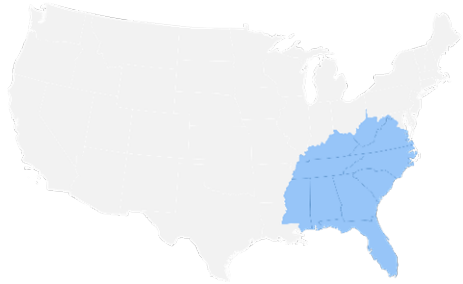


# The Latest on Hydrogen in the Southeast and How to Get Involved



**Dr. Scott McWhorter**

Board Chairman, SHEA

President & CEO, Joule Consulting



## Southeast Hydrogen Energy Alliance

Convening stakeholders to facilitate the commercialization of hydrogen energy technologies in the Southeast.

[www.seh2.org](http://www.seh2.org)

# What is the purpose of SHEA?

SHEA's mission is to convene, educate and engage stakeholders and communities, providing outreach, education and networking opportunities to facilitate the adoption of hydrogen technologies throughout the southeast to achieve a zero carbon society

01

To facilitate partnerships with regional universities, industry and research institutions on research and development grants related to H2 technologies



02

Identify and facilitate training for the next generation of hydrogen entrepreneurs and workforce participants as well as to engage and inform the public



03

Nonprofit and government organizational collaboration, i.e., networking with other regional energy organizations to inform, educate and provide outreach



04

Recruit new membership from large and small-medium companies and communities within the SE and engage them in regional hydrogen projects and partnerships



05

Provide representation of the regional hydrogen activities to DOE and other Federal agencies



# SHEA Member Benefits



## Outreach & Partnerships

### Stakeholders and Partners Management:

- Identify potential members and manage engagement based on SHEA mission and vision
- Develop marketing and development materials to grow SHEA's and members/partners footprint
- Quarterly Virtual Funding Opportunity Updates

### State legislature Engagement:

- Energy and environmental policy development
- Energy-related budget proposals
- Identification and engagement of "champions" to support hydrogen-conductive efforts in the SHEA region



## Knowledge Development

### Workforce Development:

- Promotion of hydrogen-related trade and professional education at local and state level
- Scholarship and internship programs

### Technoeconomic Knowledge:

- Monitor and project regional supply chain
- Infrastructure requirements and opportunities
- Supply/Demand Analysis opportunities
- Policy & Regulation Development
- Safety Training (H2 101's)
- Regional Roadmapping
- EJ and DEIA Impact mapping

### WFD&ED Council:

- Industry-Academic Council on H2 Workforce and Education



## Networking

### H2 Events:

- Roundtables and discussion panels
- H2 Summit
- Technology, startup, company spotlights and networking
- Monthly Webinars
- State-focused events

### Social Media:

- SHEA web page for news, technology, and member highlights;
- LinkedIn, Twitter for daily/weekly blasts and highlights

### Meetings:

Annual Regionally Rotating Member Meeting



## H2 Advocacy

### Educating Communities, Government, and Stakeholders:

- Advocate for technology, projects, training, pollution, workforce development, economic development with local/state/federal stakeholder
- Webinars to raise awareness of potential of hydrogen development needs and opportunities

# SHEA Membership Information

Developing a H2 Ecosystem that can grow the supply with demand takes an all hands onboard effort. Membership in SHEA ensures that you have a voice in the success of H2 deployment in the Southeast. Please consider joining SHEA and getting involved.

Membership Type	Price	Board Member	Technical Working Groups	Access to Analysis and Workshops	Networking Events
Sole Practitioner	\$100	By Invitation Only	By Invitation Only	By Invitation Only	By Invitation Only
Small Company (<50 employees)	\$750	By Invitation Only	Full Access	Full Access	Full Access
Academic, Government or Non-Profit	\$2500	By Invitation Only	Full Access	Full Access	Full Access
Medium Industry (50-250 employees)	\$5000	By Invitation Only	Full Access	Full Access	Full Access
Large Industry (>250 employees)	\$7500	By Invitation Only	Full Access	Full Access	Full Access

# About the Southeast Hydrogen Energy Alliance

**2006** ● Organized as the South Carolina Hydrogen and Fuel Cell Alliance

**2020** ● Reconstituted as Southeast Hydrogen Energy Alliance

**2021** ● Commissioned SE Green H2 Supply Chain Study

**2022** ● Southeast Clean H2 Hub Collaboration

● **January 27 Orientation Conference**

240+ registered

● **February 2, 3, 4, 7 and 8**

**Working Groups 1 – 5 Workshops**

Average 45/WG registered

- 200+ organizations,
- 400+ professionals,
- 5 WGs, 12 WG Task Forces

● **WGs Met as Required**

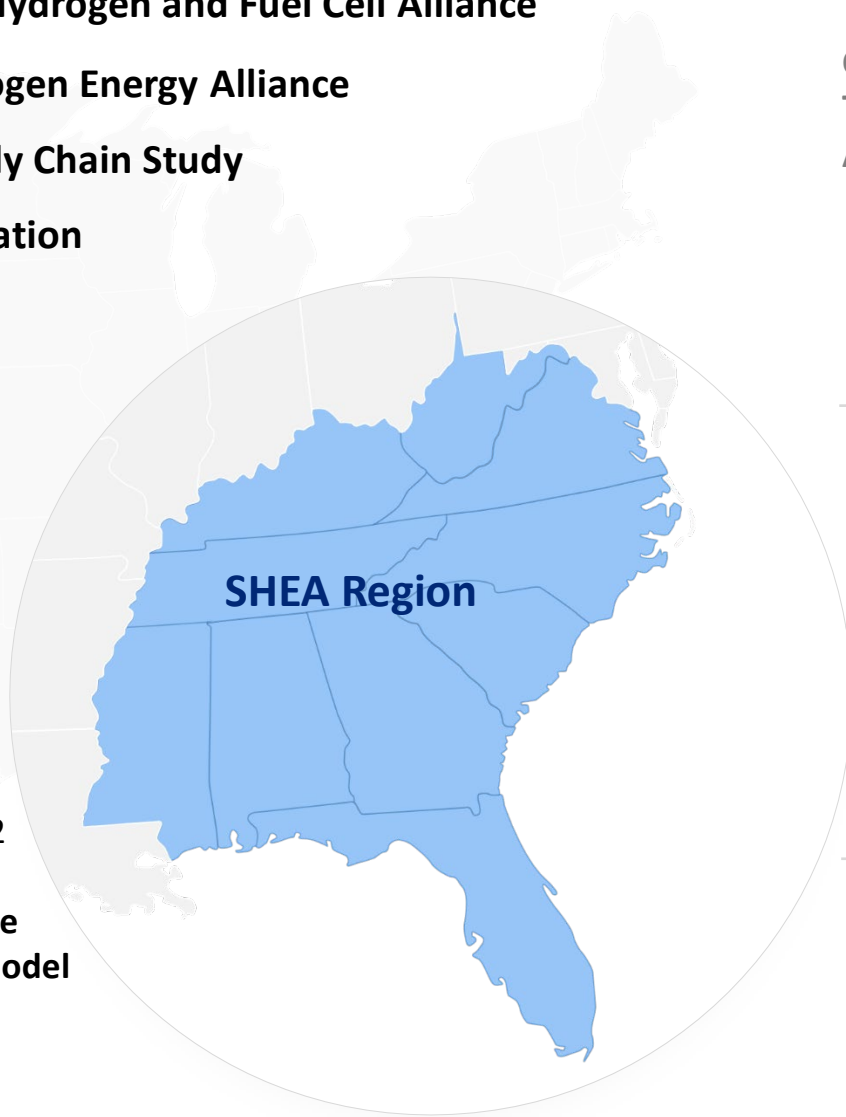
- 31 Multiple times total

● **March 17 Consolidation Conference**

- Organizing SE H2 plan and Clean H2 RFI Response

● **March 21 USDOE Clean H2 RFI Response**

● **December 2022 Issuing Membership Model**



## Board of Directors

Chairman / Consultant: Scott McWhorter

Treasurer: Ted Motyka

Advisor: David Doctor (Ret)



Sarah Adair



Geovanni Castano



Darrell Scott



Thomas Koeppel



Shawn Rossignol



John Ledbetter



Mark Johnson



Kevin Huang

# SHEA – Understanding the SE

## The Basis:

- **Identifying and Connecting the Southeast U.S. Green Hydrogen Energy Value Chain.** This study, which will be released in March of 2023, reviewed the green hydrogen supply chain in AL, FL, GA, NC, SC, TN and VA.
- **Energy Futures Initiative (EFI) Workshop on the Potential for Clean Hydrogen in the Carolinas.** This workshop, held October 28-29, 2021, focused on the potential for a green hydrogen hub in the Carolinas and surrounding region.
- **Creating a Southeast Hydrogen Energy Economy – Regional H2 Hub Plan.** Building on the green supply chain analysis and EFI workshop discussion, SHEA convened >400 individual stakeholders from 9 states for 31 workshops between January 27 and March 17 to initiate the process to define the vision for a regional clean hydrogen hub.



# SHEA – H2 Hub Workshop Working Groups and Champions

**Working Group 1: Creating the Community, NGO, Policy & Government Working Group – CO-CHAMPIONS:** Sarah Adair (Duke Energy), Comas Haynes (GTRI), Sarah Degnan (Duke Energy)

**Working Group 2: Creating The Production, Delivery and Storage Working Group – CO-CHAMPIONS:** Sarah Adair (Duke Energy), Thomas Koeppe (Siemens Energy), Dr. James Fenton (University of Central Florida)

**Working Group 3: Creating the Logistics Technology Working Group – CO-CHAMPIONS:** John Ledbetter (Summit Works), Dr. Mark Johnson (Clemson University), Sameer Parvathikar (RTI International), David Dayton (RTI International)

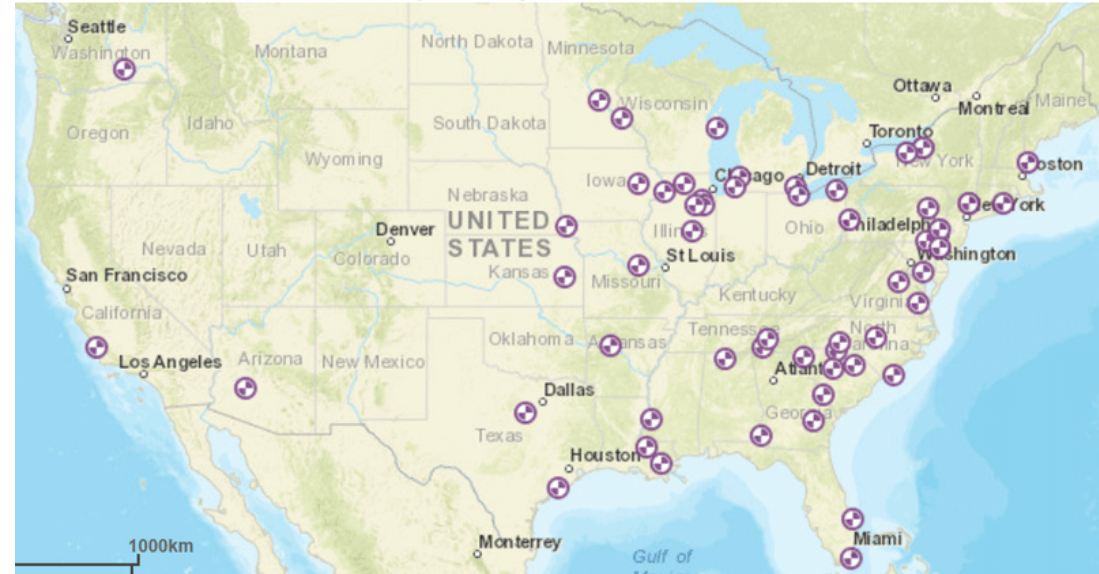
**Working Group 4: Creating the Consuming Technology Working Group – CO-CHAMPIONS:** Sarah Adair (Duke Energy), Thomas Koeppe (Siemens Energy), Peter Hoeflich (Duke Energy), and Dr. James Fenton (University of Central Florida)

**Working Group 5: Creating the Safety, Codes and Standards Working Group – CHAMPION:** Will James, (Savannah River National Laboratory)

# Unique Characteristics of the Southeast:

- Proven Renewables - solar, hydropower, growing wind potential
- Solar capacity in the SE in 2020 was 12,696 MW, and is expected to more than double to 27,500 MW by the end of 2024
- Tremendous nuclear capacity – 269 Million MWhrs, 6 of the top 10 nuclear generators are in the SHEA region
  - Resulting in the Nation's lowest energy prices
- 3.96B GDP (20+% of U.S.)
- Approximately 85M population (1/4 of the U.S.)

Locations of U.S. nuclear power plants



Source: U.S. Energy Information Administration, U.S. Energy Mapping System, April 2020



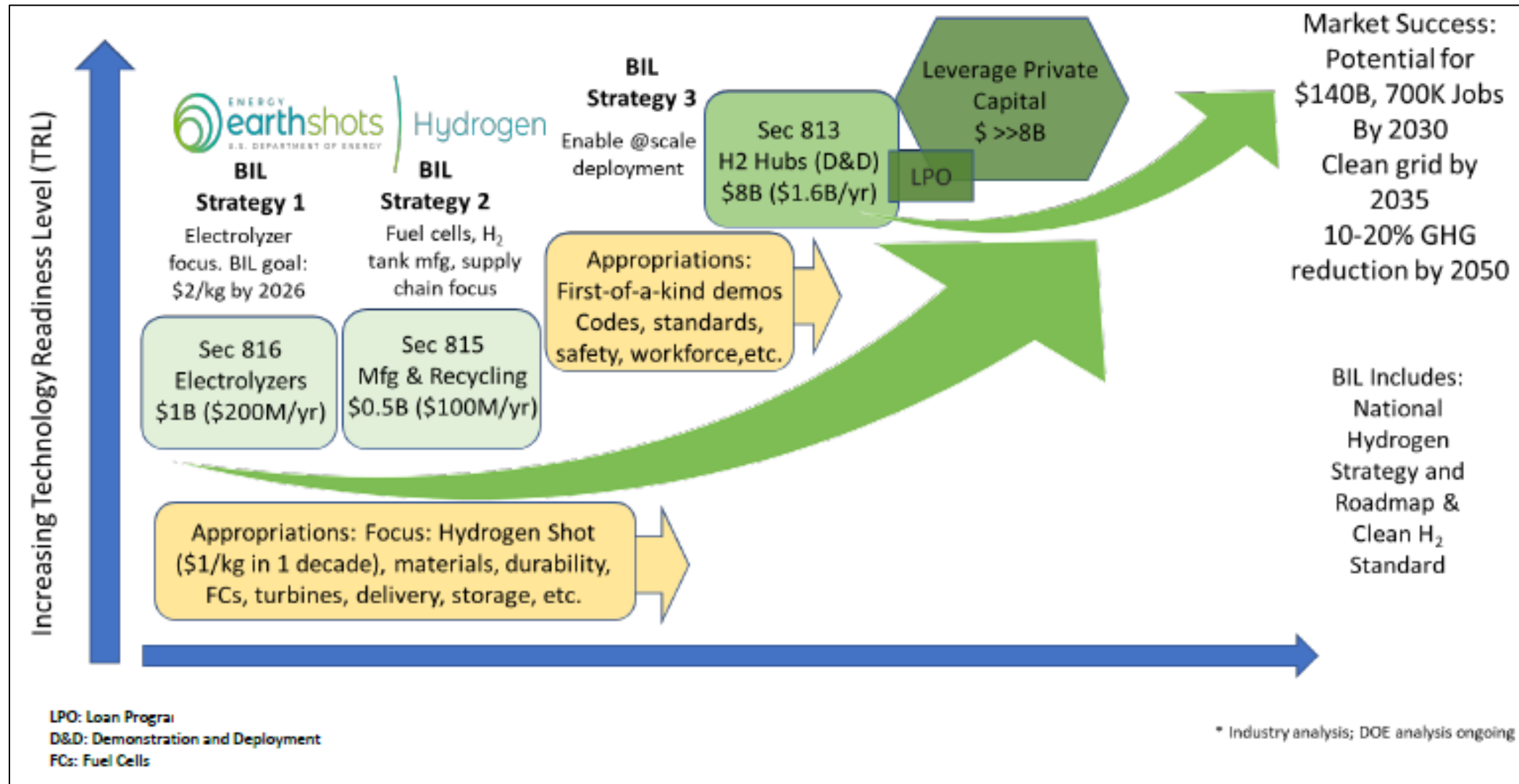


# Unique Characteristics of the Southeast:

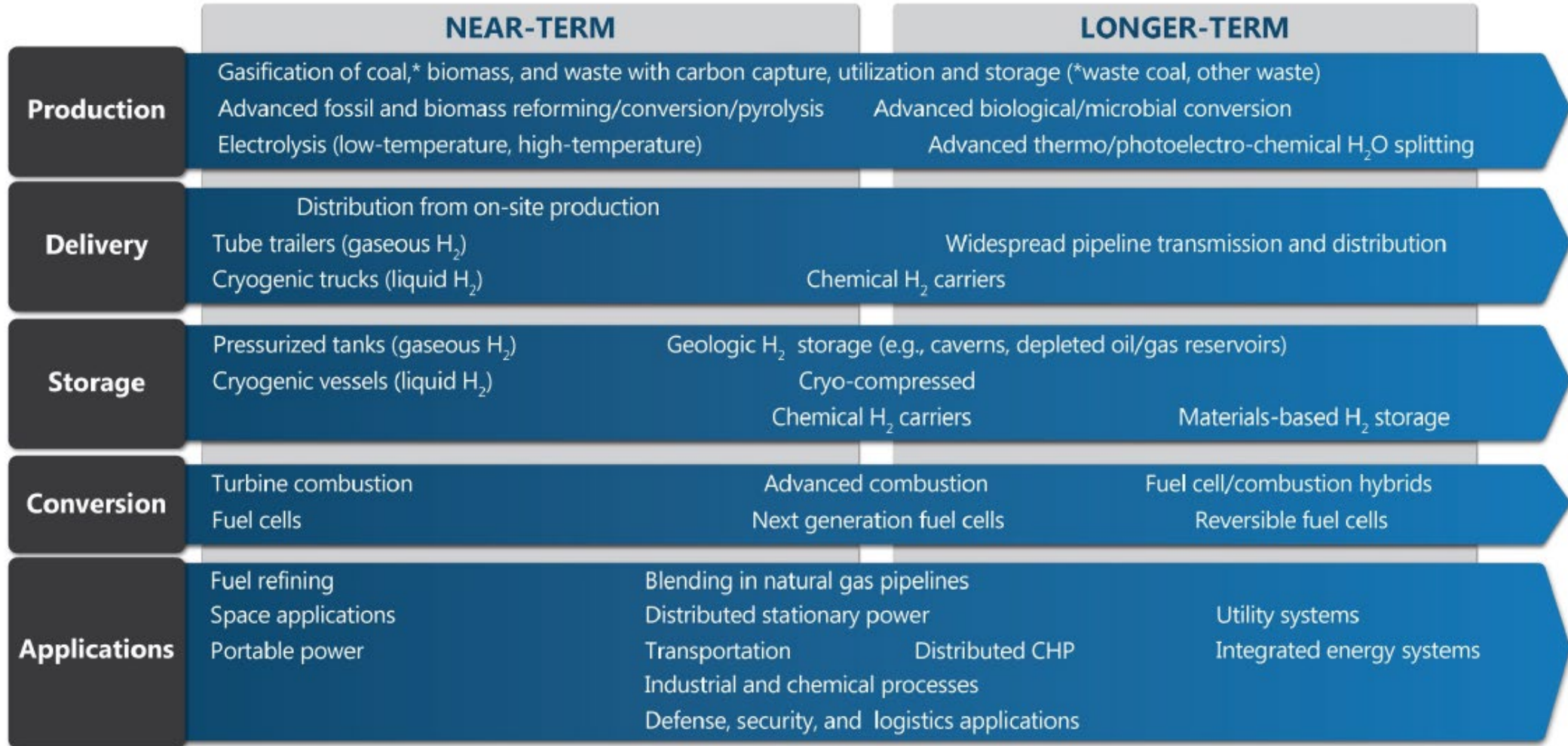
- Unique natural gas and fossil pipelines (gateway to the NE)
- Major U.S. Ports, inland ports, largest rail system in the U.S., interstate corridors
- 5 of the U.S. Largest Utility providers (Dominion, Duke Energy, NextEra, Southern Co, TVA)
- 4 DOE National Laboratories (JLab, NETL, ORNL, SRNL) plus 4 major NASA sites and over 85 military sites (22 major installations)
- 16 of the Top U.S. Colleges of Engineering in the SE
- Largest concentration of HBCU's and MSI in the country



# DOE's Strategy to Implement BIL



# H2 Supply Chain



# Regional Hydrogen Hub –

## 1. At least Four Regional Hubs

- \$8B in Office of Clean Energy Demonstrations
- \$1.5B Hydrogen Electrolyzer Manufacturing and Recycling in HFTO

## 2. Hydrogen “Earthshot”

- \$1/kg H<sub>2</sub> (assuming electricity at \$20/MWh); Non-electric energy cost is \$0.20/kg-H<sub>2</sub> (at least an order of magnitude drop)

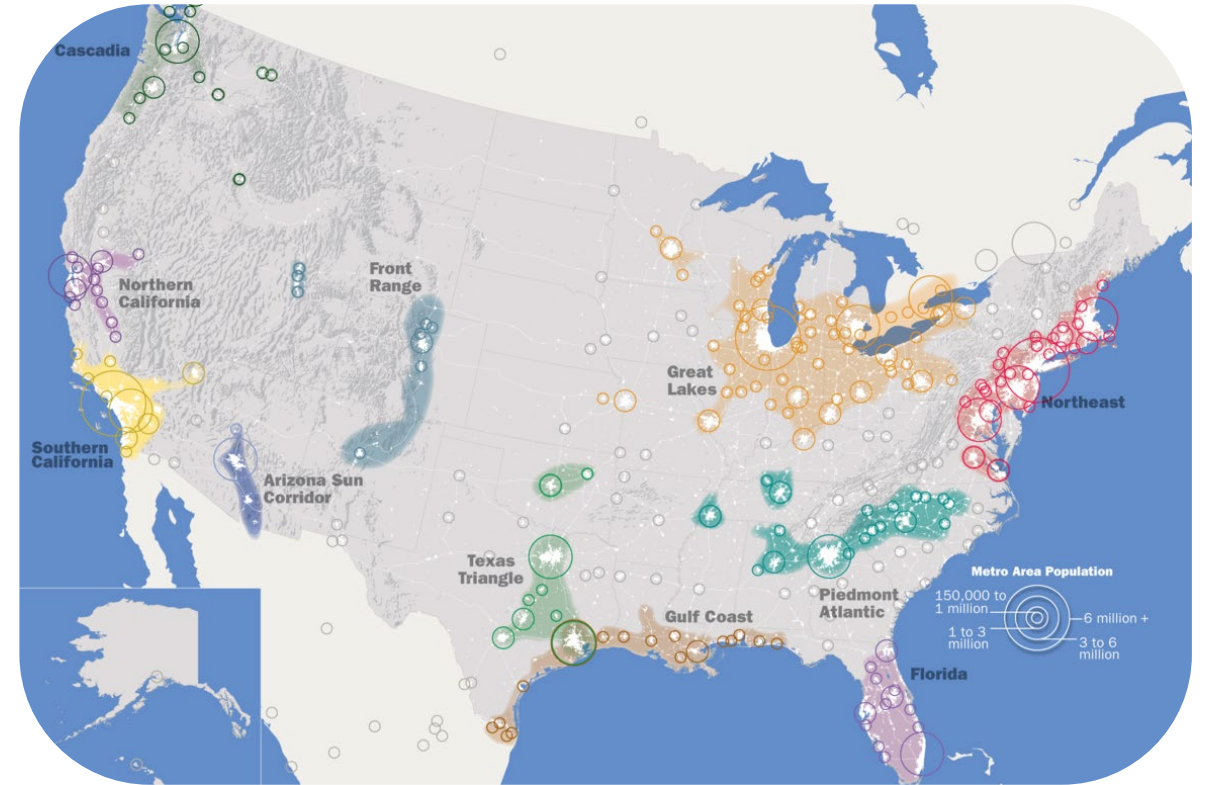
## 3. Development and Demonstration (at scale)

## 4. How to Compete

- Why this region? (Ideas and Themes being Proposed)
- Why Now? (Prioritization of Timeliness)
- Why Us? (Each Region must Make the Case)
- How does it address Diversity, Equity and Inclusion issues

## 5. Strong Competitors

- So. California (LA Basin area)
- Texas Gulf-Coast (Chemicals)
- NY (NYSERDA)
- Great Lakes (Ohio Valley including WV)



*A regional hydrogen hub is a network of hydrogen producers, potential or actual hydrogen consumers, and connective infrastructure located in close proximity.*

# Hub Criteria

## FEEDSTOCK DIVERSITY:

- at least 1 hub demonstrates the production of clean hydrogen from fossil fuels;
- at least 1 hub demonstrates the production of clean hydrogen from renewable energy;
- at least 1 hub demonstrates the production of clean hydrogen from nuclear energy

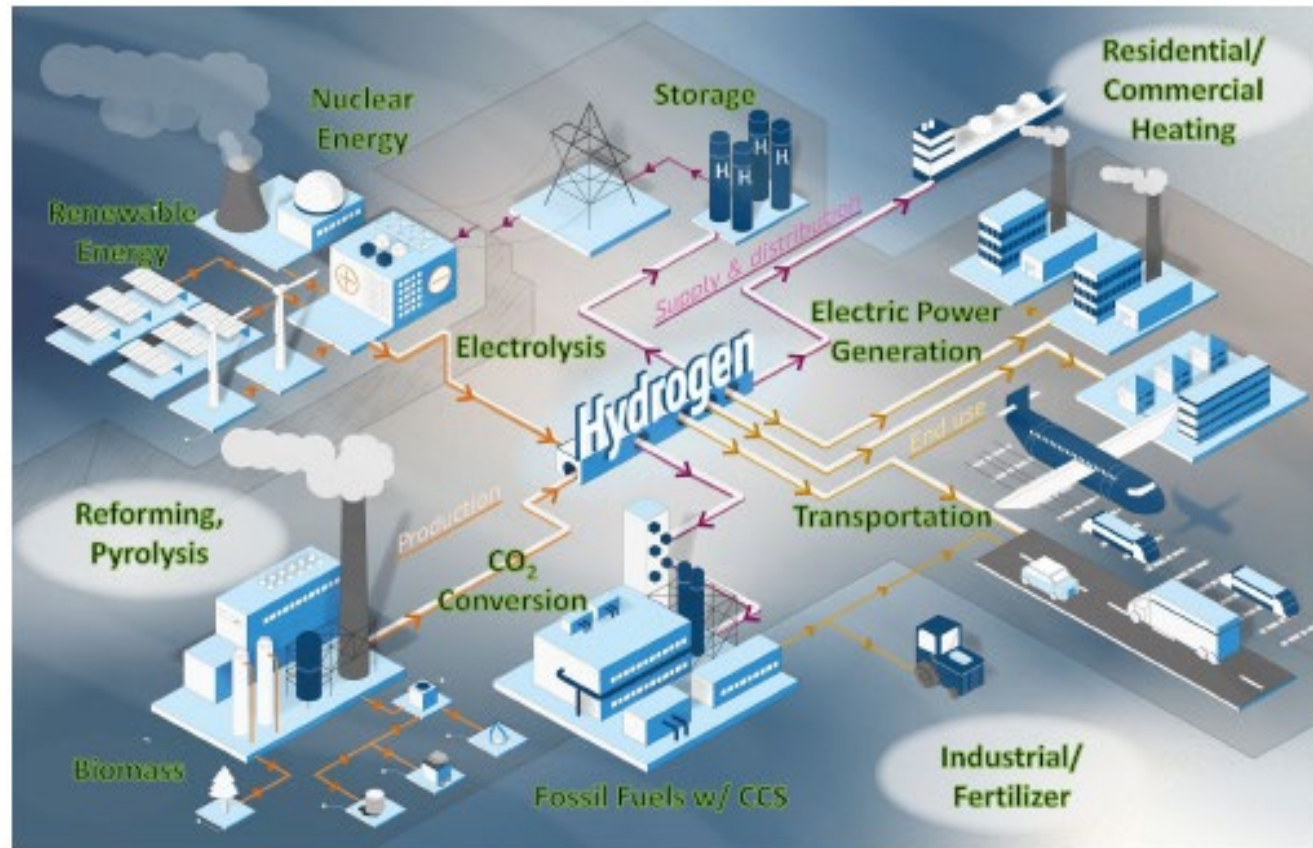
## END-USE DIVERSITY:

- at least 1 hub demonstrates electric power generation sector;
- at least 1 hub demonstrates clean hydrogen in the industrial sector;
- at least 1 hub demonstrates clean hydrogen in the residential and commercial heating sector;
- at least 1 hub demonstrates clean hydrogen in the transportation sector

GEOGRAPHIC DIVERSITY: in different regions of the United States; and use energy resources abundant in that region

HUBS IN NATURAL GAS-PRODUCING REGIONS: at least 2 hydrogen hubs in regions with the greatest natural gas resources.

# Hubs Enable Multiple Feedstocks and End-Uses with Positive Economic and Environmental Impacts



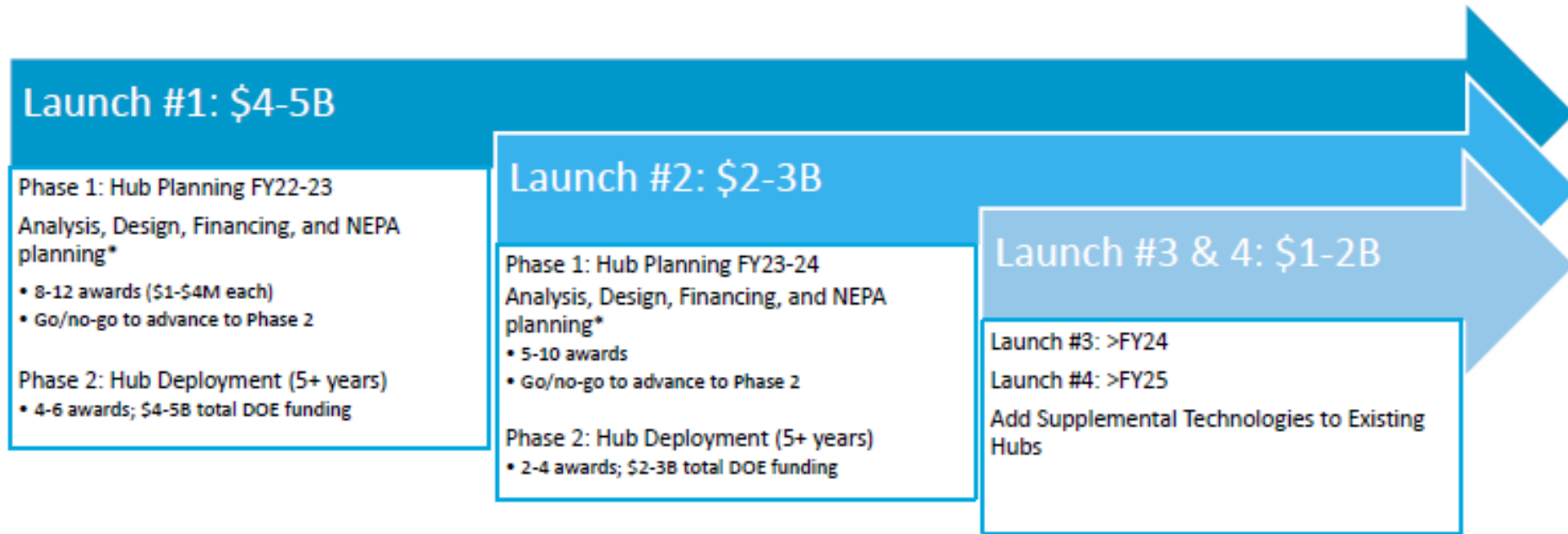
H<sub>2</sub> Ecosystem: Potential for different clean H<sub>2</sub> production methods, end uses, and necessary infrastructure all in close proximity

## Additional Key Items beyond H<sub>2</sub> Technology:

- Environmental Justice
- Community Engagement
- Job Creation
- Workforce Development
- Labor Standards
- Diversity, Equity, Inclusion
- Commercial Sustainability
- U.S. Manufacturing

# H2 Hubs Launch Strategy

Provides flexibility and maximizes potential for success, recognizing regions are at different stages of development, providing opportunity for EJ, and Disadvantaged Communities (DAC) engagement



Total Funding: \$8B (FY 2022 – FY 2026) in Office of Clean Energy Demonstrations

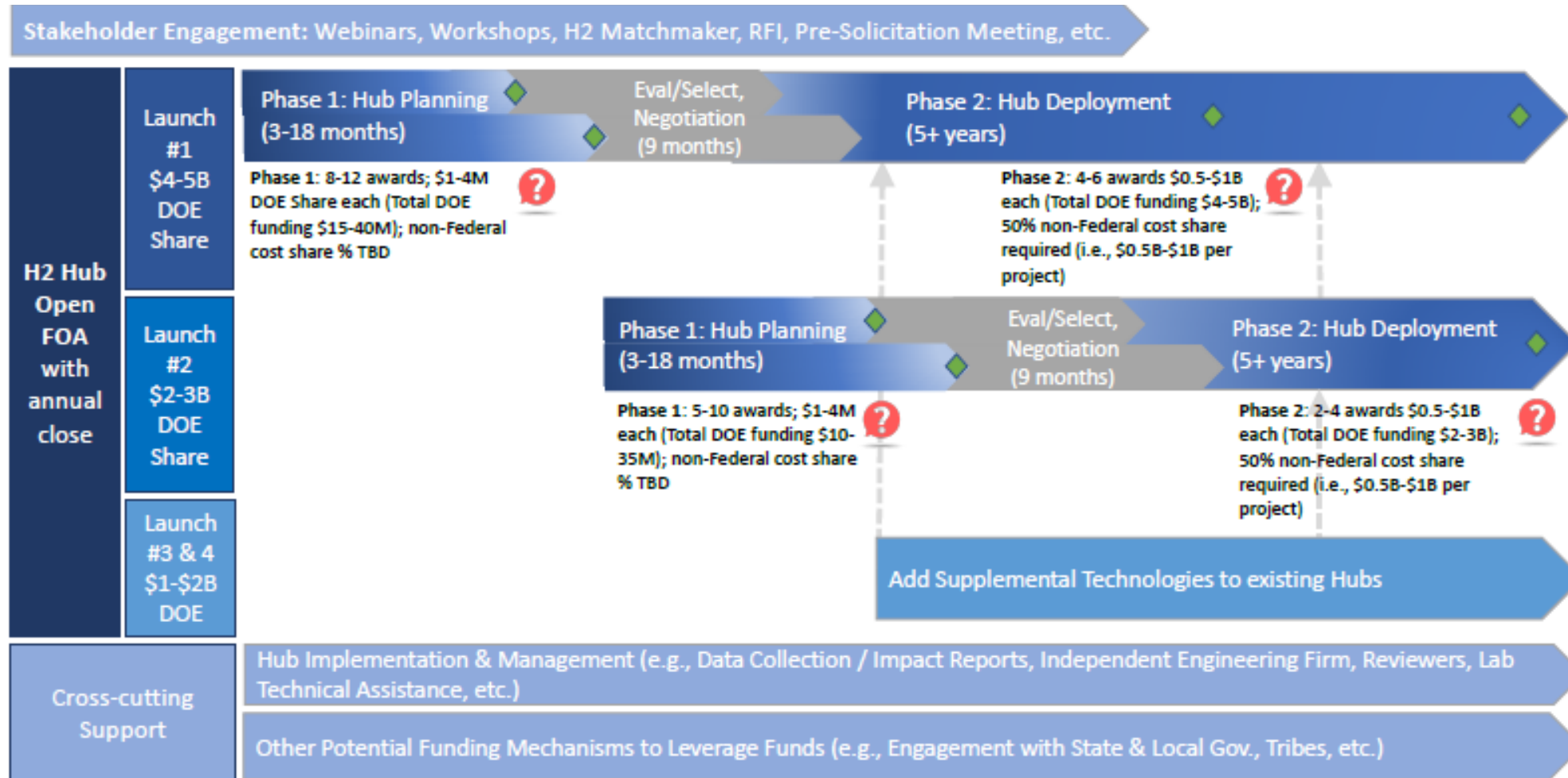
\*Hub design phase supports DEI by providing funds for pre-hub planning and analysis

NEPA: National Environmental Policy Act

# H2 Hubs Launch Strategy

**\*\*All funding amounts are approximate and subject to change**

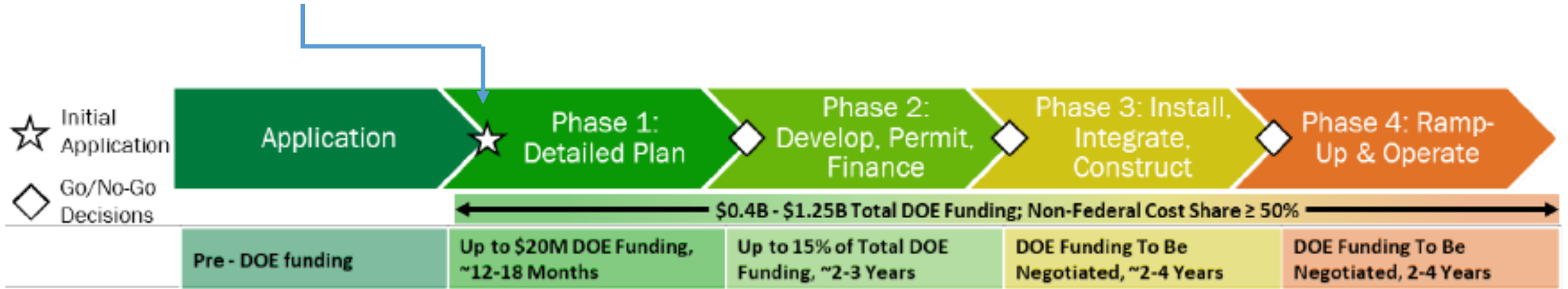
◆ "Go/No-Go" Decision Points





# H2 Hubs Launch Strategy

Full Proposals due in April 7, 2023



## H2 Hubs Phase 1 Activities

- **Business Development and Management:** Define Market, feedstock, and offtakers; LOCs; final site selections; financial model; updated BP, MP, FP
- **Engineering, Procurement, Construction & Operations:** 30% Engineering and Design; Performance Model; TRL uncertainty analysis; IPS; Class 3 Total Project Cost estimate
- **Safety, Security & Regulatory Requirements:** Initial Safety Plans; Cybersecurity Plans; Environmental Information Volume
- **Risk Analysis and Mitigation:** Risk Management Plan; Risk Register updates
- **Technical Data & Analysis:** Updated TEA; Updated LCA
- **Community Benefits Plan:** Implement Phase I Scope; Update CBP for future Phases from lessons learned through community engagements and negotiations

# Hub Teams in the SE:

Southeast Hydrogen Hub

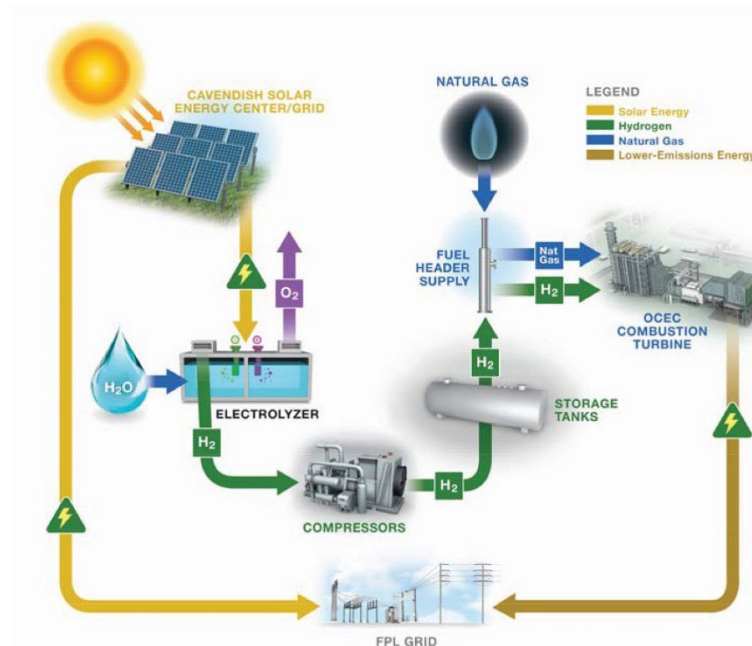


Battelle Prime with:

- Duke Energy
- Dominion Energy
- Southern Company
- TVA
- Louisville G&E and Kentucky Utilities Co.

Hydrogen Hubs in the SE will focus on:

- Heavy-duty transportation
- Major transportation corridors
- Major industrial ports
- Robust energy-intensive industrial base
- Power generation and resiliency (H<sub>2</sub> microgrids)



Cavendish Nextgen Hydrogen Hub

- NextEra/FPL
- Okeechobee Clean Energy Center H<sub>2</sub> Pilot Project

# H2 Hubs should provide positive impact on Disadvantaged Communities

## Disadvantaged communities

Current Thoughts:

- Census Tract Level
- 36 Indicators

**VULNERABILITY**

**FOSSIL DEPENDENCE**

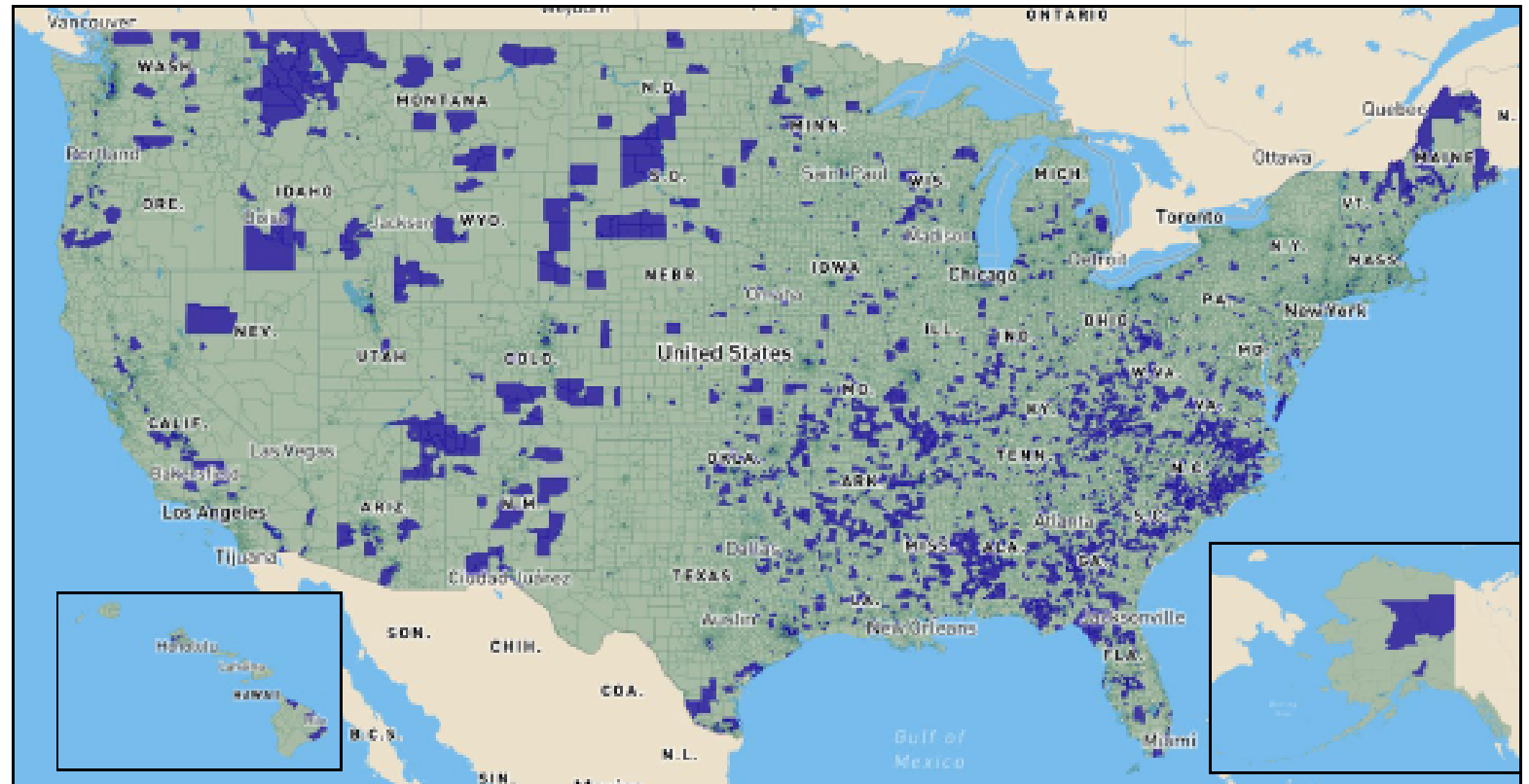
**ENERGY BURDEN**

**ENVIRONMENTAL HAZARDS**

Can also identify non-geographic DACs – groups that share a common characteristic

Distribution of census tracts identified as geographic DACs

■ DAC



# Clean H2 in the Inflation Reduction Bill:

**Defines “Clean Hydrogen”** as hydrogen that is produced through a process that results in a lifecycle greenhouse gas emissions rate of no greater than 4 kilograms of CO2 equivalent (“**CO2e**”) gas per kilogram of hydrogen.

- process-neutral
- Lifecycle gas emissions are determined by the Greenhouse gases, Regulated Emissions, and Energy use in Transportation model (known as the “**REET model**”)

## Clean H2 Tax Credits

- Production Tax credit (**PTC**) varies depending on the clean hydrogen’s lifecycle carbon intensity, with producers receiving up to \$3.00 per kg of hydrogen for the least carbon-intensive hydrogen down to \$0.60 per kg of hydrogen for the most carbon-intensive, with other qualifying factors
  - Cannot take the PTC where the carbon capture tax credit is already claimed
- An alternative “Investment Tax Credit” (the “**ITC**”) with respect to clean hydrogen production facilities, receiving an ITC of up to 30% depending on the carbon intensity of the production process
- Extends the 30% fuel cell ITC through 2024 before transitioning to the technology-neutral clean-energy investment tax credit in 2025
- A new 30% ITC for energy storage, including hydrogen storage, available through 2024
- 30% credit cap for the Alternative Fuel Refueling Property Credit up to \$100,000
- Provides from \$7,500 (class 1-3) to \$40,000 (class 4+) credits for fuel cell vehicles, including commercial vehicles

# Next Steps:

- Full proposals due April 7, 2023 addressing 4 project phases
- Work with SE States, Communities and entities to develop strategy and roadmap for H2 infrastructure deployment (*must be harmonized across the states*)
- Continue to evolve and integrate the concepts across the value chain through working groups and stakeholder conversations – SHEA will continue to convene
  - This will require many different parties coming together around the concepts (state entities, commercial providers, regulators, community leaders, universities and industry)
  - Must start to conceptualize end user (off-taker) agreements (identify and have those parties at the table)
- Engage the communities through workshops and local meetings
- Engage the states and develop support for the evolved concepts

