Meeting Minutes[1]

Tuesday, December 20, 2022
1:00 p.m. – 2:30 p.m.

The fourth meeting of the Sources and Uses Working Groups was held on December 20, 2022.

All participants joined via the Teams conference call.

Task Force Members Present:
Kathy Ayers (Nel Hydrogen), Enrique Bosch (Avangrid), Samantha Dynowski (Sierra Club), Bryan Garcia (CT Green Bank), Tony Leo (Fuel Cell Energy), Shannon Laun (Conservation Law Foundation), Ugur Pasaogullari (UCONN), Joel Rinebold (CCAT), Liddia Ruppert (Designee – CT DEEP), Becca Trietch (Designee – CT DEEP)

Others Present:
Paul Aresta (Council on Environmental Quality), Ben Butterworth (Acadia Center), Erin Childs (Strategen), Nina Hebel (Strategen), Andrea Lubawy (Toyota), Bernie Pelletier (Peoples Action for Clean Energy), Collin Smith (Strategen)

1. **Call to Order**
    - Collin Smith, a Senior Consultant at Strategen providing technical support for the Infrastructure Working Group, called the meeting to order at 1:03 p.m.

2. **Welcome and Introductions**
    - Mr. Smith provided an overview of the meeting agenda which included attendee introductions and a review and discussion of the Sources and Uses Working Group findings and recommendations.
    - Each participant introduced their name and organization.

3. **Review of Working Group Deliverables**
    - Mr. Smith provided an overview of the Sources Working Group deliverables including:
        - A proposed definition of clean hydrogen developed in collaboration with the Policy and Workforce Development Working Group.
        - An analysis of the total production potential of clean hydrogen within Connecticut.
        - An assessment of the impact on local manufacturing potential and industry, developed in collaboration with the Policy and Workforce Development Working Group.
        - Scenario based production curves for clean hydrogen.

[1] For access to the meeting recording – https://www.ctgreenbank.com/hydrogentaskforce/

- Mr. Smith provided an overview of the Uses Working Group deliverables including:
    - A structured framework to prioritize hydrogen end use applications relevant for Connecticut.
    - The total demand size of priority hydrogen end uses.
    - Scenario based demand curves for each hydrogen end use, identifying the price points at which hydrogen would become cost competitive for different end uses and expected demand at those price points.

4. Review of Key Findings

- Mr. Smith provided an overview of the hydrogen prioritization framework created by the Uses Working Group. This framework includes three categories: (1) highest priority end uses which have high potential to drive demand over the long term due to scale and/or economics; (2) high priority end uses that are smaller scale but can provide first mover projects and/or be integrated into larger hydrogen hubs; and (3) other potentially valuable applications that can be kept in view as the economics for at scale hydrogen delivery change over time.
    - Mr. Smith identified that a geographic analysis demonstrated that connecting infrastructure will likely be required to transport hydrogen to major offtakers at scale as Connecticut's areas of high renewable production potential are not directly by high potential demand sites.
    - Mr. Smith then presented the updated demand estimates for hydrogen in the state of Connecticut, divided by sector and projected out to 2050. Mr. Smith noted that material handline and power generation compose the largest near term offtake opportunities while power generation, long haul trucking, and aviation represent the largest long term offtake opportunities.
    - Mr. Smith noted that the hydrogen demand curve developed illustrates the target hydrogen price for cost parity with fossil duels. Of note, industry and power generation have the lowest cost parity points while maritime shipping, material handling, and long haul trucking have the highest cost parity points.
    - Mr. Smith identified the key considerations for the low, medium and high hydrogen supply scenarios. He pointed out that key inputs include siting restrictions, resource availability for offshore wind and nuclear, and curtailment forecasts. Mr. Smith noted all scenarios included an initial allocation of renewable resources to meet Connecticut's general decarbonization targets prior to calculating the technical potential for hydrogen production which will not be in competition for capacity needed to meet decarbonization targets.
        - Ms. Laun inquired which targets were being referred to when discussing Connecticut's general decarbonization targets. Ms. Laun recommended clearer inclusion of this consideration and a citation to relevant statutes.
            - Mr. Smith indicated this analysis does refer to the guidelines set forth by the 2040 zero carbon electricity requirement.
    - Mr. Smith presented the hydrogen supply curve for the mid production case noting that the lowest cost clean hydrogen could be produced from onshore wind and nuclear while the highest cost clean hydrogen would be produced from biogas and excess renewables.
    - Mr. Smith presented a comparison of hydrogen supply and demand curves for Connecticut. He explained that the technical production potential exceeds the potential demand for hydrogen. He also noted in most scenarios, the cost

to produce hydrogen at the point of production is lower than that of diesel and bunker fuels, but infrastructure will add cost. He also noted that the low cost of natural gas indicates the likely use of hydrogen driven by decarbonization targets rather than economics.
    - Mr. Butterworth requested clarification regarding the end use of hydrogen blending for non-core customers and its categorization in the high priority category. He noted that this is two distinct end uses, targeting for high heat customers, and more blanketed blending for residential and commercial customers. Mr. Butterworth stressed the need for additional specificity.
        - Mr. Smith indicated that further specificity is discussed in the Legislative report.
- Mr. Smith presented an overview of best practices for defining clean hydrogen. He noted that there has been a shift from color coding hydrogen to defining it based on carbon intensity. He noted that federal guidance from the proposed Clean Hydrogen Production Standard has established clean hydrogen as that with less than 4 kg of CO2e/kg H2 on a lifecycle basis (well-to-gate).

5. Discussion of Draft Recommendations

- Mr. Smith presented provided an overview of the draft recommendations related to the Sources Working Group which state that:
    - DEEP should conduct further investigation to ultimately establish a definition of clean hydrogen that would be most appropriate for Connecticut.
    - DEEP should continue to evaluate the sufficiency of zero-emission electricity sources to meet both electric sector decarbonization goals and hydrogen production needs.
    - DEEP should consider accounting mechanisms that encourage hydrogen producers to certify the carbon intensity of produced hydrogen.
    - DEEP should consider investigating additional approaches to expanding clean hydrogen supply within the state, as appropriate based on the definition of clean hydrogen established.
    - PURA should consider whether existing renewable energy, flexible and/or interruptible load tariffs could be applied to electrolytic hydrogen production and determine if a specific electrolytic tariff would be required.
    - DECD should evaluate the need for additional funding for Brownfield Loan and Grant programs to help meet the clean energy needs of the state and its subsequent land requirements.
    - DEEP and DECD should continue maintaining the Connecticut Brownfields Inventory as a resource for potential developers to identify prospective project sites, including those potentially eligible as "energy communities" under the Inflation Reduction Act.
    - DEEP and DECD should continue supporting development of clean energy projects on brownfields and projects that have community support and/or have completed community benefits agreements.
- Ms. Laun noted that it is unclear how the recommendation regarding accounting mechanisms will encourage hydrogen producers to use such accounting mechanisms.
    - Ms. Childs explained that this recommendation this aims to give DEEP the freedom to investigate how accounting mechanisms may most appropriately

fit their existing portfolio of programs and policies. Further, Ms. Childs noted that accounting and tracking and addressing compensation gaps are initial steps needed to certify clean hydrogen and may lead to the development of further policy opportunities.

- Mr. Smith presented provided an overview of the draft recommendations related to the Uses Working Group which state that:
    - DEEP should consider further investigation and the possibility of focused policy and market development support for clean hydrogen use in the highest priority end uses.
    - DEEP should consider further investigation into high priority hydrogen end uses and the possibility of coordinating support measures with other hydrogen efforts.
    - DEEP should explore market-based approaches to incent reductions in the carbon intensity of fuels for mobility end use applications.
    - DEEP should identify and potentially expand clean transportation incentives to include on-site port handling equipment, harbor crafts, and ocean-going vessels in collaboration with other state and federal agencies
    - DEEP should investigate the need for hydrogen fueling stations to support multi-sectoral mobility applications, and as appropriate, coordinate with CT DOT to develop more specific strategies for optimizing siting and funding.
    - The Legislature should consider tax exemptions for hydrogen vehicles and critical facilities that produce or use clean hydrogen.
    - The Legislature should evaluate broader policies that would ensure the decarbonization of hard-to-electrify sectors, including long haul heavy-duty trucking, aviation, shipping, and industrial processes.
    - PURA should evaluate the role of hydrogen fuel cells for critical backup power and peak power generation and identify approaches to incorporate recommendations into appropriate planning venues.
    - DEEP and PURA may wish to consider promoting the use of hydrogen end uses that are currently commercially viable through the existing clean energy programs. PURA's consideration should include how any changes would affect the programs' existing objectives and cost-effectiveness.
    - DECD and OPM should identify opportunities for tax incentives or programs to support CT's leading hydrogen fuel cell manufacturing industry.
- Ms. Lubawy noted that the prioritization of end uses does not always align with the economic readiness of end uses defined by the Sources Working Group. She identified that there may be a need to further focus on reducing costs associated with applications in the highest priority categorization. Ms. Lubawy added that a potential method to reduce cost is increased volume and removing limitations on production methods.
    - Mr. Smith noted that the Uses and Sources Working Group analysis does not aim to imply that production will be limited to the potential demand posed by the highest priority end uses, and further, market development support for highest priority end uses does not intend to limit greater clean hydrogen market development as a whole.
- Mr. Leo inquired whether demand had been estimated for lower priority end uses, such as gas blending.
    - Mr. Smith explained that demand for lower priority end uses was not estimated.

- Mr. Pelletier noted that a key reason for the need for hydrogen is to complement the variability of solar and wind in a decarbonized grid, both hourly and seasonally. Mr. Pelletier explained that electricity created by solar and wind should be used for electricity unless this is not possible, in which case hydrogen can serve as a seasonal energy carrier.
    - Ms. Childs noted that investments in hydrogen would only be made because of perceived value in the greater context of the imperative of climate change, which is a key consideration emphasized within the report.
    - Mr. Smith noted that in the prioritization framework, considerations were made pertaining to where electricity can be used directly and where it cannot.
- Ms. Ayers agreed with Mr. Pelletier's comment point regarding baseload renewable capacity, but also noted that there will be end use demands for hydrogen as a fuel such as for transportation and agriculture.
- Ms. Lubawy voiced her opposition to the assumption that if a certain hydrogen production method does not completely meet the definitions of being clean or zero carbon, it is not worth doing at all. She noted that anything that is better then what is currently in place, is worth consideration.
    - Ms. Childs noted that the report aims to represent all stakeholder positions.
    - Mr. Smith noted that there will be continued hydrogen-related processes considering the definition, noting the definition of clean hydrogen as a specific future area of work for DEEP.
- Mr. Butterworth noted that in the recommendation to the Legislature regarding hydrogen vehicles, it may be useful to note specific vehicle types as not all vehicles were determined to be high priority end uses for hydrogen.
    - Ms. Laun agreed and noted that the CLF would not support a tax exemption on light-duty hydrogen vehicles. Ms. Laun added that considering the thriving state of the fuel cell industry in the state, incentives for manufacturing may not be necessary.
        - Ms. Childs noted that the Policy and Workforce Development Working Group findings identified a need for manufacturing-related support. Ms. Childs noted that the manufacturing recommendations aim to position Connecticut as a fuel cell manufacturing leader as related investments grow nationally.
- Mr. Leo noted that while the Connecticut fuel cell industry is impressive, it is not currently profitable and state support will be beneficial as the industry expands.
- Ms. Ayers noted that while Connecticut is a leader in the fuel cell industry today, it is important to have Legislative support as competition within the industry grows.

6. Next Steps

- Mr. Smith presented an overview of the upcoming Task Force milestones through January highlighting that Task Force due on the draft report is due on December 23 and the final report is due on January 15.
- Ms. Laun explained that the report should include detail regarding the current state of the hydrogen ecosystem specifically regarding how hydrogen is currently produced.
    - Ms. Lubawy indicated such percentages regarding production may be difficult to source if broken out on an end-use basis.
    - Ms. Laun noted that aggregate production method percentages would be most useful for those unfamiliar with hydrogen.

7. Adjourn

- Mr. Smith adjourned the meeting at 2:20 p.m.