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**DEPARTMENT OF JUSTICE**
GENERAL COUNSEL DIVISION

August 22, 2013

Attention: Filing Center
Public Utility Commission of Oregon
550 Capitol Street NE, #215
P.O. Box 2148
Salem, OR 97301-2148
puc.filingcenter@state.or.us

Re: *In the Matter of PACIFICORP, dba PACIFIC POWER, 2013 Integrated Resource Plan*
PUC Docket No.: LC 57
DOJ File No.: 330030-GN0100-13

Enclosed for filing with the Commission today are an original and five copies of the Opening Comments of Oregon Department of Energy in the above-captioned matter.

Sincerely,

Renee M France
Senior Assistant Attorney General
Natural Resources Section

Enclosures
RMF:jrs/#4530078
c: LC 57 Service list (electronic copies only)

**BEFORE THE PUBLIC UTILITY COMMISSION**

**OF OREGON**

**LC 57**

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| In the Matter of | ) | |
| | ) | OPENING COMMENTS OF |
| PACIFICORP | ) | OREGON DEPARTMENT OF |
| | ) | ENERGY |
| 2013 Integrated Resource Plan | ) | |
| | ) | |

Oregon Department of Energy (ODOE) appreciates the opportunity to comment on PacifiCorp's 2013 integrated resource plan (IRP). ODOE's comments cover two issues: 1) carbon dioxide ($CO_2$) price risk analysis and 2) capacity credits for solar and wind generation.

**1. $CO_2$ Prices Used in the Risk Analysis Do Not Comply With IRP Guideline 8a**

**Summary**

Guideline 8a in Commission Order No. 08-339 requires that IRPs examine $CO_2$ scenarios "ranging from the present $CO_2$ regulatory level to the upper reaches of credible proposals by governing entities." PacifiCorp's 2013 IRP does not comply with this guideline. In several places in the IRP, PacifiCorp makes note of credible proposals by governing entities to regulate carbon emissions, but does not use those proposals in developing its high case values for its carbon risk analysis.

PacifiCorp's "medium" carbon scenario is almost indistinguishable from a zero carbon price scenario through 2032 in its ability to achieve the economy-wide carbon reductions called for in U.S. international agreements. While a U.S. carbon price equivalent

to zero is certainly possible, ODOE does not agree that PacifiCorp's medium scenario is most likely. The medium scenario has a much higher chance of being less stringent than actual regulations the utility will be subject to over the 20 year period than it has of being too high. Because it is difficult to forecast U.S. carbon policy over the next two decades, it is particularly important that the IRP comply with the full range of risk analysis required by Guideline 8a.

An issue of particular concern for ODOE in the IRP is that PacifiCorp did not use in its risk analysis the two highest carbon price scenarios that the company used in its System Optimizer to develop its portfolios. Further, ODOE finds that even the higher of these two carbon price scenarios, not used in the risk analysis, is inconsistent with the range required by Guideline 8a.

With its failure to comply with Guideline 8a, PacifiCorp's IRP does not adequately demonstrate that proposed action plan items that have significant carbon risks are "the best combination of expected costs and associated risks and uncertainties for the utility and its customers," as required under Guideline 1c in Order No. 07-002 (as corrected by Order No. 07-047). There is a significant risk to PacifiCorp and its customers that the political pendulum will swing back to Congressional action on climate change as we saw in 2008 and 2009. There is a growing scientific and political consensus that worldwide emissions need to plateau by 2020 to have even a 50-50 chance of avoiding dangerous anthropogenic climate change. Such a realization by even a fraction of U.S. voters would halt the pattern of inaction by many members of Congress and lead soon to regulations to make large reductions in U.S. $CO_2$ emissions.

Even if Congress remains gridlocked, the U.S. Environmental Protection Agency (EPA) has a legal duty under the Clean Air Act to regulate $CO_2$ emissions from existing power plants and plans to do so by 2015. Since either EPA or Congressional action would result in carbon costs well in excess of those in PacifiCorp's medium carbon scenario, it raises doubts about any action item that might increase carbon risks.

In summary, the 2013 IRP fails to comply with Guideline 8a and has a medium case carbon price scenario that would have virtually no impact on economy-wide carbon reduction efforts that may reasonably be expected through 2032. The Commission should express its skepticism about a PacifiCorp medium case carbon scenario that is completely inconsistent with international agreements that the U.S. has made and with EPA's plan to regulate emissions from existing power plants.

Because the IRP has an incomplete risk analysis, PacifiCorp must demonstrate, beyond its submitted IRP, that its action plan complies with Guideline 1c. Based on the information presented in this docket, the Commission must make its own informed judgment of what it might have learned from an adequate assessment of carbon risks before acknowledging proposed action items in the 2013 IRP with significant carbon price risks.

At a minimum, the Commission should in its Order in this docket clarify the meaning of Guideline 8a for PacifiCorp.

**What Is a Governing Entity?**

Commission IRP Guideline 8a relies on "credible proposals by governing entities." The Commission does not define that term in Order No. 08-332. ODOE believes a reasonable interpretation of "governing entities" includes:

1. The 50 U.S. states;

2. The U.S. federal government, including its treaty obligations;

3. Canadian provinces; and

4. Other democratically-elected sovereign states.

Even if the Commission takes a narrower view of the definition of governing entities than ODOE finds reasonable, requirements enacted by other democratically-elected governments that are in effect today are indicative of possible future U.S. regulations.

Neither ODOE nor Guideline 8a seek to deter any utility from expressing its opinion about the base case that it wants to use for integrated resource planning. However, Order No. 08-339 requires the utility's $CO_2$ scenarios used for risk analysis to encompass a wide range of possibilities. Order No. 08-339 goes beyond Kenneth Boulding's principle that "if it has happened, it is possible," to the principle that "if there is a credible proposal, it is possible." Wisely, the Commission restricted this to proposals by governing entities.

The first two items on the list above -- the 50 U.S. states and the federal government, including its treaty obligations -- are clearly "governing entities" under Guideline 8a. ODOE also believes that proposals, plans or actions by other democratically-elected governments in the world lend credibility to *possible* future regulations and carbon pricing by U.S. states and the federal government. Further, agreements, formally adopted plans, or carbon prices that already have been implemented have more credibility that mere "proposals" by governing entities. Clearly, if a democratically-elected sovereign state has already taken an action, then *it is possible* that the U.S. might also take a similar action sometime in the future. In some sense, an action by another governing entity is more credible evidence of a possibility than a proposal by one's own governing entity.

ODOE's finding that PacifiCorp's 2013 IRP does not comply with Guideline 8a does not rest on actions by democratically-elected sovereign states outside the U.S. Still, we will present evidence related to this principle.

**Existing Proposals and Actions by U.S. States**

At a minimum, PacifiCorp's range of scenarios of carbon regulation and pricing should have been based on U.S. state proposals, plans and actions. The company should have considered actions by California under AB 32 and Oregon's goals codified in ORS 468A.205(1). Both states are served by PacifiCorp. In addition, the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island and Vermont apply a price to $CO_2$ emissions from the power sector through a regional cap and trade system (the Regional Greenhouse Gas Initiative).

AB 32 is being implemented in California. Under AB 32 the California Air Quality Board has adopted rules and actions to lower California's greenhouse gas emissions to 1990 levels by 2020 economy-wide. Oregon's goal under ORS 468A.205(1)(b) is more stringent – to "achieve greenhouse gas levels that are 10 percent below 1990 levels" by 2020. PacifiCorp's IRP discussed AB 32 but did not relate the current costs of AB 32 and the implications of an economy-wide reduction plan to future federal proposals. A single economy-wide price to achieve a given reduction percentage will be higher than the price to achieve the same reduction from the power sector alone. This makes the carbon prices in the "hard-cap" scenarios unrealistically low.

While it may be impractical for the federal government to achieve California's planned limit by 2020 at this late date, the IRP's range of federal carbon scenarios should

have considered the reduction timing and short-term goal that California has implemented as credible.

PacifiCorp used a System Optimizer to select a wide range of portfolios to be analyzed for stochastic and scenario risk in the Company's Planning and Risk (PaR) model. The highest two $CO_2$ price scenarios PacifiCorp used in its System Optimizer model were based on carbon prices that would reduce emissions in the U.S. electric sector to 80 percent below 2005 levels by 2050 (the "hard-cap" cases). These hard-cap scenarios ignored carbon emissions in other sectors, which have higher carbon reduction costs than the power sector.

The IRP does not cite a source for this 2050 goal, or explain why it is reasonable for the highest risk scenarios to assume that carbon caps will be limited to the power sector in 2050. The IRP discusses Oregon's goal in ORS 468A.205(1)(c) to "by 2050, reduce greenhouse gas levels to at least 75 percent below 1990 levels." The IRP does not indicate why an economy-wide cap, as currently being applied in California and the basis of Oregon's goal, is not credible.

In its response to ODOE Data Request 8 (Attachment 1), PacifiCorp characterizes an analysis of an economy-wide cap as "using highly speculative and multi-sectorial assumptions." While this challenge is true, it is also true of a myriad of assumptions in any IRP, including, but not limited to, forecasts of loads and fuel prices. Further, PacifiCorp is incorrect when it states that using a power-sector only cap "sacrifices no accuracy."

The sacrifice in accuracy can be clearly seen in the highest carbon price for 2032 considered in System Optimizer runs. This "hard-cap high-gas-price" scenario has a $CO_2$ price in 2032 of $92 per ton (all carbon price or tax values below are in 2013 U.S. dollars per short ton of $CO_2$, except where noted). While this carbon price would strongly affect

operations of the power sector, it would barely dent emissions from other stationary sources and transportation emissions. Only about one third of U.S. emissions come from the power sector.

A carbon price of $92 per ton, applied upstream, translates to a price at the pump of about one dollar per gallon. While substantive, a carbon price of one dollar per gallon in 2032 is clearly not on a path to achieve a reduction in U.S. transportation emissions of 80 percent below 2005 by 2050. Gasoline taxes of $2.50 to $3.25 in France, Great Britain, Italy and Germany[1] have been in place for decades, while achieving only small reductions in gasoline use or driving.

Almost half of the cars that will be on the road in 2050 will already be on the road in 2032. Even a carbon price in 2032 similar to what these four European countries have now would not result in enough change to the vehicle stock by 2050 to achieve the 2050 carbon reduction goal in the transportation sector. By setting high-range carbon prices using only the power sector, the IRP has low-balled the likely price required to achieve a given percentage reduction.

An economy-wide carbon price is much more likely to be implemented than a carbon price applied only to the power sector. Virtually all economists advocate that a carbon price should be applied economy-wide to minimize the cost of achieving a particular target. This includes conservative economists Art Laffer and Greg Mankiw. PacifiCorp and other utilities would protest if Congress were considering a carbon tax applied only to the power sector, as would any other sector singled out in such a manner.

[1] http://en.wikipedia.org/wiki/Fuel_tax

To achieve a 75 percent or 80 percent reduction economy-wide for the U.S. by 2050 will require a $CO_2$ price substantially above the levels used in any of PacifiCorp's System Optimizer runs. Below ODOE proposes a method to estimate the levels of carbon prices that would have resulted if PacifiCorp had set its high-price carbon scenario consistent with the "upper reaches of credible proposals by governing entities." While the discussion below does not completely substitute for an analysis of Oregon's statutory carbon goal applied economy-wide to the U.S., it shows that the carbon price range used in the System Optimizer runs did not comply with Guideline 8a.

**U.S. Plans and International Agreements**

The Organization for Economic Cooperation and Development (OECD) has made an estimate of a carbon price that would achieve carbon reduction goals comparable to Oregon's 2050 goal under ORS 468A.205(1)(c).[2] The UN Framework Convention on Climate Change (UNFCCC)[3] committed to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic [human-caused] interference with the climate system." The U.S. made this commitment by signing and having the U.S. Senate approve the UNFCCC in 1992. Early estimates of the reduction levels needed to achieve the UNFCCC commitment were used to establish Oregon's statutory carbon reduction goals. The OECD carbon price estimates are based on a 2010 agreement interpreting the UNFCCC commitment by 76 of the UNFCCC parties, including the U.S., and an up-to-date analysis.

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[2] A description of OECD is at http://www.oecd.org/about/ . OECD is the international organization with the broadest and longest history of U.S. participation. A copy of Attachment 2 can be downloaded at http://www.oecd.org/env/indicators-modelling-outlooks/Outlook%20to%202050_Climate%20Change%20Chapter_HIGLIGHTS-FINA-8pager-UPDATED%20NOV2012.pdf

[3] http://en.wikipedia.org/wiki/United_Nations_Framework_Convention_on_Climate_Change#cite_note-King.2C_D..2C_et_al._12-4

OECD estimates that a worldwide carbon price of $295 per ton of $CO_2$ in 2050 would, at a 50 percent probability, keep the increase in global temperature below 2 degrees Celsius (°C) (or 3.6 degrees Fahrenheit) at the end of this century. Attachment 2 is the OECD's November 2012 report, *Key Findings on Climate Change*. On page 1 it notes:

> *Without more ambitious policies* [than current], *the Baseline projects that* ***atmospheric concentration of GHG*** *would reach almost 685 parts per million (ppm) $CO_2$-equivalents by 2050. This is well over the concentration level of 450 ppm required to have at least a 50% chance of stabilising the climate at 2 degrees (2°C) global average* ***temperature increase****, the goal set in 2010 at the UN Framework Convention on Climate Change (UNFCCC) conference in Cancún. Under the Baseline projection, global average temperature is likely to exceed this goal by 2050, and by 3 to 6°C higher than pre-industrial levels by the end of the century.* (emphasis in original)

Note that all of the OECD scenarios consistent with the UNFCCC 2010 agreement begin reductions in worldwide $CO_2$ emissions before or by 2020. A substantial U.S. carbon price would need to be in place before 2020 for the U.S to keep its agreement as a party to the UNFCCC. The U.S. has continuously been a party to the UNFCCC treaty since the U.S. Senate approved it in 1992.

Before 2010 there were not any specifics on how to interpret the core agreement of the treaty. As noted in Wikipedia, "… the treaty provides a framework for negotiating specific international treaties (called "protocols") that may set binding limits on greenhouse gases." The Kyoto Protocol has expired but the treaty is still operative. Wikipedia also notes that:

*The 2010 Cancún agreements*[4] *(COP 16) include voluntary pledges made by 76 developed and developing countries [including the U.S.] to control their emissions of greenhouse gases.*[5] *At the 2012 Doha climate change talks (COP 18), parties to the UNFCCC agreed to a timetable for a global agreement which will include all countries. The timetable states that a global agreement should be adopted by 2015, and implemented by 2020.*

By agreeing to a firm temperature cap by 2100 , the Cancún agreement signatories established a clear basis to estimate a carbon price path consistent with the treaty's core agreement to prevent "dangerous anthropogenic interference of the climate system."

Because the U.S. remains a signatory to the treaty, the modeling by the OECD represents an estimate of the carbon prices consistent with international agreements that the U.S. has made. This constitutes not just a credible U.S. proposal but an international agreement. The estimated carbon prices from OECD are not guaranteed or might not be a good base case. Even so, they represent a credible proposal for future carbon costs that PacifiCorp should have included in its range of carbon regulation scenarios used for risk analysis.

**Adopted Actions by Other Governing Entities**

As examples of *adopted* proposals by governmental entities outside the U.S., the current carbon tax level in Switzerland is 107.28 Euros per metric tonne of $CO_2$. The simple average for all European OECD countries is EUR 52.04 per tonne of $CO_2$.[6] Both tax levels

[4] http://en.wikipedia.org/wiki/2010_United_Nations_Climate_Change_Conference
[5] http://www.unep.org/pdf/2012gapreport.pdf
[6] From *Taxing Energy Use – A Graphical Analysis (2013), an* OECD report available at http://www.oecd.org/tax/tax-policy/taxingenergyuse.htm.

are an average of the carbon price for all fossil fuel sources of $CO_2$. Using conversion factors of $1.33 per Euro and 1.1023 short tons per metric tonne yields current carbon tax levels in U.S. dollars of $129.44 and $62.79 for Switzerland and Europe, respectively. The highest price used in PacifiCorp's System Optimizer runs is the "hard-cap high-gas price" scenario, which is only $92 per ton of $CO_2$ for *2032*. This is well under the *current* actual carbon price in Switzerland.

As further evidence of the possibility that an economy-wide carbon tax is a realistic possibility, it is important to note the actions of jurisdictions outside the U.S. such as British Columbia and Australia. Both jurisdictions have economies and cultures similar to Oregon and both have implemented a carbon tax. Moreover, in the case of Australia, that tax is currently envisioned as transitioning to a cap-and-trade system. Since both systems are relatively new it is difficult to predict their future tax rates. Nonetheless, their impact – particularly that of B.C.'s carbon tax – is clear since the Province testified in front of the Oregon Legislature on the tax and a carbon tax study bill was passed in the recently completed Oregon Legislative Session (SB 306). Under the bill, the Legislative Revenue Officer will prepare a report for interim committees of the Oregon Legislative Assembly related to revenue and the environment on a clean air fee or tax to generate revenue, including to "[e]valuate how to treat imported and exported energy sources under a clean air fee or tax."

**Planned Actions by U.S. EPA**

The discrepancy between PacifiCorp's IRP modeling of $CO_2$ scenarios and Commission Order No. 08-339 increased on June 25, 2013, when President Obama announced that the U.S. Environmental Protection Agency (EPA) would pursue $CO_2$

regulation of existing power plants under the Clean Air Act. In developing this rule, EPA will be guided by the social cost values produced in May 2013 by the U.S. Interagency Working Group on Social Cost of Carbon.[7] For 2030, these values range from $16 to $159 per ton of $CO_2$. EPA plans to adopt the rule by 2015. If EPA is successful in regulating $CO_2$ from existing power plants and it uses the social costs associated with the mid-range values calculated using discount rates of 2.5 percent or 3 percent, it would yield equivalent carbon price values of $76 or $52 in 2030, for the two discount rates respectively.[8] In contrast, the highest $CO_2$ price scenario PacifiCorp used for PaR model runs has a 2020 price of $12 trending to $52 in 2032. That is equivalent to the medium-low value of the four EPA damage estimates for 2030 shown in Table 1 below. (Note: Table 1 shows values in 2013$ per short ton. The Social cost of Carbon table on the EPA web site shows values in 2011$ per metric tonne.)

[7] http://www.epa.gov/climatechange/EPAactivities/economics/scc.html

[8] These values are slightly different than those on the EPA web site to obtain values in 2013$ per short ton. The SCC values in the EPA table are in 2011$ per metric tonne.

Table 1

**Social Cost of $CO_2$, 2015-2050 [9]**
**(in 2013 Dollars per Short Ton)**

| Year | Discount Rate and Statistic | | | |
|---|---|---|---|---|
| | 5% Average | 3% Average | 2.5% Average | 3% 95th percentile |
| 2015 | $ 11.22 | $ 37.40 | $ 57.98 | $ 109.40 |
| 2020 | $ 12.16 | $ 43.01 | $ 64.52 | $ 128.11 |
| 2025 | $ 14.03 | $ 47.69 | $ 70.13 | $ 144.00 |
| 2030 | $ 15.90 | $ 52.36 | $ 75.74 | $ 158.96 |
| 2035 | $ 18.70 | $ 57.04 | $ 81.35 | $ 174.86 |
| 2040 | $ 21.51 | $ 61.72 | $ 86.96 | $ 191.69 |
| 2045 | $ 23.38 | $ 66.39 | $ 92.57 | $ 205.72 |
| 2050 | $ 26.18 | $ 71.07 | $ 98.18 | $ 220.68 |

As such, the values PacifiCorp uses do not constitute the upper reaches of credible ranges. EPA states: "As noted by the IPCC Fourth Assessment Report it is 'very likely that

[9] EPA's social cost of carbon estimate, found at http://www.epa.gov/climatechange/EPAactivities/economics/scc.html, and converted from 2011$ per metric tonne to 2013$ per short ton

[SCC] [the social cost of carbon] underestimates' the damages."[10] Note also that the IPPC reports are part of the UNFCCC process.

When it was published, PacifiCorp's 2013 IRP clearly indicated the possibility that EPA might regulate emissions from existing power plants in the near future. On page 34 of Volume 1 the IRP states:

> *On December 23, 2010, **in a settlement reached with several states** and environmental groups in New York v. EPA, the **EPA agreed** to promulgate emissions standards covering GHGs from **both new and existing** electric generating units under Section 111 of the CAA by July 26, 2011 and issue final regulations by May 26, 2012.7 NSPS are established under the CAA for certain industrial sources of emissions determined to endanger public health and welfare and must be reviewed every eight years. While NSPS were intended to focus on new and modified sources and effectively establish the floor for determining what constitutes BACT, the emission guidelines will apply to existing sources as well. In April 2012, the EPA proposed a NSPS for new fossil-fueled generating facilities that would limit emissions of carbon dioxide to 1,000 pounds per megawatt hour (MWh). The proposal exempted simple cycle combustion turbines from meeting the standards. The public comment period closed in June 2012 and a final rule is expected by April 2013. While the **EPA is also under a consent decree obligation to establish GHG NSPS for modified and existing sources**, EPA has indicated it has not established a schedule for doing so.* [emphasis added]

PacifiCorp did not further assess the potential effects of EPA's agreements discussed in

[10] Here EPA is quoting the IPCC report. The IPCC is a research arm of the UNFCCC. It Fourth IPCC Assessment Synthesis Report can be found at http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm .

the quote above in its risk analysis, presumably because EPA has not "established a schedule" of implementation. Planned actions by federal agencies should help construct a realistic base case, and not just be used to set a range including the "upper reaches of credible proposals."

A credible high case should include the possibility that, as a substitute for EPA action, in 2015 Congress could pass a revenue-neutral carbon tax or other carbon pricing with taxes implemented in 2017. The law could have an initial schedule of carbon taxes consistent with the $295 per ton price in 2050 needed to stay under the 2°C threshold. That is what is required under the U.S. treaty agreement from Cancun as interpreted by the OECD, a research arm of all major developed countries. Whether it is action by Congress or EPA, an effective carbon price could be in place in 2017.

Alternatively, a reasonable upper bound to the carbon cost range could be based on U.S. *economy-wide* $CO_2$ reductions consistent with Oregon's goals under ORS 468A.205(1). This certainly constitutes a proposal by a governing entity under any definition. PacifiCorp has not shown that Oregon's statutory, economy-wide goal is less credible than the company's IRP scenario of a 2050 cap on only the power sector based on carbon emissions 80 percent below 2005 levels.

**A Credible Proposal Based on Oregon's Goals and U.S. Agreements**

ODOE finds that the range of $CO_2$ prices used to develop PacifiCorp's IRP action plan is inconsistent with Order 08-339. As evidence ODOE presents the following case: A plausible high $CO_2$ price scenario would begin with at least $20 per ton in 2017, a date the lawsuits on EPA regulations on existing power plants could be concluded or the 2015 Congress could pass legislation to implement a carbon price in 2017. The comparable EPA

damage values for 2015 are $37.40 and $57.98 for the 3 and 2.5 discount rates, respectively. The proposed $20 starting value in 2017 is substantially lower than EPA's damage values to account for political realities.

A linear trend from the $20 value in 2017 to the OECD's 2050 value of $295 yields a 2032 value of $145 per ton of $CO_2$. The "high" $CO_2$ price for 2032 that PacifiCorp used in the IRP for developing its action plan was only $52, roughly a third of the value that would have been consistent with U.S. international agreements. This indicates a material and substantive inconsistency between the analysis in PacifiCorp's 2013 IRP and Guideline 8a in Order No. 08-339.

**The IRP Risk Analysis Did Not Use the Two Highest Carbon Price Scenarios**

Risks are assessed in the IRP by applying the appropriate range of carbon scenarios, as directed by Guideline 8a, to the PaR stochastic runs to assess risks from both carbon costs and five input stochastic variables. The PaR model uses a Monte Carlo random sampling of five stochastic variables: loads, commodity natural gas prices, wholesale power prices, hydro energy availability, and thermal unit availability for new resources. Carbon risks are captured by running the PaR under a variety of carbon price scenarios.

As discussed above, even the highest $CO_2$ price considered in the System Optimizer runs ("hard-cap high-gas price") is too low to be consistent with Order No. 08-339. Still, PacifiCorp did not use this price scenario in its stochastic PaR model runs used to establish the risks of the IRP action plan. Nor did PacifiCorp use the second highest price scenario ("hard-cap medium gas price") in its PaR model runs. Instead, the IRP confines its stochastic analyses to $CO_2$ prices in 2032 that range from zero in the low scenario to $52 per ton $CO_2$ in PacifiCorp's high scenario, the equivalent of about 57 cents per gallon of gasoline.

PacifiCorp's medium case has a value of $18 for 2032. For comparison, $18 per ton of $CO_2$ is equivalent to about 20 cents per gallon of gasoline, a carbon adder that is within the noise of current gasoline price volatility.

**Conclusions**

The Commission Order in this docket should state: The Commission finds that PacifiCorp's 2013 IRP does not comply with Guideline 8a.

The Commission should carefully scrutinize all action items in the IRP that might have been shown to be too risky had a more appropriate range of possible carbon policies been used in the IRP risk analysis. Based on the information presented in this docket, the Commission must make its own informed judgment of what it might have learned from an adequate assessment of carbon risks before acknowledging proposed action items in the 2013 IRP with significant carbon price risk. With its failure to comply with Guideline 8a, PacifiCorp's 2013 IRP does not adequately demonstrate that action plan items that have significant carbon risks are "the best combination of expected costs and associated risks and uncertainties for the utility and its customers," as required under Guideline 1c in Order No. 07-002.

Regardless of its acknowledgements, the order should instruct PacifiCorp for the next IRP that the "upper reaches of credible proposals by governing entities" in Guideline 8a, Order No. 08-339, includes the Oregon goal under ORS 468A.205(1)(c) of achieving "greenhouse gas levels that are at least 75 percent below 1990 levels" by 2050 as an *economy-wide* goal for the U.S.

It is clear from ORS 468A.205 that the Oregon 2050 goal is an economy-wide goal. ORS 468A.205(1) states, "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:" There is no specific mention of the power sector.

There is no reason that the Oregon 2050 goal could not be achieved by the U.S. If Order No. 08-339 had intended that only the U.S. be considered a "governing entity," Guideline 8a would have said, "credible proposals by the U.S. Government."

As an alternative to using Oregon's statutory 2050 goal, the Commission Order could indicate that the high $CO_2$ price scenario should be consistent with the Cancún agreement of the UNFCCC parties as interpreted by the OECD. This is an agreement signed by the U.S. in 2010 as an interpretation of a U.S. treaty still in force.

The Commission Order should also instruct PacifiCorp that "credible proposals by governing entities" includes adopted plans and actions by other democratically-elected sovereign states.

**2. Determining an Appropriate Capacity Credit for Solar and Wind Generation**

PacifiCorp excludes from its analysis of the reliability value of solar and wind resources all hours outside the 100 summer peak load hours of the year. Retail customers value reliability in every hour of the year. Studies by the National Energy Renewable Laboratory indicate that the capacity credit can be substantially different depending on how many hours of the year are considered.[11]

The Commission should direct PacifiCorp that for the next IRP it should conduct a stochastic assessment of the appropriate capacity credit for solar and wind resources based on

[11] *Comparison of Capacity Value Methods for Photovoltaics in the Western United States,* by Seyed Hossein Madaeni, Ramteen Sioshansi and Paul Denholm, July 2012; *http://www.nrel.gov/docs/fy12osti/54704.pdf*

unserved energy for all 8,760 of the year. At least one of these analyses should use equal weights for all MWhs of unserved energy.

PacifiCorp's response to ODOE Data Request 4 is provided in Attachment 3. ODOE asked PacifiCorp "to explain the relative advantages and disadvantages of using the company's method [which uses only 100 summer peak hours]..., as compared to an annual analysis of effective load carrying capacity (ELCC) of these [solar and wind] resources." The company responded: "The Company's method to determining [sic] the peak contribution is reasonable based on the following: [it is] Supported by actual experience using historical wind generation data and calculation; [and] Aligns generation levels at the times when coincident system peak loads occur, consistent with how the need for capacity is defined in the Integrated Resource Plan (IRP)." The response also listed the data used and provided a description of PacifiCorp's method.

ODOE disputes the implication that annual methods, such as the ELCC, could not or would not use "actual experience using historical wind [or solar] data and calculation[s]." ELCC and other annual methods would use historical data from 8,760 hours of data per year, rather than just 100 hours. ODOE also disputes PacifiCorp's notion that capacity for variable renewable energy resources (wind and solar) should be defined identically with how capacity is defined for thermal resources.

Neither of PacifiCorp's reasons for restricting the analysis to only peak 100 hours is persuasive. An analysis of resource capabilities should provide an understanding of how resource choices affect unserved energy in all hours. IRP portfolios should provide consistent levels of system reliability.

In its data request, ODOE asked, "Please include considerations of whether the analyses provide consistent levels of unserved load [across resource choices]." PacifiCorp's response did not address this question.

ODOE also requested that PacifiCorp's response "Please include considerations of approximations of the annual ELCC method, such as the Garver approximation." PacifiCorp responded, "The Company has formed no opinion on the Garver approximation method."

The Commission Order in this docket should include guidance for the next IRP cycle that PacifiCorp conduct a stochastic capacity credit study that fully uses 8,760 hours of data per year and provides consistent levels of reliability, as measured by unserved energy, across portfolios. The Order should direct PacifiCorp to appoint an advisory group of experts and stakeholders for the study. PacifiCorp should present the draft results for advisory group review in time for the final capacity credit values to be used in all the IRP analyses that support the action plan. If PacifiCorp does not have the staff to complete the assessment in a timely way, it should hire a consultant to conduct the study.

DATED this 22nd day of August 2013

Respectfully submitted,

ELLEN F. ROSENBLUM
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OSB 055115

Mark Schmidt for

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Senior Assistant Attorney General
Natural Resources Section

# ATTACHMENT 1

# LC 57

# ODOE OPENING COMMENTS

LC-57/PacifiCorp
July 24, 2013
ODOE Data Request 8

**ODOE Data Request 8**

As noted on page 170 of Vol. I of the 2013 IRP, the OPUC requires that IRPs examine $CO_2$ scenarios "ranging from the present $CO_2$ regulatory level to the upper reaches of credible proposals by governing entities."

(a) Please indicate the projected U.S. economy-wide total emissions (power and non-power sectors combined) from the hard cap price scenarios produced by the *Integrated Planning Model* (see pp. 167-170).
(b) If economy-wide emission levels were not analyzed, please explain why not, given that the application of an economy-wide carbon price is widely endorsed by U.S. economists (e.g. Art Laffer and Greg Mankiw) as the most efficient carbon regulatory mechanism and is being pursued in California and in many countries.
(c) Please explain how the range from a zero carbon price to PacifiCorp's hard cap scenarios would contain "the upper reaches of credible proposals."

**Response to ODOE Data Request 8**

(a) U.S. economy-wide $CO_2$ emission constraints were not assumed in producing the hard-cap $CO_2$ price scenarios in the 2013 Integrated Resource Plan (IRP). Instead, $CO_2$ emission constraints reflected an 80 percent reduction in 2005 $CO_2$ power sector emission levels by 2050.

(b) The impact of power sector $CO_2$ emission caps serve as a proxy for capturing the impact of economy-wide $CO_2$ emission caps on power sector emission levels and costs. To forecast an economy-wide $CO_2$ price, assumptions must be made as to non-power sectors covered, timing of non-power sector coverage, reserve price, non-power sector abatement costs, and the eligibility, availability, and cost of offsets. Since 2010 there has been little momentum for a national economy-wide cap and trade program. As such, PacifiCorp chose to impose a power-sector (only) cap and trade program for scenario purposes versus a detailed economy-wide cap and trade program using highly speculative and detailed multi-sectorial assumptions. Either way, given the vagaries of future $CO_2$ legislation and/or regulation there is an infinite array of future $CO_2$ price outcomes. Bracketing outcomes using plausible simplified assumptions sacrifices no accuracy vis-à-vis bracketing outcomes using detailed multi-sectorial assumptions made under a posited future for which no national regulatory or legislative guidelines yet exist.

(c) In PacifiCorp's 2013 IRP, national $CO_2$ prices range from zero to a high of $132.25 per ton in 2032. The zero national $CO_2$ price scenario represents the status quo and is the lowest viable $CO_2$ price scenario since prices are bounded on the low side by zero. The high-gas hard cap scenario represents a credible upper bound in that it assumes

an 80 percent reduction from 2005 $CO_2$ power sector emissions by 2050[1], high natural gas prices, no domestic or international offsets, no price ceilings, and no trading outside of the power sector. Thus, the power sector is forced to reduce $CO_2$ emissions by retiring high-emitting units, retrofitting, fuel switching, and building non-$CO_2$ emitting units. The resulting $CO_2$ price represents the power sector's marginal cost of compliance in meeting its $CO_2$ caps without help from offsets, price ceilings, or multi-sector trading. The power sector should not be willing to pay more for $CO_2$ allowances than its marginal cost of compliance. As such, this stringent scenario serves to bracket the upper reaches of credible proposals.

[1] Loosely based on emission levels proposed in the American Power Act of 2010, sponsored by Senators John Kerry and Joe Lieberman, and the American Clean Energy and Security Act of 2009, sponsored by Representatives Henry Waxman and Edward Markey.

# ATTACHMENT 2

# LC 57

# ODOE OPENING COMMENTS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
ORGANISATION DE COOPÉRATION ET DE DÉVELOPPEMENT ÉCONOMIQUES
BETTER POLICIES FOR BETTER LIVES DES POLITIQUES MEILLEURES POUR UNE VIE MEILLEURE

# THE OECD ENVIRONMENTAL OUTLOOK TO 2050

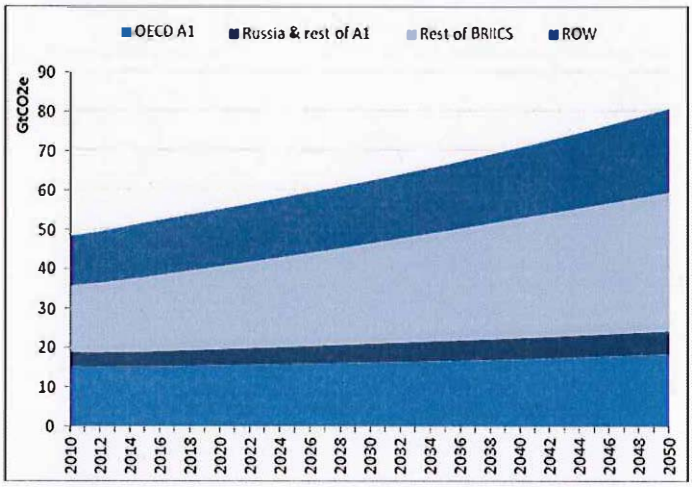
## Key Findings on Climate Change

### *Trends and projections: we are far off course*

*Environmental state and pressures*

**Global greenhouse gas (GHG) emissions** continue to increase, and in 2010 global **energy-related carbon dioxide ($CO_2$) emissions** reached an all-time high of 30.6 gigatonnes (Gt) despite the recent economic crisis. The *Environmental Outlook Baseline* scenario envisages that without more ambitious policies than those in force today, GHG emissions will increase by another 50% by 2050, primarily driven by a projected 70% growth in $CO_2$ emissions from energy use. This is primarily due to a projected 80% increase in global energy demand. Transport emissions are projected to double due to a strong increase in demand for cars in developing countries and aviation. Historically, OECD economies have been responsible for most of the emissions. In the coming decades, increasing emissions will also be caused by high economic growth in some of the major emerging economies.

**GHG emissions by region (in $GtCO_2e$): *Baseline* scenario**



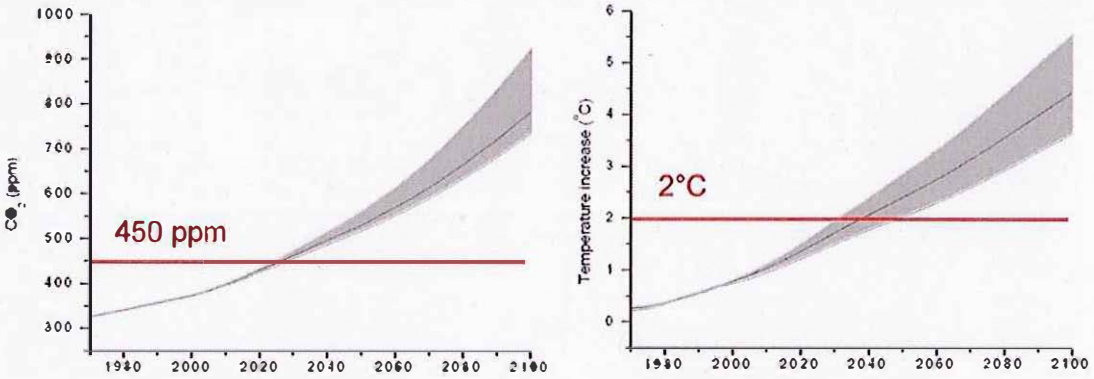

***"Global GHG emissions are expected to grow by 50% between now and 2050, mostly driven by energy demand and economic growth in key emerging economies"***

Note: $GtCO_2e$ = Giga tonnes of $CO_2$ equivalent
ROW = Rest of the World
*Source:* OECD Environmental Outlook Baseline; ENV-Linkages model

Without more ambitious policies, the *Baseline* projects that **atmospheric concentration of GHG** would reach almost 685 parts per million (ppm) $CO_2$-equivalents by 2050. This is well over the concentration level of 450 ppm required to have at least a 50% chance of stabilising the climate at 2 degrees (2°C) global average **temperature increase**, the goal set in 2010 at the UN Framework Convention on Climate Change (UNFCCC) conference in Cancún. Under the *Baseline* projection, global average temperature is likely to exceed this goal by 2050, and by 3 to 6°C higher than pre-industrial levels by the end of the century. Such a high temperature increase

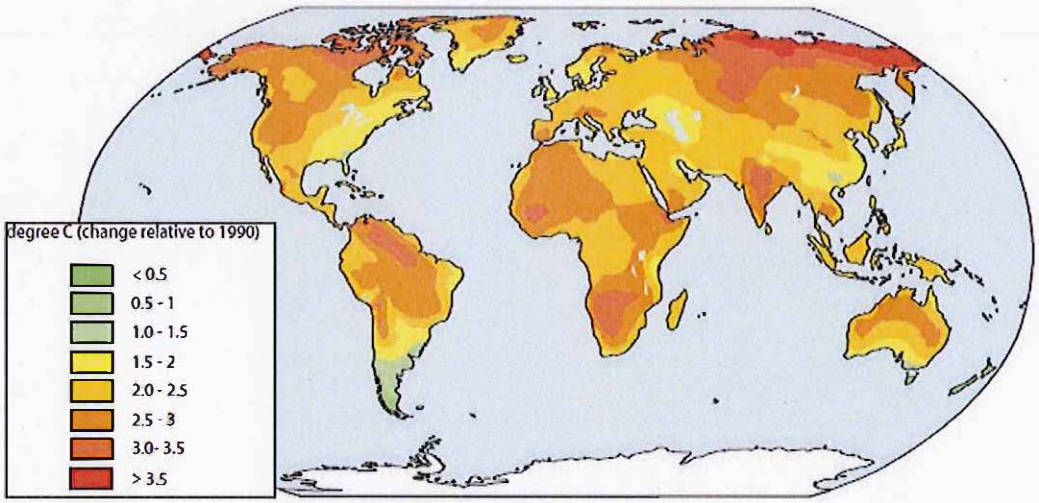
would continue to alter precipitation patterns, melt glaciers, cause sea-level rise and intensify extreme weather events to unprecedented levels. It might also exceed some critical "tipping-points", causing dramatic natural changes that could have catastrophic or irreversible outcomes for natural systems and society.

**Long-run $CO_2$ concentrations and temperature increase: *Baseline*, 1980-2100**




*Source:* The *OECD Environmental Outlook Baseline* projections; IMAGE model

**Change in annual temperature 1990-2050: *Baseline* scenario**




*Source:* The *OECD Environmental Outlook Baseline* projections; IMAGE model

Technological progress and structural shifts in the composition of growth are projected to improve the **energy intensity of economics** in the coming decades (*i.e.* achieving a relative decoupling of GHG emissions growth and GDP growth), especially in OECD and the emerging economies of Brazil, Russia, India, Indonesia, China and South Africa (BRIICS). However, under current trends, these regional improvements would be outstripped by the increased energy demand worldwide.

Emissions from **land use, land use change and forestry** (LULUCF) are projected to decrease in the course of the next 30 years, while carbon sequestration by forests increases. By 2045, net $CO_2$ emissions from land use are projected to become negative in OECD countries – *i.e.* become a net emissions sink. Most emerging economies also show a decreasing trend in emissions from an expected slowing of deforestation. In the rest of the world, land use emissions are projected to increase to 2050, driven by expanding agricultural areas, particularly in Africa.

***Policy responses***

Pledging action to achieve national GHG emission reduction targets and actions under the UNFCCC at Copenhagen and Cancún was an important step by countries in finding a global solution. However, **the mitigation actions** pledged by countries are not enough to be on a least-cost pathway to meet the 2°C goal. Limiting temperature increase to 2°C from these pledges would incur substantial additional costs after 2020 to ensure that atmospheric concentrations of GHGs do not exceed 450 ppm by the end of the century. More ambitious action is therefore needed now and post-2020. For example, 80% of the projected emissions from the power sector in 2020 are inevitable, as they come from power plants that are already in place or are being built today. The world is locking itself into high-carbon systems more strongly every year. Prematurely closing plants – at significant economic cost – would be the only way to reverse this "lock-in".

***"Copenhagen/Cancun pledges are not enough."***

Progress has been made in developing national strategies for **adapting to climate change**. These also encourage the assessment and management of climate risk in relevant sectors. However, there is still a long way to go before the right instruments and institutions are in place to explicitly incorporate climate change risk into policies and projects, increase private-sector engagement in adaptation actions and integrate climate change adaptation into development co-operation.

## *How can we avoid the grim prospects?*

**We must act now** to reverse emission trends projected under the *Baseline* scenario in order to stabilise GHG concentrations at 450 ppm $CO_2e$ and increase the chance of limiting the global average temperature increase to 2°C. Delayed or only moderate action up to 2020 (such as going no further than implementing the Copenhagen/Cancún pledges, or waiting for better technologies to come on stream) would be more costly. It would increase the pace and scale of efforts needed after 2020, and also entail higher environmental risk.

This *Outlook* explores three different scenarios for stabilising emissions at 450 ppm by the end of the 21st century:

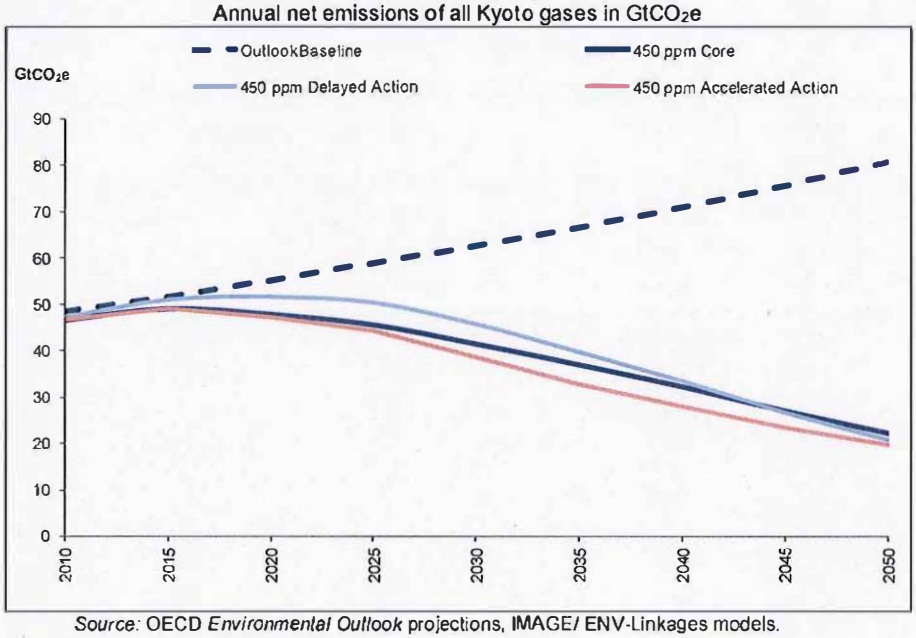
- ***450 ppm Core* scenario:** least-cost timing of action (immediately tapping into less costly mitigation options in all sectors, regions and gases; use of low-cost mitigation technologies e.g. biomass energy with carbon capture and storage [BECCS] that become available later this century), start pricing carbon in 2013.

- ***Accelerated Action* scenario:** assumptions as in the *450 Core* scenario, but with steeper mitigation efforts between 2013 and 2030 to reduce reliance on emerging new technologies like BECCS in later decades.

- ***Delayed Action* scenario:** mitigation action limited to Cancún and Copenhagen pledges to 2020; fragmented regional carbon markets between 2013 and 2020; requires rapid, costly and significant

"catch up" after 2020 involving premature scrapping or retrofitting of existing fossil energy infrastructure that are "locked in".

**Alternative emission pathways, 2010-2050;**
Annual net emissions of all Kyoto gases in $GtCO_2e$

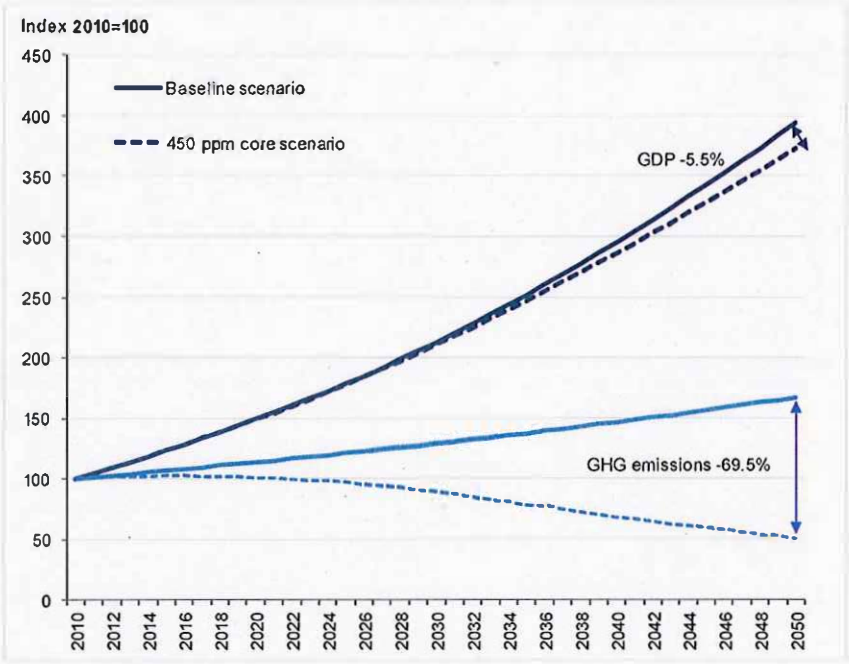



*Source:* OECD *Environmental Outlook* projections, IMAGE/ ENV-Linkages models.

These stylised pathways modelled for this *Environmental Outlook* have at least an even chance of limiting global temperature increase to 2°C and suggest that:

- **Emissions must peak before 2020**. The *Delayed Action* scenario shows a short delay before global emission levels start reducing, implying that after 2025 there would need to be a rapid reversal of current trends to still achieve the 2°C goal with an even chance.
- **To avoid excessive costs, an overshoot of the targeted concentration level (450 ppm) has now become inevitable** in the middle of the century, before falling to reach the target concentration by the end of the century. However, overshooting may have environmental impacts by causing higher rates of temperature change in the coming decades. The *Accelerated Action* scenario, though more costly, reflects a lesser degree of overshoot than the other two scenarios hence a limited environmental risk.
- **A significant carbon price is needed to induce technological change**. The *450 Core* scenario assumes a global carbon price gradually increasing rapidly to USD 325/$tCO_2e$ in 2050. Energy use grows to 2020, but thereafter emissions would be reduced primarily by energy efficiency improvements as well as decarbonisation in the power generation, transport sector, and existing dirty energy use by consumers (*e.g.* use of cooking fuels) replaced with more efficient electricity-based technologies.
- **Ambitious mitigation action substantially lowers the risk of catastrophic climate change**. Global GHG emissions could be 70% lower than in our no-new- policy *Baseline*. (Or 52% below 2005 levels). This could be achieved at a **cost of action to global GDP of abont 5.5% in 2050** by which time GDP is projected to have quadrupled. It would hence slow down global average GDP growth from 3.5% to 3.3% per year (by 0.2 percentage points) in this period. This cost does not include the co-benefits of climate mitigation on health and biodiversity for instance, and has to be compared with the costs on inaction which could be over 14% of average world consumption per capita (Stern, 2006).

***450 ppm Core* scenario: global emissions and cost of mitigation**




*Source:* OECD Environmental Outlook Baseline; ENV-Linkages model.

## *Policy steps to build a low-carbon, climate-resilient economy*

A prudent response to climate change calls for both an ambitious mitigation policy to reduce further climate change, and timely adaptation policies to limit damage from the impacts that are already inevitable. In the context of tight government budgets, finding least-cost solutions and engaging the private sector will be critical to finance the transition. Costly overlaps between policies must also be avoided. The following actions are a priority:

- **Adapt to inevitable climate change.** The level of GHG already in the atmosphere means that some changes in the climate are now inevitable. The impact on people and ecosystems will depend on how the world adapts. Adaptation policies will need to be implemented to safeguard the well-being of current and future generations worldwide.
- **Integrate adaptation into development co-operation.** The management of climate change risks is closely intertwined with economic development – impacts will be felt more by the poorest and most vulnerable populations. National governments and donor agencies have a key role to play and integrating climate change adaptation strategies into all development planning is now critical. This will involve assessing climate risks and opportunities within national government processes, at sectoral and project levels, and in both urban and rural contexts. The uncertainty surrounding climate impacts means that flexibility is important.
- **Set clear, credible, more stringent and economy-wide GHG mitigation targets** to guide policy and investment decisions. Participation of all major emission sources, sectors and countries would reduce the costs of mitigation, help to address potential leakage and competitiveness concerns and could even out ambition levels for mitigation across countries.

*Adaptation options and potential policy instruments*

| Sector | Adaptation options | Potential policy instruments |
|---|---|---|
| **Agriculture** | Crop insurance; investment in new technologies; removal of market distortions; change crops and planting dates; yield-development of yield-improving crops (*e.g.* heat and drought resistant crops). | Price signals/markets; insurance instruments; microfinance; R&D incentives and other forms of public support. |
| **Fisheries** | Installations to prevent storm damage; techniques to deal with temperature stress; breeding technology innovations; improved food sourcing away from reliance on fish; reduced antibiotic use; ecosystem approach to fisheries; aquaculture. | R&D incentives and other forms of public support; regulatory incentives, marine spatial planning |
| **Coastal zones** | Coastal defences/sea walls; surge barriers; sediment management; beach nourishment; habitat protection; land use planning; relocation. | Coastal zone planning; differentiated insurance; PPPs for coastal defence schemes. |
| **Health** | Air conditioning, building standards; improvements in public health; vector control programmes; disease eradication programmes; R&D on vector control, vaccines, disease eradication. | R&D incentives and other forms of public support; regulatory incentives (*e.g.* building codes); insurance; heat alert and response systems; air quality health indices. |
| **Water resources** | Leakage control; reservoirs; desalination; risk management to deal with rainfall variability; water permits, water pricing; rational water use, rainwater collection. | Price signals/markets; regulatory incentives; financing schemes; R&D incentives and other forms of public support. |
| **Ecosystems** | Reduce *Baseline* stress; habitat protection; change in natural resource management; market for ecological services; facilitate species migration; breeding and genetic modification for managed systems. | Ecosystem markets; land use planning; environmental standards; microfinance schemes; R&D incentives and other forms of public support. |
| **Settlements and economic activity** | Insurance, weather derivatives; climate-proofing of housing stock and infrastructure; zone planning, location decisions. | Building standards; insurance schemes; adjustments to infrastructure PPPs, direct public support. |
| **Extreme weather events** | Insurance; flood barriers; storm/flood-proof infrastructure, housing stock; early warning systems; enhanced disaster management; land use planning; green infrastructure or ecosystems based adaptation. | Building codes, land use planning; private finance or PPPs for defence structures |

*Source:* adapted from OECD (2008a), Economic Aspects of Adaptation to Climate Change. Costs, benefits and policy instruments, OECD, Paris.

- **Set clear, credible, more stringent and economy-wide GHG mitigation targets** to guide policy and investment decisions. Participation of all major emission sources, sectors and countries would reduce the costs of mitigation, help to address potential leakage and competitiveness concerns and could even out ambition levels for mitigation across countries.

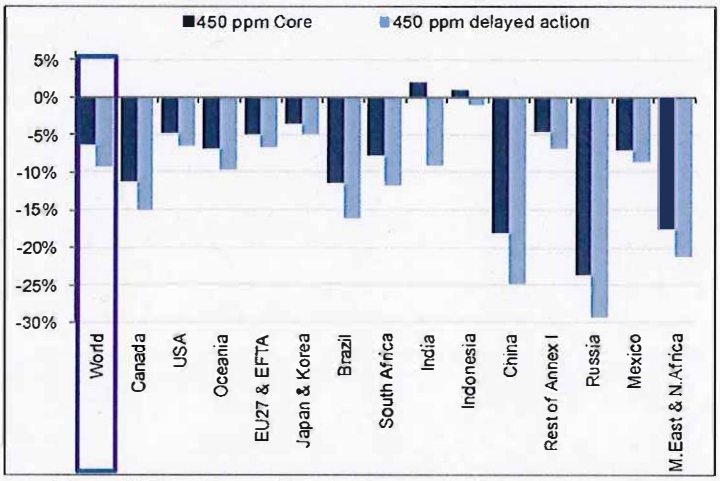
- **Put a price on carbon**. This can be done most effectively by using market-based instruments like carbon taxes or emission trading schemes. These can provide a dynamic incentive for innovation and private investment in low-carbon, climate-resilient infrastructure, plant and equipment. These can also generate revenues to ease tight government budgets and potentially provide new sources of public funds.

- **Act now. Delay is costly and could become unaffordable.** The further we delay action, the costlier it will be to stay within 2°C. 450 ppm is still achievable, but the costs are rising every day, month and year that passes to compensate for the increased emissions. In the longer run to 2050, the *450 Delayed Action* scenario requires costly mitigation efforts to bring

***"If the Copenhagen/ Cancun pledges and actions for Annex I countries were to be implemented as a carbon tax or a cap-and-trade scheme with fully auctioned permits, in 2020 the fiscal revenues would amount to more than 250 billion USD, i.e. 0.6% of their GDP."***

concentration levels back down to 450 ppm before the end of the century.

**Regional real income impacts, 450 Core vs. 450 Delayed Action scenarios: % change from Baseline, 2050**



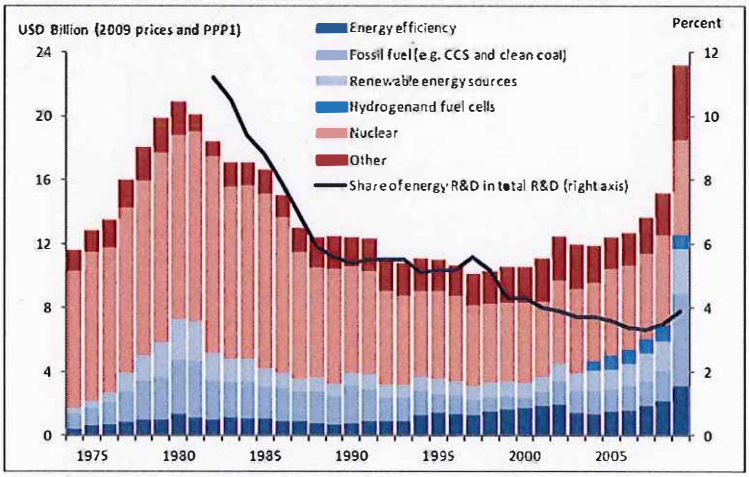

Source: OECD Environmental Outlook projections, ENV-Linkages model

***"Delaying action would increase the global cost of mitigation by nearly 50% by 2050"***

- **Reform fossil fuel support policies.** Support to fossil fuel production and use in OECD countries is estimated to have been about USD 45-75 billion a year in recent years; developing and emerging economies provided USD 410 billion in fossil fuel consumer subsidies in 2010. Phasing out fossil fuel subsidies in emerging and developing countries could reduce global GHG emissions by 6% globally by 2050, compared with the *Baseline*, and by over 20% in Russia and the Middle East and North-Africa region. Fossil fuel subsidy reforms should be implemented carefully by addressing potential negative impacts on households through appropriate measures.

- **Foster innovation and support new clean technologies.** OECD work shows that the cost of mitigation could be significantly reduced if R&D could come up with new breakthrough technologies. For example, emerging technologies – such as bioenergy from waste biomass and carbon capture and storage – have the potential to absorb carbon from the atmosphere. Perfecting these technologies, and finding new ones, will require a clear price on carbon, targeted government-funded R&D, and policies to foster investment in new low-carbon technologies and their deployment.

**Government energy RD&D expenditures in IEA member countries: 1974-2009**

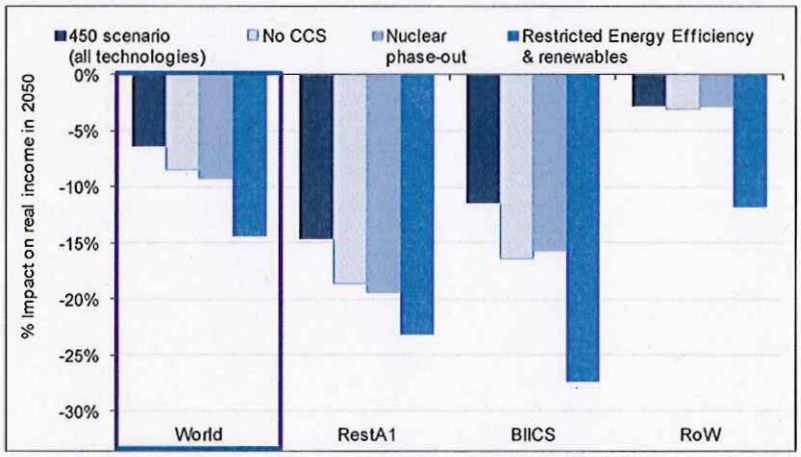



Notes: [1]PPP= Purchasing Power Parities. The Czech Republic, Poland and Slovak Republic not included.
*Source*: IEA (2011a), $CO_2$ Emissions from Fuel Combustion: Highlights, OECD/IEA, Paris

***"Except for the 2009 green stimulus, public RD&D on energy as share of total R&D budgets has declined in real terms over the last 35 years."***

The Environmental Outlook's 450 mitigation scenarios assume all energy technology options (e.g. nuclear, Carbon Capture and Storage (CCS), energy efficiency measures, renewables) to be available. If policies constrain some of technology options, the cost of mitigation would be higher (see below). The impact of technology choices is limited in the short run. In the long run, sufficient flexibility in energy systems will protect regions against sudden unexpected changes in the availability of technologies or increased costs.

**450ppm Accelerated Action scenario: Economic impacts of technology choices in 2050**




*Source*: OECD Environmental Outlook Baseline; ENV-Linkages model

***"Leaving out any single technology, such as nuclear or carbon capture and storage (CCS), will make the costs of the transition higher."***

- **Complement carbon pricing with well-designed regulations.** Carbon pricing and support for innovation will not be enough to ensure all that energy efficiency options are adopted or accessible. Additional targeted regulatory instruments (such as fuel, vehicle and building efficiency standards) may also be required. If designed to overcome market barriers and avoid costly overlap with market-based instruments, they can accelerate the uptake of clean technologies, encourage innovation and reduce emissions cost-effectively. The net contribution of the instrument "mix" to social welfare, environmental effectiveness and economic efficiency should be regularly reviewed.

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The *OECD Environmental Outlook to 2050* (2012) was prepared by a joint team from the OECD and the PBL Netherlands Environmental Assessment Agency. The *Outlook* includes chapters on: socioeconomic developments, climate change, biodiversity, water, and health and environment.

www.oecd.org/environment/outlookto2050

OECD member countries are Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

# ATTACHMENT 3

# LC 57

# ODOE OPENING COMMENTS

**ODOE Data Request 4**

Please explain the relative advantages and disadvantages of using the company's method of determining the capacity credits for wind and solar generation in Appendix O of Volume II of the 2013 IRP, as compared to an annual analysis of the effective load carrying capacity (ELCC) of these resources. Please include considerations of whether the analyses provide consistent levels of un-served load with and without these resources and the types of data that are needed to conduct both analyses. Please include consideration of approximations of the annual ELCC method, such as the Garver approximation.

**Response to ODOE Data Request 4**

The Company's method to determining the peak contribution is reasonable based on the following:

- Supported by actual experience by using historical wind generation data in the calculation;
- Aligns generation levels at the times when coincident system peak loads occur, consistent with how the need for capacity is defined in the Integrated Resource Plan (IRP);
- Top 100 summer peak hours (June to September) determined from actual load reported each year;
- Data covers a multi-year period (2007 to 2010); and
- Calculates the capacity contribution for a 90 percent probability based on the level of wind or solar resource generation, rather than the generation from a single hour.

The Company has formed no opinion on the Garver approximation method.

CERTIFICATE OF SERVICE

I hereby certify that on August 22, 2013, I served the foregoing OPENING COMMENTS OF OREGON DEPARTMENT OF ENERGY upon all parties of record in this proceeding by delivering a copy by electronic mail only as all parties of the service list have waived paper service.

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**(C)= Confidential**

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