BEFORE THE PUBLIC UTILITY COMMISSION

OF OREGON

UM 1302

In the Matter of	)
PUBLIC UTILITY COMMISSION OF OREGON,	)
Staff Investigation into the Treatment of CO_2 Risk in the Integrated Resource Planning Process.	)

OPENING COMMENTS OF THE
CITIZENS' UTILITY BOARD OF OREGON
ECUMENICAL MINISTRIES OF OREGON
NW ENERGY COALITION &
RENEWABLE NORTHWEST PROJECT

July 26, 2007

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Appendix 1 Congressional Climate Change Policy Proposals, Basic Features

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I. Introduction

Utility resource planning is all about risks, but each type of risk – fuel cost, load growth, hydro generation, technology change, regulatory change, *etc.* – has unique characteristics, and therefore calls for different treatment. Key to determining the appropriate treatment of CO_2 risk and its cost in the IRP process are assumptions about its future regulatory treatment.

The approach that the Citizens' Utility Board, Ecumenical Ministries of Oregon, NW Energy Coalition, and Renewable Northwest Project have taken in these Comments is to survey the likely regulatory treatment of CO_2 on the federal, regional, and state levels. We have attempted to organize that discussion in a way that makes an apples-to-apples comparison possible, through the use of levelized cost of CO_2 emissions using a recent analysis by the Massachusetts Institute of Technology's Joint Program on the Science and Policy of Global Change. This approach points to a convergence of policies,

and we rely on this convergence to recommend, for utility resource planning, a low carbon regulation scenario, a medium carbon regulation scenario (what we will call the "base case"), and a high carbon regulation scenario.

We provide a general discussion of the use of trigger point analyses for determining the cost for CO_2 that would likely tip the balance between one preferred portfolio and another. We also examine the value of having options and being able to change the proverbial horse mid-stream. This has not been taken into account in past resource planning processes, but is an important measure of a resource portfolio's long-term viability. We believe the NW Power and Conservation Council's model provides a good example of this type of analysis, and is a model that can be used by the utilities.

Finally, we will address some of the unique and asymmetric risk characteristics that CO_2 presents – especially the conclusion that the harm to customers of underestimating the stringency of eventual CO_2 regulation is much greater than the harm of overestimating it. This combination of policy, technical, and risk factors leads us to recommend that utilities use the following scenarios as low, base case, and high carbon regulatory futures in their IRP modeling:

- Low: A low carbon regulatory future can reasonably be modeled with the Bingaman-Specter 2007 proposal. This would represent a policy resulting in a freeze in U.S. emissions at approximately current levels.[1] This would require a levelized CO_2 cost of $24 per ton,[2] which corresponds to $11 per ton in 2015 escalating at 5% annually in real terms (corresponding to the safety valve price set in the legislation).[3]

[1] This policy would allow total cumulative U.S. emissions of approximately 287 billion metric tons (bmt) of CO_2-equivalent ($CO_{2\text{-eq}}$) between 2015 and 2050.
[2] In these Comments, we use "ton" to refer to a metric ton, not a short ton.
[3] Unless otherwise specified, all dollars are in terms of real 2005$.

- Base Case: For purposes of IRP planning, the Lieberman-McCain 2007 / Oliver-Gilchrest 2007 proposal represents a reasonable middle ground regulatory future to be used as a utility's base case. This would represent a policy requiring a 50-60% emissions reduction below 1990 levels by 2050[4] and a levelized CO_2 cost of $71, corresponding to a CO_2 cost of $39 in 2015 escalating at 4% real.
- High: To model a stringent carbon regulatory future, we recommend using the Sanders-Boxer 2007 proposal, which represents a policy requiring an 80% emissions reduction below 1990 levels by 2050.[5] The levelized CO_2 cost would be $97 per ton, corresponding to $53 per ton in 2015 escalating at 4% real.

The above three cases represent only points within the range of policy futures, and, when testing possible resource portfolios, other points in that range should be considered. Further, in order to adequately plan for a range of possible regulatory futures, we recommend that the Commission direct utilities to:

- Compliance Portfolios: Present and analyze one or more portfolios that would comply with each of the above low, base case, and high carbon regulatory futures.
- HB 3543 Portfolios: Present and analyze one or more portfolios that would comply with the emissions reduction targets set in Oregon statute by Oregon HB 3543.
- Value of Optionality: Incorporate the value of optionality when evaluating different portfolios. The NW Power and Conservation Council's model for performing this kind of analysis is highly-developed and available to the utilities.

[4] This policy would allow total cumulative U.S. emissions of approximately 203 bmt of $CO_{2\text{-eq}}$ between 2015 and 2050.
[5] This policy would allow total cumulative U.S. emissions of approximately 167 bmt of $CO_{2\text{-eq}}$ between 2015 and 2050.

II. Survey Of Possible Futures

This section lays out the current policy proposals for addressing greenhouse gas emissions, and the following section presents the prices for CO_2 emissions that those proposals would likely produce. This overview provides a reasonable range of carbon regulatory futures for which utilities should be prepared.

A. Policy Instruments For Curbing Greenhouse Gas Emissions

A number of regulatory and legislative approaches to reducing greenhouse gas emissions and mitigating the impacts of global climate change are currently under consideration in the United States at the federal, regional, and state levels. The policy instrument that has achieved the greatest attention is a cap-and-trade system, although various carbon tax policies have also been proposed.

Both policies, cap-and-trade and carbon taxes, are designed to internalize the currently external costs of greenhouse gas emissions by assigning a monetary value to these emissions. The two policies' main difference is in their approach to internalizing these costs. A cap-and-trade policy sets a specific emissions reduction path and allows the market to set the price for greenhouse gas emissions. A carbon tax policy takes the opposite approach by setting a specific price for emissions, while letting the market decide the level of emissions reductions achieved. Both policies will result in a monetary value for CO_2 and other greenhouse gas emissions, which will affect the financial operations of major greenhouse gas emitters, including electric utilities.

The term "cap-and-trade" is used here to refer to a policy that identifies specific greenhouse-gas-emitting entities covered by the policy, sets an upper limit on their emissions (the cap), and allows trading in the resulting emissions allowances between

covered entities. Cap-and-trade policies vary in a number of ways, each of which will ultimately affect the price of greenhouse gas emissions under the policy. The following table illustrates some of the major policy design features of cap-and-trade policies:

Table 1: Major Design Features Of Cap-And-Trade Policies

Policy Scope	What economic sectors and emitting entities are covered by the policy and what geographic scope does the policy cover?
Stringency Of Emissions Reduction	At what level is the cap set and how quickly is it reduced over time?
Emissions Allocation Method	Does the policy allocate emissions for free, are emissions allocated based on historic emissions levels, are the emissions allowances auctioned to polluters, *etc.*?
Safety Valve Provision[6]	Does the policy set a safety valve, or maximum price, on emissions?

The variety of cap-and-trade policies under consideration underscores the uncertainty and risk inherent in considering climate change policies in utility integrated resource planning. However, the length and breadth of current climate policy activity at the regional, state, and federal levels indicates that utilities operating in Oregon can expect to face greenhouse gas emissions regulation in the near-term. The remaining question is not whether emissions will be regulated, but rather how, when, and what the resulting value for greenhouse gas emissions will be.

B. Federal Bills

As scientific consensus on climate change has strengthened in recent years,[7] Congressional activity relating to climate change has mounted. According to the Pew Center on Global Climate Change:

[6] A safety valve sets a maximum price on emissions allowances, and allows emitters to purchase allowances that exceed the emissions cap if the safety valve is triggered.

[7] See *Fourth Assessment Report: Climate Change 2007.* Intergovernmental Panel on Climate Change. http://www.ipcc.ch/.

> Members of the 110th Congress are introducing legislation related to global climate change at a faster pace than any previous Congress. As of mid-July 2007, lawmakers had introduced more than 125 bills, resolutions, and amendments specifically addressing global climate change and greenhouse gas (GHG) emissions – compared with the 106 pieces of relevant legislation the previous Congress submitted during its entire two-year (2005-2006) term.[8]

At least eight major cap-and-trade policies have been proposed since the start of the 110th Congress. These policies range in stringency, but can be generally categorized into three groups based on their emissions reductions targets: (1) policies designed to freeze emissions somewhere near current levels; (2) policies designed to reduce emissions to 1990 levels by 2020-2030 and 50-60% below 1990 levels by 2050; and (3) policies designed to reduce emissions to 1990 levels by 2020 and to 65-80% below 1990 levels by 2050.

Several of these proposals are presented in Table 2 below along with three representative, "core cases" that roughly correspond to the three groups of policies.[9] The core cases are drawn from an April 2007 MIT Joint Program analysis of Congressional climate change policies[10] (MIT 2007) and correspond to the following targets:

- A freeze in emissions at current levels;
- A linear reduction path targeting 50% below 1990 levels by 2050; and
- A linear reduction path targeting 80% below 1990 levels by 2050.

[8] "What's Being Done in Congress." Pew Center on Global Climate Change. http://www.pewclimate.org/what_s_being_done/in_the_congress/ as of July 23, 2007.

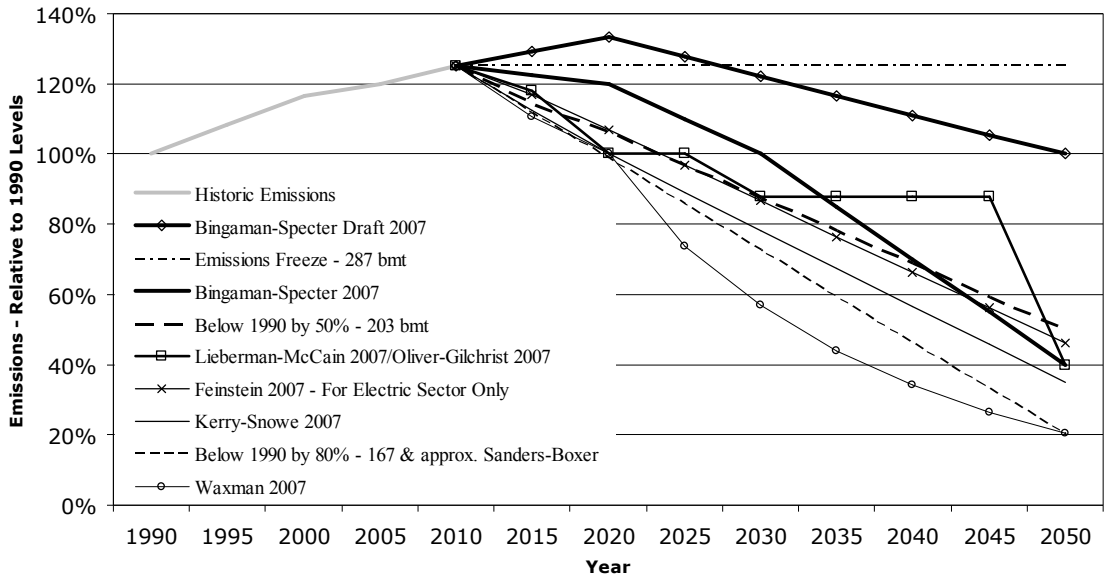
[9] We use the phrase "core cases" as used in the MIT 2007 study referenced throughout these comments, see the following footnote.

[10] Paltsev, Reilly, *et. al., Assessment of U.S. Cap-and-Trade Proposals.* MIT Joint Program on the Science and Policy of Global Change. (Massachusetts Institute of Technology: April 2007). http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt146.pdf.

Table 2: MIT Core Cases & Corresponding Congressional Climate Policy Proposals (2050 Targets)	
287 bmt Emissions Freeze	Bingaman-Specter Draft 2007
203 bmt 50% below 1990	Bingaman-Specter 2007, Lieberman-McCain 2007, Oliver-Gilchrist 2007, Feinstein 2007
167 bmt 80% below 1990	Kerry-Snowe 2007, Sanders-Boxer 2007, Waxman 2007

These three core cases are represented in Figure 1 below as dotted lines, and are labeled based on the total cumulative tons of greenhouse gases that may be emitted by 2050, expressed in billion metric tons (bmt) of carbon dioxide equivalent: 287 bmt, 203 bmt, and 167 bmt respectively. A more detailed table of Congressional climate change policy proposals and their basic features is included in Appendix 1.

Figure 1 - Greenhouse Gas Emissions Levels



The descriptions of three Senate proposals that follow, and their House analogues, deserve particular attention, as they are sponsored by senators holding influential committee positions and have garnered the most cosponsors and attention.

i. S.1766: Bingaman-Specter "Low Carbon Economy Act of 2007"

Senator Jeff Bingaman (D-NM), the Chair of the Senate Energy and Natural Resources Committee, has proposed several greenhouse gas reduction policies over the past several years. Until recently, Senator Bingaman, as ranking member of the Energy Committee, had proposed various versions of a policy designed to stabilize emissions at current levels. Those proposals featured a safety valve price with a relatively low price cap of $7/ton CO_2 (2007$), and were to be implemented as a cap on greenhouse gas emissions intensity (tons of $CO_{2\text{-eq}}$ emitted per dollar of gross domestic product), which would have allowed emissions to grow if economic growth outpaced the emissions intensity reduction targets. A discussion draft circulated earlier this year continued with this approach.[11]

However, on July 11th, Senator Bingaman and Senator Arlen Specter (R-PA) introduced S.1766, the "Low Carbon Economy Act of 2007," which differs significantly from previous Bingaman climate policy proposals, and has 5 bipartisan cosponsors. S.1766 is not an intensity-based cap; instead, it is a cap on total emissions and features a higher safety valve price, $12/ton (2007$). The policy has significantly more stringent reduction targets than previous proposals – 2006 levels by 2020, 1990 levels by 2030, and at least 60% below current levels by 2050. The introduction of this more stringent proposal seems to indicate a shift away from Congressional support for policies designed to simply freeze emissions at current levels. Currently, there are no bills introduced in the 110th Congress designed to merely target a freeze in emissions at current levels, and S.1766 is currently the least stringent bill under consideration.

[11] See Bingaman-Specter Draft 2007 in Appendix 1.

ii. S.280: Lieberman-McCain "Climate Stewardship and Innovation Act of 2007"

Senator Joseph Lieberman (I-CT) and Senator John McCain (R-AZ) have repeatedly introduced versions of their "Climate Stewardship and Innovation Act" over the past several Congressional sessions. The current version of the bill, S.280, features a cap on emissions from major emitting sectors of the economy, including electric utilities, that declines in a stair-step pattern (see Figure 1 above) to achieve the following targets: 2004 levels by 2012, 1990 levels by 2020, 22% below 1990 levels by 2030, and 60% below 1990 levels by 2050. The bill has 9 bipartisan cosponsors, and a House analogue, the "Oliver-Gilchrist Climate Stewardship Act of 2007" has been introduced with 17 cosponsors.

As with the changes in Senator Bingaman's climate policy proposals over time, the trend for Senators Lieberman and McCain's proposals is toward more stringent emissions reduction targets, as well. Both the 2003 and 2005 versions of the "Climate Stewardship and Innovation Act," for example, simply targeted a return to 2000 emissions levels by 2010, while the current version is clearly more stringent.

iii. S.309: Boxer-Sanders "Global Warming Pollution Reduction Act of 2007"

Senator Barbara Boxer (D-CA), the Chair of the Senate Environment and Public Works Committee, and Senator Bernard Sanders (I-VT) have introduced the most aggressive cap-and-trade policy proposal in the Senate, S.309, the "Global Warming Pollution Reduction Act of 2007." Senators Boxer and Sanders' predecessor, Senator James Jeffords (I-VT), introduced a similar bill during the 109th Congress.

S.309 sets mandatory, economy-wide emissions reduction targets for all major emitting sectors, and authorizes the Environmental Protection Agency to implement regulations to achieve these targets in various sectors. The bill envisions that one or more

of these sectors will fall under a cap-and-trade system, including the electric utility sector. The bill targets a halt in emissions growth by 2010, a return to 1990 levels by 2020, and a linear reduction path to 80% below 1990 levels by 2050 with interim targets of 27% below 1990 levels by 2030, and 53% below 1990 levels by 2040. The bill currently has 11 cosponsors, and an analogous, but slightly more aggressive, proposal has been made in the House, H.R.1590, the "Waxman Safe Climate Act of 2007," which currently has 140 cosponsors.

C. Federal Jurisprudence: Massachusetts vs. EPA

In April of 2007, the United States Supreme Court handed down a decision finding that gases that cause or contribute to global warming are pollutants under the Clear Air Act. The Court said that the Administrator of the Environmental Protection Agency has the authority to, and must, regulate greenhouse gases unless the Administrator finds that such gases do not contribute to climate change, or there is some other reasonable explanation justifying no action.

The case arose from a review sought by several parties, including a number of states (Oregon among them), of the EPA's decision denying a petition to establish rules regulating greenhouse gases. The EPA said it denied the petition because it did not have the authority to regulate greenhouse gases, and if it did, it was unwise to do so at this time. The D.C. Circuit Court deferred to the EPA's reasoning (415 F.3d 50), but the Supreme Court reversed the lower court and remanded the issue back to the EPA. The Court said: "EPA has offered no reasoned explanation for its refusal to decide whether greenhouse gases cause or contribute to climate change. Its action was therefore [] arbitrary and capricious…" April 2, 2007 (No. 05-1120). It is unclear at this point what

the EPA will do with this issue now that it is back at the Agency; however, in a statement issued April 25, 2007, the governor of California announced that he would give the EPA six months to act and would, at that point, consider a lawsuit to compel action.

D. State & Regional Actions

i. Oregon

The 2007 Oregon Legislature passed House Bill 3543, a bill that speaks directly to the issues of global warming and carbon regulation policy. As part of the legislative findings, the bill reads:

> (11) Policies pursued, and actions taken, by Oregon will:
>
> (a) In concert with complementary policies and actions by other states and the federal government, substantially reduce the global levels of greenhouse gas emissions and the impacts of those emissions;
>
> (b) Encourage similar policies and actions by various stakeholders;
>
> (c) Inform and shape national policies and actions in ways that are advantageous to Oregon residents and businesses; and
>
> (d) Directly benefit the state and local governments, businesses and residents.[12]

The bill specifically lays out greenhouse gas emissions reduction goals and timelines to achieve substantial reductions of greenhouse gas emissions, and declares these goals to be the policy of the State of Oregon:

> (1) The Legislative Assembly declares that it is the policy of this state to reduce greenhouse gas emissions in Oregon pursuant to the following greenhouse gas emissions reduction goals:
>
> (a) By 2010, arrest the growth of Oregon's greenhouse gas emissions and begin to reduce greenhouse gas emissions.
>
> (b) By 2020, achieve greenhouse gas levels that are 10 percent below 1990 levels.

[12] Oregon HB 3543 Section 1.

(c) By 2050, achieve greenhouse gas levels that are at least 75 percent below 1990 levels.

(2) The Legislative Assembly declares that it is the policy of this state for state and local governments, businesses, nonprofit organizations and individual residents to prepare for the effects of global warming and by doing so, prevent and reduce the social, economic and environmental effects of global warming.[13]

While HB 3543 does not create any additional regulatory authority for a state agency,[14] the bill language clearly directs agencies, within their existing authority, to implement the policy of this state, which is to consider the potential effects of global warming and governmental responses to it. There is a clear assumption in HB 3543 that this state will respond to global warming, that other states and the federal government will also respond, and that Oregon should be a leader in this challenge, as well as being prepared for other future legislative and regulatory responses to global warming.

Governor Kulongoski also supported HB 3545,[15] a bill that would have gone beyond simply setting state goals. Instead it would have implemented an electric load-based cap-and-trade regime. However, the bill was introduced late in the session and was not passed. Another bill to regulate greenhouse gas emissions will likely be introduced in the 2009 legislative session, and, if so, it would certainly receive more attention than HB 3545 did in 2007.

ii. Emissions Performance Standards

In April, Washington State passed SB 6001, which establishes a greenhouse gas emissions performance standard, and includes statutory emissions goals specifying a return to 1990 levels by 2020, 25% below 1990 levels by 2035, and 50% below 1990

[13] Oregon HB 3543 Section 2.
[14] Oregon HB 3543 Section 2(3).
[15] David Van't Hof, the Governor's Sustainability Advisor testified in support of the bill at its first public hearing.

levels by 2050. Section 4(1)(a) requires the governor to make recommendations to the 2008 legislature, including a recommendation as to "How market mechanisms, such as a load-based cap and trade system, would assist in achieving the greenhouse gases emissions reduction goals…"

California is in the process of implementing AB 32, the "California Global Warming Emissions Cap," which involves a reduction to 1990 level emissions by 2020 for all sectors.[16] In 2006, California also passed SB 1368, the "Greenhouse Gas Emissions Performance Standard for Major Power Plant Investments." California has completed its rulemakings on the emissions performance standards from SB 1368.[17]

iii. Western Regional Climate Action Initiative

This year has seen a significant increase in actions on climate change by western states. On February 26, 2007, the governors of Arizona, California, New Mexico, Oregon, and Washington signed the Western Regional Climate Action Initiative. Since February, British Columbia, Manitoba, and Utah have also joined the Western Climate Initiative. The Initiative includes:

- Setting an overall regional goal, within six months of the effective date of this initiative, to reduce emissions from our states collectively, consistent with state-by-state goals;
- Developing, within eighteen months of the effective date of this agreement, a design for a regional market-based multi-sector mechanism, such as a load-based cap-and-trade program, to achieve the regional GHG reduction goal; …[18]

To date, eight of the eleven western states, including Oregon, have adopted renewable electricity standards. The three remaining states without renewable energy

[16] AB 32 passed the California legislature in September 2006.
[17] SB 1368 passed the California legislature in September 2006.
[18] Western Regional Climate Action Initiative, February 26, 2007, p. 2.

standards are Idaho, Wyoming, and Utah.[19] The governor of Utah has announced that he will seek to implement a renewable electricity standard.[20] The final report from the Utah Renewable Energy Initiative Focus Group, established by the governor, is due on October 15th of this year.

E. Points Of Agreement In The Current Policy Environment

In light of the growing climate change policy activity at all levels of government, it is increasingly certain that Oregon utilities will face greenhouse gas emissions regulations of some kind in the near future. The survey of policy proposals and activities presented above provides a reasonable indication of the range of possible policies that Oregon utilities should expect and plan for in their integrated resource planning process. The survey of possible futures we present also reveals that policy proposals are in remarkable agreement on two main points, which should be noted in the utility integrated resource planning process.

First, no currently proposed policy allows for an overall increase in greenhouse gas emissions over current levels. While previous federal cap-and-trade proposals – *e.g.,* Bingaman-Specter draft 2007 – may have allowed some level of emissions growth before freezing emissions and returning to near current levels, Senators Bingaman and Specter's most-recent proposal (S.1766) is significantly more aggressive. Bingaman-Specter 2007 targets a return to 2006 levels by 2020 and to 1990 levels by 2030 and is currently the least stringent cap-and-trade policy under consideration at the federal level.

Second, all current policy proposals target a return to emissions levels somewhere near 1990 emissions levels by the 2020-2030 time frame. While targets for later dates

[19] Union of Concerned Scientists. Website: "Renewable Electricity Standards Toolkit" as of July 19, 2007. http://go.ucsusa.org/cgi-bin/RES/state_standards_search.pl?template=main.
[20] Henetz, Patty. "Renewable Energy the Coming Boom?" The Salt Lake Tribune. July 18, 2007.

(*e.g.,* the 2050 time frame) vary more considerably, as Table 3 demonstrates, the range of policy proposals are in near agreement that a return to 1990 emissions levels by 2020 (or in one case, by 2030) will be required.

Table 3: Medium-Term (2020-2030) Emissions Reduction Targets of Climate Policies

1990 levels by 2030	Bingaman-Specter 2007
1990 levels by 2020	Lieberman-McCain 2007, Oliver-Gilchrist 2007, Feinstein 2007, Kerry-Snowe 2007, Boxer-Sanders 2007, Waxman 2007, California AB 32, Washington SB 6001
10% below 1990 levels by 2020	Oregon HR 3543

III. CO_2 Price Estimates Of Core Cases & Congressional Proposals

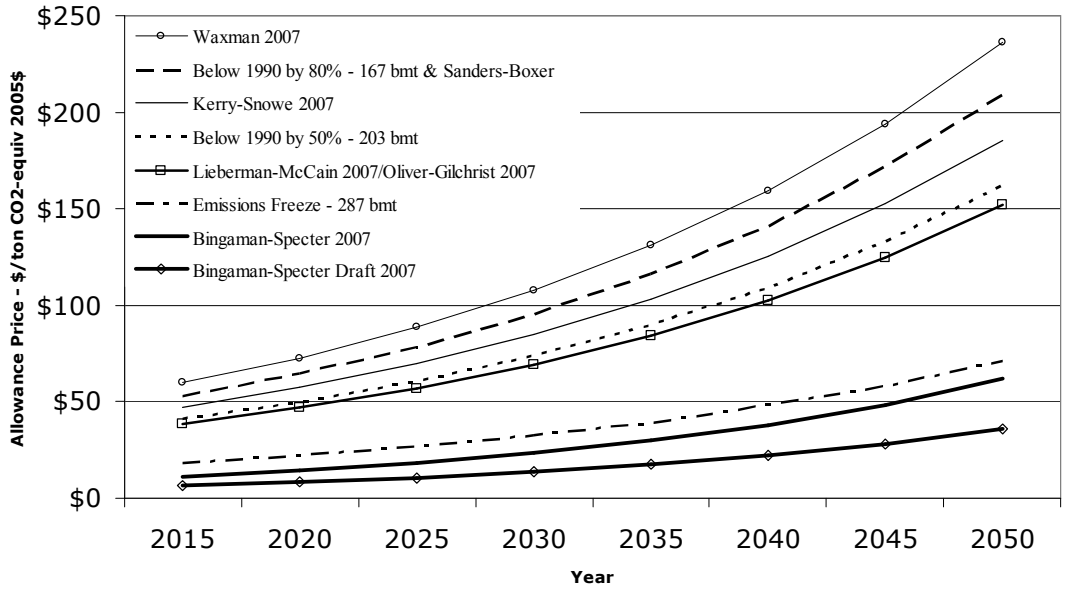
The Massachusetts Institute of Technology's Joint Program on the Science and Policy of Global Change's April 2007 assessment of current Congressional cap-and-trade proposals (MIT 2007) includes estimates of the greenhouse gas emissions prices that the market can be expected to set under various federal cap-and-trade proposals.[21] MIT 2007 uses the three representative core cases discussed above (Table 2) to estimate a range of likely carbon prices under cap-and-trade policies that resemble the emissions reduction pathways of MIT's three core cases. These price estimates are based on extensive economic modeling.

While uncertainty in emissions growth and abatement cost, combined with imperfect foresight on the part of economic actors, means that it is highly unlikely that the price path for emissions allowances would follow a smooth increase, MIT 2007 uses a projected annual interest rate of 4% in real dollar terms (*i.e.,* 4% above inflation), which

[21] MIT 2007, p. 15-18.

gives a reasonable projection of the growth of the value of greenhouse gas emissions allowances over time under potential cap-and-trade policies.[22] Figure 2 shows the rise in price of emissions allowance over time under MIT's core cases and Congressional policy proposals.

Figure 2 - Emissions Allowance Prices



Remember that the 287 bmt case corresponds to a freeze in emissions at current levels, which roughly corresponds to the Bingaman-Specter 2007 draft policy proposal. The 203 bmt case corresponds fairly closely to the Lieberman-McCain 2007 bill, while the 167 bmt case very closely tracks the Sanders-Boxer 2007 bill. The other policies fall generally between these core cases, and where they fall in relation to the core cases can be used to estimate expected emissions allowance prices under the various Congressional cap-and-trade proposals discussed above.

[22] MIT 2007 assumes that when banking of allowances is permitted "[allowance] holders decide whether to bank [allowances] or not by comparing the expected rate of return on abatement (and banking of allowances) to returns on other financial instruments and alter their banking behavior until these returns are equalized." (MIT 2007, p. 16).

Price estimates for emissions allowances in policies that set safety valve prices can also be estimated. In the case of both policies with safety valve provisions that were discussed earlier – Bingaman-Specter Draft 2007 and Bingaman-Specter 2007 – the safety valve price set by both proposals is consistently lower than MIT 2007's estimates of the allowance prices necessary to achieve a freeze in emissions (see 287 bmt core case in Table 4 below). That means that, if the MIT 2007 analysis is correct, the safety valve prices set by both policies will determine both the price of emissions allowances and the level of emissions reductions achieved under each policy, which will therefore fall short of the emissions targets set in the legislation.[23]

This analysis illustrates how a safety valve provision that is set too low can undermine the integrity of a cap-and-trade policy, resulting in actual emissions reductions that fall below the targets specified in the legislation. This is relevant for the planning process, because it highlights continued policy uncertainty in modeling policies that include safety valve prices. If a policy sets a safety valve price that is too low to achieve the targets set in the policy, it is likely that the safety valve price will be revised upwards when it becomes apparent that the low safety valve price is preventing the policy from achieving its stated targets. Relying on a safety valve price in modeling, therefore, implicitly accepts continued policy uncertainty and risk that the safety valve price may be revised in the future.[24]

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[23] A freeze in emissions for Bingaman-Specter Draft 2007 and a return to 1990 emissions levels by 2030 in the case of Bingaman-Specter 2007 (see Appendix 1).

[24] For example, the $7/ton (2007$) safety valve price specified in previous Bingaman-Specter policy proposals served as the basis of the base case CO_2 adder value included in both PGE and PacifiCorp's 2007 IRPs. [Portland General Electric. 2007 Integrated Resource Plan. June 29, 2007. Page 91. PacifiCorp. 2007 Integrated Resource Plan. May 2007, Page 133]. However, just since the filing of these IRPs, Bingaman and Specter introduced a revised version (Bingaman-Specter 2007) that includes a $12/ton (2007$) safety valve, an increase of 71% within just one planning period cycle.

The future carbon market, like any future market projection, is subject to any number of uncertainties. Nevertheless, the price estimates presented in this section give a good indication of the emissions allowance prices to be expected under the various Congressional cap-and-trade proposals under consideration. State and regional cap-and-trade proposals will likely fall within or near this range of cost estimates as well, although restricted market scope may lead to higher allowance prices than a nationwide policy with equivalent emissions reduction targets.

Continued…

Table 4: Emissions Allowance Price Estimates Under Congressional Proposals & MIT Core Cases[25]

Cap-and-Trade Proposal	Nearest MIT Core Case	Allowance Price ($/ton CO2-e, 2005$)				Comments
		2015	2025	2050	Levelized[26]	
Bingaman-Specter Draft 2007	287 bmt	$7	$11	$36	$14	Safety valve price lower than expected price under 287 bmt case; safety valve price ($7 [2007$]/$6.56 [2005$] rising 5% in real terms annually) sets allowance price.
Bingaman-Specter 2007	Target 203 bmt Safety Valve 287 bmt [27]	$11	$18	$62	$25	Safety valve price lower than expected price under 203 bmt case; safety valve price ($12 [2007$]/$11.25 [2005$] rising 5% in real terms annually) sets allowance price.
287 bmt core case		$19	$27	$71	$33	Emissions Freeze at Current Level
Lieberman-McCain 2007 / Oliver-Gilchrest 2007	203 bmt	$39	$57	$152	$71	National emissions estimate is 216 bmt, so this is estimated at slightly lower than the 203 bmt case.
203 bmt core case		$41	$61	$162	$75	50% Below 1990 Level by 2050
Kerry-Snowe 2007	Between 203 and 167 bmt	$47	$70	$186	$86	Calculated as halfway between the two core cases.
167 bmt core case		$53	$79	$209	$97	80% Below 1990 Level by 2050
Sanders-Boxer 2007	167 bmt	$53	$79	$209	$97	National emissions estimate is the same as 167 bmt case.
Waxman 2007	167 bmt	$60	$89	$236	$110	National emissions estimate is 148 bmt, so estimated at slightly higher than 167 bmt case.

[25] Price estimates are based on estimates of total national emissions allowances under a particular policy and price estimates of three core cases (both from MIT 2007). In the case of policies without a safety valve, prices are assumed to be proportional to the core cases based on a ratio of national emissions allowances under the policy and under the core case. For policies with a safety valve, the safety valve price determines allowance price estimates.

[26] Real levelized cost estimates are based on a net present value of the cost stream for years 2015-2050 (inclusive) and an annual discount rate of 4% (from MIT 2007).

[27] Emissions reduction targets specified in Bingaman-Specter 2007 are closest to the 203 bmt MIT core case, however, since the safety valve price is set far below the allowance price levels MIT 2007 estimates are necessary to achieve those targets, the actual emissions reductions achieved by Bingaman-Specter 2007 would be closest to the 287 bmt core case. See earlier discussion of safety valves.

IV. Carbon Cost Trigger Points

An additional approach to analyzing legislative possibilities is to perform a trigger point analysis to see what CO_2 cost would result in a change in utility strategy, such that a particular target emissions level would be reached or certain utility decisions would be made. Trigger-point analyses depend on the kind of technology and the strategy options being evaluated. Such an analysis is designed to answer the question of what CO_2 value would be required to make two alternatives equal from a financial point of view. Though this is not the approach we took in making our recommendations in these Comments, it is another tool that can be used to evaluate long-term resource decisions in an unknown future of carbon regulation.

This type of analysis could be used to find the trigger point CO_2 value between a utility's preferred portfolio using a zero value for CO_2 emissions, and a portfolio that results in emissions equal to a particular emissions reduction target. The target portfolio would be selected from a resource stack in much the same fashion as is done currently – perhaps including a price for high-quality carbon offsets[28] – with the model constraint being the target emissions. As carbon regulation can be expected to impact the demand for natural gas, trigger point analyses should account for this relationship.

Trigger-point analyses can illuminate decisions without the Commission having to specify a value or range of CO_2 adders. These decisions include whether more expensive but more efficient major thermal power plants are economic over their planned lifetimes, whether IGCC plants with sequestration are a preferable baseload resource,

[28] By "high-quality", we mean a definition similar to what appears in California's AB 32 (2006) Section 38562(d) which, in part, requires that offsets be: "real, permanent, quantifiable, verifiable, and enforceable by the state board, … [and] … in addition to any greenhouse gas emission reduction otherwise required by law or regulation, and any other greenhouse gas emission reduction that otherwise would occur."

whether a portfolio should include more renewable generation than specified by renewable portfolio standard regulation, *etc.*

V. Risk

As in our UM 1208 Joint Comments, of which all the parties here plus OSPIRG were a part, we take a step back from the technical calculations and modeling assumptions to look at the bigger picture. Some risks can be approximately quantified, others cannot. From where we stand today, the risk of global warming falls in the latter category. In its Third Assessment Report, the Intergovernmental Panel on Climate Change describes the nonlinearity of the global warming risk:

> Investigations into climate change and its potential consequences have begun to highlight the importance of strongly nonlinear, complex, and discontinuous responses … Strongly nonlinear responses are characterized by thresholds—which, if exceeded by a stimulus, result in substantially greater sensitivity to further stimulus or dramatic change, explosive growth, or collapse.[29]

Individuals, states, nations, and the entire global community are becoming increasingly concerned that global warming is not only real and dangerous, but may cause serious, rapid climate disruptions as certain climate system thresholds are met and exceeded. Faced with the threat of this potentially imminent danger and the public's response to it, we believe that governmental regulation of greenhouse gases will increase both in prevalence and in strength. If that regulation is to be effective, it will, by necessity, be aggressive, and it is not safe to presume that our utilities will be protected from past resource decisions when something so much larger is at stake. We do not wish to face the specter of the financial dislocation for customers of purchasing and then

[29] Intergovernmental Panel on Climate Change. Climate Change 2001, Third Assessment Report. Working Group II: Impacts, Adaptation and Vulnerability 1.4.3.7 p. 93.

retiring – well before the end of their useful lives – resources that do not meet the regulatory restrictions of the 21st Century.

A. The Risk Of Global Warming Is Asymmetric

In coping with risk, it is important to know both the shape of the *distribution* of the risk (*i.e.,* is its curve bell-shaped or significantly skewed?), and the shape of the *impact* of the risk. That is: (a) are the outcomes as likely to be good as bad; and (b) does a good outcome have as much benefit as a bad outcome has damage? For example, how does one evaluate and compare the financial risk that electricity rates might be a few mills below what they might have been if we overestimate future greenhouse gas regulations, as opposed to the risk that rates will skyrocket in a regulatory response to the submersion of Florida?

The risk of global warming is also asymmetric in regard to its reversibility. If a good outcome can, in time, change to a bad outcome, is the reverse also true? Clearly, low rates for a few years can become high, and vice versa. In contrast, the impacts of global climate change cannot reasonably be expected to be reversible. As it is these impacts that are motivating CO_2 regulation, the monetary risk that is the foundation of this docket must include consideration of the relatively irreversible nature of CO_2 impacts on a human time scale.

Another asymmetric risk unique to CO_2 is how it will be evaluated by electricity markets. Utilities normally assume that electricity sales and purchases will occur at roughly the same price. However, we think it is likely that the price of electricity will increasingly be dependent upon the carbon content of that electricity. In a world adapting to a changing climate, we cannot assume that the market will evenly distribute

the CO_2 costs of a more carbon-intensive utility and the costs of a less carbon-intensive one. Therefore, a carbon-intensive utility may not be able to sell power at the same price at which it buys power. For such a utility, the risk of being long or short in the market is not symmetric.

We conclude, therefore, that the risk of planning for a too-lenient carbon regulatory structure is far greater than planning for one that is too stringent. The risk of being overly cautious lies primarily in the rate impacts as described below. The risk of not being cautious enough, however, is unbounded, could cripple Oregon utilities and their customers, and devastate the state's economy.

B. CO_2 Risk In The Context Of Rate Impact

In the real world – in contrast with the regulatory world – the risks Oregonians face in the context of CO_2 and the electricity they use are numerous. They include environmental damage on an unprecedented scale, economic disruption and possible dislocation, global insecurity and unrest with unknown consequences, and future rate impacts. It should be evident that rate impacts are the least of humanity's worries, but it is what we address in utility regulation. To put the cost risk of CO_2 regulation in perspective for utility regulation, we note the customer rate impact projections that PacifiCorp's 2007 IRP developed for each of its proposed portfolios.

For the Commission, this analysis is really where the rubber meets the road: How do the different resource decisions affect rates? The entire IRP process revolves around the rate impacts of various resource choices, but when we look at that impact, we find that "[t]he difference between the lowest and highest impact [among candidate portfolios] under the $0 adder case is $0.12/MWh, and increases to $0.40/MWh for the $61 adder

case."[30] It would be nonsensical to not reduce greenhouse gas emissions and instead make resource decisions based on rate impact differences among candidate portfolios of less than 1% over 20 years – certain to be lost in the noise of other factors[31] – while ignoring the tremendous environmental, social, and economic externalities, that together will drive strong carbon regulation and thereby customer rates, with a force many, many times greater.

This docket would not exist if CO_2 were just another cost. As PacifiCorp found with regard to rate impact, there is little difference in the cost choice of portfolios with minimal carbon regulation, but there will most likely be significant cost differences between portfolios with aggressive carbon regulation. It is the global warming risk, and the subsequent rate impact risk to customers, that this docket is all about.

C. External Regulatory Risk And The Value Of Optionality

All of the financial risk that this docket addresses comes from outside of the Commission's jurisdiction. CO_2 costs or limits, whatever they may become, will be imposed by state and/or federal mandate. Unfortunately, we cannot know the kind of regulatory scheme that will be imposed; neither can we know its timing nor its amount. Thus it is integral to the evaluation of the peculiar nature of CO_2 risk that the models and methodology used by utilities help them choose preferred portfolios that properly deal with this uncertainty. Of particular importance is to value a portfolio's ability, or inability, to adjust to a state or federal mandate if, when, and to whatever extent it is enacted.

[30] PacifiCorp 2007 IRP, p. 187. These projected rate impacts assume the carbon adder is implemented as a cap-and-trade policy.

[31] See PacifiCorp 2007 IRP, p. 164 for projections of overall rate impacts of candidate portfolios. Rate impacts range from $3.08/MWh to $3.31/MWh for different candidate portfolios.

Studies under the rubric of "Real Options Analysis" have investigated this issue.[32] They all attempt to quantify the value of the ability to change horses in mid-stream. Importantly, they show enormous value – upwards of 15% or more of the capital cost – in being able to delay a large investment. As deterministic valuation of a portfolio is so flawed when dealing with this type of external risk, the NW Power and Conservation Council has developed a more dynamic approach. The Council's model, which is available at no cost to all regional utilities, develops portfolios in a different way than the static models used currently by PGE and PacifiCorp. The utilities' static models develop portfolios by choosing the least-costly options operating in a given, predetermined future (scenario). The utilities design several candidate portfolios by repeating this process for different futures.

Noticeably missing, however, are portfolios that demonstrate how a utility would actually act in the real world where circumstances change. No matter what path a utility starts down, if conditions change significantly, a utility would react by changing its resource choices. If Congress passed a stringent CO_2 regime, a utility would switch to less carbon-intensive resources. Not all portfolios are created equal when it comes to changing horses; some are much more flexible than others. It is this flexibility that is so valuable in dealing with the CO_2 challenge, but that is not valued in the current IRP process.

The Council's model is different. It chooses resources in response to the conditions at the time of resource decision. By comparing different initial portfolios it

[32] "Evaluating Utility Investment Decisions – An Options Approach" by James Sawhill, May 1989; and more recently, "Valuing Innovative Technology R&D as a Real Option: Application to Fuel Cell Vehicles" by Maggie Tsui, September 2005, and a presentation in June of this year at the Crystal Ball User Conference, entitled, "Are Real Options Real?"

allows the model to adjust future acquisitions (and retirements) depending upon what scenario it sees – and those scenarios are introduced stochastically, meaning that the future is not predetermined in the model. This analysis results in flexible portfolios being less costly, due to the utility's ability to change course when conditions warrant.

We urge the Commission to direct utilities, in their future IRPs, to incorporate the value of flexibility in the face of CO_2 uncertainty.

VI. Issue List Summary

The preceding discussion leads us to approach the questions posed in the Issue List as follows:

Issue 1. What CO_2 regulatory cost stream should utilities use in their IRP base case, and what assumed CO_2 regulatory future, *e.g.*, a fixed carbon adder or a carbon policy modeling constraint, should serve as the basis for the base case cost stream?

See section VII Recommendations.

Issue 2. What alternative CO_2 regulatory cost streams should utilities use in their IRP scenario analyses, and what assumed CO_2 regulatory futures should serve as the bases for these alternative cost streams?

See section VII Recommendations.

Issue 3. How should the existing, and potential future, carbon or other greenhouse gas emission goals of the State of Oregon be included in utility IRPs?

All utilities should be required to present one or more candidate portfolios that comply the with the greenhouse gas reduction goals specified in HB 3543, and estimate a range of costs for compliance with those goals with and without the use of quality offsets. Utilities should also consider reductions in emissions of other greenhouse gases in addition to CO_2, primarily sulfur hexafluoride (SF_6) emissions from electric utilities and methane (CH_4) emissions from both electric and natural gas utilities. Utilities' total

greenhouse gas emissions should include each of these greenhouse gases and be expressed in terms of tons of $CO_{2\text{-eq}}$.

Issue 4. What probability weighting, if any, should utilities assign to the CO_2 base case and scenario analyses?

We have not made any attempt to quantify the probability of any of the carbon futures presented. Given the risks of global warming it is not the probability of any given future, but the risks of planning for a weak, as opposed to stringent, regulatory carbon future that drives our recommendations. Within this asymmetric context of risk and impact, we recommend leaning more toward planning for more stringent regulation than not.

Issue 5. How should utilities vary the CO_2 regulatory cost streams to identify the "trigger point" (or CO_2 regulatory future) that changes the preferred resource portfolio, and should utilities vary other model inputs to achieve logical consistency and to test the sensitivity of the trigger point to the changes in other variables?

The trigger point analysis presented earlier can bring perspective to a utility's analysis of different portfolio options. Such analyses will depend on the kind of technology and strategy options being evaluated. A trigger point analysis can help illuminate what emissions allowance prices would be necessary to induce utility compliance with a range of potential policy futures. In addition, trigger point analysis can be used to consider major resource decisions, including:

- The efficiencies of new thermal plants and their technologies;
- Natural gas combined cycle turbines vs. traditional pulverized coal;
- IGCC and/or traditional pulverized coal with sequestration vs. other baseload generation options; and
- A greater percentage of renewable generation than required by SB 838 or other state renewable energy policies.

In addition, the NW Power and Conservation Council has created an innovative model to assess the relative risks of alternative strategic approaches that account for the value of flexibility and of having multiple options. This type of analysis should be incorporated into electric utilities' IRP analyses.

Issue 6. Are the alternative futures used in the scenario analyses an adequate measure of the cost risk associated with choosing one portfolio over another? Should utilities use a different approach when considering the risk of future CO_2 regulation?

Generally, the risk of underestimating the regulation of CO_2 and other greenhouse gas emissions far, far outweighs the risk of overestimating them. As more is learned about climate change, the risks become more apparent, and the trend in policy proposals has been towards increasingly aggressive greenhouse gas reduction targets. Furthermore, if disastrous consequences happen, as is likely, drastic political actions, that seem unlikely today, will become possible.

VII. Recommendations

We recommend that the Commission direct utilities to use the following as low, base case, and high carbon regulatory futures in their IRP modeling:

- Low: A low carbon regulatory future can reasonably be modeled with the Bingaman-Specter 2007 proposal. This would represent a policy resulting in a freeze in U.S. emissions at approximately current levels. This would require a levelized CO_2 cost of $24 per ton, which corresponds to $11 per ton in 2015 escalating at 5% annually in real terms (corresponding to the safety valve price set in the legislation).
- Base Case: For purposes of IRP planning, the Lieberman-McCain 2007 / Oliver-Gilchrest 2007 proposal represents a reasonable middle ground regulatory future to be used as a utility's base case. This would represent a policy requiring a 50-60% emissions reduction below 1990 levels by 2050 and

a levelized CO_2 cost of $71, corresponding to a CO_2 cost of $39 in 2015 escalating at 4% real.

- High: To model a stringent carbon regulatory future, we recommend using the Sanders-Boxer 2007 proposal, which represents a policy requiring an 80% emissions reduction below 1990 levels by 2050. The levelized CO_2 cost would be $97 per ton, corresponding to $53 per ton in 2015 escalating at 4% real.

The above three cases represent only points in the range of policy futures, and, when testing possible resource portfolios, other points in that range should be considered. Further, in order to adequately plan for a range of possible regulatory futures, we recommend that the Commission direct utilities to:

- Compliance Portfolios: Present and analyze one or more portfolios that would comply with each of the above low, base case, and high carbon regulatory futures.
- HB 3543 Portfolios: Present and analyze one or more portfolios that would comply with the emissions reduction targets set in Oregon statute by Oregon HB 3543.
- Value of Optionality: Incorporate the value of optionality when evaluating different portfolios. The NW Power and Conservation Council's model for performing this kind of analysis is highly-developed and available to the utilities.

Respectfully Submitted,
July 26, 2007

/s/ Jason G. Eisdorfer	Citizens' Utility Board of Oregon
/s/ James Edelson	Ecumenical Ministries of Oregon
/s/ Jesse Jenkins	Renewable Northwest Project
/s/ Steve Weiss	NW Energy Coalition

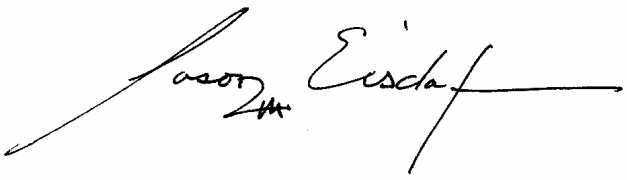
Congressional Climate Change Policy Proposals, Basic Features

	Bingaman-Specter 2007 Draft	Bingaman-Specter 2007	Lieberman-McCain 2007 / Oliver-Gilchrist 2007	Feinstein 2007	Kerry-Snowe 2007	Sanders-Boxer 2007	Waxman 2007
Bill Number/ Name	N/A: Early 2007 Discussion Draft; not introduced in Congress	S.1766; Low Carbon Economy Act of 2007	S.280; Climate Stewardship and Innovation Act of 2007 / H.R.620; Climate Stewardship Act of 2007	S.317; Electric Utility Cap and Trade Act of 2007	S.485; Global Warming Reduction Act of 2007	S.309; Global Warming Pollution Reduction Act of 2007	H.R.1590; The Safe Climate Act of 2007
Basic Framework	Mandatory, market-based cap on GHG emissions "intensity" (emissions per $ GDP) with safety valve price.	Mandatory, market-based cap on GHG emissions from fossil fuel sectors with safety valve price.	Mandatory, market-based cap on total emissions from all large emitting sectors	Mandatory, market-based cap on total emission for all large emitters; implemented as separate bills targeting major emitting sectors, beginning with electricity sector	Mandatory, economy-wide, market-based cap on total emissions for all large emitters	Mandatory, economy-wide market-based system to be implemented by EPA; allows for cap-and-trade in one or more sectors; cap-and-trade envisioned for electricity sector	Mandatory, economy-wide, market-based cap on total emissions from all large emitters.
Targets	Targeted reduction in GHG intensity is 2.6% annually between 2012 and 2021, then 3% annually beginning in 2022. Safety valve provision may allow higher emissions levels.	Cap for emissions declining to 2006 levels by 2020, 1990 levels by 2030 and, subject to adjustment by the President, at least 60% below current levels by 2050 (~50% below 1990 levels).	Cap for emissions returning to 2004 levels by 2012, to 1990 levels by 2020, 22% below 1990 levels by 2030 and to 60% below 1990 levels by 2050. Cap declines in a 'stair-step' pattern.	Cap for electricity sector emissions would return emissions to 2006 levels by 2011, 2001 levels by 2015 and gradually reduce to 60% below 2001 levels by 2050 (~54% below 1990 levels).	Cap for emissions that freezes emissions by 2010, returns to 1990 levels by 2020 and gradually reduces to 65% below 1990 levels by 2050.	Cap for emissions that freezes emissions by 2010, returns to 1990 levels by 2020, reduces linearly to 80% below 1990 levels by 2050.	Cap for emissions that freezes emissions by 2010, reduces by 2%/year to return to 1990 levels by 2020, then reduces 5%/year to return to 80% below 1990 levels by 2050.
Safety Valve Price	$7.00/ton CO2 (2007$), rising 5% annually in real dollars.	$12.00 (2007$), rising 5% annually in real dollars.	None	None	None	None	None

CERTIFICATE OF SERVICE

I hereby certify that on this 26th day of July, 2007, I served the foregoing Opening Comments of the Citizens' Utility Board of Oregon, Ecumenical Ministries of Oregon, NW Energy Coalition, and Renewable Northwest Project in docket UM 1302 upon each party listed below by email, and upon the Commission by email and by sending 6 copies by U.S. mail, postage prepaid, to the Commission's Salem offices.

Respectfully submitted,



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