

**Connecticut Center for Advanced Technology,
Administrator of Connecticut Hydrogen Fuel Cell Coalition
Response to the Connecticut Green Bank
Re: Special Act No. 22-8 Public Request for Written Comments**

On May 23, 2022, the Senate and House of Representatives in General Assembly approved Special Act 22-8 establishing a Task Force to study hydrogen chaired by the Connecticut Green Bank. Special Act 22-8 mandates a study that must include the following items:

- (1) A review of regulations and legislation needed to guide the development and achievement of economies of scale for the hydrogen ecosystem in the state,

Comment: This review may include an assessment of regulations and legislation related to:

- **Fuel cell powered distributed energy to be owned and operated by public service companies for energy reliability including PA 21-162 and the CT Comprehensive Energy Strategy;**
- **Hydrogen blending in LDC natural gas systems for increased energy supply and fuel diversity related to Smart Grid and Grid Reliability proceedings including federal Safety Standards (49 CFR 191, 192, 193 and 199) (49 USC Chapter 601) and Regulations of Connecticut State Agencies (§16-11-1 et. seq.), and CGS (§16-263, et. seq.) ;**
- **Zero emission vehicles and hydrogen refueling including passenger vehicles supported by the CT DEEP CHEAPR program;**
- **Energy storage to support asynchronous renewable energy and to provide energy reliability including storage to be procured by CT pursuant to PA 22-55;**
- **Zero emission buses purchased by CT DOT potentially to be operated in ambient air quality non-attainment areas and distressed urban communities CGS Chapters 242, including CGS 13b-38dd;**
- **Zero emission materials handling and energy refueling infrastructure to be supported by CT DECD for clean energy operation including operation at warehouse facilities for economic development pursuant to CGS Chapter 588 including CGS 32-224;**
- **CT supported workforce development by CT DECD for clean energy job development pursuant to CGS Chapter 588 including CGS 32-235 and CGS 32-238;**
- **CT supported cost share and support by CT DECD for research and deployment of CT manufactured technologies pursuant to CGS Chapter 588 including CGS 32-238a. Such cost share and support to provide lower cost, improved technology durability, increased reliability, integrity management, inspection, monitoring and hydrogen detection for fuel cell and hydrogen infrastructure operations. Targets would include motive, stationary, aviation, marine, military, and space exploration applications.**

- (2) An examination of how to position the state to take advantage of competitive incentives and programs created by the federal Infrastructure Investment and Jobs Act,

Comment: This examination may include an assessment to develop a comprehensive hydrogen ecology through a regional hydrogen fuel cell “Roadmap” with provisions for green hydrogen production and distribution, fuel cell deployment, carbon emission reduction and/or capture with sequestration, economic development, support for disadvantaged communities, research, workforce development, regional cooperation, and cost share for grant funding, consistent with the federal Infrastructure Investment and Jobs Act and DOE DE-FOA-0002779. This work could pull together a listing of projects into an integrated plan for production, distribution, storage, deployment and use with research and workforce development as envisioned by Congress in the Infrastructure Act and DOE.

(3) Recommendations for workforce initiatives to prepare the state's workforce for hydrogen fueled energy-related jobs,

Comment: These recommendations may be developed through consultation with industry associated with the CT Hydrogen Fuel Cell Coalition; analysis related to IMPLAN and REMI modeling; and collaboration with the Governor's Workforce Council, CT Office of Workforce Strategy, CT State Colleges and Universities, CT DECD, and through strategic supply chain and workforce development exchange events.

(4) An examination of the sources of potential clean hydrogen, including, but not limited to, wind, solar, biogas and nuclear,

Comment: This examination may be developed through direct consultation with industry associated with the CT Hydrogen Fuel Cell Coalition, gas and electric public service companies, renewable energy developers, ISO NE, and the US DOE.

(5) Recommendations for funding and tax preferences for building hydrogen-fueled energy facilities at brownfield sites through the Targeted Brownfield Development Loan Program,

Comment: These recommendations may be developed through an analysis related to IMPLAN and REMI value/impact modeling; consultation with industry associated with the CT Hydrogen Fuel Cell Coalition, CT DEEP, CT DECD, and collaboration with the US DOE, EDA, NSF, and EPA. Recommendations should be consistent with the federal Infrastructure Investment and Jobs Act, DOE DE-FOA-0002779, and a comprehensive regional hydrogen fuel cell "Roadmap". Provisions may include green hydrogen production and distribution, fuel cell deployment, carbon emission reduction, economic development, support for disadvantaged communities, research, workforce development, regional cooperation, and cost share for grant funding consistent with CGS 32-765.

(6) Recommendations regarding funding sources for developing hydrogen fueled energy programs and infrastructure, and

Comment: These recommendations may be developed through an analysis related to IMPLAN and REMI impact/value modeling; consultation with industry associated with the CT Hydrogen Fuel Cell Coalition, public service companies, CT DEEP, CT PURA, and CT DECD; and collaboration with the US DOE, EDA, NSF, and EPA in compliance with a comprehensive regional hydrogen fuel cell "Roadmap". Provisions may include incentives for development of Smart Grid technology for increased energy reliability with green hydrogen energy storage production and distribution, fuel cell power facility deployment, carbon emissions reduction and/or capture with sequestration, regional energy and carbon transport infrastructure, economic development, support for disadvantaged communities, research, workforce development, regional cooperation, and cost share for grant funding.

(7) Recommendations for potential end uses of hydrogen-fueled energy.

Comment: This examination may be developed through direct consultation with industry associated with the CT Hydrogen Fuel Cell Coalition, gas and electric public service companies, disadvantaged towns and cities through community groups, and the US DOE.

Not later than January 15, 2023, the Task Force will submit a report on its findings and recommendations to the joint standing committee of the General Assembly.

The Connecticut Green Bank is issuing this request for written comments to ensure the success of the activities of the Task Force. While the Connecticut Green Bank specifically requests input on the questions

included below, additional stakeholder comments on other topics are also welcome. Respondents are invited to answer all or a subset of the comments below.

Please note that responses to this Request for Written Comments will be posted publicly on the Connecticut Green Bank's website. Because your comments will be made public, you are solely responsible for ensuring that your comments do not include any confidential information that you or a third party may not wish to be posted.

The Connecticut Green Bank will accept written comments to inform the final legislative report of the Task Force until December 9, 2022, at 5:00 p.m. ET. Please submit your comments via email to CThydrogentaskforce@strategen.com.

Questions for Stakeholders:

Defining Clean Hydrogen

1. Based on Federal guidance in the Infrastructure Investment and Jobs Act and the Inflation Reduction Act, clean hydrogen is defined as hydrogen that is produced through a process that results in a lifecycle greenhouse gas emissions rate of not greater than 4 kilograms of CO₂e per kilogram of hydrogen and with less than 2 kilograms of CO₂e per kilogram of hydrogen at the point of production. Do you believe that Connecticut should pursue a more stringent definition for clean hydrogen than the one that has been established by the Federal government? If so, why? If not, why not?

A: No, CT should follow the federal definition for consistency. CT can engage within proper channels with federal officials to request and suggest refinement or expansion of the federal definition if the federal definition proves to be unworkable or has unintended consequences.

Stakeholder Engagement and Equity

2. When and how should the state of Connecticut engage with environmental justice and disadvantaged communities throughout the clean hydrogen planning and development process? What steps can the state take to support EJ and disadvantaged communities engagement in these processes?
3. What steps should the state of Connecticut take to ensure that the clean hydrogen economy provides equitable benefits for environmental justice and disadvantaged communities?

A: Direct contact and collaboration with community leaders, environmental justice stakeholders, and distressed / disadvantaged community officials should be a requirement for long term community engagement, especially for development of at-scale hydrogen hubs for multiple users in communities for applications including public transportation, clean power generation, and workforce development. CT may seek to develop a standing CT Hydrogen Commission or Council to be established by CT legislation for long-term engagement of communities, industry manufacturers, researchers, government, and other stakeholders.

Hydrogen End-Uses

4. The Hydrogen Task Force has been exploring hydrogen end uses including: critical facilities, aviation, cargo ships, material handling equipment, long-haul heavy duty trucks, fuel cells for peak power generation, high heat industrial processes, buses, ferries, rail, hydrogen blending in pipelines, and light-duty vehicles. How should the state address differing stakeholder perspectives about hydrogen end use prioritization? Which specific end uses are of greatest concern, and why? What actions can or should the state take to continue to solicit stakeholder feedback?

A: Direct and regular engagement with technology providers, public service companies (gas and electric utilities), CT technology manufacturers, researchers, and community stakeholder user groups should be a requirement for long term market development and targeted technology deployment. This engagement will provide an understanding of the market strength, how to prioritize end-users for investment, and how best to engage users for long term investments.

To meet these objectives, CT should administer a focused program including execution of a “CT Hydrogen Fuel Cell Roadmap” to deploy hydrogen and fuel cell technologies consistent with identified tangible and goals for development of actionable projects in CT. Prioritized applications should include focused application hub goals with multiple users including hydrogen fueled electric generation (i.e., MW goals deployed per year on the electric grid and behind the meter); motive applications (i.e., vehicle deployment goals for hydrogen fleet vehicles and public buses in distressed communities); material handling for business

warehousing (specified warehouse and warehouse districts for zero emission motive technology deployment with hydrogen supply); hydrogen refueling (i.e., hydrogen refueling stations to fuel fleet vehicles, trucks, and public buses); clean energy transportation hubs at marine ports and aviation airports (at specified ports and airports as clean energy transportation centers); natural gas decarbonization (i.e., schedule for percent of hydrogen to be blended to natural gas to meet distribution demand and reliability standards); research and demonstration related to low cost operation, durability, and advanced manufacturing (potentially as cooperative “lead-by-example” demonstration project arrangements between industry and state university institutions); and safety requirements including codes and standards for safe production, distribution, and operation of applications (i.e., standards for integrity management, inspection, detection, safety, and mitigation of issues).

User applications that are not applicable, actionable, or relevant to the CT market should not be prioritized. Applications that have multiple values to CT communities, industry, energy reliability, and workforce should be considered for prioritization. As used here and for other comments in this response, prioritized user applications should include deployment of Connecticut-made hydrogen technologies for use in Connecticut communities, research undertaken at Connecticut businesses and educational institutions to develop and demonstrate hydrogen technologies, manufacture of hydrogen products for export to global markets, and production of hydrogen fuel for local use and export to global markets.

CT may seek to manage this focused and coordinated approach with legislative incentives for community development, workforce development, energy reliability, and decarbonization through a Hydrogen Commission or Council to be established by CT legislation. Such Commission or Council would administer a CT Hydrogen Fuel Cell Roadmap with annual reporting on deployment progress, energy reliability, cost effectiveness, industry growth, user value, environmental performance, workforce development, manufacturing, research and demonstration, and economic impact.

Hydrogen Supply

5. If local (in-state) hydrogen supply is expected to limit in-state hydrogen end use applications, should the state consider the role of hydrogen imports in meeting supply needs?

A: Yes, but such import may not be necessary with regular and direct engagement of local hydrogen producers through regional renewable energy providers, assessment of market forces including local users, and annual assessment of loads and resources. These metrics should be an annual requirement for legislative reporting for long term engagement to meet legislative goals for energy reliability, market needs, economic development. Workforce development, decarbonization, and energy cost management.

Hydrogen Infrastructure

6. What additional processes should the state consider to ensure that use of pipeline infrastructure for hydrogen transport is implemented safely, and supports community and climate goals?

7. What enabling infrastructure do you believe is highest priority for the state to pursue to support the development of Connecticut’s hydrogen economy, and why?

A: Direct continual engagement of utility stakeholders, institutional researchers, and federal officials should be a requirement to examine market forces; economic impact, local manufacturing; use of existing infrastructure; potential bidirectional use of infrastructure and infrastructure ROWs for transport of electricity to produce hydrogen, distribution of natural gas blended with hydrogen, distribution of hydrogen, and/or sequestration of carbon; and establishment of codes and standards for long term engagement and integrity management

of hydrogen infrastructure. Direct engagement may include development and execution of a “CT Infrastructure Development Plan” with public service companies to examine production supply resources, deployment of hydrogen and fuel cell technologies, cost, reliability, environmental performance, bidirectional use of infrastructure and infrastructure ROWs, distributed fuel and power resources, and research for efficient manufacturing and safe operations. This work should be examined at least annually consistent with identified tangible goals for infrastructure to support distributed hydrogen production and applications for electric generation, motive use, hydrogen refueling, management of carbon, and natural gas decarbonization for safe production, distribution, and operation of applications.

Use of existing infrastructure should be prioritized to avoid stranded investment (i.e., scheduled blending of hydrogen with natural gas in the LDC system). An incremental approach should be favored above an all-or-nothing goal (i.e., incremental annual percentage goals for natural gas blending). Research for integrity management, detection, and inspection of infrastructure should be prioritized.

Hydrogen Funding and Policy Activities

8. What portions of the hydrogen value chain (uses, sources, transport, storage) would be most benefited by further development of additional policy or regulatory guidance? Why, and what gaps should these policies be seeking to address?

9. Federal funding is hoped to represent a significant portion of hydrogen funding but is not expected to meet all funding needs. Which hydrogen investments (infrastructure, manufacturing, end use equipment, workforce training, etc.) would be the most important for the state to consider funding? Why?

10. What are the best mechanisms for state agencies to gain visibility into federal funding opportunities pursued by individual commercial actors or other organizations? What actions can the state take to support these applications?

A: Direct continual engagement of all stakeholders should be a requirement for long-term market development and assessment of the value chain. Goals should support all viable vectors for development including source, transport, storage, use, and controls. Specific action may change incrementally with progress and should include appropriate market reporting measures to identify opportunities for funding, financing, and deployment of hydrogen and fuel cell technologies; protection of the CT gas and electric rate base(s); research and workforce development for CT industry; adoption of codes and standards for safety and integrity management of infrastructure; assessment of the supply chain for manufacturing; and open engagement with federal officials when appropriate for direction, investment, and funding. These value chain components can be emphasized and managed through legislative, regulatory, and administrative processes to maximize value, increase reliability, avoid stranded investment, assist communities to develop clean energy economies, and increase economic value with workforce development. Specific elements may include:

- **Partnerships with grid, fuel cell, and hydrogen industry supply chain entities,**
- **Market analysis of energy demands, production, distribution, and storage limitations,**
- **Continued regional engagement with the DOE Hydrogen Safety Panel,**
- **Establishment or adoption of appropriate federally consistent codes and standards,**
- **Analysis of cash flow and rate impact,**
- **Coordination with public funding entities, private investors, and finance companies,**
- **Network and integrity management of grid infrastructure for safety, reliability and durability,**
- **Establishment of incentives and predictable cost share provisions for research, advanced manufacturing, and deployment,**

- **Workforce readiness with STEM education, advanced research, energy / integrity management, and manufacturing,**
- **Direct and indirect opportunities made available to distressed cities and communities of need, Opportunity Zones, and disproportionately affected communities with clean energy, high quality employment, and energy reliability,**
- **Integration of advanced research, manufacturing, workforce training, demonstration, and technology deployment,**
- **Recognition of and support for multiple pathways including energy production and carbon management to develop and maintain a clean energy and Hydrogen Hub economy,**
- **Performance-based regulation with monitoring for cost, reliability, durability, workforce readiness, and**
- **Support for regional applications including**
 - **Education / Training Initiatives**
 - **Collaborative university research**
 - **Supply chain management**
 - **Advanced manufacturing**
 - **Zero emission fuel production**
 - **Zero emission fleets, public buses, trucking, ferries, aircraft**
 - **Zero emission power and CHP districts**
 - **Zero emission electric and gas infrastructure**

Applications that are not applicable, actionable, or relevant to the CT market should not be prioritized. Applications that have multiple values to CT communities, industry, and workforce should be considered for prioritization. Integrated actions that include local research, manufacturing, and deployment to multiple end users may be of highest value to reinforce value to CT. As previously stated, prioritized applications should include deployment of Connecticut-made hydrogen technologies for use in Connecticut communities, research undertaken at Connecticut businesses and educational institutions to develop and demonstrate hydrogen technologies, manufacture of hydrogen products for export to global markets, production of hydrogen fuel for local use and export to global markets.

Further, to attract long standing support for federal funding CT must clearly show interagency commitment to develop and maintain an integrated clean energy ecology with state policy and incentives for action including support for stationary/grid and transportation applications. These policies and incentives should include commitment to build a broad and complete energy supply chain, develop training and workforce resources, establish and support institutional centers to conduct world class research, provide leadership to demonstrate and deploy technologies for multiple user classes in critical markets, and provide in-kind and monetary cost share for federal grant applications. With interagency commitment for research, financing, workforce development, deployment, and technology demonstrations CT will be more attractive for federal support including grant funding.

11. What federal funding opportunities have stakeholders applied to? Are these formula grants or competitive? Are these opportunities hydrogen-related? Do stakeholders have lessons learned to share based on the application or implementation process

A: CT legislative guidance is recommended to engage state agencies, industry, public service companies, research institutions, and energy communities to identify the need for market based funding, financing, cost share, and competitive federal funding opportunities. This coordination would establish a strong potential for multiple-user hydrogen hubs for federal funding, cost sharing, and private financing.

Regular consultation with industry, the Governor’s Workforce Council, CT Office of Workforce Strategy, CT State Colleges and Universities, and CT DECD is recommended to tailor applications for funding. CT may also seek to identify deployment goals for formula grants (i.e., zero emission bus funding) to coordinate clean transportation, community development, workforce training, research and economic development, and decarbonization.

Regular open engagement as allowed by and with federal agencies is recommended including identification of FOAs from US DOE, EDA, NSF, DOT, FTA, and EPA. Applications to FOAs should confirm regional compliance with a comprehensive hydrogen fuel cell “Roadmap” with provisions for green hydrogen production and distribution, fuel cell deployment, carbon emission reduction, economic development, support for disadvantaged communities, research, workforce development, regional cooperation, and cost share for grant funding.

Applications that do not provide multiple values for hydrogen production and use, or applications that are not applicable, actionable, or relevant to the CT market should not be prioritized. Applications that have multiple values to CT communities, industry, and workforce should be considered for prioritization.

General summary comments for legislative consideration:

Connecticut should prescriptively build a desired energy ecology outcome for clean, reliable, sustainable, and cost effective energy with an active “Roadmap” approach to achieve results.

Within the “Roadmap” Connecticut should:

- Establish tangible standards and deployment goals for hydrogen production, use type, and quantity of clean energy technology in critical locations including distressed and disadvantaged communities.**
- Identify the balance between energy supplies, including surplus offshore wind, nuclear power, and solar energy, and energy users for transformation to a clean hydrogen economy.**
- Balance infrastructure for bidirectional use to support distributed fuel production, energy use, and management of carbon capture and sequestration.**
- Establish a tracking and reporting program to verify investments, expenditures, project deployment, economic and workforce results, environmental benefits, and progress with attainment of goals.**

Connecticut should prioritize investments in hydrogen, carbon management, and fuel cell technologies made in Connecticut to bolster economic growth, workforce and career pathways, and deployment of clean energy technologies in local communities.

Connecticut should increase assistance to local hydrogen, carbon management, and fuel cell businesses for advanced manufacturing including digital processing, robotic stacking, additive machining, and high speed production.

Connecticut should establish strong partnerships with electric and gas utilities under a Regulatory Compact partnership to avoid stranded investment of existing infrastructure, avoid curtailment of asynchronous renewable generation, foster bidirectional use of infrastructure, increase energy reliability, and manage costs to avoid impacting the rate base(s).

Connecticut should increase investment in education and research to develop local workforce talent and manufacturing resources for hydrogen and fuel cell technologies.

Connecticut should prioritize a process to provide a predictable cost share for federal grant project funding.

**Respectfully submitted,
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Administrator of the Connecticut Hydrogen Fuel Cell Coalition**