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April 1, 2015

To: Portland Planning and Sustainability Commission

From: Susan Anderson, Director, and Michael Armstrong, Senior Sustainability Manager

Subject: Options to mitigate carbon impacts of propane export terminal

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This memo summarizes the discussions of Andre' Baugh, Teresa St. Martin and Chris Smith to evaluate options to mitigate the impacts of the greenhouse gas emissions associated with the proposed propane export facility at Terminal 6.

Based on direction from the March 17 PSC briefing, the group discussed two primary approaches to assessing the carbon emissions related to the facility:

1) Total lifecycle emissions: This includes emissions resulting from the extraction, processing, transportation, storage and use of the propane.
2) Estimated net emissions: This takes the total lifecycle emissions as a starting point and adjusts the emissions based on assumptions about the end use of the propane, including how much is used as a chemical feedstock and how much displaces existing use of fossil fuels.

Table 1 below shows the calculations for emissions using the two approaches.

The three members of the PSC also discussed several reference points for the financial value of carbon emissions:

1) Market price in the California cap-and-trade market: The California program covers the electric power and industrial sectors and began in 2013. Over the course of 2014, California market prices averaged $12.08/ton, with a relatively narrow range of $11.66 to $12.58/ton. As of March 26, 2015, the price was $12.64/ton (http://calcarbondash.org/).
2) Recent auction of emissions allowance by the Regional Greenhouse Gas Emissions Initiative (RGGI) involving nine northeastern states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont). RGGI began auctioning carbon emission allowances in 2008 and held its 27th auction on March 11, 2015, which resulted in a clearing price of $5.41/ton (www.rggi.org/market/co2_auctions/results/auction-27).
3) Market price in the European Emissions Trading Scheme: Launched in 2005, the European carbon market covers 31 countries and broad sectors of the economy. Market prices have ranged from less than €1/ton to as high as €30/ton, reflecting changes in the number of emission allowances issued as well as the recession. As of March 25,

2015, emission allowances were trading at €7/ton, or $7.57 (www.economist.com/news/economic-and-financial-indicators/21647315-markets). For the first half of 2014, carbon allowances traded for an average of €6.23/ton, or $6.77 at current exchange rates.

Recommendations

Carbon emissions

The PSC members recommend using Scenario 2 (see Table 1 below) to reflect the full lifecycle emissions but adjust those emissions based on the assumption that 50% of the propane would be used as a chemical feedstock, 15% would displace coal, and another 15% would displace fuel oil.

Scenario 2 = 0.9 million metric tons carbon dioxide equivalent

Carbon price

PSC members agreed that the European market price was the most reliable benchmark for the cost of reducing emissions, given its longevity and broad applicability to many economic sectors. The price of carbon should be revised annually to reflect the European market price.

European Union Allowance (EUA) market price for 2014 = €6.23/metric ton = $6.77/metric ton

Carbon mitigation investments

PSC members recommend that the City seek a 25-year funding commitment that would be managed as a separate Environmental Investment Fund administered by the City with oversight from an advisory board. If the propane exports become subject to a sufficient carbon fee or pricing mechanism, the funding commitment would be re-evaluated at that time. Funds will be restricted to funding projects that:

- Reduce energy use, generate electricity from renewable energy sources (e.g., wind and solar); or
- Sequester carbon (e.g., tree planting, habitat improvements).

In addition to reducing or sequestering carbon, projects will occur in the City of Portland and prioritize benefits to public health, local economic development, environmental health, and equity, both through workforce practices and by targeting lower-income households and small business.

The funds should be invested with a high degree of transparency, including annual reporting. After five years, the uses and mechanism for administering the funds will be evaluated.

Table 1

Carbon Mitigation Scenarios All figures in metric tons CO2-equivalent
3/27/2015
draft Emissions estimates are from Port of Portland "Propane White Paper" prepared by URS, March 3, 2015

Scenario 1: Full Lifecycle Emissions with Credit for Green Power Use at Facility

(1)	*(2)*	*(3)*	*(4)*	*(5) = 1 + 2 + 3 - 4*
Propane process GHG emissions	GHG emissions for transport and storage of propane	GHG emission from 100% combustion	Credit for green power use at Portland facility	Total
735,714	63,307	3,425,287	40,378	4,183,930

Scenario 2: Adjusted Lifecycle Emissions Including Upstream Process Emissions

Assumptions:

50%	= % of propane used as feedstock and not burned
15%	= % of propane that displaces coal
15%	= % of propane that displaces diesel or fuel oil

(1)	*(2)*	*(3)*	*(4) = 1 + 2 - 3*	*(5)*	*(6) = (5) * % assumed above*	*(7)*	*(8)*	*(9) = 4 + 6 - 7 - 8*
Propane process GHG emissions	GHG emissions for transport and storage of propane	Credit for green power use at Portland facility	Adjusted process, transport and storage subtotal	GHG emission from 100% combustion	Adjusted emissions based on % used as feedstock	Credit for combusted propane that displaces coal	Credit for combusted propane that displaces diesel or fuel oil	Net GHG emissions
735,714	63,307	40,378	758,643	3,425,287	1,712,644	797,615	752,320	921,352