

Pacific Northwest Hydrogen Hub

Tribal Engagement Convening

March 18, 2024

PNWH2

Agenda

I. Greeting & introductions (5 min)

II. Presentation (40 min)

- State and federal tribal engagement and consultation
- Hydrogen “101”
- PNWH2 hub overview
- Tribal engagement on PNWH2 board
- Next steps and staying connected

III. Q&A (45 min)

Washington State Department of Commerce Office of Tribal Relations

Tribal communities have been the stewards of the lands of Washington State since time immemorial. The Department of Commerce respects their continued stewardship and actively work to honor their Tribal Sovereignty by engaging in meaningful government to government work as illustrated by the Centennial Accord.

Michelle Gladstone-Wade, Tribal Liaison

Email: michelle.Gladstone-wade@commerce.wa.gov

OREGON DEPARTMENT OF ENERGY

Leading Oregon to a safe, equitable, clean, and sustainable energy future.

Our Mission

The Oregon Department of Energy helps Oregonians make informed decisions and maintain a resilient and affordable energy system. We advance solutions to shape an equitable clean energy transition, protect the environment and public health, and responsibly balance energy needs and impacts for current and future generations.

What We Do

On behalf of Oregonians across the state, the Oregon Department of Energy achieves its mission by providing:

- A Central Repository of Energy Data, Information, and Analysis
- A Venue for Problem-Solving Oregon's Energy Challenges
- Energy Education and Technical Assistance
- Regulation and Oversight
- Energy Programs and Activities

Tribal Relations

- **Guided by ORS 182.162-168 and work within the structure of the Legislative Commission on Indian Services (LCIS) and related "cluster" groups**
  - Learn more about LCIS here: https://www.oregonlegislature.gov/cis
- **ODOE has a Policy on Tribal Relations** –
  - Early notification and invitation to discuss 1:1 with each Tribe with a focus on potential funding decisions and energy facility siting decisions as well as policy analysis and recommendations
  - Working on building staff to staff relationships between each Tribe and ODOE staff
  - Sponsoring events through ATNI or other organizations
  - Learn more here https://www.oregon.gov/energy/Data-and-Reports/Documents/ODOE-Tribal-Policy.pdf
- **Annual reports** - https://www.oregon.gov/energy/Data-and-Reports/Pages/Tribal-Reports.aspx
- **Contact**: Ruchi Sadhir (she/her) – Associate Director for Strategic Engagement/Tribal Liaison
  - ruchi.sadhir@energy.Oregon.gov

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Stay Connected

- **Email: brian.odonnchadha@hq.doe.gov**
- **OCED Website & Newsletter Sign-up**
  energy.gov/oced
- **OCED Exchange (RFIs, NOIs, and FOAs)**
  oced-exchange.energy.gov
- **Get in touch via email**
  OCED@hq.doe.gov
- **Follow us on LinkedIn**
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OCED
Office of Clean Energy Demonstrations

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JOINT CENTER FOR DEPLOYMENT & RESEARCH IN EARTH ABUNDANT MATERIALS

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CONSORTIUM FOR HYDROGEN AND RENEWABLY GENERATED E-FUELS

Hydrogen 101

March 13, 2024

Aaron Feaver PhD
Executive Director

Problem: Electrification can't do it all

- There is a need for fuels derived from renewable energy to support GHG reduction in high power demand applications.
- Washington State transportation OEMs and the tech companies are building assets that will be in place for decades but need to be decarbonized
- Washington State utilities produce low carbon electricity at some of the lowest costs on the planet




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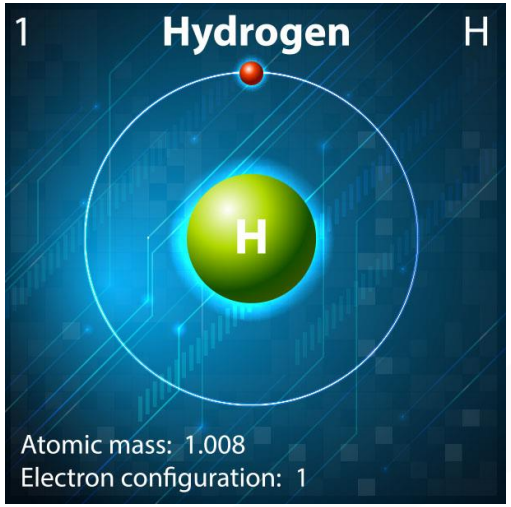
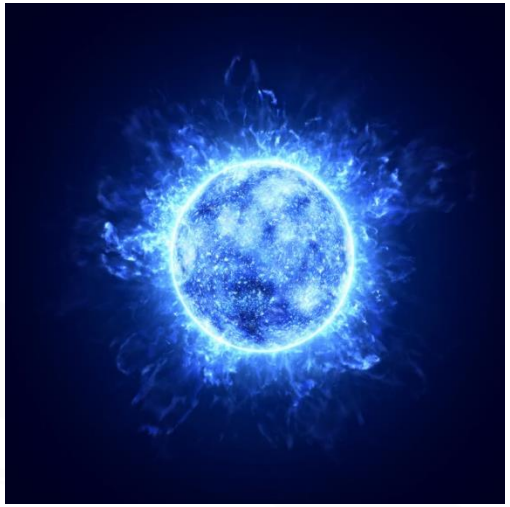
Renewable hydrogen: a crucial molecule





- Hydrogen is the lightest and most abundant element in the universe
- On Earth, hydrogen is found in the greatest quantities in water
- Hydrogen is an energy carrier. Compared to other fuels, it has the highest energy content by weight but lower energy content by volume

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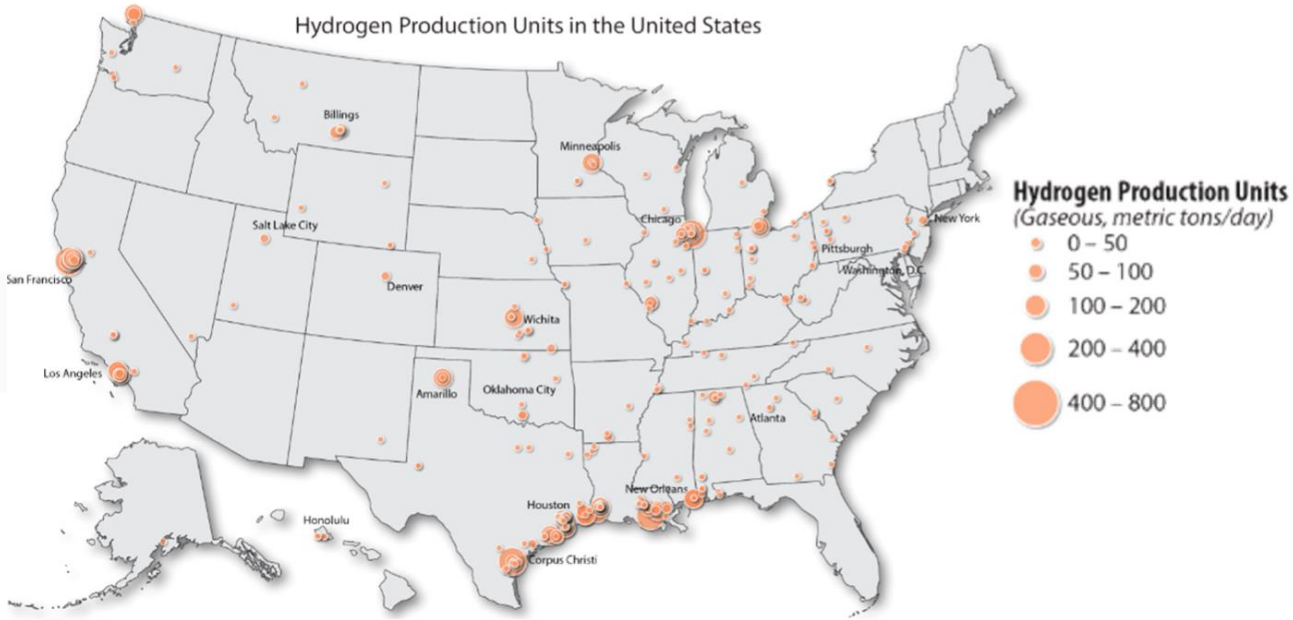
How much hydrogen?

- The U.S. produces 10 million metric tons per year
- Conventionally, H2 is produced from natural gas and used in refineries, chemicals and fertilizer production

Clean hydrogen is an important component of the net-zero future. Production of 50 million metric tons/year by 2050 will help achieve a 10% GHG emissions reduction



Source: National Renewable Energy Laboratory

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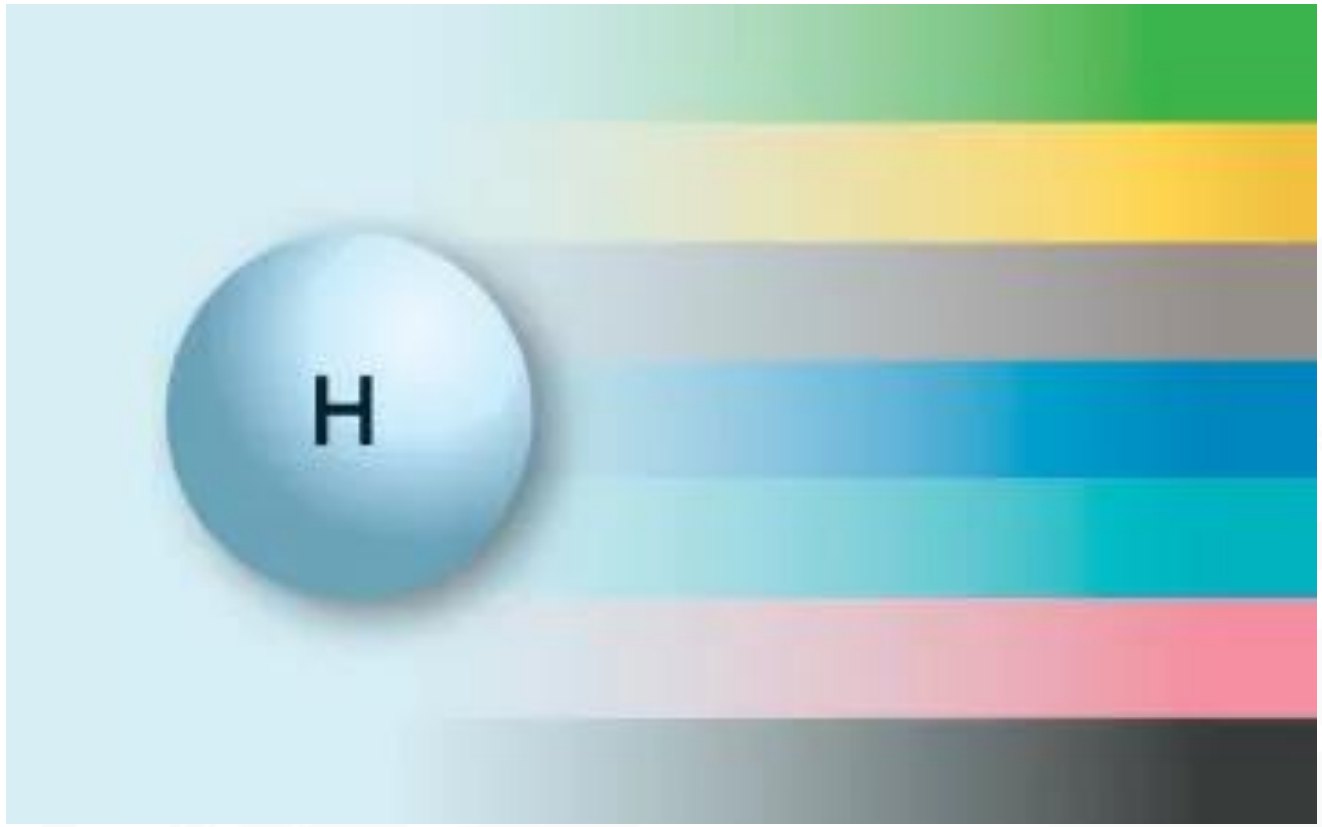
How much hydrogen?

- PNWH2 Hub will potentially produce 400 metric tons of H2 per day
  (146,000 tons per year)

- Used for a variety of applications to replace diesel, aviation fuel, natural gas, and gasoline

- In diesel-energy-equivalent terms, this could replace 400,000 gallons of diesel each day

Hydrogen comes in many colors



If you want "Clean" H2, <u>Follow the Carbon!</u>

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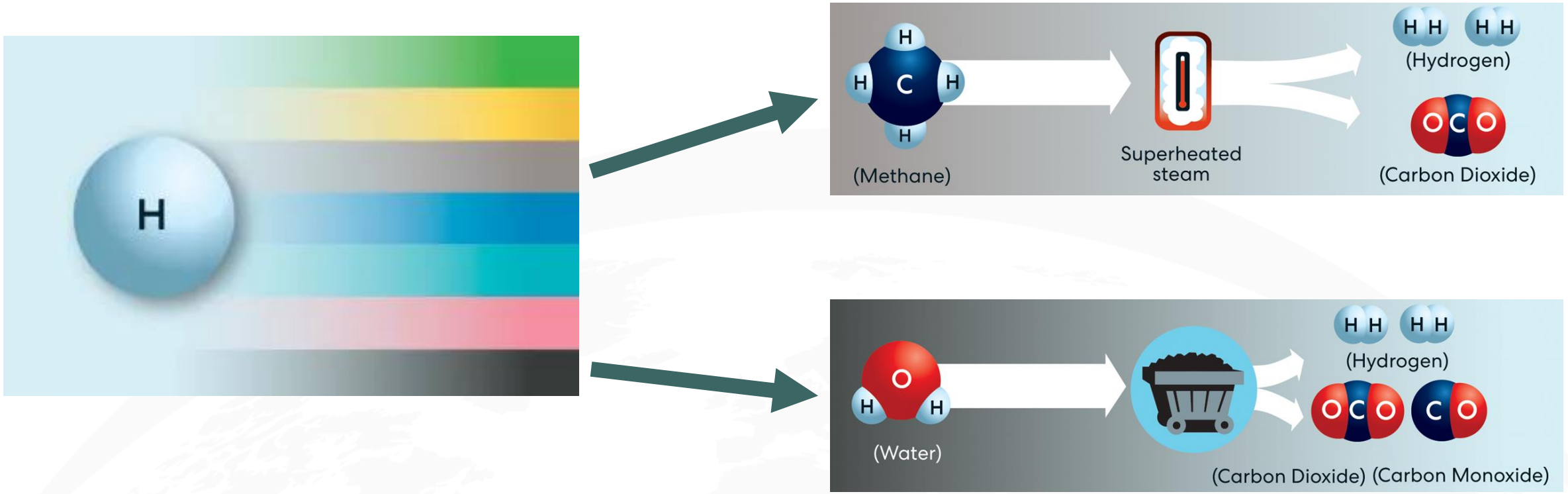

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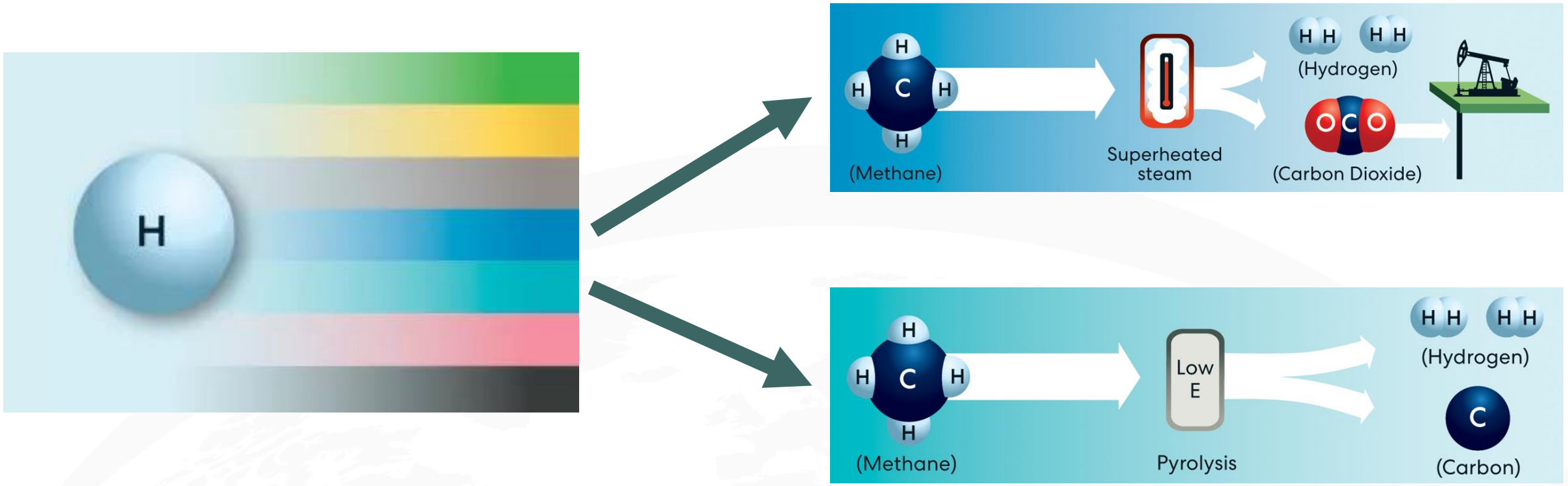

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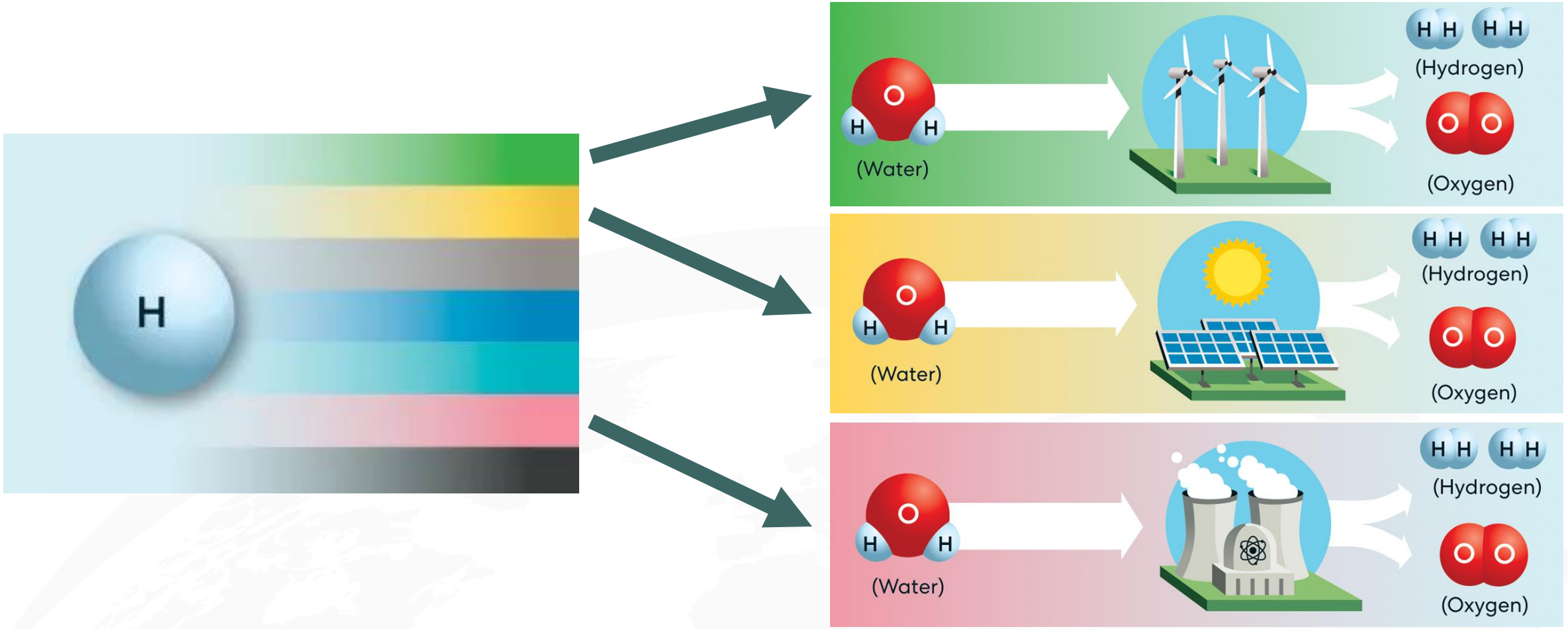

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CONSORTIUM FOR HYDROGEN AND RENEWABLY GENERATED E-FUELS

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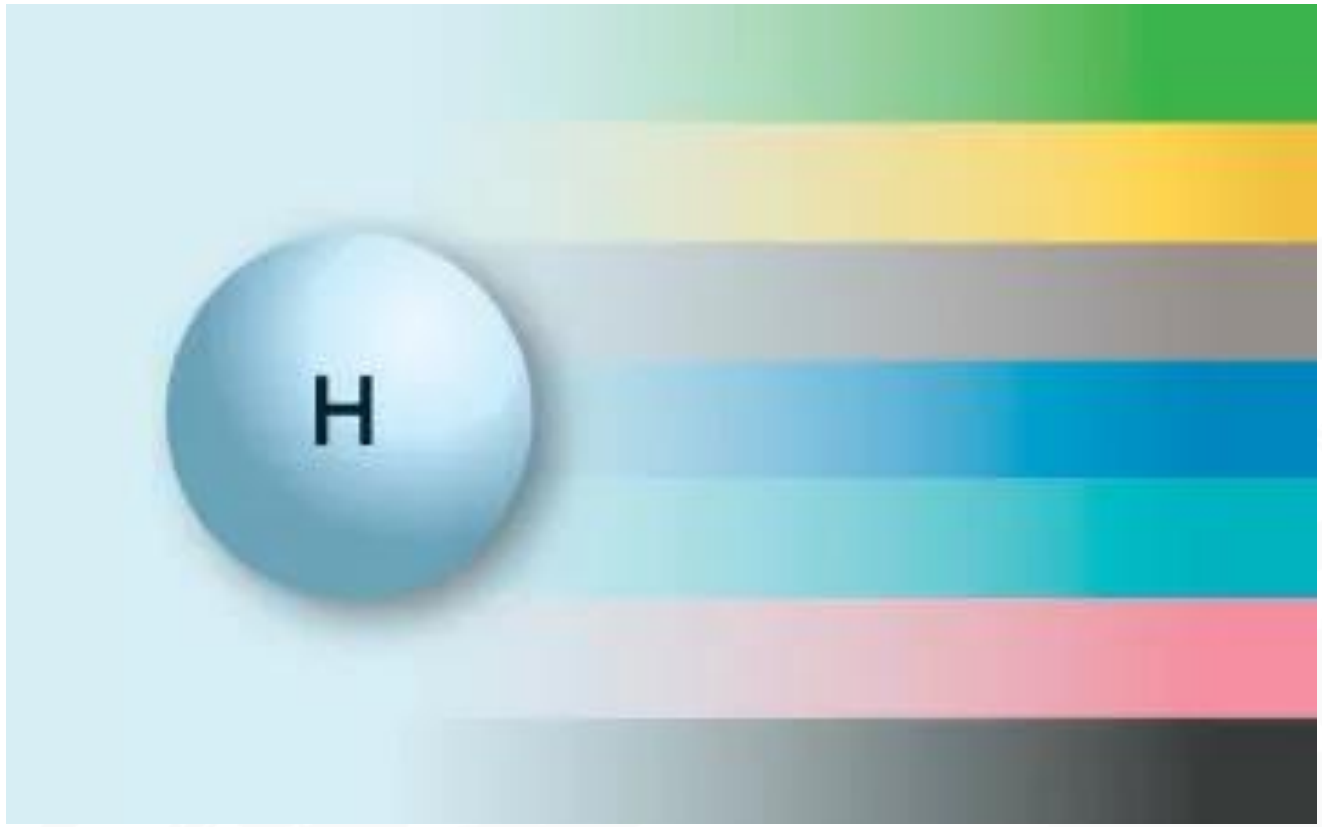
Hydrogen comes in many colors



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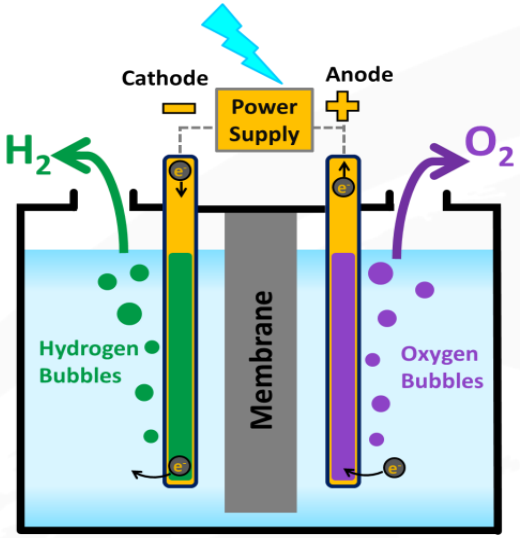
Electrolyzers and Fuel Cells 101

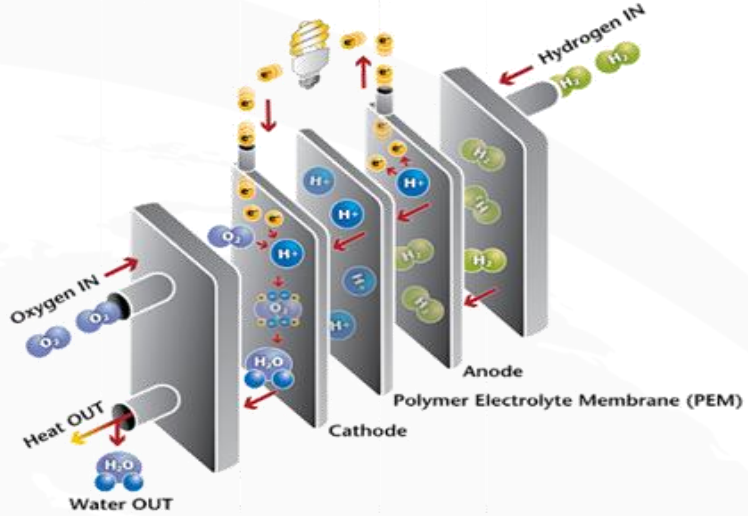
Electrolyzers: Make Hydrogen

- Electricity and Water IN
- Hydrogen and Oxygen OUT
- Makes hydrogen using electricity



Fuel Cells: Can Use Hydrogen

- Hydrogen and Oxygen IN
- Electricity and Water OUT
- Makes electricity using hydrogen



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Hydrogen Safety

Challenges

- Hydrogen is not toxic, but it is a fuel, flammable and potentially explosive
- Hydrogen flame is invisible in daylight
- Unique challenge – hydrogen embrittles metal and tends to leak due to molecule size

Solutions

- Hydrogen is stored **outside**
- Hydrogen storage, transportation, and use require the selection of **appropriate materials, ventilation** and **leak detection systems** to ensure safety
- Workers handling hydrogen and first responders **will be trained** accordingly

National labs and companies worldwide are developing hydrogen safety standards, new materials, and leak-detecting solutions

H2 Value Chain

- PUBLIC UTILITIES
- PRIVATE UTILITIES
- RENEWABLE DEVELOPERS

- ELECTROLYSIS
- PYROLYSIS
- REFORMING

CONDITIONING
- COMRESSION
- LIQUEFACTION

CONVERSION TO H2 CARRIERS
- METHANOL
- AMMONIA
- SUSTAINABLE AVIATION FUELS
- LIQUID CARRIERS

- TRUCKS
- PIPELINES
- FUELING INFRASTRUCTURE
- LOGISTICS

- ON-ROAD TRANSPORTATION
- OFF-ROAD TRANSPORTATION
- BACKUP POWER
- INDUSTRIAL FEEDSTOCK

H2 CARRIERS END USE
- MARITIME
- AVIATION
- AGRICULTURE

- TECHNICAL & BUSINESS SERVICES
- EDUCATION
- GOVERNMENT
- INDUSTRY GROUPS

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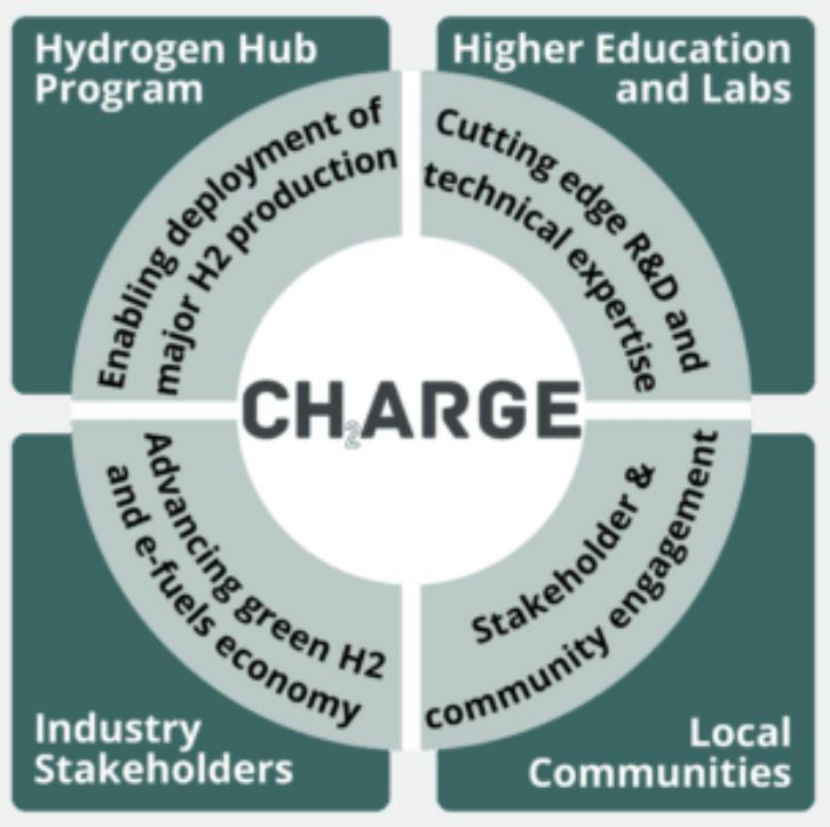
CHARGE and the H2 Value Chain



Upstream

Renewable Energy Production — View Companies →

Midstream

H2 Production — View Companies →

H2 Conversion — View Companies →

Storage & Transportation — View Companies →

Downstream

H2 End Use — View Companies →

H2 Carrier End Use — View Companies →

Value Adding Services

Technical & Business Services — View Companies →

Education & Community Organizations — View Companies →

Explore companies in the H2 value chain with our interactive web tool:

www.jcdream.org/charge/directory

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PNWH2 Hub Overview

About the Pacific Northwest Hydrogen Hub

The Pacific Northwest Hydrogen Association is a multi-state nonprofit coalition of public and private partners bringing clean hydrogen power solutions to market in the coming years to help meet the nation's clean energy goals.

Vision:

- Create a clean hydrogen ecosystem across the Pacific Northwest **in partnership with labor, Tribal Nations, and public and private sectors** to improve the lives and futures of people throughout the region.
- Accelerate deployment of hydrogen infrastructure to **attract greater investment and promote high-quality jobs** with a **strong focus on social equity and environmental justice** as guiding principles.
- Establish the Pacific Northwest as a **national benchmark for successful low-carbon intensity and economically viable hydrogen production** to decarbonize hard-to-abate industries.

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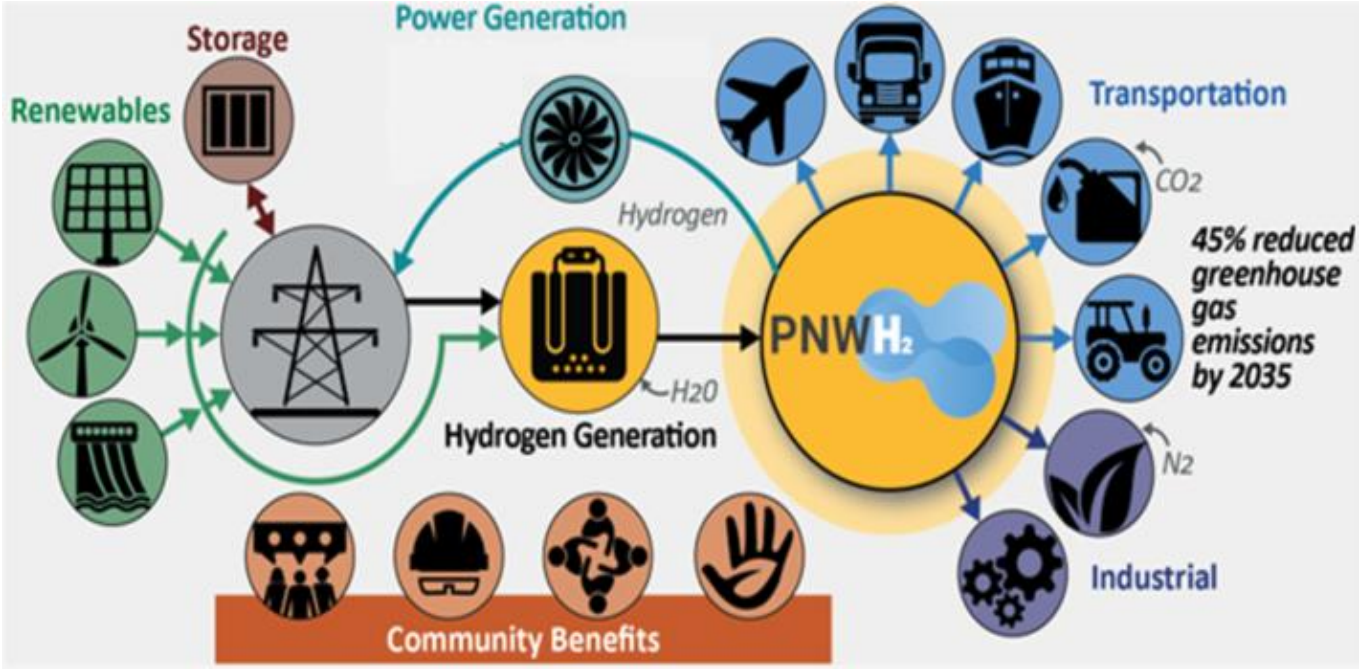
Pacific Northwest Hydrogen Hub

Decarbonizing hard to abate sectors using clean hydrogen in the PNW

- Energy Equity and Environmental Justice Plan
- Workforce Development and Jobs Plan
- Tribal Nation Engagement
- Community Engagement
- Use of Mapping and Geospatial Tools & Data to Advance Equity
- Domestic Clean Technology Manufacturing
- Energy Emergency Management & Planning
- Industry Cluster Development



Clean hydrogen will be made and used in the PNW

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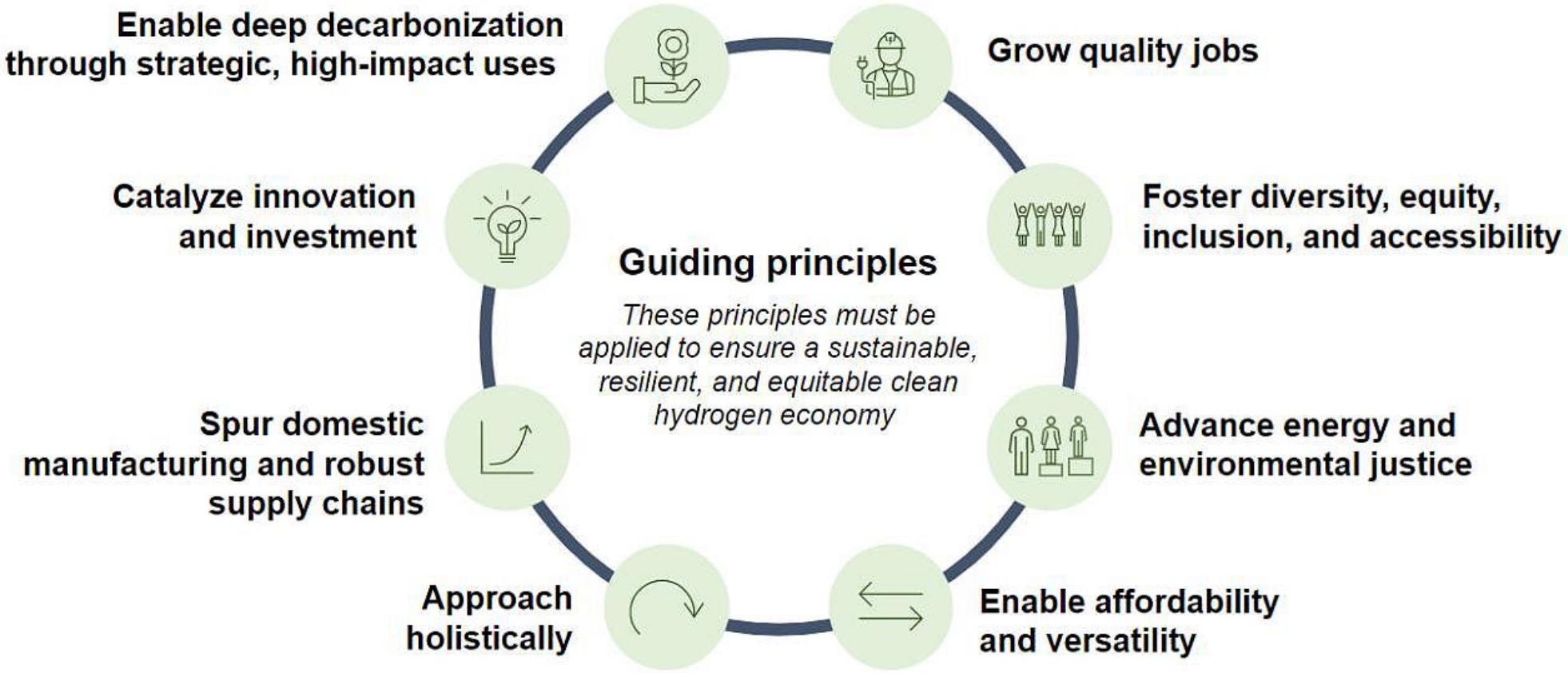
Applying National Guiding Principles



This graphic was originally created and published by the U.S. Department of Energy.

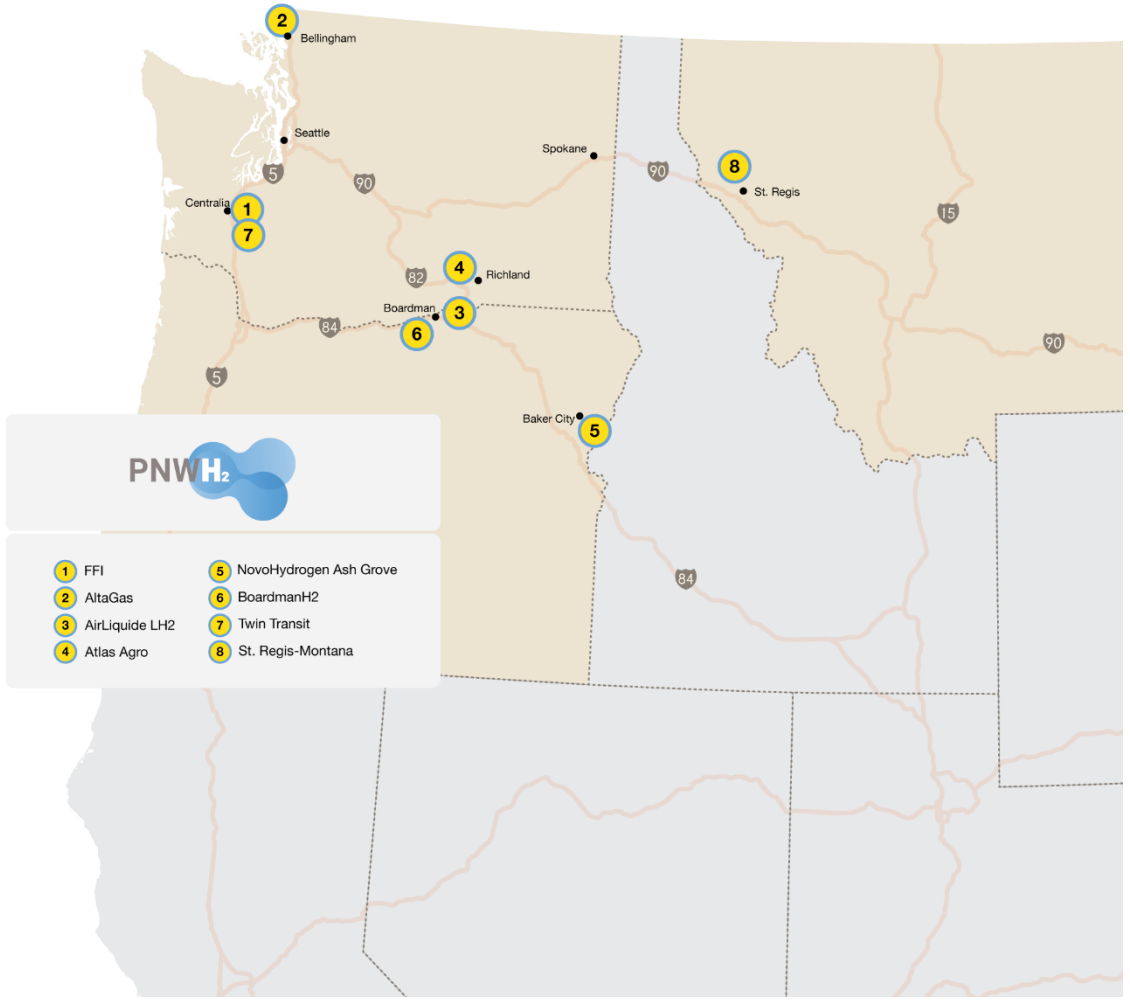
Potential Project Locations

1. **USA Fortescue Future Industries; First Mode; Puget Sound Energy; Amazon; Centralia College**
   - H2 for clean energy and heavy-duty transportation
   - H2 training and workforce development facilities

2. **ALA Renewable Energy LLC**
   - H2 for heavy-duty transportation, petrochemical production, and power generation

3. **Air Liquide; NW Seaport Alliance; PACCAR**
   - Liquified H2 for heavy duty transportation

4. **Atlas Agro**
   - H2 for calcium ammonium nitrate fertilizer production



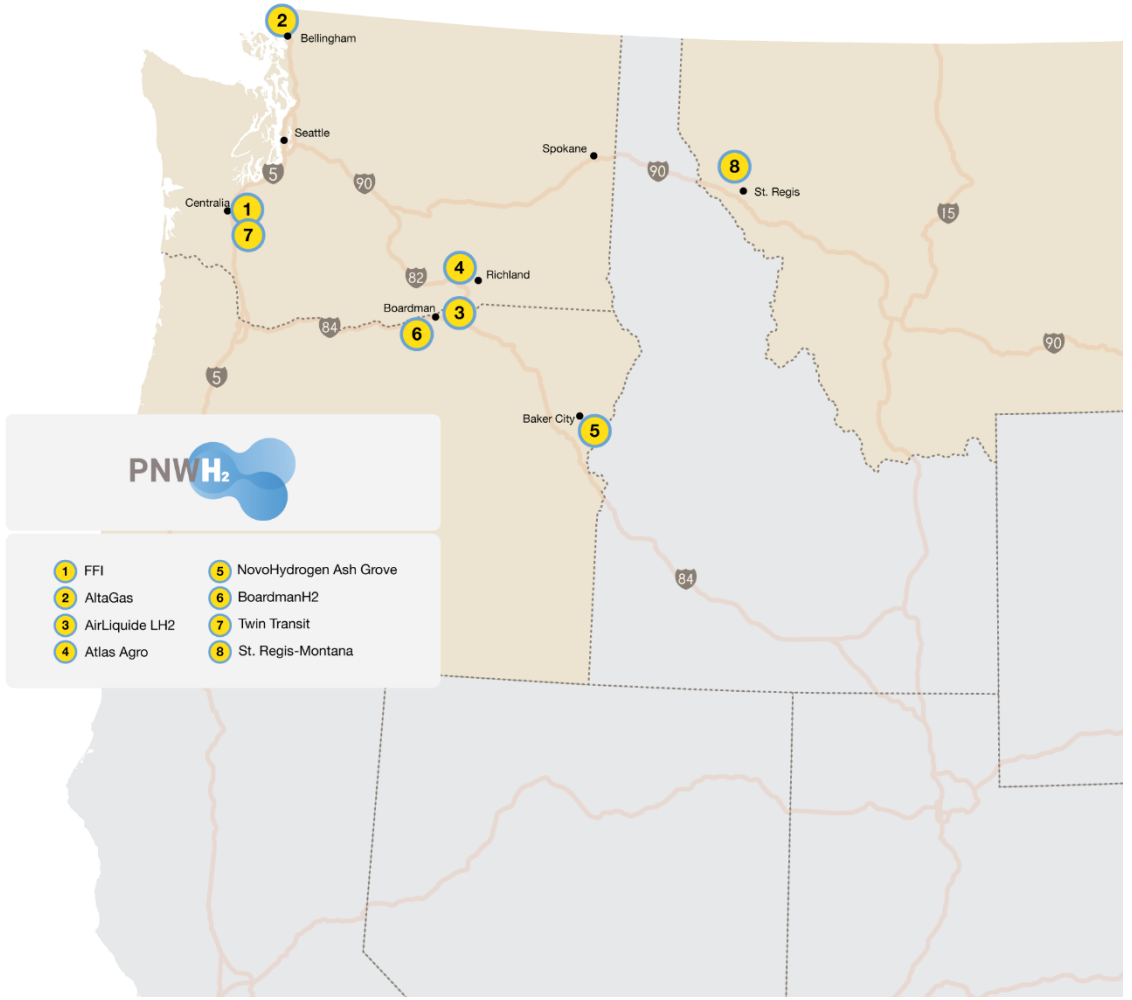
Potential Project Locations

5. **NovoHydrogen Holdings LLC**
   - H2 for heavy duty transportation

6. **Mitsubishi Power Americas Inc.; Williams Field Services Group, LLC; Portland General Electric Company**
   - H2 for clean electricity generation
   - Providing H2 to other parts of Hub for heavy duty transportation

7. **Twin Transit**
   - H2 for public transit

8. **St. Regis Solar LLC**
   - H2 for heavy-duty transportation



Meaningful Community Benefits

- **212 stakeholder groups**, including **28 labor unions** and **15 Tribal nations**, identified during initial stakeholder analysis across the region
- **100+** community expressions of support
- Regional coalition of apprenticeship programs, colleges and universities to develop and sustain an enduring hydrogen workforce (**10,000+ jobs**)
- Additional **Justice40 benefits** include:
  - Reduced environmental/health disparities
  - Displaced worker training
  - Economic impact - tax incentives to support deferred acquisition costs, reduced energy costs, etc.

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Tribal Engagement & Partnerships

- DOE oversees government-to-government Tribal consultation
  - Brian Ó Donnchadha, Tribal Liaison, Office of Clean Energy Demonstrations – U.S. Department of Energy. Email: Brian.Odonnachadha@hq.doe.gov
- Commerce, State Tribal Liaisons, and PNWH2 Hub team create space for ongoing feedback and engagement through:
  - Dear “Tribal Leaders” letters, presentations, listening sessions, website communications, and individual or community meetings based on request.
- Tribes represented on PNWH2 Board (Cowlitz Indian Tribe and Chehalis Tribe)
- Tribal leaders and Tribal-led organizations serving on Planning and Advisory Committees at the Hub level.
- PNWH2 Community Benefits team remain committed to prioritizing and respecting Tribal sovereignty in the development of the HUBs.

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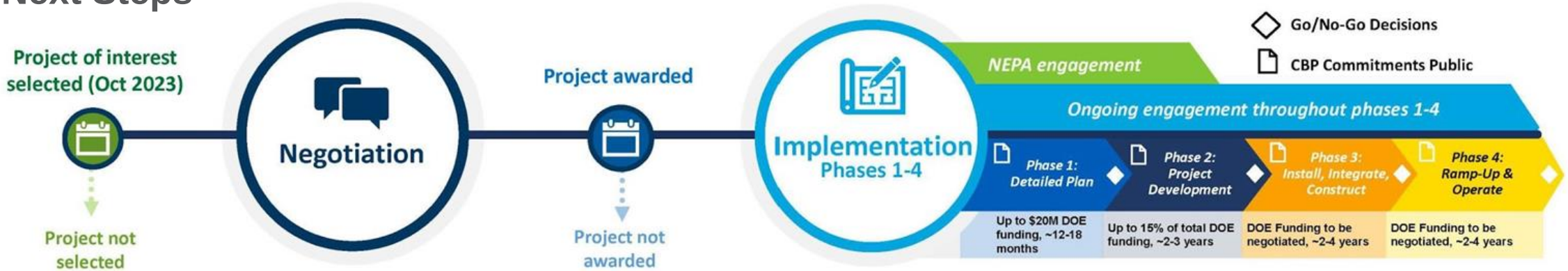
Next Steps



How to engage during negotiation:

- Visit **Hub webpages**
- Attend **Hub-specific virtual briefing**
- **Email the H2Hub**
- **Email DOE** at engage_H2Hubs@hq.doe.gov
- **Attend local engagements** (details TBD)
- Read **Initial CBP summary**

DOE will use feedback from engagements to inform the negotiation process

How to engage during Phases 1-4:

- **Attend facilitated sessions** with DOE and project performers to raise priorities and concerns
- **Reach out to H2Hub teams** any time
- **Participate in H2Hub engagements**; workforce or community agreements; or advisory boards H2Hubs may have as part of their CBP activities
- **Reach out to DOE** if any questions or concerns are not being adequately addressed **engage_H2Hubs@hq.doe.gov**
- Each phase has a go/no-go where DOE will assess project performance including CBP – **your feedback matters!**

How NEPA will work:

- **DOE will comply** with the National Environmental Policy Act (NEPA) and related requirements for the Hubs.
- Feedback via early engagement will **inform initial scope of NEPA reviews**.
- **Stakeholder engagement** throughout the NEPA process, including at scoping and draft NEPA document review stages.

This graphic was originally created and published by the U.S. Department of Energy's Office of Clean Energy Demonstrations.

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How tribal nations and citizens can stay engaged

Stay connected & informed

Visit https://pnwh2.com/tribal-relations

Providing input on hub projects near your community

- Reach out to us at https://pnwh2.com under "Contact Us"
- Tribal and community benefits planning
- National Environmental Policy Act and state permitting

Exploring DOE clean hydrogen grants

- Visit https://www.hydrogen.energy.gov/library/funding-opportunities
- Visit https://www.energy.gov/indianenergy/ongoing-funding-opportunities

Exploring opportunities for your company, organization, or tribal enterprise to join the clean hydrogen value chain

Reach out to CHARGE at https://jcdream.org/charge/charge-membership/

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