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September 1, 2015

The Honorable Mary Nichols, Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814
(Comment submitted electronically)

RE: Cap-and-Trade Auction Proceeds, Second Investment Plan, Draft Concepts

Dear Chair Nichols,

Sierra Energy appreciates the opportunity to provide comments regarding the concept paper developed by the Air Resources Board (“ARB”), Cap-and-Trade Auction Proceeds Second Investment Plan (“Second Investment Plan”). Sierra Energy is developing the capabilities to produce hydrogen from municipal solid waste (“MSW”), and to deploy hydrogen fuel cells in freight applications. We are therefore supportive of ARB’s Second Investment Plan. In addition, we would like to suggest opportunities to enhance the Second Investment Plan by facilitating the production of low carbon intensity hydrogen, and the development of truly zero emission freight solutions. Specifically, this letter recommends that the ARB:

- Consult with the Secretary of Environmental Protection to enable sound recommendations to the Legislature and Governor regarding the production of clean hydrogen by January 1, 2016, as mandated by California Health & Safety Code §43869(g);
- Incentivize the development and production of all clean and low carbon intensity fuels rather than limiting incentives to renewable fuels; and,
- Consider short line railroad locomotives and freight yard fuel cell tenders as priority areas for zero emission funding.

Sierra Energy’s Expertise

Sierra Energy and Sierra Northern Railway are both companies within the Sierra Industrial Group. Sierra Energy is a waste gasification company founded in Davis, California in 2004. Sierra Northern Railway was formed in August 2003 through the merger of two Northern California short line railroads: the Sierra Railroad Company and the Yolo Shortline Railroad. As a result, Sierra Energy has relevant experience and capabilities that range from the conversion of methane-emitting municipal solid waste (“MSW”), to the reduction of black carbon from locomotives.

Sierra Energy's FastOx Gasifier is a robust and flexible technology, capable of processing MSW, hazardous waste, medical waste, construction and demolition waste, and other waste streams. The application of Sierra Energy's waste gasification technology reduces the air, soil and water pollution created by landfills; and produces clean, low carbon energy for power and transportation. The syngas generated is suitable for reformation into fuel grade hydrogen.

Sierra Energy is currently installing a modular, community-scale waste gasification system at U.S. Army Garrison Fort Hunter Liggett in Monterey County. Sierra Energy's technology was selected by the US Department of Defense's ("DoD") Environmental Security Technology Certification Program to help increase DoD energy security, reduce waste and energy costs, drastically reduce greenhouse gas emissions, and help meet the U.S. Army's net-zero initiatives. The project has also received grant support from the California Energy Commission to convert the resulting syngas into Fischer-Tropsch diesel fuel for transportation applications.

Sierra Northern Railway has been at the forefront of reducing black carbon emissions from locomotives. Short line railroads are typically exempted from state regulations by federal preemption. Nonetheless, Sierra Northern Railway has worked with local air districts on a number of projects to retrofit locomotives and reduce emissions. Given its fleet of locomotives, network of rail lines, and relationship to Sierra Energy, Sierra Northern Railway is ideally situated to develop and execute zero emission freight projects.

Recommendations

Provide specific recommendations to the Legislature and Governor regarding the production of clean hydrogen by January 1, 2016, as mandated by California Health & Safety Code §43869(g).

As is recognized in the Second Investment Plan,

"Projects supported in 2016-17 through 2018-19 will realize benefits beyond 2020 and should be focused on helping deliver successes in meeting the State's mid- and long-term climate targets and goals. Therefore, this Second Investment Plan suggests investing in programs and projects that lay the groundwork for the approaches to resource management and zero and near-zero emission systems that are needed to meet the State's long-term reduction targets."¹

In order to enable the development of truly zero and near-zero emission systems, it is

¹ Second Investment Plan at 4.

necessary to address the emissions caused by the production of the fuel as well as the tailpipe emissions. Passed in 2006 as a cornerstone of California's planned hydrogen economy, SB 1505 was intended to ensure that hydrogen used in transportation applications in California is clean and renewable. SB 1505 mandates that the ARB:

“(A)dopt regulations that will ensure that state funding for the production and use of hydrogen fuel, as described in the California Hydrogen Highway Blueprint Plan, contributes to the reduction of greenhouse gas, criteria air pollutant, and toxic air contaminant emissions, and would require these regulations to meet minimum requirements, as specified.”

As stated in the SB 1505 at Section 1(l):

“According to the California Hydrogen Highway Blueprint Plan, the absence of specific goals for reducing emissions and using renewable resources to produce hydrogen fuel might actually increase greenhouse gas and particulate matter emissions relative to petroleum fueled vehicles.”

ARB commenced its SB 1505 rulemaking in 2007 and held a series of workshops. The last scheduled workshop on April 19, 2010 was cancelled without explanation and never rescheduled.² In addition, ARB has missed several January 1, 2010, deadlines established by the bill that are now codified including the following:

“The Secretary for Environmental Protection, in consultation with the state board, shall recommend to the Legislature and the Governor, on or before January 1, 2010, incentives that could be offered to businesses within the hydrogen fuel industry and consumers to spur the development of clean sources of hydrogen fuel.”³

The lack of regulatory structure and incentives to enable the development of clean sources of hydrogen fuel has likely been one factor in the slow development of low carbon intensity hydrogen. Under the Low Carbon Fuel Standard (“LCFS”), not a single company has obtained approval for a low carbon intensity hydrogen pathway. Instead, the LCFS program includes only the following standardized hydrogen pathways:

² See <http://www.arb.ca.gov/msprog/hydprod/hydprod.htm> and related links (last viewed August 18, 2015).

³ California Health and Safety Code §43869(g).

Fuel	Pathway Identifier	Pathway Description	Carbon Intensity Values (gCO ₂ e/MJ)			
			Direct Emissions	Land Use or Other Indirect Effect	Total	
	HYGN003	Compressed H ₂ from central reforming of NG (no liquefaction and re-gasification steps)	98.80	0	98.80	
	HYGN004	Compressed H ₂ from on-site reforming of NG	98.30	0	98.30	
	HYGN005	Compressed H ₂ from on-site reforming with renewable feedstocks	76.10	0	76.10	
	Hydrogen	HYGN001	Compressed H ₂ from central reforming of NG (includes liquefaction and re-gasification steps)	142.20	0	142.20
		HYGN002	Liquid H ₂ from central reforming of NG	133.00	0	133.00

We recognize that even with the relatively high carbon intensity of conventional hydrogen fuel, highly efficient hydrogen vehicles can still achieve GHG reductions under the LCFS program. This efficiency is recognized by the LCFS energy economy ratios for hydrogen vehicles which range from 1.9 to 2.5. However, for hydrogen transportation to deliver on its potential as a true zero emission fuel, new methods of low carbon intensity hydrogen production must be developed. As a global leader in clean energy technology and policy, California is the optimal state to develop these new clean hydrogen production technologies.

To unlock the potential of clean hydrogen production, ARB should integrate the following changes to its Second Investment Plan:

1. In the Summary of Potential Investment Concepts on page 8, include the development of clean⁴ hydrogen production technologies;
2. On page 12, include a category of Advanced Fuel Technology and a reference to “Demonstrations, pilot projects and deployment of low carbon intensity hydrogen fuel production methods;” and,
3. Initiate the necessary analysis to provide recommendations to the Secretary of Environmental Protection by December 15, 2015, regarding “incentives

⁴ The word “clean” is used in SB 1505 and can reasonably be interpreted to reference the environmental standards established by the statute.

that could be offered to businesses within the hydrogen fuel industry and consumers to spur the development of clean sources of hydrogen fuel.”

Incentivize the development of all clean and low carbon intensity fuels rather than solely fuels categorized as renewable.

The Second Investment Plan discusses the opportunities inherent in the capture and conversion of waste to energy and fuels, as well as policy strategies to eliminate future disposal of organic materials at landfills. However, the Plan limits its draft investment concepts to reducing methane release from organic waste and utilizing traditional composting and anaerobic digestion technologies.⁵

While constructive, these proposed measures to reduce methane emissions are unnecessarily narrow. As the ARB recently recognized in its Concept Paper on Short-Lived Climate Pollutants:

“Even if we eliminate new organics in landfills, existing organic waste in landfills will remain a source of methane emissions for years to come.”⁶

To achieve the ambitious California’s ambitious GHG reduction and air quality goals, it is necessary to more aggressively reduce emissions in the waste sector. California has developed a waste treatment and diversion policy that currently renders it infeasible to convert the methane released from MSW into energy or fuels. In particular, existing policies preclude the development of gasification techniques that would otherwise better enable the state to achieve GHG, petroleum and criteria pollutant reduction goals while maintaining air, water and soil quality, and attaining renewable energy standards. These policy limitations are evidenced by the impossible standard imposed on MSW to qualify as renewable energy under the state’s renewable portfolio standard:

(b) "Municipal solid waste conversion," as used in subdivision (a), means a technology that uses a noncombustion thermal process to convert solid waste to a clean-burning fuel for the purpose of generating electricity, and that meets all of the following criteria:

(1) The technology does not use air or oxygen in the conversion process, except ambient air to maintain temperature control.

⁵ Second Investment Plan at p. 21.

⁶ Air Resources Board, Short-Lived Climate Pollutant Second Investment Plan, Concept Paper, May 7, 2015, at p. 20-21.

- (2) The technology produces no discharges of air contaminants or emissions, including greenhouse gases as defined in Section 38505 of the Health and Safety Code.*
- (3) The technology produces no discharges to surface or groundwaters of the state.*
- (4) The technology produces no hazardous wastes.*
- (5) To the maximum extent feasible, the technology removes all recyclable materials and marketable green waste compostable materials from the solid waste stream prior to the conversion process and the owner or operator of the facility certifies that those materials will be recycled or composted.⁷*
- (...)*

In order to maximize the impacts of the Second Investment Plan, ARB should leverage existing and future technologies that are capable of converting MSW to energy and fuel, without harmful environmental impact. In addition to organic waste in landfills, this material will also include contaminated organic waste that is impractical to separate from MSW, and other non-organic material. Sierra Energy looks forward to assisting ARB in developing a strategy that reduces methane from all sources, not just methane from organic material that meets the renewable definition.

To reflect this approach, the ARB should remove the word “renewable” from its Draft Investment Concepts on page 12 and instead provide, “Incentives for in-State production of low carbon intensity fuels.”

Prioritize short line railroad locomotives and freight yard fuel cell tenders as priority areas for zero emission funding.

The Second Investment Plan recognizes that,

Further, continued financial support is critical to transition to a zero emission freight system. This approach includes significant investment in pre-commercial development and demonstrations of innovative freight technologies, followed by greater funding to support widespread deployment. Also required is funding for the alternative renewable fuels and fueling infrastructure to support these advanced technologies.⁸

Sierra Energy is in agreement that there are significant opportunities in the

⁷ Public Resources Code §25741(b)(1)-(5).

⁸ Second Investment Plan at p. 11.

locomotive sector for the development and deployment of fuel cell tenders. As the ARB has recognized, locomotives are far less constrained than heavy-duty trucks by space and weight issues thus the larger and heavier footprint of fuel cells is not problematic. Locomotive engines are electrically powered and travel on pre-determined routes on tracks between stations with infrastructure capabilities thus further enabling fuel cell technologies.

In addition to these factors, short line railroads are particularly well-suited for fuel cell tenders. California short line railroads:

1. Operate primarily or exclusively within the state of California;
2. Have shorter routes to travel;
3. Have lesser rates of locomotive utilization than national locomotives; and,
4. Can become a vital part of California's clean energy economy.

For all of these reasons, California's short line railroads provide the optimal proving ground for ZEV and other demonstration projects in the locomotive sector.

Conclusion

Thank you for your consideration of our input. We look forward to continuing to participate in the development of fuels and technologies that support the ARB's major transportation goals and targets.

Sincerely,

A handwritten signature in black ink, appearing to read 'Michael Hart', with a stylized, cursive script.

Michael Hart

Cc: Catherine Dunwoody, Division Chief, Fuel Cell Program
Sam Wade, Transportation Branch Chief
Graham Noyes, Keyes, Fox & Wiedman LLP