Meeting Minutes[1]

Tuesday, October 25, 2022
2:00 p.m. – 3:30 p.m.

The first meeting of the Infrastructure Working Group was held on October 25, 2022.

All participants joined via the Teams conference call.

Task Force Members Present:
Eric Annes (DEEP), Kathy Ayers (Nel Hydrogen), Samantha Dynowski (Sierra Club), Shannon Laun (Conservation Law Foundation), Tony Leo (FuelCell Energy), Mary Nuara (Dominion Energy), Ugar Pasaogullari (UCONN), Joel Rinebold (CCAT), Becca Trietch (Designee – DEEP)

Others Present:
Jordan Ahern (Strategen), Eliasid Animas (Strategen), Paul Aresta (Council on Environmental Quality), Ben Butterworth (Acadia Center), Erin Childs (Strategen), Nathan Frohling (The Nature Conservancy), Ahmet Kusoglu (LBNL), Andrea Lubawy (Toyota), Trent Molter (Skyre), Bernie Pelletier (Peoples Action for Clean Energy), Callyn Priebe, 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 2:04 p.m.

2. **Welcome and Introductions**
    - Mr. Smith provided an overview of the meeting agenda including attendee introductions. Each participant introduced their name and, organization. Following this Mr. Smith discussed the working group meeting schedule for the coming months.

3. **Review of Working Group Schedule**
    - Mr. Smith presented a schedule of the upcoming Working Group meetings noting that the next Sources Working Group meeting will be held on Thursday, November 17, 2022, from 11:00 a.m. to Noon and the next Uses Working Group meeting will be held on Thursday, November 22, 2022 from Noon to 1:00 p.m.

4. **Review Updated Hydrogen End Use Evaluation**
    - Mr. Smith provided an overview of the analytical process that was utilized to determine scores assigned to hydrogen end uses. Mr. Smith noted that the framework will directly inform demand analysis, and indirectly inform recommendations made in the final legislative report.

[1] For access to the meeting recording – https://www.ctgreenbank.com/hydrogentaskforce/hydrogen-sources/ or https://www.ctgreenbank.com/hydrogentaskforce/hydrogen-uses/

- Erin Childs added that the analytical process will incorporate stakeholder feedback prior to the development of final results and recommendations.
- Mr. Smith presented a sample scenario development, containing ranked end use types, separated into low, medium, and high-demand scenarios. He noted that hydrogen demand from all cost-competitive end uses will be evaluated and potential demand will be compared to an assessment of local hydrogen production potential which will be evaluated by the Sources Working Group.
- Mr. Smith reviewed the scoring framework and the criteria ranking descriptions. The criteria utilized to prioritize hydrogen end uses include cost-competitiveness compared to alternatives, greenhouse gas reduction potential, technological maturity, infrastructure requirements, environmental justice, workforce development, resilience benefits, and safety regulation.
- Mr. Smith discussed the status of the rankings and reiterated that Working Group members are encouraged to provide feedback. He noted that pending further stakeholder feedback, finalized evaluations would be sent out the following week. He explained that following the determination of priority end uses, the Uses Working Group's efforts would culminate in a demand analysis.

5. Discussion of End Use Evaluation

- Mr. Smith presented the priority, or Tier 1, hydrogen end use applications which include critical facilities, heavy-duty trucks, aviation, and power sector applications for fuel cells and turbines. Mr. Smith walked through the scores associated with each Tier 1 end use.
- Mr. Smith provided an overview of lower priority – Tier 2 and Tier 3 – applications and noted the key factors that differentiated them from Tier 1 applications, noting greenhouse gas reduction potential, workforce development, and safety. Tier 2 applications include material handling equipment, specialty vehicle fleets, trans-oceanic shipping, harbor craft and buses. Tier 3 applications include rail, industrial heat, and hydrogen blending. Mr. Smith noted that end uses that were not cost competitive with alternatives were excluded. These end uses included passenger cars, 100% hydrogen residential and commercial heat, and low heat industrial processes.
- Mr. Smith sought stakeholder feedback on the end use evaluation approach.
    - Ben Butterworth raised a concern regarding the weighting of criteria. Mr. Butterworth cited the cost criteria as one that considers numerous factors, and the overall score of an end use, whether that be high or low, may be nullified by an inversely high or low-cost sub-score.
        - Mr. Smith responded that through the use of different demand scenarios, there will be a holistic analysis of all end uses.
        - Kathy Ayers cautioned against the use of the ranking system as anything more than a qualitative system of comparison.
    - Tony Leo questioned the cost score for the aviation application. He sought clarification regarding what costs are included for aviation. Additionally, Mr. Leo asked what type of generation technology was assumed in the analysis of critical facilities.
        - Mr. Smith responded that hydrogen scored highly in aviation due to its use as a drop in fuel. He noted that a specific cost of hydrogen was not assumed in this analysis. Mr. Smith also clarified that for critical facilities, the generation technology is assumed to be fuel cells.
    - Joel Rinebold agreed with previous concerns regarding oversimplifications of a scoring system for end uses and recommended that a list of end uses and

their associated values and limitations be developed. He suggested referring to the public statute that established the Task Force for guidance.

- Andrea Lubawy voiced concern regarding the ranking system not being able to capture the practicality of different applications across end uses.
- Bernie Pelletier voiced agreement with Mr. Rinebold's comments, suggesting that the ranking system is not capable of capturing intricacies associated with different end uses, and a qualitative approach may better suit this analysis.
- Mr. Butterworth reiterated his concerns regarding the scoring matrix system but stated he believes it is a necessary component of this analysis. In addition, Mr. Butterworth requested that Mr. Smith revisit the industrial heat end use scoring.
- Shallon Laun voiced support for Ms. Childs' framing of the analysis as a "prioritization matrix", reiterating that the findings do not have to be set in stone. Further, Ms. Laun proposed that in the final report, a recommendation should direct that the state revisit the findings at some regular intervals to ensure that it is accounting for the evolving hydrogen ecosystem.
- Mr. Leo voiced support for Mr. Rinebold's favoring of a qualitative over a quantitative scope of analysis. Further, Mr. Leo asked whether the rankings are specific to Connecticut.
    - Mr. Smith affirmed that the scoring is Connecticut specific.
- Mr. Rinebold reiterated his concern with alignment of the analysis with Public Act 22-8 that established the Task Force. He noted that the Task Force intends to provide the state with recommendations and voiced concern with current ability to do so.
    - Ms. Childs noted that the Funding Working Group and the Policy and Workforce Development Working Group are focused on providing enabling recommendations to support the findings of other Working Groups. She noted that a key goal is to find places where the State can put forward action to capture greater value.
- Ms. Lubawy voiced support for Mr. Rinebold's perspective and stated that some applications need policy intervention to ease the way and others do not, and this is not something that these rankings take into account.

6. Presentation and Discussion of Hydrogen Price Curve Analysis

- Mr. Smith explained that hydrogen prices impact consumption and can strongly inform state policy. He outlined the primary components of an electrolytic hydrogen ecosystem and noted that current federal policy provides incentives for both clean energy and hydrogen production.
- Mr. Smith presented levelized cost of energy (LCOE) and hydrogen (LCOH) charts, noting that tax credit systems can significantly reduce the cost of hydrogen in the short term.
- Mr. Smith discussed hydrogen economics across sectors, highlighting the transportation sector when considering cost parity points with incumbent fuels, depending on the cost of necessary infrastructure.
- Mr. Smith outlined the next steps regarding the price curve analysis, including refining LCOH forecasts through conversations with project developers and stakeholders, incorporating infrastructure costs into estimates, and including hydrogen supply potential from various feedstocks.
- Mr. Leo requested clarity regarding cost parity charts. In addition, he inquired whether imported hydro is considered as an energy source in this analysis.

    - Mr. Smith clarified that the cost parity charts display the price at which hydrogen would need to reach to compete with incumbent sources of energy. Mr. Smith added that imported hydro was not included in Special Act 22-8, so it had not been included yet.
    - Mary Nuara voiced her agreement that other feedstocks such as nuclear should be considered as outlined in Special Act 22-8.
- Mr. Butterworth asked whether the wind, solar, and offshore wind resources considered are dedicated renewable energy resources that are strictly for the purpose of powering electrolyzers or are rather providing curtailed excess renewable energy for hydrogen production.
    - Mr. Smith clarified that all resources are assumed to be dedicated resources.

7. Adjourn

- Mr. Smith adjourned the meeting at 3:31 p.m.