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April 5, 2014

Ms. Rajinder Sahota,
Chief, Climate Change Program Evaluation Branch
California Air Resources Board
1001 I Street
Sacramento, CA 95812-2828

Filed Online

Subject: **Praxair Inc. Comments on March 21, 2014 15 Day Cap-and-Trade Amendments**

Dear Ms. Sahota:

Praxair, Inc., (Praxair)[1] provides the following comments on the March 21, 2014 Cap-and-Trade Regulatory Amendments. Praxair supports the Air Resources Board's ("ARB") proposed update to the emissions benchmark specified in Table 9-1 for liquefied hydrogen. As amended the Cap-and-Trade Regulation would recognize that liquefied hydrogen is a separate and distinct product from gaseous hydrogen. The Cap-and-Trade Regulation would allocate 8.94 allowances for gaseous hydrogen and 11.9 allowances to liquefied hydrogen. The allocation for liquefied hydrogen would be based on the quantity of liquid hydrogen sold.

Praxair supports the ARB's efforts to recognize the diverse economic activities occurring in California. The separation of liquid and gaseous hydrogen achieves parity with other aspects of the regulation where the ARB has acknowledged the distinctions in different product types that may be categorized under a common four, five or six digit NAICS code (e.g., various types of food processing and atypical vs. typical refineries).

As Praxair has noted in its previous comments on the Cap-and-Trade amendments - liquefied and gaseous hydrogen have different demands and uses for their products, and similar to the refining sector, liquefied and gaseous hydrogen production are structurally distinct. Liquefied hydrogen plants are smaller than plants producing gaseous hydrogen for use by refineries. This is because liquefied hydrogen plants are sized to meet the regional and fluctuating market demands for liquefied hydrogen. As such, liquefied hydrogen plants are typically 5 - 10% of the size of gaseous hydrogen plants serving refineries. Moreover, due to the predictable demand of refineries, gaseous hydrogen plants typically operate closer to their nameplate capacities, resulting in higher operating efficiencies. Liquefied hydrogen plants have less consistent demand, meaning they cannot consistently achieve the same operating efficiencies as gaseous hydrogen plants serving refineries. Thus, due to the completely different customers and demands for their products, liquefied and gaseous hydrogen plants have different GHG emissions intensities.

[1] Praxair was founded in 1907 and became an independent publicly traded company in 1992. Praxair is a supplier of atmospheric gases and coating services business, and is globally recognized for its sustainability efforts (Dow Jones Sustainability World Index in each of the last 11 years, and World CDP Leadership Index for six consecutive years). In California, Praxair has 1000 employees at 80 locations and five production facilities: two atmospheric, two carbon dioxide, and one hydrogen.

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Moreover, gaseous hydrogen is typically consumed close to the gaseous hydrogen production facility (such as in a refinery setting) and there are minimal commodity losses between what is produced and what is delivered to customers. On the other hand, there are commodity losses associated with the handling and delivery of liquefied hydrogen. Liquefied hydrogen is transported by truck and there can be losses due to the distance traveled, elevation, temperature and other factors. Since liquefied hydrogen producers must report the volumes sold to their customers under the Mandatory Reporting Regulation (and this information will be the basis for the allowance allocation), the liquefied hydrogen benchmark would appropriately account for the delivered product. It is also important to note that sales data is more easily verified than production data, resulting in a more accurate allocation to liquefied hydrogen producers.

Finally, liquefied hydrogen plants are structurally different due to the purity requirements for creating liquefied hydrogen. To produce liquefied hydrogen, the hydrogen feedstock from a Steam Methane Reformer ("SMR") must be purified to 10 ppm. By comparison, SMR's that serve refineries only require a purity of 1,000 ppm. To achieve the higher purity for liquefaction, the filtering process disposes of both hydrogen and impurities together. The impact of purifying the hydrogen is the loss of approximately 5.6% of the molecules created in the reforming process. This reduced volume of hydrogen increases the CO2 emissions per unit of liquid hydrogen produced.

CONCLUSION

Praxair supports the ARB's recognition of the distinctions between gaseous and liquefied hydrogen and the development of an appropriate benchmark for liquefied hydrogen that is consistent with the ARB's analysis for other products. We appreciate the ARB staff's attentiveness to these issues and thank the ARB staff for their diligent efforts to address the myriad issues facing California diverse economy in an open and transparent manner.

Sincerely,

Gerald L. Miller
Vice President,
West Region
Praxair, Inc.