STAFF DRAFT—08-10-06

Sectors in Addition to Electricity Load to Consider for an Oregon Carbon Cap-and-Trade Program

Introduction

The Oregon Carbon Allocation Task Force is studying the feasibility of, and design for, an Oregon carbon cap-and-trade program. Its first focus is limiting the carbon emissions from electrical load-serving entities (LSEs) through a load-based cap-and-trade system. If an expanded Oregon cap-and-trade scheme were developed, it is important to consider which sectors, in addition to the electrical sector, would be suitable to cap. The nature of the emissions from the sector would also inform the design of the cap.

Emissions associated with electricity generation accounted for about 42 percent of Oregon's total CO_2 emissions and 35 percent of its total greenhouse gas (GHG) emissions in 2000. Thus, in order to incorporate a larger portion of overall GHG emissions and benefit from a diverse set of emission reduction possibilities, it is critical to examine other sectors with significant GHG emissions. Transportation accounted for 38 percent of Oregon's CO_2 emissions in 2000, and direct use of natural gas, distillate fuel, residual oil, and coal in the industrial (12 percent), commercial (3 percent) and residential (5 percent) sectors accounted for 20 percent.

Governor Ted Kulongoski has set a goal of reducing GHG emissions by 10 percent below 1990 levels by 2020 and 75 percent below by 2050. Putting a carbon cap on electrical LSEs is a critical first step in meeting those goals. Likewise, Oregon's adoption of a GHG emission standard for new vehicles is another important milestone in reducing the state's emissions.

In looking at other sectors or facilities that might be suitable for a cap, there are a couple of examples to consider: California legislation (Assembly Bill (AB) 32) and the European Union Emission Trading Scheme.

Design Criteria in California

The California Assembly is considering a bill that would cap greenhouse gas emissions beginning in 2012. In AB 32, most implementation decisions are left to the California Air Resources Board. In determining which sources and categories of sources will be subject to an emissions cap, the ARB would take into consideration the following characteristics:

(1) The significance of its contribution to statewide emissions.
(2) The effectiveness of existing emissions reduction strategies in reducing greenhouse gas emissions.
(3) The ease of implementation and cost-effectiveness of further greenhouse gas emission reductions from these sources.

A multi-sector or facility-based cap-and-trade program that has taken into considerations these characteristics might prove to be advantageous because a larger number of GHG

emitting sources would be mandated to reduce emissions, thereby making the governor's reduction goals more feasible.

On the other hand, a cap-and-trade program is not necessarily the best approach for reducing emissions from *all* types of GHG-emitting sources. The transportation sector is a good example where emissions standards for vehicles, use of alternative fuels, and land use techniques, such a compact urban growth, are more effective at the state level.

European Union Emission Trading Scheme (EU ETS). The EU ETS was created to help each member state comply with its Kyoto Protocol obligations of reducing GHG emissions by 5.2 percent below 1990 levels for the period 2008-2012. In Phase I (2005-2007) of the EU ETS, only carbon dioxide emissions are regulated; the other five greenhouse gases may be covered during Phase II (2008-2012). There are 12,000 plants that are currently regulated under the cap and together these make up a little less than half of the EU's total CO_2 emissions. The *Official Journal of the European Union* has established various categories of activities and installations that are regulated, including:

1. Energy activities
    a. Combustion installations with a rated thermal input exceeding 20 MW (except hazardous or municipal waste installations)
    b. Mineral oil refineries
    c. Coke ovens
2. Production and processing of ferrous metals
    a. Metal ore (including sulfide ore) or sintering installations
    b. Pig iron or steel (primary or secondary fusion) including continuous casting[1]
3. Mineral Industry
    a. Installations for the production of cement clinker or lime in rotary kilns or in other furnaces
    b. Installations for the manufacture of glass including glass fiber
    c. Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, titles, stoneware or porcelain
4. Other activities
    a. Production of pulp from timber or other fibrous materials
    b. Production of paper and board

Which Sectors or Types of Facilities Might be Suitable in Oregon?
The task force is designing a load-based cap-and-trade scheme for electricity use in Oregon. In addition, there are other sectors or large-emitting facilities in Oregon that would be well suited to be under a different type of carbon cap.

[1] "Where one operator carries out several activities falling under the same subheading in the same installation or on the same site, the capacities of such activities are added together" (Annex I, 10/25/2003, pg. L 275/42).

Natural Gas

A load-based system such as being proposed for electricity suppliers would not have the same benefits for a natural gas utility. Whereas a load-based system is designed to capture the benefits of changing the fuel mix of generators as well as energy efficiency, energy efficiency and fuel switching are the only alternatives for natural gas utilities. In most cases, fuel switching would be to a more carbon-intensive fuel or, if to electricity, it could create an unanticipated load for electric utilities that are trying to reduce load to meet their caps.

It is appropriate to distinguish between large end-users who contract for their gas in the wholesale market from interstate suppliers and all others who obtain their natural gas from a utility, regardless of size. The issue then becomes 1) whether to cap the natural gas utilities or whether to use another approach for utility customers, such as a carbon-weighted public purpose charge, and 2) whether to cap individual sectors of large natural gas end-users.

About 13 percent of Oregon's total CO_2 emissions in 2000 came from direct combustion of natural gas in the residential, commercial, and industrial sectors. About 8 percent of the total CO_2 emissions came from customers of natural gas utilities. About 5 percent of total CO_2 emissions was delivered directly to wholesale customers, not including central electricity generating plants.

Natural Gas Utility Customers

One approach would be to set a cap for utilities that meets the goal of being 10 percent below 1990 levels and leaving it to the utilities to reduce their sales to that level through efficiency. Meeting that goal would require about a 41 percent reduction from 2004 natural gas utility emissions, compared to the 17 percent reduction required of the electricity sector based on the same year's emissions. Based on Public Utility Commission data, there would need to be an identical reduction from wholesale purchasers of natural gas that was transported by utilities. We do not have data for natural gas delivered directly from interstate pipelines to wholesale customers.

Another approach would be to establish a public purpose charge directed to energy efficiency. To maintain parity with the effort required of the electricity sector, there could be an adder to the cost-effectiveness level that is equivalent to a $40 per tonne circuit breaker. Such an adder would increase the cost-effectiveness criteria level by $2.12 per million Btu (2004 $) above the forecast price of natural gas. While this approach would not have the certainty of the electricity cap and while it would not meet the governor's goal for natural gas users, some might consider it more equitable compared to the potential costs of emissions reductions required of the electricity sector.

While the adder would be comparable to the $40 per tonne circuit breaker, as with the electricity sector, the cost of individual measures would not necessarily be $40 per tonne. That would be the maximum. Likewise, while this technique would

tend to push the cost of actions toward the $40 per tonne, the percentage of reductions would still be smaller than that required by a cap on electricity and the uncertainty of achieving absolute reductions would be higher.

Other Natural Gas Users

Of the CO_2 emitted in 2000, _____ percent was emitted by about 140 natural gas transport customers. These are large businesses that buy natural gas on the wholesale market, not through a utility. Therefore, the utility approaches described above would not affect them. Instead, the state would need to set a cap on each facility. This facility-based cap would be similar to the individual caps in the EU ETS.

Other Fossil Fuels

Based on reports filed with the Department of Environmental Quality, the Department of Energy estimates that there are about 10 other facilities that emit significant amounts of CO_2 from their use of distillate fuel, residual oil, coal, and other fossil fuels. This is a rough estimate, because the source data were not collected to identify fossil fuel users. However, available data suggest that there would be only a few large end-users of fossil fuels other than natural gas. Combining these large users with the 140 natural gas transport customers suggests that a facility-based cap for large emitters might apply to about 150 facilities. Whatever the final number, it would likely be in the few hundred range.

Fossil CO_2 Emissions from Cement and Lime Production

The manufacturing of cement and lime releases fossil CO_2 from the conversion processes in addition to any fuel used. There are about 0.5 tonnes of CO_2 emitted for each tonne of cement manufactured. The CO_2 is emitted when calcium carbonate is heated in a cement kiln to form clinker. Likewise, about 0.75 tones of CO_2 is produced for each tonne of high-calcium lime and 0.86 tonnes of CO_2 for each tonne of dolomitic lime manufactured[2]. In 1990, CO_2 emissions from cement manufacturing were about 216,000 tonnes. Emissions from lime manufacturing were about 68,000 tonnes. In 2000, emissions had risen to about 447,000 tonnes from cement manufacturing and 115,000 tonnes from lime manufacturing.

Next Steps

Staff recommends that the task force develop more fully the proposal to create a carbon-enhanced public purpose charge for natural gas utilities. Because Northwest Natural is voluntarily participating in a public purpose charge with the Energy Trust of Oregon already, enhancing the charge to account for a $2.12 per million Btu carbon adder and making it mandatory for all natural gas utilities should be straight forward.

For large natural gas users not served by utilities and for facilities that use large amounts of other fossil fuels, a next step could be to design facility-specific cap and collect data on fuel use to refine the mechanics of the cap. Collecting data before you know how you

[2] "Methods for Estimating Non-Energy Greenhouse Gas Emissions from Industrial Processes," pp. 6.4-1 through 6.4-13 (See Sources Consulted)

will use them may not be productive, but some data need to be collected in an iterative fashion to help design the implementation of the cap. A mandatory reporting scheme designed to support a cap for large-emitting facilities, such as the EU ETS, might be a beneficial start.

More work would have to be done to identify which facilities would be under the cap. A minimum emissions threshold, probably somewhere between 1,000 to 10,000 tonnes per year, would have to be set to determine whether a facility was under the cap. Other program design issues, such as the definition of a covered facility and mechanisms to avoid leakage between facilities, would also have to be addressed.

Sources Consulted

"California Global Warming Solutions Act of 2006," Assembly Bill 32, Amended in the Senate June 22, 2006.

"European Union Emission Trading Scheme," Natsource, http://www.natsource.com/markets/index.asp?s=106.

"Large Final Emitters," Environment Canada, http://www.ec.gc.ca/lfe-gef/home-lfe.htm.

"Methods for Estimating Non-Energy Greenhouse Gas Emissions from Industrial Processes," Emission Inventory Improvement Program, Volume VIII, Chapter 6, prepared by ICF Consulting for the U.S. Environmental Protection Agency and EIIP, June 2003

"Moving Forward on Climate Change: A Plan for Honouring Our Kyoto Commitment," Government of Canada, http://www.climatechange.gc.ca/kyoto_commitments/report_e.pdf.