Public Workshop to discuss Fuels and Infrastructure for a Carbon Neutral Economy
Comments by True North Renewable Energy and Ørsted

August 5, 2020

True North Renewable Energy and Ørsted are pleased to provide these comments in response to the Public Workshop, "Fuels and Infrastructure for a Carbon Neutral Economy." It is becoming increasingly clear that renewable gases, like biogas and green electrolytic hydrogen, will be a necessary component in California's drive to successfully achieve carbon neutrality. It is time for the state to implement key policies, like those outlined in this letter, that will catalyze growth in this sector and unlock its full potential. Doing so will not only be a major step toward achieving the state's climate objectives but will also propel an infrastructure construction boom, akin to that seen as a result of the Renewable Portfolio Standard, that will aid in the state's recovery from the COVID-induced recession.

For decades, True North Renewable Energy, LLC and True North Venture Partners (True North) have invested in disruptive technologies that can reduce climate change and improve fundamental societal practices to be more sustainable – including renewable electricity production, water treatment, organic waste recycling, and renewable and electrolytic gas and fuel production. We also contribute research and analysis in major international markets to help shape policies that enable green economic expansion and advance climate change policies. The companies' individual and collective work ranges from thin film solar technology development and deployment (First Solar), to organics recycling-to-biogas (True North Renewable Energy, LLC), to electrolysis for hydrogen production (Aquahydrex).

Ørsted is a leading global renewable energy developer with over 10 GW of generation worldwide consisting of offshore wind, onshore wind, solar and bioenergy facilities. In 2020, Ørsted was recognized as the world's most sustainable company by Global 100 Index. The company is looking to continue its renewable investments in the U.S. market and sees California as an exciting potential market for green electrolytic hydrogen.

Our companies are global leaders facilitating change in the energy sector, developing and commercializing technologies that produce and utilize non-fossil, zero carbon energy resources – including renewable power, green electrolytic hydrogen and biogas. We look forward to helping the state meet its short-lived climate pollutant reduction goals and supporting and accelerating its transition to 100 percent clean energy – not just in the power sector, per SB 100, but across all sectors. With that in mind, we respectfully submit the following comments for consideration.

Summary of Recommendations for Accelerating Economic Recovery and Climate Action

CARB and its sister agencies already have all the authority needed to make California a global hub for renewable gas companies, projects, and jobs, while rapidly accelerating the transition

to clean energy and a more stable climate. By leveraging California's existing climate and environmental policy framework – including CARB's existing climate policies, SB 1383, SB 1369, SB 100, SB 1440 and the Executive Order on Carbon Neutrality – CARB can help optimize current programs and develop new ones to rapidly expand markets, spur investment, and support job growth, while deploying the organics recycling and renewable gas infrastructure we will need to meet our climate goals. In particular, CARB and state should:

- Move forward with and support CalRecycle's existing SB 1383 ***organic waste diversion and recycling mandates***.
- Implement SB 1369 to ***deploy green electrolytic hydrogen as long duration energy storage*** and in other applications.
- Clearly ***define green electrolytic hydrogen and other renewable gases as a renewable and zero carbon resource*** for the purposes of implementing SB 100.
- ***Incorporate green electrolytic hydrogen into SB 100 planning*** to achieve zero emissions in the power sector.
- Adjust rate structures and market rules to ***put curtailed and surplus renewable power to use***, generating renewable hydrogen for use as long duration energy storage or to decarbonize the gas system and other sectors.
- Through the SB 1440 implementation proceeding, ***develop biomethane procurement standards that support CalRecycle's organics diversion regulations and develop hydrogen injection standards*** allowing green electrolytic hydrogen to be safely injected into the natural gas pipeline.
- Through the Scoping Plan or other process, ***develop a strategic plan*** for making green electrolytic hydrogen a cost-effective, widely available climate solution within the next decade and a driver of economic growth in California.

Additional policies targeted at managing organic waste and developing renewable gas as a solution to decarbonize hard-to-abate sectors will serve to accelerate progress towards achieving climate neutrality and net-negative emissions in California and bring down costs for these important technologies. In addition to leveraging existing programs, CARB and the state should develop new renewable gas policies to create jobs and cost-effective climate solutions, including:

- Create a ***renewable gas procurement program*** that is broadly inclusive of all renewable gas, such as biomethane and green electrolytic hydrogen, with ambitious energy and infrastructure targets and price controls to minimize cost.
- Establish an ***electrolyzer deployment target*** in-line with the policy need and market scale required to achieve cost-parity with fossil-based gases.
- Provide ***monetary incentives to support first-mover projects for organics recycling and green electrolytic hydrogen***, accelerate project development, and maximize benefits.

- ***Adopt financial mechanisms*** that can support new renewable gas policies and infrastructure by re-imagining existing programs to attract private investment and reduce consumer costs.
- ***Support a series of pilot projects*** as launching pads for the renewable gas market.
- Provide ***non-monetary support for shovel-ready projects***.

The Potential of Renewable Gases

As California is realizing a successful transformation of its electricity system to 100 percent zero-carbon and renewable electricity, one of the next big tasks is to create a similarly meaningful, holistic, and long-term policy in the industrial and gaseous fuels sectors. One of the most significant opportunities today is leveraging electricity systems, connecting them to gas systems, and pursuing cross-sector decarbonization through electric fuels.

This opportunity is being actively pursued worldwide. Green electrolytic hydrogen is emerging as a key element of Europe's economic recovery plans,[1] Los Angeles Department of Water and Power's SB 100 plans,[2] industrial strategies throughout Europe, Asia, and Australia, and even Joe Biden's presidential campaign.[3] Indeed, just recently, Air Products, ACWA Power and NEOM announced a $5 billion project to deliver zero-carbon green electrolytic hydrogen on a global scale for use in transportation markets by 2025.[4] This important climate solution is not decades away – it's imminent.

And, it's needed in California. Even the most optimistic renewable power and electrification scenarios see California continuing to rely on natural gas well beyond 2050 for some existing buildings, power plants and industrial uses and see an important role for renewable gas in the near-term. The state's initial modeling under SB 100 suggests a continued reliance on natural gas power plants through 2045 and beyond.[5] E3's high building electrification scenario, which is its most conservative in terms of the role of renewable gas, includes 7 percent renewable gas in the pipeline by 2025 and 14 percent by 2030. Some of its other scenarios include more than 10 percent by 2025 and more than 20 percent by 2030 – including 7 percent hydrogen by energy (20 percent by volume) in 2030.[6] Another recent study by E3 shows that power plants

[1] https://www.bloomberg.com/news/articles/2020-05-26/hydrogen-primed-for-key-role-in-world-s-greenest-stimulus-plan
[2] https://amer.mhps.com/intermountain-power-agency-orders-mhps-jac-gas-turbine-technology-for-renewable-hydrogen-energy-hub.html
[3] https://joebiden.com/climate-labor-fact-sheet/
[4] http://www.airproducts.com/Company/news-center/2020/07/0707-air-products-agreement-for-green-ammonia-production-facility-for-export-to-hydrogen-market.aspx
[5] https://efiling.energy.ca.gov/GetDocument.aspx?tn=230751
[6] https://www.ethree.com/wp-content/uploads/2018/05/Comparison_Graphs_CEC-EPIC-GHG-Scenarios-clean-26Jan2018.xlsm

using green electrolytic hydrogen could be profitable in the Southern California market in the 2025-2030 timeframe.[7]

Renewable gas has the unique ability to decarbonize hard-to-abate sectors, and any other, at scale. Renewable gas can decarbonize the last parts of the power and transportation sectors – which wind, solar and batteries can't practically do on their own – as well as the industrial sector, including buildings, fertilizer and agriculture, and waste. And it can do so cost-effectively, once the market gets to scale.

In addition to the market activities and studies identified above, several other studies expect green electrolytic hydrogen to rapidly scale, fall in price, and become a widely available, cost-effective energy and climate solution over the next decade – just as solar and batteries have become over the past decade. For example, Bloomberg New Energy Finance suggests costs for green electrolytic hydrogen could plunge by 80 percent by 2030,[8] while an analysis by McKinsey for the Hydrogen Council finds that green electrolytic hydrogen could become an increasingly cost-effective solution for decarbonizing many sectors of the economy, beginning as soon as the 2025-2030 timeframe.[9] With the widescale availability of low-cost, renewable power available – including in California – those reports and others point to scaling electrolyzer production as the key barrier to enabling renewable hydrogen as a cost effective energy and climate solutions.[10,11] Accordingly, if we adopt policies that facilitate scaling electrolyzer production capacity, we can quickly unleash cost-effective, zero carbon energy solutions.

Green Stimulus through Renewable Gas Buildout

California has always been and continues to be an international leader in creating long-term sustainable new market frameworks that result in expanding the green economy, drastically increasing clean technology jobs and accelerating greenhouse gas emission reductions. Under California's policy leadership, we have benefitted from a robust clean energy sector boom for nearly two decades, with policies ranging from the Renewable Portfolio Standard to zero-emission vehicle initiatives. The green economy exploded with these policies, creating more than half-a-million clean energy jobs in the state, along with new market opportunities and private investments in infrastructure in California.

---

[7] https://www.ethree.com/e3-evaluates-hydrogen-opportunities-in-a-low-carbon-future/

[8] https://www.bloomberg.com/news/articles/2019-08-21/cost-of-hydrogen-from-renewables-to-plummet-next-decade-bnef

[9] https://hydrogencouncil.com/wp-content/uploads/2020/01/Path-to-Hydrogen-Competitiveness_Full-Study-1.pdf

[10] For example, an analysis by HSBC bank notes "A glut of wind and solar power can make our lightest element economic." https://www.gbm.hsbc.com/insights/global-research/renewables-can-make-hydrogen-green

[11] As another example, former Energy Secretary and Nobel Prize winner Steven Chu has noted renewable power prices at some sites are already below levels needed to make green electrolytic hydrogen cost-effective. https://www.forbes.com/sites/jeffmcmahon/2019/04/02/get-ready-for-1-5%C2%A2-renewable-electricity-steven-chu-says-which-could-unleash-hydrogen-economy/#14fa86b41c01

A similar policy effort around renewable gases will yield similar economic results. Green electrolytic hydrogen, in particular, offers double job benefits across the renewable power and renewable gas sectors. Policies supporting green electrolytic hydrogen will turbocharge job creation in the renewable power sector, while also supporting existing and new jobs in the gas and other sectors. For perspective, Bloomberg New Energy Finance projects that to meet a 1.5°C climate target, about a quarter of global energy demand would be supplied by renewable hydrogen, which would double demand for renewable power in the future.[12]

Renewable Gas Policy: Incorporation into Existing Programs

The state can take important steps to begin to capture the enormous economic and environmental benefits associated with renewable gas projects and market development by appropriately including renewable gas, and green electrolytic hydrogen in particular, in its existing policies and planning efforts:

- **SB 1383 (Lara, 2016):** A simple step the state can take to support renewable gas markets and associated benefits is to stick to the regulatory framework and timelines already established at CalRecycle, pursuant the state's short-lived climate pollutant law, SB 1383. We ask that CARB support CalRecycle in its timely implementation of its regulation and consider other financial and non-financial incentives, as described below, to support project developers, local jurisdictions, and the broader market in meeting the targets established in these policies.

- **SB 1369 (Skinner, 2018):** This statute directs CARB and other state agencies to advance opportunities for green electrolytic hydrogen as long duration (seasonal) energy storage and other potential applications, including supporting grid reliability and minimizing reliance on fossil-based power plants. We ask that CARB, CPUC and CEC work together on policies to expand the use of green electrolytic hydrogen as long duration energy storage, dispatchable, zero carbon energy generation, and in other ways that support the reliable operation of the electricity grid. This could also include allowing access to wholesale electricity rates for production of renewable hydrogen and other market rules to enable the state to put curtailed electricity to use as renewable hydrogen.

- **SB 100 (De León, 2018):** The state's pioneering clean energy law requires agencies to plan for renewable and zero carbon resources to provide 100 percent of retail sales and state agency energy demands by 2045. This leaves room for conventional, fossil-fueled generation to continue playing a significant role in powering California's grid beyond 2045, which has been incorporated into initial modeling scenarios. Indeed, during the workshop, CPUC staff mentioned the state will continue to rely on most of the existing

[12] BNEF (2020) *Hydrogen Economy Outlook, Key Findings,* Bloomberg New Energy Finance, March 30. https://data.bloomberglp.com/professional/sites/24/BNEF-Hydrogen-Economy-Outlook-Key-Messages-30-Mar-2020.pdf

fleet of fossil fueled power plants through 2045.

The state can truly achieve zero carbon emissions throughout the electricity sector if it plans to transition existing fossil fueled power plants to zero carbon resources, including through the use of renewable gas, as the Los Angeles Department of Water and Power is doing. We encourage CARB, CEC and CPUC to include green electrolytic hydrogen in its SB 100 modeling, along with scenarios that achieve zero or near-zero emissions in the sector.

- **SB 1440 (Hueso, 2018):** As part of Phase 4 of its renewable natural gas proceedings, the CPUC is considering procurement standards pursuant to SB 1440, which directs the agency to develop biomethane procurement targets to meet the state's short-lived climate pollutant and other climate targets, as well as hydrogen-related issues. We encourage CARB to support the CPUC in these efforts, and in particular, to push for biomethane procurement targets that align with volumes and timelines of diverted organic waste under CalRecycle's SB 1383 regulations. Appropriate procurement targets will help support successful implementation of the state's short-lived climate pollutant strategy, including the quick deployment of required infrastructure and associated jobs, air quality and climate benefits. Additionally, we encourage CARB to support CPUC in developing near-term standards allowing for the injection of green electrolytic hydrogen into the natural gas pipeline network.

- **Scoping Plan:** As CARB begins to develop its next Scoping Plan, which will provide an initial outline for achieving climate neutrality in California, it should evaluate the role renewable gas can play in decarbonizing all sectors of the economy, including waste, industry, heavy-duty transportation, seasonal electricity storage and electricity generation, building energy, shipping, and aviation. Green electrolytic hydrogen may also be an important strategy for achieving net negative greenhouse gas emissions, either through biomass-to-hydrogen pathways with carbon capture and sequestration, or using green electrolytic hydrogen to create new fuels or materials from carbon dioxide removed from the atmosphere or ocean. We recommend that as part of the next Scoping Plan, CARB include a strategic plan for accelerating the production and use of green electrolytic hydrogen in California, in order to make it a cost-effective, widely available climate solution within the next decade and a driver of economic growth in California.

Renewable Gas Policy: New Programs to Drive Economic Growth

In addition to effectively implementing existing policies to include renewable gas, CARB and other state agencies have all the authority they need to pursue additional policies to enable this key climate solution and accelerate market growth and job creation. We hope CARB will consider taking additional steps that could put the state on the path to resilient, economy-wide clean energy solutions:

- **Create a renewable gas procurement program.** SB 1383 and SB 1440 direct the state to develop policies that promote increased renewable gas development. A procurement target for gas users and/or gas system managers that parallels the Renewable Portfolio Standard (RPS) in the electric sector is the most effective policy that can help make a renewable gas market, create jobs, and attract private investors. Like the RPS for electricity, a renewable gas standard should provide clear price signals and long-term visibility into the market, which has enabled renewable power markets to quickly and successfully grow.

- **Establish an electrolyzer deployment target.** Since costs for green electrolytic hydrogen are so tightly connected to market scale, CARB can put the state, and planet, on course for cost-effective renewable hydrogen on a timeline it chooses, by setting and achieving targets for electrolyzer deployment that align with targets in a renewable gas standard and the objective of ensuring widely available, cost-effective renewable hydrogen supplies and cost-parity with fossil-based gases by 2030. Germany is taking a similar approach, with various entities calling for electrolyzer deployment targets of 5 GW over 5 years, 10-15 GW by 2030, and 40 GW by 2050.[13,14] This is the same approach and rationale as California has previously used when setting deployment targets for energy efficiency, rooftop solar power, or zero emissions vehicles. Such a target would send a clear market signal that would foster private sector investment and support green stimulus in California.

- **Provide monetary incentives to support first-mover projects for organics recycling and green electrolytic hydrogen, accelerate project development, and maximize benefits.** The state can support organics recycling and green electrolytic hydrogen infrastructure by providing monetary incentives to support first-mover jurisdictions and project developers and encouraging others to accelerate their plans for developing projects and reducing emissions. We encourage the state to pursue federal stimulus dollars and CARB and other state agencies to provide near-term financial support for organics recycling and green electrolytic hydrogen projects and to develop financial mechanisms to support broader market transformations. Sources of funding for state incentives or financial mechanisms could include:

    - Gas utility Cap-and-Trade allowance value.
    - Utility programs, including EPIC.
    - Gas system interconnection incentives.
    - Grants and tax incentives.
    - Waste generator fees and recycling incentives.

[13] https://www.reuters.com/article/us-germany-gas-conference/german-gas-industry-targets-5-gw-of-power-to-gas-capacity-in-five-years-idUSKBN1Y01UI

[14] https://www.cleanenergywire.org/news/german-government-postpones-hydrogen-strategy-coal-exit-hearing

- **Support a series of pilot projects to serve as launching pads for the renewable gas market.** We hope CARB will additionally support development of pilot projects to quickly attract investment to the state while serving to demonstrate and scale renewable gas markets. Potential market-moving pilot projects include:

    - Procure renewable gas for state agencies and buildings
    - In-state power plant conversion to green electrolytic hydrogen
    - Decarbonize a large industrial user of hydrogen
    - Large-scale demonstration of green electrolytic hydrogen to deeply decarbonize the gas system and multiple end uses

Moving Forward Together

While this new decade ushered in an overwhelming pandemic that has disrupted our lives and devastated our short-term economic outlook, California's collective environmental state policies also present opportunities to immediately expand the green workforce and put us on a long-term trajectory of continued sustainable revitalization. Upgrading infrastructure and leveraging the renewable electric and organic waste collection systems to green our gas resources is our next big opportunity in energy and the jobs that comes with it. As investors, developers, and technology and solution providers in California, we look forward to tackling this challenge with you.

Sincerely,

Lorraine Paskett
Vice President, True North Renewable Energy

Sean Ebnet
Lead Developer, Ørsted