydrogen Hub

<https://archesh2.org/>

Heartland Hydrogen Hub

www.HeartlandH2Hub.com

Gulf Coast Hydrogen Hub

<https://www.hyvelocityhub.com>

Mid-Atlantic Hydrogen Hub

<https://mach-2.com/>

Midwest Hydrogen Hub

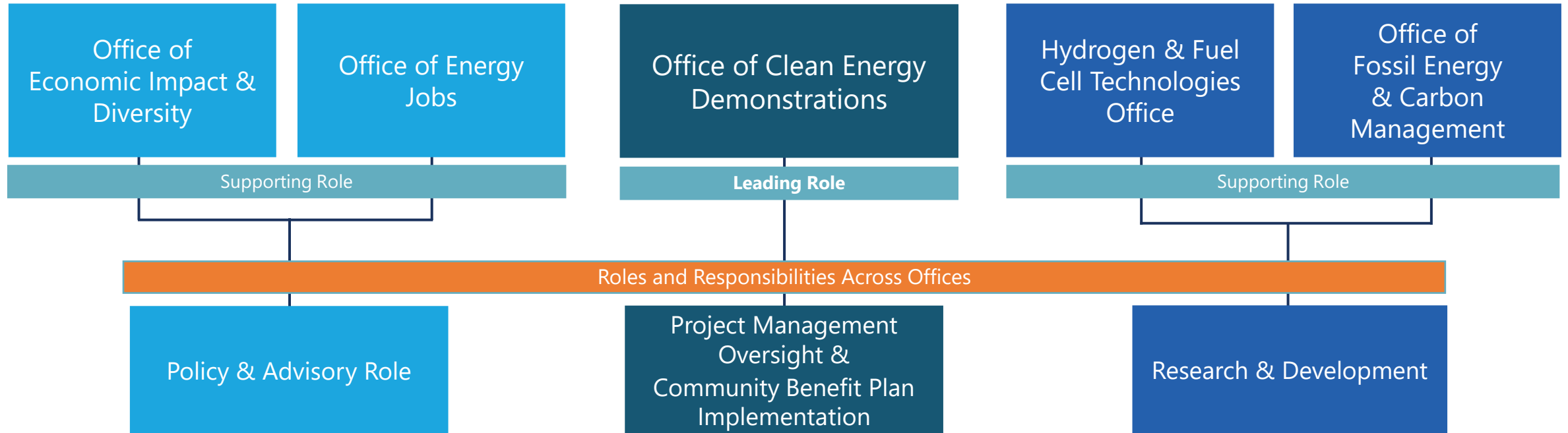
<https://machh2.com/>

Pacific Northwest Hydrogen Hub

<https://pnwh2.com/>



Key DOE Offices for H2Hubs



H2Hubs Resources

Regional Clean Hydrogen Hubs

- [Program Page](#)
- [Press Release](#)
- [Overview of Selected Projects](#)
- [Local Engagement Opportunities](#)
- [OCED CBP fact sheet](#)

Demand-Side Support Initiative for Clean Hydrogen

- [Request for Proposals \(RFP\)](#)
- [Video: OCED Update on Demand-Side Support Initiative](#)

Additional Clean Hydrogen Resources

- [U.S. National Clean Hydrogen Strategy and Roadmap](#)
- [Clean Hydrogen Pathways to Commercial Liftoff Report](#)
- [Hydrogen Shot](#)

Additional DOE Resources

- [Office of Economic Impact and Diversity assistance to advance equity & CBP in communities](#)
- [Office of Energy Jobs technical assistance to advance CBP jobs, labor & skilled workforce](#)





Feedback Session

Ground Rules for Discussion

- Submit questions using the Q&A feature.
 - You can also see and upvote other questions that have been asked.
- Reserve judgement
- One idea at a time
- It is okay to build on the ideas of others
- Clarifying questions are okay





For more information

- Reach OCED about the H2Hubs midatlantich2hub@hq.doe.gov
- OCED Website & Newsletter Sign-up energy.gov/oced
Scroll to bottom to sign up here:

Sign Up for OCED News & Alerts

Subscribe and stay up-to-date on all upcoming funding opportunities, news announcements, upcoming events, and more.

GO

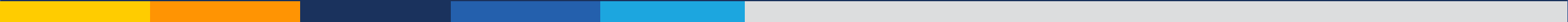
- OCED Exchange (RFIs, NOIs, and FOAs) oced-exchange.energy.gov
- Follow us on LinkedIn linkedin.com/company/doe-oced/



Thank you!



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For more information; please visit energy.gov/OCED