

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

LC 48

In the Matter of)	
)	
PORTLAND GENERAL ELECTRIC	)	SIERRA CLUB, COLUMBIA
	)	RIVERKEEPER, FRIENDS OF
2009 Integrated Resource Plan	)	THE COLUMBIA GORGE, AND
	)	THE NORTHWEST ENVIRONMENTAL
	)	DEFENSE CENTER'S COMMENTS

Pursuant to the procedural order issued in this docket on May 13, 2010, Sierra Club, NEDC, Friends of Columbia Gorge and Columbia Riverkeeper (hereinafter "Coalition") hereby submit these comments to the Oregon Public Utility Commission ("Commission" or "PUC") on Portland General Electric's ("PGE's") 2009 Integrated Resource Plan ("IRP"). The Coalition appreciates this opportunity to provide information to the Commission.

INTRODUCTION

The Coalition represents tens of thousands of Oregonians who support a clean energy future that can help us avoid the imminent risks to our future from continued dependence on carbon intensive energy production, create sustainable jobs, and preserve and protect public health and the environment. The question before the Commission is whether PGE's investments totaling around \$510,000,000 to comply with existing clean air rules at the Boardman coal plant would be prudent. PGE asks for acknowledgement of two alternative action plans in its 2009 IRP. PGE primarily seeks approval of its plan to install controls and operate until 2040. PGE's proposal to attempt to gain the statutory and regulatory approvals it needs to operate Boardman without a scrubber and other add-on pollution control technology so that it may transition off coal by 2021 is secondary to the 2040 backstop of a half a billion dollar investment in the Boardman coal plant. PGE has asked that the Commission acknowledge both plans. As explained below and in the attached technical comments, PGE's 2020 plan presents unworkable challenges, and PGE's proposal to run the plant until 2040 and beyond is not the least cost, least risk option. Thus, the Commission should not acknowledge the Boardman aspects of PGE's 2009 IRP.

The Coalition has contracted with David Schlissel of Schlissel Technical Services to provide a technical analysis of the PGE 2009 IRP on behalf of the Coalition. Since 1973, Mr. Schlissel has served as a consultant, expert witness, and attorney on complex management, engineering, and economic issues, primarily in the fields of energy and the environment. Mr. Schlissel has been retained by regulatory commissions, state and federal governmental agencies, publicly-owned utilities and private environmental and consumer organizations to prepare expert analyses on issues related to electric, natural gas, and telephone utilities. As part of this work, he has presented expert testimony in more than 100 proceedings before regulatory boards and commissions in 30 states, two federal regulatory agencies, and in state and federal court

proceedings. Mr. Schlissel holds BS and MS degrees in Astronautical Engineering from the Massachusetts Institute of Technology and Stanford University. He received a Juris Doctor degree from Stanford University School of Law. He has also studied Nuclear Engineering and Project Management at MIT. Mr. Schlissel's comments are attached as Exhibit 1.

In addition to Mr. Schlissel's technical comments, the Coalition offers the following comments on matters of public policy that bear on the (1) viability of the 2020 plan; (2) the risks to ratepayers of the 2040 plan; and (3) the benefits of a transition off coal at Boardman in compliance with existing and anticipated regulatory frameworks. While the Coalition acknowledges that laws and regulations limit the Commission's authority in policy matters, we hope that these policy comments are useful to the Commission in addition to the comments of Mr. Schlissel, which address head-on the failures of PGE's 2009 IRP to provide a reliable least cost, least risk analysis.

I. PGE'S 2020 PLAN IS NOT ACTIONABLE IN THE TIMEFRAME PGE REQUIRES. THUS, PGE'S ONLY REAL PREFERRED PLAN IS "DIVERSIFIED THERMAL WITH GREEN."

PGE proposes to transition the Boardman plant off coal if, and only if, PGE can avoid making capital investments to reduce pollution from the plant until the end of 2020. PGE makes no secret of its position – if Boardman clean-up is required, by the Oregon Department of Environmental Quality (DEQ), the Environmental Protection Agency (EPA), or citizens under the Clean Air Act, before 2020, PGE will not transition the plant off coal, but will instead install the required pollution controls and continue operating until 2040 or beyond. The premise of the 2020 plan, thus, is that there will be a legal way to operate a coal-fired power plant without significant capital investment until after 2020. As explained below, there is only a miniscule probability of that happening. In fact, all the evidence points to required pollution reductions from power plants before 2020.

A look at the history of the Boardman plant is important in determining whether PGE will be able to escape pollution clean up for another decade. The history reveals that PGE has done an excellent job of avoiding clean up for the past three decades. This history may seem to support PGE's confidence that it will be successful once again, but the opposite is true. In fact, PGE is now facing the backlash from their earlier successes in avoiding pollution control. The three primary challenges for the 2020 plan are: (1) *Sierra Club et al., v. Portland General Electric Co.*; (2) the Environmental Quality Commission's ruling on PGE's petition for a revised BART rule; and (3) new and revised pollution standards for air toxics from power plants. PGE's need to have these three issues settled before or during the first quarter of 2011 demonstrates that PGE's 2020 plan is unworkable. Decisions on these three issues are unlikely to be made by the first quarter 2011.

Sierra Club, et al., v. Portland General Electric Co. is scheduled for trial in the United State District Court for the District of Oregon in May 2011. This action has been pending since September 2008, and PGE has had notice of the action since January 2008. Over the past several years, the plaintiffs in the case have engaged in good faith discussions with PGE regarding a compromise resolution of the action. While the plaintiffs remain ready and willing to work on a

compromise, the complexity of the issues involved and the court's schedule make it highly unlikely that this case will be resolved by the first quarter of 2011.

PGE has petitioned the Environmental Quality Commission ("EQC") to revise its Regional Haze rule to remove PGE's obligation to install pollution controls in 2014 and 2017 in exchange for a transition off coal at the plant by the end of 2020. If PGE is successful, EQC is very unlikely to revisit that rule again. The rule must be adopted into state law, and also must be approved by EPA into the state's Clean Air Act implementation plan. EQC denied PGE's attempts to include optional "off-ramps," during the first Regional Haze rulemaking. If PGE is unsuccessful in getting exemptions from other environmental requirements, PGE says it backstop will install the controls required by the original Regional Haze rule and operate until 2040 and beyond. The EQC is not any more likely to approve options for PGE today than they were in June 2009. In fact, PGE has not characterized its proposal to the EQC as an option. PGE was very clear in its petition for rulemaking that it would consent to a federally enforceable permit requiring cessation of emissions from the coal boiler at Boardman by the end of 2020. Apparently, PGE believes that if it is ultimately unsuccessful in avoiding pollution controls as a result of *Sierra Club, et al., v. Portland General Electric Co.*, or new federal air toxics standards, it can return for a third Regional Haze Rule.

Finally, new and revised pollution standards for air toxics from power plants and coal combustion waste will require investment in the plant before 2020. After decades of inaction, EPA is finally beginning the process to clean up air toxics from power plants. EPA is under a court order to promulgate new air toxics requirements to address *all* air toxics from power plants (i.e. not just mercury) by November 2011. Compliance will be required within three years of promulgation. While PGE is actively lobbying Congress for an amendment to the Clean Air Act that would allow coal-fired power plants to continue to operate uncontrolled in exchange for an accelerated phase out, it is unreasonable to expect that, even if successful, Congress would pass such an amendment before the first quarter of 2011. And PGE's efforts are not likely to be successful. On May 14, 2010, the Executive Director of the Natural Resources Defense Council had this to say about plans to roll back the Clean Air Act's air toxic provisions:

These important clean air rules finally will require many power plants to install cleanup equipment like scrubbers that they have escaped for decades due to violations of the law, or illegal delays and exemptions undertaken by EPA. Dirty power plants will need effective pollution controls by no later than 2015, but utility lobbyists argue that they should be allowed to escape those cleanup obligations if they were just given *more* time to shut down instead.

The draft [climate change] legislation leaves an ominous blank for when any future shutdown date might be, but power plant lobbyists have been pushing for 2020 or 2025 or even later. Of course they don't want to clean up their toxic or smog or soot pollution during the period between now and

2020 or 2025 or later. Or if they did agree to better controls it would only be at the margins since they do not wish to install meaningful controls like scrubbers.

As a nation we have suffered the deadly consequences of this dangerous shell game for the past three decades. When the 1977 amendments to the Clean Air Act were adopted, dirty, decades-old power plants were grandfathered from strong cleanup requirements due in part to the prospect held out by the utility industry that waves of plants would shut down soon and it was not necessary to require them to incur the capital costs to clean up.

History has proven that prospect to be a fraud. The dirty old coal plants did not shut down and they did not clean up. Instead they continued to evade cleanup by going so far as to break the law themselves, then persuading the prior administration to break the law on their behalf.¹

The roll backs that PGE needs to keep Boardman open until 2020 will not come without a fight, and that fight is not likely to be resolved by the first quarter of 2011. Thus, PGE's 2020 plan is not a realistic, actionable plan. PGE is really asking the Commission to approve the over \$500,000,000 investment in Boardman required to keep the plant running for decades.

II. PGE'S "DIVERSIFIED THERMAL WITH GREEN" PLAN IS RISKY FOR RATEPAYERS.

The Commission should reject PGE's plan to invest in coal. Coal is a poor investment choice for PGE stakeholders in all but the very short-term: Todd Stern, special envoy for climate change at the state department, recently posed the question: "How good will the business judgment of companies that make high-carbon choices now look in five, 10, 20 years, when it becomes clear that heavily polluting infrastructure has become deadly and must be phased out before the end of its useful life?"² PGE's "Diversified Thermal with Green" plan – to invest half a billion dollars in Boardman and operate it for as long as possible into the future, is just such a high-carbon choice. It is extremely risky for Oregon's economy, public health, and the environment. There is no question that greenhouse gases will be regulated, and there is no longer a real question about when. On December 7, 2009, EPA issued a final ruling that greenhouse gases (including carbon dioxide) endanger public health and welfare, and are

¹ Peter Lehner, Executive Director, Natural Resource Defense Council, "The Clean Energy Bill is no Place for Dirty Energy Attacks on Public Health" (May 14, 2010). Online at:

<http://switchboard.nrdc.org/blogs/plehner/>.

² Fiona Harvey, Take Green Path, US Business Warned, Financial Times, April 8, 2009. Online at: <http://www.ft.com/cms/s/0/ffb6b5bc-23d3-11de-996a-00144feabdc0.html>

therefore subject to EPA regulation. EPA will issue its first regulations to control greenhouse gases, those for motor vehicles, in January 2011.

There can no longer be any doubt that our climate is changing due to human sources of greenhouse gases, most significantly carbon dioxide (“CO₂”). The composition of the atmosphere has been shifted to the extent that CO₂ levels are higher than they have been in the past 800,000 years.³ James Hansen, a NASA climate scientist, tells us that to avoid catastrophic melting of ice sheets, CO₂ concentrations in the atmosphere must be no higher than 350 parts per million. Today, the atmosphere contains up to 387 parts per million. Dr. Hansen has urged leaders around the world to adopt the policies that are necessary to avoid catastrophic climate change. Dr. Hansen tells us that there are two *essential* actions: (1) phase-out coal use that does not capture CO₂ – 80% of the solution; and (2) gradually but continually rising price on carbon emissions and elimination on fossil fuel subsidies – 20% of the solution.⁴ Continuing to burn coal will create certain disaster. Dr. Hansen warned German Chancellor Angela Merkel – “Coal, with larger reserves [than oil] has the potential to destroy life on our planet as we know it. Thus a policy aiming to reduce CO₂ emissions some percentage by a given time is doomed to failure, even if it achieves its goal, if it permits emissions of CO₂ by coal to continue. This is a simple consequence of the long life of CO₂ in the air and the assumption that readily available oil will be used. The only way to preserve climate resembling that in which civilization developed is to phase out coal use except where CO₂ is captured and sequestered.”⁵

The President of the United States, the Oregon Governor, and the Oregon Legislature have recognized that global warming poses a serious threat to the economic well-being, public health, natural resources and environment of Oregon, the nation and our world. They continue to work toward policy solutions. In January 2009, President Obama stood before the nation and called for a “new era of responsibility,” promising that his government would “restore science to its rightful place” and “roll back the specter of a warming planet.”⁶ The President spoke of a clean energy future where “[w]e will harness the sun and the winds and the soil to fuel our cars and run our factories,” built upon a strong and interlocking foundation of innovation and sustainability.⁷ The U.S. Environmental Protection Agency has stated that the dangers presented by climate change are “not a close case” and “[i]n both magnitude and probability, climate change is an

³ “Provocative New Study Warns of Crossing Planetary Boundaries,” Carl Zimmer: Yale Environment 360, <http://www.e360.yale.edu/content/feature.msp?id=2192> (last visited Sep. 29, 2009).

⁴ Letter from James Hansen to UK Prime Minister Gordon Brown (December 19, 2007) (and similar letters sent to leaders around the world).

⁵ Letter from James Hansen to Chancellor Angela Merkel, Federal Republic of Germany (January 22, 2008).

⁶ See <http://www.whitehouse.gov/blog/inaugural-address/> (Ex 1).

⁷ See *id.*

enormous problem.”⁸

In response, the Oregon Governor’s Advisory Group on Global Warming issued a report calling for immediate and significant action to address global warming and to reduce Oregon’s exposure to the risks of global warming.⁹ The Oregon Legislature has adopted aggressive greenhouse gas reduction goals, declaring it to be the policy of the state to reduce greenhouse gas emissions in Oregon as follows:

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

House Bill 3543 (2007).

In order for Oregon, the nation and our world to “roll back the specter of a warming planet,” global climate change must be a top priority for utilities because coal-fired power plants contribute 32% of the CO₂ from the United States, about one-third of the total, and more than any other source, including surface transportation.¹⁰ As Dr. Hanson has cautioned, the CO₂ released from coal burning today will stay in our atmosphere for many centuries. In Oregon, the Boardman coal-fired plant is the only coal plant and the largest stationary source of CO₂ in Oregon- contributing nearly 5 million tons of CO₂ to the atmosphere each year, the equivalent of the annual greenhouse gas emissions of nearly one million cars. Only the early and complete cessation of CO₂ emissions from Boardman can help prevent the transformation of Oregon from one of the most beautiful places on earth to what the Governor’s Advisory Group on Global Warming described in 2004 as “dramatically altered and far less habitable within only a few

⁸ U.S. Environmental Protection Agency, *Climate Change Division, Office of Atmospheric Programs, Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act*, at ES-1, 3-4 (April 17, 2009), available at http://epa.gov/climatechange/endangerment/downloads/TSD_Endangerment.pdf (last visited June 16, 2009).

⁹ Governor’s Advisory Group on Global Warming, *Oregon Strategy for Greenhouse Gas Reductions* at i (2004) (available at <http://www.oregon.gov/ENERGY/GBLWRM/docs/GWReport-FInal.pdf>).

¹⁰ Energy Information Administration, 2008 Annual Energy Outlook

generations.”¹¹

Climate Change is not just a problem for our children and grandchildren. Global climate changes are already occurring. In the Pacific Northwest storms are more frequent and intense, and heat waves, like the one we experienced this summer, droughts and floods are more severe and frequent. In addition, Pacific Northwest temperatures have been rising since 1920, precipitation has increased 10% since 1916 with some areas showing as high as a 40% rise, the sea level is rising 1-2mm per year, glaciers are rapidly retreating, and Cascade snowpack is melting earlier and faster each spring.¹² These changes in the water cycle, along with other global climate changes, threaten crops, salmon, recreation, fishing, and water supplies. Global climate change also affects the reproductive success, range, and diet of vulnerable species.¹³ A recent study revealed that climate change may be responsible for widespread decline in Western forests.¹⁴ Increasing CO₂ also causes acidification of the oceans. Acidic seawater interferes with the survival and growth of invertebrates – the building blocks of the food web - because the acid dissolves the minerals these organisms need to build skeletons.¹⁵ “According to recent surveys, the ocean is now acidifying 100 times faster than at any time during the past 20 million years.”¹⁶ Ocean acidification will have profound negative economic impacts on Oregon coastal communities.

Every day brings new evidence of the scale of the threat; even in the last year, prominent international organizations have released reports documenting the harm being caused by the accelerating climate crisis. Recently, the magnitude of human suffering that global warming is causing, and will cause, has repeatedly been underlined and amplified. A series of new reports, including a magisterial call for action from the Lancet, one of the world’s leading medical journals, lend even greater urgency to addressing health and welfare impacts ranging from

¹¹ Governor’s Advisory Group on Global Warming, *Oregon Strategy for Greenhouse Gas Reductions* at i (2004) (available at <http://www.oregon.gov/ENERGY/GBLWRM/docs/GWReport-FInal.pdf>).

¹² *Scientific Consensus Statement on the Likely Impacts of Climate Change on the Pacific Northwest*, Consensus Statement drafted by a subcommittee of participants in the scientific meeting “Impacts of Climate Change on the Pacific Northwest” convened at OSU on June 15, 2004 at 4 (available at www.ef.org/westcoastclimate/E_OSU%20Consensus%20Statement.pdf).

¹³ See IPCC, *Climate Change 2001: Impacts, Adaptation and Vulnerability* (2001), available at http://www.grida.no/climate/ipcc_tar/wg2/index.htm; IPCC, *Climate Change 2007: The Synthesis Report* (2007), available at <http://www.ipcc.ch>; NRC, *Climate Change Science: An Analysis of Some Key Questions*, (2001) (available at <http://books.nap.edu/html/climatechange/>).

¹⁴ Phillip J. van Mantgum, *et al.*, “Widespread Increase of Tree Mortality Rates in the Western United States,” *Science* Vol. 323 (Jan. 23, 2009) (available at <http://www.sciencemag.org>).

¹⁵ “Provocative New Study Warns of Crossing Planetary Boundaries,” Carl Zimmer: Yale Environment 360, <http://www.e360.yale.edu/content/feature.msp?id=2192> (last visited Sep. 29, 2009).

¹⁶ *Id.*

flooded coasts to sweltering heatwaves to spreading diseases.¹⁷ The Lancet Commission's study, conducted by top academics working jointly with University College London, making world headlines when it was released one year ago,¹⁸ concluded simply that "[c]limate change is the biggest global health threat of the 21st century."¹⁹ Bigger, in other words, than cancer, AIDS, multi-drug-resistant tuberculosis, starvation, malaria, or pandemic flu. As the report puts it, "[e]ffects of climate change on health will affect most populations in the next decades and put the lives and wellbeing of billions of people at increased risk."²⁰

Moreover, major climate-linked disasters are on the rise. "In recent years, more than 2 billion people were affected by natural disasters, many of which were directly or indirectly related to extreme meteorological phenomena, including heatwaves and coldwaves, floods, droughts, and windstorms."²¹ Reinsurance giant Munich Re tracks such disasters and reports that in 2007 there were 960 major natural disasters – the highest number ever – and "more than 90% [were] the result of extreme weather-related or climate-related events."²² The 2007 events were accompanied by 16,000 reported fatalities and \$82 billion in economic losses.²³ Munich Re reports that "the number of great weather-related disasters has climbed from an average of less than two per year in 1950 to more than six annually by 2007. Over the same period, average annual economic losses have risen from less than \$5 billion to more than \$60 billion."²⁴

Given the profound consequences of business as usual, we urge the Commission to fully consider the likely costs associated with CO₂ emissions in the context of a decision to invest of \$500,000,000 in coal-fired generation. We do not know today what the ultimate cost of carbon regulation will be, but we know from the accepted science that the consequences of the failure to reduce carbon emissions will be extremely costly.

Beyond climate change, the costs of continuing to burn coal will continue to increase. The EPA is poised to release rules regulating toxic emissions from power plants and the disposal of coal combustion wastes that will increase the costs of operating coal-fired power plants.

¹⁷ Anthony Costello et al., *The Lancet Commissions, Managing the health effects of climate change*, 373 *The Lancet* 1693, 1693 (May 16, 2009).

¹⁸ See, e.g., "Global warming 'biggest health threat'," *The Hindu* (Indian coverage) (May 14, 2009); "Climate change biggest threat to global health: doctors," *CCTV* (Chinese coverage) (May 14, 2009); "Climate change is 'biggest health threat of 21st century, claims report into global warming," *Daily Mail* (British coverage) (May 14, 2009); "Climate change could be world's biggest health threat: Report shows rising temperatures could spread drought and tropical disease," *ABC News* (American and Canadian coverage) (May 14, 2009).

¹⁹ Anthony Costello et al., *The Lancet Commissions, Managing the health effects of climate change*, 373 *The Lancet* 1693, 1693.

²⁰ *Id.*

²¹ *Id.* at 1706.

²² *Id.*; see also Ernst Rauch, Munich Re, *Effects of Climate Change on the Insurance Industry*, 26A *Stanford Environmental Law Journal* 239 (2007).

²³ Lancet Report at 1706.

²⁴ *Id.*

Oregon may also face new nonattainment designations for ozone, which may result in accelerated requirements to control nitrogen oxides from Boardman. If PGE continues operating Boardman until 2040 and beyond, it will have to constantly return to the Commission for more money for more pollution controls. Already, PGE has avoided installing pollution controls at Boardman for 30 years. PGE will be unable to avoid significant clean-up costs for the next decade, and has absolutely no chance of avoiding them for another 30 years.

III. TRANSITION OFF COAL AT BOARDMAN IN COMPLIANCE WITH EXISTING AND ANTICIPATED REGULATORY FRAMEWORKS YIELDS SIGNIFICANT BENEFITS FOR RATEPAYERS.

As explained in Mr. Schlissel's comments in Exhibit 1, PGE can transition off coal in time to satisfy the current and anticipated Clean Air Act requirements without sacrificing reliability and without driving up utility bills higher than other options. The fact is that rates will increase as a result of investments required to clean up or transition off Boardman. In transitioning off Boardman, however, PGE can step up its investment in conservation and renewables, options that will actually drive down ratepayers' monthly bills. Moreover, conservation and renewables will create jobs in the green energy economy. A transition at Boardman in compliance with existing and anticipated law will also yield significant benefits in public health improvement and environmental protection.

Boardman is the largest stationary source of sulfur dioxide ("SO₂") and nitrogen oxides (NO_x) in the state of Oregon. In 2001, Boardman released 17,821 tons of SO₂, and in 2003, Boardman released 10,080 tons of NO_x. According to EPA, PGE Boardman accounts for 65% of Oregon's stationary SO₂ emissions and emits almost six times the amount of SO₂ emitted from the next highest point source in Oregon. According to EPA, PGE Boardman is responsible for 35% of the NO_x emissions statewide and emits over five times as much NO_x as the next highest emitting source. Boardman is the largest point source of mercury in Oregon and annually emits enough mercury (221 lbs.) to contaminate 2.6 million acres of water, or four times the surface area of all Oregon lakes. Though PGE plans to cut back its mercury emissions by 90% it will still qualify as a major source of mercury. These pollutants have been linked to serious health effects, including cancer, low birth weight, birth defects, developmental disorders, autism, heart and respiratory problems and asthma attacks. Researchers have estimated that between 317,000 and 631,000 children are born in the U.S. each year with blood mercury levels high enough to impair performance on neurodevelopment tests and cause lifelong loss of intelligence.

The Boardman plant also impairs visibility in more than ten federally protected National Parks and Wilderness Areas. The Columbia River Gorge National Scenic Area ranked 6th in the country for poorest visibility for Scenic Areas. The Boardman plant causes acid rain and fog in the Columbia River Gorge National Scenic Area. Precipitation in the Gorge is 10-30% more acidic than normal rainfall. Acid rain is erasing nationally significant cultural resources in the Gorge, including "She Who Watches," the most famous ancient petroglyph in North America. Acid rain is also impacting the sixteen species of endemic wildflowers – species that are found nowhere else on the planet. Metals, sulfur and nitrogen concentrations in lichen tissue found in the Gorge are comparable to that found in lichen tissue sampled in urban areas. In fact, the Gorge now stands among the most polluted places in the country, including Pittsburgh and Los

Angeles. A transition from coal at Boardman consistent with existing and anticipated law would save Oregonians, within and without the PGE service territory, the expense and loss of public resources caused by Boardman's pollution.

CONCLUSION

For the reasons stated above, and in the attached technical comments, the Coalition respectfully requests that the Commission not acknowledge the Boardman aspects of PGE's 2009 IRP.

Dated this 19TH day of May 2010.

Attorney for Intervenors:



Gloria Smith, Senior Attorney
Sierra Club
85 Second Street, Second floor
San Francisco, CA 94105
(415) 977-5532 Voice
(415) 977-5739 Facsimile
gloria.smith@sierraclub.org

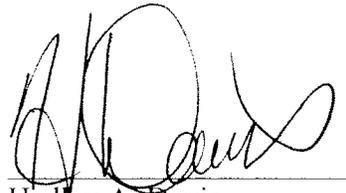


Aubrey Baldwin, OSB No. 060414
Pacific Environmental Advocacy Center
10015 SW Terwilliger Blvd.
Portland, Oregon 97219
503.768.6929 phone
503.768.6642 fax
abaldwin@lclark.edu

Certificate of Service

I certify that I have this day served the foregoing Intervenor Comments upon all parties of record in LC 48 by delivering a copy by electronic mail or by U.S. Mail to all parties as indicated on the attached service list compiled by the OPUC.

Dated this 19TH day of May 2010.



Hadley A. Davis
Program Assistant
Sierra Club Environmental Law Program

[LC 48 SERVICE LIST ATTACHED]



eDockets

Docket Summary

[Return to Search Page](#)
[eFiling](#)

Docket No: LC 48 **Docket Name:** PORTLAND GENERAL ELECTRIC COMPANY

[Print Summary](#)

Subject Company: [PORTLAND GENERAL ELECTRIC](#)

In the Matter of PORTLAND GENERAL ELECTRIC COMPANY 2009 Integrated Resource Plan Filed by Randy Dahlgren.

Filing Date: 11/5/2009

Case Manager: MAURY GALBRAITH

Phone: (503) 378-8718

Email: maury.galbraith@state.or.us

Staff Contact: LISA GORSUCH

Phone: (503) 378-3778

Email: lisa.gorsuch@state.or.us

Law Judge: SHANI PINES

Phone:

[Email Service List \(semi-colon delimited\)](#) [Email Service List \(comma delimited\)](#)

If you experience problems with the *above* 'Email Service List' links,
please try one of these:

[Service List Popup \(semi-colon delimited\)](#) [Service List Popup \(comma delimited\)](#)

<u>ACTIONS</u>		<u>SERVICE LIST (Parties)</u>		<u>SCHEDULE</u>	
W=Waive Paper service	C=Confidential HC=Highly Confidential		Sort by Last Name	Sort by Company Name	
W	BRUCE A KASER		PO BOX 958 SILVERTON OR 97381-0958 brucekaser@comcast.net		
W	RYAN M SWINBURNSON COUNSEL FOR MORROW COUNTY		515 N NEEL ST KENNEWICK WA 99336 r_swinburnson@verizon.net		
W	*DEPARTMENT OF JUSTICE				
	JANET L PREWITT (C) ASSISTANT AG		NATURAL RESOURCES SECTION 1162 COURT ST NE SALEM OR 97301-4096 janet.prewitt@doj.state.or.us		
W	*OREGON DEPARTMENT OF ENERGY				
	KIP PHEIL (C) SENIOR POLICY ANALYST		625 MARION ST NE - STE 1 SALEM OR 97301-3737 kip.pheil@state.or.us		
	VIJAY A SATYAL (C) SENIOR POLICY ANALYST		625 MARION ST NE SALEM OR 97301 vijay.a.satyal@state.or.us		
W	ASSOCIATED OREGON INDUSTRIES				
	JOHN LEDGER		1149 COURT ST NE SALEM OR 97301 johnledger@aoi.org		
	ASSOCIATION OF OREGON COUNTIES				
	PAUL SNIDER		PO BOX 12729 SALEM OR 97309		
	BOMA PORTLAND				
	SUSAN STEWARD EXECUTIVE DIRECTOR		200 SW MARKET, SUITE 1710 PORTLAND OR 97201 susan@bomaportland.org		
W	CABLE HUSTON BENEDICT ET AL				
	J LAURENCE CABLE (C)		1001 SW 5TH AVE STE 2000 PORTLAND OR 97204-1136 lcable@cablehuston.com		

W	CABLE HUSTON BENEDICT HAAGENSEN & LLOYD LLP	RICHARD LORENZ (C)	1001 SW FIFTH AVE - STE 2000 PORTLAND OR 97204-1136 rlorenz@cablehuston.com
W	CITIZENS' UTILITY BOARD OF OREGON	GORDON FEIGHNER (C) ENERGY ANALYST	610 SW BROADWAY, SUITE 308 PORTLAND OR 97205 gordon@oregoncub.org
		ROBERT JENKS (C) EXECUTIVE DIRECTOR	610 SW BROADWAY STE 308 PORTLAND OR 97205 bob@oregoncub.org
		G. CATRIONA MCCRACKEN (C) LEGAL COUNSEL/STAFF ATTY	610 SW BROADWAY - STE 308 PORTLAND OR 97205 catriona@oregoncub.org
W	CITY OF PORTLAND - CITY ATTORNEY'S OFFICE	BENJAMIN WALTERS (C) CHIEF DEPUTY CITY ATTORNEY	1221 SW 4TH AVE - RM 430 PORTLAND OR 97204 ben.walters@portlandoregon.gov
W	CITY OF PORTLAND - PLANNING & SUSTAINABILITY	MICHAEL ARMSTRONG (C) SUSTAINABILITY MANAGER	1900 SW 4TH AVE, STE 7100 PORTLAND OR 97201 michael.armstrong@portlandoregon.gov
		DAVID TOOZE (C) SENIOR ENERGY SPECIALIST	1900 SW 4TH STE 7100 PORTLAND OR 97201 david.tooze@portlandoregon.gov
W	CLACKAMAS COUNTY BUSINESS ALLIANCE	BURTON WEAST EXECUTIVE DIRECTOR	300 OSWEGO POINTE DR, STE 220 LAKE OSWEGO OR 97034 burton@ccba.biz
W	COLUMBIA CORRIDOR ASSOCIATION	CORKY COLLIER	PO BOX 55651 PORTLAND OR 97238 corky@columbiacorridor.org
W	COLUMBIA RIVERKEEPER	LAUREN GOLDBERG (C)	724 OAK STREET HOOD RIVER OR 97031 lauren@columbiariverkeeper.org
W	DAVIS WRIGHT TREMAINE LLP	JOHN DILORENZO	1300 SW FIFTH AVE, STE 2300 PORTLAND OR 97201 johndilorenzo@dwt.com
		MARK P TRINCHERO	1300 SW FIFTH AVE STE 2300 PORTLAND OR 97201-5682 marktrinchero@dwt.com
	DAVISON VAN CLEVE	IRION A SANGER (C) ASSOCIATE ATTORNEY	333 SW TAYLOR - STE 400 PORTLAND OR 97204 ias@dvclaw.com
	DEPARTMENT OF JUSTICE	STEPHANIE S ANDRUS (C) ASSISTANT ATTORNEY GENERAL	REGULATED UTILITY & BUSINESS SECTION 1162 COURT ST NE SALEM OR 97301-4096

stephanie.andrus@state.or.us

W ECUMENICAL MINISTRIES OF OREGON

JAMES EDELSON

415 NE MIRIMAR PL
PORTLAND OR 97232
edelson8@comcast.net**W ECUMENICAL MINISTRIES OF OREGON**JENNY HOLMES
ENVIRONMENTAL MINISTRIES
DIRECTOR0245 SW BANCROFT, SUITE B
PORTLAND OR 97239
jholmes@emoregon.org**W ESLER STEPHENS & BUCKLEY**

JOHN W STEPHENS (C)

888 SW FIFTH AVE STE 700
PORTLAND OR 97204-2021
stephens@eslerstephens.com;
mec@eslerstephens.com**W FRIENDS OF COLUMBIA GORGE**

MICHAEL LANG (C)

522 SW FIFTH AVENUE, SUITE 720
PORTLAND OR 97204
michael@gorgefriends.org**IBERDROLA RENEWABLES, INC**

KEVIN LYNCH

1125 NW COUCH ST STE 700
PORTLAND OR 97209
kevin.lynch@iberdrolausa.com

TOAN-HAO NGUYEN

1125 NW COUCH ST
PORTLAND OR 97209
toan.nguyen@iberdrolausa.com**IBEW LOCAL 125**MARCY PUTMAN
POLITICAL AFFAIRS &
COMMUNICATION REPRESENTATIVES17200 NE SACRAMENTO STREET
PORTLAND OR 97230
marcy@ibew125.com**INDUSTRIAL CUSTOMERS OF NORTHWEST UTILITIES**MICHAEL EARLY
EXECUTIVE DIRECTOR1300 SW 5TH AVE, STE 1750
PORTLAND OR 97204-2446
mearly@icnu.org**W NORTHWEST ENERGY COALITION**STEVEN WEISS
SR POLICY ASSOCIATE4422 OREGON TRAIL CT NE
SALEM OR 97305
steve@nwenergy.org**W NORTHWEST ENVIRONMENTAL DEFENSE CENTER**

MARK RISKEDAHL

10015 SW TERWILLIGER BLVD
PORTLAND OR 97219
msr@nedc.org**NORTHWEST FOOD PROCESSORS ASSOCIATION**DAVID ZEPPONI
PRESIDENT8338 NE ALTERWOOD RD, STE 160
PORTLAND OR 97220
pbarrow@nwfp.org**W NORTHWEST PIPELINE GP**JANE HARRISON (C)
MGR-MARKETING SERVICES295 CHIPETA WAY
SALT LAKE CITY UT 84158
jane.f.harrison@williams.com

	BRUCE REEMSNYDER (C) SENIOR COUNSEL	295 CHIPETA WAY SALT LAKE CITY UT 84108 bruce.reemsnyder@williams.com
W	NW INDEPENDENT POWER PRODUCERS	
	ROBERT D KAHN EXECUTIVE DIRECTOR	1117 MINOR AVENUE, SUITE 300 SEATTLE WA 98101 rkahn@nippc.org
	OREGON AFL-CIO	
	JOHN BISHOP	1635 NW JOHNSON ST PORTLAND OR 97209 jbishop@mbjlaw.com
	OREGON CATTLEMEN'S ASSOCIATION	
	KAY TEISL	3415 COMMERCIAL ST SE, SUITE 217 SALEM OR 97302 kayteisl@orcattle.com
W	OREGON DEPARTMENT OF ENERGY	
	ANDREA F SIMMONS (C)	625 MARION ST NE SALEM OR 97301-3737 andrea.f.simmons@state.or.us
W	OREGON ENVIORNMENTAL COUNCIL	
	JANA GASTELLUM PROGRAM DIRECTOR, GLOBAL WARMING	222 NW DAVIS ST, STE 309 PORTLAND OR 97309-3900 janag@oeconline.org
W	OREGON FARM BUREAU FEDERATION	
	KATIE FAST	3415 COMMERCIAL ST SE SALEM OR 97302 katie@oregonfb.org
W	OREGON FOREST INDUSTRIES COUNCIL	
	RAY WILKESON	PO BOX 12826 SALEM OR 97309 ray@ofic.com
W	OREGON SIERRA CLUB	
	IVAN MALUSKI	1821 SE ANKEY ST PORTLAND OR 97214 ivan.maluski@sierraclub.org
W	OREGONIANS FOR FOOD AND SHELTER	
	TERRY WITT EXECUTIVE DIRECTOR	1149 COURT ST SE, STE 110 SALEM OR 97301 terry@ofsonline.org
W	PACIFIC ENVIRONMENTAL ADVOCACY CENTER	
	AUBREY BALDWIN (C) STAFF ATTORNEY/CLINICAL PROFESSOR	10015 SW TERWILLIGER BLVD PORTLAND OR 97219 abalwin@lclark.edu
W	PACIFIC ENVIRONMENTAL ADVOCACY CENTER	
	ALLISON LAPLANTE (C)	10015 SW TERWILLIGER BLVD PORTLAND OR 97219 laplante@lclark.edu
W	PACIFIC POWER & LIGHT	
	JORDAN A WHITE SENIOR COUNSEL	1407 W. NORTH TEMPLE, STE 320 SALT LAKE CITY UT 84116 jordan.white@pacificcorp.com

W	PACIFICORP ENERGY PETE WARNKEN MANAGER, IRP	825 NE MULTNOMAH - STE 600 PORTLAND OR 97232 pete.warnken@pacificorp.com
W	PHYSICIANS FOR SOCIAL RESPONSIBILITY-OREGON CHAPTE CATHERINE THOMASSON CLIMATE CHANGE CHAIR OREGON PSR	1227 NE 27TH #5 PORTLAND OR 97232 thomassonc@comcast.net
W	PNGC POWER JOHN PRESCOTT PRESIDENT AND CEO	711 NE HALSEY PORTLAND OR 97232 jprescott@pngcpower.com
W	PORTLAND BUSINESS ALLIANCE BERNIE BOTTOMLY	200 SW MARKET, STE 150 PORTLAND OR 97201 bbottomly@portlandalliance.com
	PORTLAND GENERAL ELECTRIC PATRICK G HAGER (C) MANAGER - REGULATORY AFFAIRS	121 SW SALMON ST 1WTC0702 PORTLAND OR 97204 pge.opuc.filings@pgn.com
	DENISE SAUNDERS (C) ASST GENERAL COUNSEL	121 SW SALMON ST - 1WTC1711 PORTLAND OR 97204 denise.saunders@pgn.com
	PUBLIC UTILITY COMMISSION MAURY GALBRAITH	PO BOX 2148 SALEM OR 97308 maury.galbraith@state.or.us
W	RENEWABLE NORTHWEST PROJECT KEN DRAGOON	917 SW OAK, SUITE 303 PORTLAND OR 97205 ken@rnp.org
W	RICHARDSON & O'LEARY GREGORY MARSHALL ADAMS (C) ATTORNEY	PO BOX 7218 BOISE ID 83702 greg@richardsonandoleary.com
W	RICHARDSON & O'LEARY PLLC PETER J RICHARDSON (C)	PO BOX 7218 BOISE ID 83707 peter@richardsonandoleary.com
W	SALEM CHAMBER OF COMMERCE MIKE MCLARAN CHIEF EXECUTIVE OFFICER	1110 COMMERCIAL ST SE SALEM OR 97301 mike@salemchamber.org; jason@salemchamber.org
	SEDCOR RAYMOND BURSTEDT PRESIDENT	625 HIGH ST NE, STE 200 SALEM OR 97301 rburstedt@sedcor.com
W	SIERRA CLUB LAW PROGRAM GLORIA D SMITH (C)	85 SECOND STREET SAN FRANCISCO CA 94105 gloria.smith@sierraclub.org
W	TURLOCK IRRIGATION DISTRICT	

RANDY BAYSINGER
ASSISTANT GENERAL MANAGER

PO BOX 949
TURLOCK CA 95381-0949
rcbaysinger@tid.org

W

WESTSIDE ECONOMIC ALLIANCE

JONATHAN F SCHLUETER

10220 SW NIMBUS AVE, STE K-12
TIGARD OR 97223
jschlueter@westside-alliance.org

W

**WILSONVILLE CHAPTER OF
COMMERCE**

RAY PHELPS

PO BOX 3737
WILSONVILLE OR 97070
rphelps@republicservices.com;
steve@wilsonvillechamber.com

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

LC 48

In the Matter of)	
)	
PORTLAND GENERAL ELECTRIC	)	SIERRA CLUB, COLUMBIA
	)	RIVERKEEPER, FRIENDS OF
2009 Integrated Resource Plan	)	THE COLUMBIA GORGE, AND
	)	THE NORTHWEST ENVIRONMENTAL
	)	DEFENSE CENTER'S EXHIBIT 1



**Comments on
PGE 2009 Integrated Resource Plan
Public Utility Commission of Oregon
Docket No. LC 48**

David A. Schlissel

Thomas Sanzillo, TR Rose Associates

David White, Synapse Energy Economics

May 19, 2010

PUBLIC

PROTECTED MATERIALS REDACTED

45 Horace Road, Belmont MA 02478

david@schlissel-technical.com

(office) 617-489-4840

(cell) 617-947-9507

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Conclusion

Portland General Electric's ("PGE") recommended and alternate Action Plans would maintain the Company's dependence on the coal-fired Boardman plant for at least the next decade. For this reason, these plans entail excessive uncertainty and risk for PGE's ratepayers.

- Uncertainty as to the greenhouse gas emissions reductions that ultimately will be required as a result of federal, state or regional action and the timing and cost of compliance with likely future greenhouse gas regulations.
- Uncertainty about the impact of more stringent air emissions regulations and the cost of managing and storing coal combustion wastes.
- Uncertainty whether projected loads and energy sales will materialize.
- Uncertainty as to future coal prices and whether there will be supply disruptions that will affect plant performance and fuel prices.
- Uncertainty about the role that the Boardman plant will play as a baseload unit in the future.

The confluence of factors – economic recession, uncertainty about the details of federal greenhouse gas restrictions, impending costs associated with carbon emissions, tightening of air emissions requirements and standards for handling coal combustion by-products – means that this is a terrible time to make a significant investment in emissions controls at an existing coal-fired power plant. Such an investment would lock customers into paying for a course of action that could prove, and is indeed likely to prove, an ill-chosen option as greater certainty emerges over the next several years.

In light of these significant uncertainties, it would be better for the Company to adopt a resource plan that allows it to avoid large capital expenditures for the Boardman plant while offering the flexibility to modify course as circumstances change. PGE's recommended and alternate Action Plans that continue a near-term commitment to investments in the Boardman plant are the wrong choices in today's uncertain economic and regulatory conditions. Moreover, at the same time that there is a growing awareness of the dangers posed by global climate change, continuing to make large investments in the Boardman plant would lead to increases, not decreases, in PGE's annual greenhouse gas emissions.

Instead of spending hundreds of millions of dollars on Boardman, PGE should adopt a plan that relies on the substantial availability of energy efficiency, renewable resources and existing gas-fired capacity in the Northwest, as well as the widely accepted expectation that future natural gas prices will not be as high as was believed even two years ago. Such a plan will provide the flexibility that PGE and its ratepayers need and is

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

a step in the right direction towards significantly reducing the Company's annual greenhouse gas emissions.

Finally, we have found that the economic analyses that PGE has presented in its 2009 Integrated Resource Plan ("IRP") and IRP Addendum are heavily biased in favor of the continued operation of the Boardman plant by a number of questionable assumptions regarding future natural gas prices, PGE's need for the capacity and energy from the Boardman plant, and the potential for entering into a mid- to long-term power purchase agreements for electricity generated at a gas-fired unit in the region. In fact, some of the key assumptions on which the results of PGE's IRP analyses are based have already been significantly modified since the IRP was issued in November 2009. Unfortunately, these substantial revisions have not been reflected in the analyses that the Company presented in the April 2010 IRP Addendum.

For these reasons:

1. The Commission should not approve PGE's requested expenditures for emissions controls for the Boardman coal plant.
2. The Commission should not approve PGE's recommended Action Plan which would allow the continued operation of the Boardman plant through the end of 2020.
3. The Commission should not approve PGE's alternate Action Plan that would allow PGE the option of continuing to operate the Boardman plant through 2040.

Summary of Findings

In particular, we have found:

- Finding No. 1. PGE used unreasonably high natural gas prices in its IRP modeling analyses (both deterministic and stochastic) that biased the analyses against natural gas-fired alternatives and in favor of the continued operation of the Boardman plant
- Finding No. 2. PIRA has significantly reduced its projected natural gas prices from the forecasts used in the PGE IRP analyses. These new forecasts confirm our conclusion that the gas prices used in the IRP analyses were unreasonably high.
- Finding No. 3. PGE has not analyzed whether adding a new combined cycle natural gas-fired unit would be the lowest cost option if Boardman were retired at any time between 2014 and 2020.
- Finding No. 4. PGE has not adequately considered the availability of a substantial amount of under-utilized gas-fired combined cycle and gas turbine capacity in and around the state of Oregon that could provide

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan

PUBLIC
Protected Materials Redacted

much, if not all, of the replacement energy if the Boardman plant were retired.

- Finding No. 5. PGE overstates its need for the capacity and energy from the Boardman plant through the use of high load forecasts and by understating the potential for energy efficiency.
- Finding No. 6. PGE has significantly reduced its long term energy and peak load forecasts in December 2009.
- Finding No. 7. The results of PGE's IRP modeling analyses show that if PGE continues to operate the Boardman plant past 2020, its annual CO₂ emissions will be significantly higher in 2030 than they were in 2007. Even if PGE retires the Boardman within the next ten years, its annual CO₂ emissions in 2030 still will be higher than they were in 2007. Therefore, PGE must start to aggressively plan to achieve actual reductions in its CO₂ emissions rather than assuming, as it does in its IRP, that it will be able to continue emitting the same or higher levels of CO₂ by purchasing emissions allowances. Making large investments in the Boardman plant and continuing to operate the plant through 2040 would be a step in the wrong direction.
- Finding No. 8. The results of PGE's stochastic analyses are distorted in favor of the continued operation of the Boardman plant by (a) the failure to shock CO₂ costs and (b) by the use of unreasonably high natural gas prices.
- Finding No. 9. PGE failed to consider the potential for higher coal prices in any of its future scenarios.
- Finding No. 10. PGE does not appear to have adequately considered the potential costs of complying with new or revised air emissions requirements and the proper disposal and management of coal combustion wastes.
- Finding No. 11. PGE has not provided persuasive evidence that the retirement of the Boardman plant before the year 2020 would adversely affect the reliability of the electric grid in Oregon or its ability to provide reliable service to its customers. Instead, PGE limited its assessment of reliability to whether it would need to purchase power from the market and not to whether it would be unable to do so or would, in any way, be unable to provide power to its customers.

PUBLIC
Protected Materials Redacted

- Finding No. 12. Fuel diversity is an important consideration. However, PGE has failed to demonstrate that the HHI differences between portfolios presented in the IRP are in any way significant.
- Finding No. 13. Despite these flaws and biases, the results of PGE’s IRP modeling show that investing \$510 million in a scrubber and other environment control equipment for the Boardman plant is not part of a lowest cost, low risk resource plan.
- Finding No. 14. The results of PGE’s modeling analyses show that by 2020 Boardman will no longer be a baseload generating unit even if \$510 million is invested in environmental upgrades.
- Finding No. 15. PGE’s analyses that purport to show that retirement of the Boardman plant in 2020 would be a lower cost and lower risk option than retirement in an earlier year are biased in favor of the later retirement date.

Findings

- Finding No. 1. PGE used unreasonably high natural gas prices in its IRP modeling analyses (both deterministic and stochastic) that biased the analyses against natural gas-fired alternatives and in favor of the continued operation of the Boardman plant**

PGE has said that its objective in resource planning to “to identify a robust portfolio that performs better than the alternatives under a wide range of *credible* futures.”¹ [Emphasis added] PGE also has acknowledged that “[o]f the three major cost drivers, natural gas price risk emerges as the greatest driver of the portfolio NPVRR and, as a result, the single largest risk factor.”²

Therefore, it is quite unfortunate that, as can be seen in Figure 1, below, PGE has used natural gas prices in its IRP analyses that are simply not ‘credible.’ Instead, the natural gas prices that PGE used in its IRP are much higher than the future natural gas prices projected by NWPCC, the Oregon PUC staff, and the U.S. Department of Energy’s Annual Energy Outlook for 2010 (“AEO 2010”), as well as current NYMEX futures prices.

¹ IRP Addendum, at page 49.

² Id., at page 101.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 1: Natural Gas Prices Used in IRP Modeling Analyses vs. NWPCC, Oregon PUC Staff, AEO 2010 and NYMEX Futures (Levelized in 2009\$)

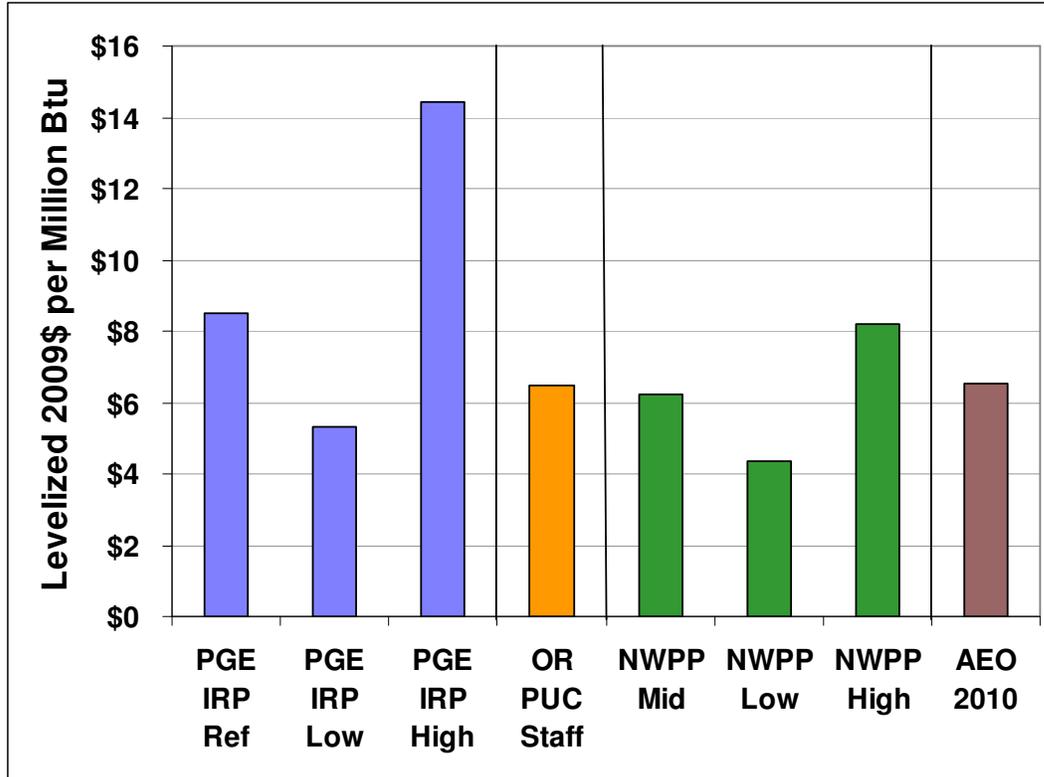


Figure 1 shows that:

- The reference case natural gas prices that PGE used in its IRP analyses are significantly higher than Oregon PUC Staff, NWPP mid and AEO Forecasts and NYMEX futures prices.
- PGE’s IRP reference case natural gas prices are actually slightly higher than NWPCC’s *high* gas price forecast.
- PGE’s IRP high natural gas price forecast is dramatically higher than NWPCC high forecast.
- On a levelized basis, the PGE IRP high gas price forecast is 70 percent higher than the PGE reference case forecast while the NWPCC high gas price forecast is only 32 percent higher than the NWPCC mid forecast.

The following two confidential Figures compare the annual reference case and ‘high case’ natural gas prices that PGE used in the IRP with the same forecasts from the NWPCC, the Oregon PUC staff, AEO 2010 and current NYMEX futures.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 2: Annual Natural Gas Prices Used in Reference Case IRP Modeling vs. NWPCC, Oregon PUC Staff, AEO 2010 and NYMEX Futures

[Confidential. Please See Page 6 of Confidential Version]

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 3: Annual Natural Gas Prices Used in ‘High Gas Price’ IRP Modeling vs. NWPCC, Oregon PUC Staff, AEO 2010 and NYMEX Futures

[Confidential. Please See Page 7 of Confidential Version]

The use of unreasonable natural gas prices artificially raises the cost of each of the portfolios considered in the PGE IRP but has a bigger impact on those portfolios that rely more heavily on natural gas generation. This means that the NPVRR of those portfolios with larger amounts of natural gas generation, e.g., the Boardman retirement portfolios, will be more heavily impacted (i.e., increased) by using unreasonably high natural gas prices than will the NPVRR of those scenarios which assume the continued operation of the Boardman plant through 2040.

The unreasonably high natural gas prices used by PGE in its IRP modeling analyses also distort its risk assessments. This is because two of the 21 futures scenarios in which PGE examined its pre-selected resource portfolios were (1) the ‘High Gas’ future and (2) the “High CO₂ cost with high natural gas prices and low coal prices.”³ PGE has acknowledged that the “Boardman through 2014” and “Boardman through 2020” are more exposed to gas price risk than “Diversified Thermal with Green” because a gas-fuelled CCCT is the assumed replacement technology for Boardman in these portfolios.”⁴ Indeed, the “Boardman through 2014” portfolio is more exposed to gas than the “Boardman through 2020” portfolio because it adds the gas-fired CCCT six years earlier.

³ IRP Addendum, at pages 29 and 30.

⁴ Id., at page 101.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Consequently, it is no surprise that the NPVRR of the Boardman through 2014 is the most heavily impacted by the extremely high, and very unreasonable, high gas price forecast shown in Figures 1 and 3, above, that PGE uses in its IRP modeling. As a result, the Boardman through 2014 portfolio performs worst in the two “high gas price” futures scenarios.

In this way, the extremely high natural gas prices distort the metrics PGE uses to measure risk in its deterministic modeling analyses: the “Average Cost of Four Worst Futures” and the “Average Cost of Four Worst Futures Less the Cost of Reference Case.” By using unreasonably high natural gas prices in these futures, PGE increases the apparent riskiness of the Boardman through 2014 portfolio. For this reason, the risk assessment (and related portfolio scoring based on these metrics) presented in the IRP Addendum does not provide any insight into the actual relative economic risk of retiring the Boardman plant in 2014 or, indeed, any year prior to 2040.

Although the IRP does discuss the recently changed circumstances regarding natural gas, it doesn’t seem to have considered those changed circumstances in the natural gas prices it used in its IRP analyses. This is quite unlike other utilities, such as the Entergy Corporation, and an increasing number of gas and electric industry sources which consider the changed circumstances as a structural change in the natural gas market.

This structural change has two important impacts on the resource planning for companies like PGE. First, as a result of the existing and expected supply glut, current and projected prices of natural gas have been significantly reduced. At the same time, the dramatically larger domestic supplies of natural gas should be able to accommodate any increased demands from any fuel switching due to the relative economics of gas-fired vs. coal—fired generation or federal regulation of greenhouse gas emissions without causing significant increases in natural gas prices.

The structural change in the natural gas markets already has had a significant impact on utilities’ resource planning. For example, in early April of last year, Entergy Louisiana informed the Louisiana Public Service Commission of its intent to defer (and perhaps cancel) the proposed retirement of an existing gas-fired power plant and its replacement by a new coal-fired unit. Entergy explained that it no longer believed that a new coal plant would provide economic benefits for its customers due to its current expectation that future gas prices would be much lower than previously anticipated:

Perhaps the largest change that has affected the Project economics is the sharp decline in natural gas prices, both current prices and those forecasted for the longer-term. The prices have declined in large part as a result of a structural change in the natural gas market driven largely by the increased production of domestic gas through unconventional technologies. The decline in the long-term price of natural gas has caused a shift in the economics of the Repowering Project, with the Project currently – and for

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

the first time – projected to have a negative value over a wide range of outcomes as compared to a gas-fired (CCGT) resource.⁵

4. Recent Natural Gas Developments

Until very recently, natural gas prices were expected to increase substantially in future years. For the decade prior to 2000, natural gas prices averaged below \$3.00/mmBtu (2006\$). From 2000 through May 2007, prices increased to an average of about \$6.00/mmBtu (2006\$). This rise in prices reflected increasing natural gas demand, primarily in the power sector, and increasingly tighter supplies. The upward trend in natural gas prices continued into the summer of 2008 when Henry Hub prices reached a high of \$131.32/mmBtu (nominal). The decline in natural gas prices since the summer of 2008 reflects, in part, a reduction in demand resulting from the downturn in the U.S. economy.

* * * *

However, the decline also reflects other factors, which have implications for long-term gas prices. During 2008, there occurred a seismic shift in the North American gas market. “Non-conventional gas” – so called because it involves the extraction of gas sources that previously were non-economic or technically difficult to extract – emerged as an economic source of long-term supply. While the existence of non-conventional natural gas deposits within North America was well established prior to this time, the ability to extract supplies economically in large volumes was not. **The recent success of non-conventional gas exploration techniques (e.g., fracturing, horizontal drilling) has altered the supply-side fundamentals such that there now exists an expectation of much greater supplies of economically priced natural gas in the long-run....**

* * * *

Of course, it should be noted that it is not possible to predict natural gas prices with any degree of certainty, and [Entergy Louisiana] cannot know whether gas prices may rise again. Rather, based upon the best available information today, it appears that gas prices will not reach previous levels for a sustained period of time because of the newly discovered ability to produce gas through non-traditional recovery methods...⁶ [Emphasis added]

Entergy’s conclusion that there has been a seismic shift in the domestic natural gas industry was confirmed in early June of 2009 by the release of a report by the American

⁵ Report and Recommendation Concerning the Little Gypsy Unit 3 Repowering Project, submitted by Entergy Louisiana to the Louisiana Public Service Commission, April 1, 2009, at pages 6-8.

⁶ Id., at pages 17, 18 and 22.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Gas Association and an independent organization of natural gas experts known as the Potential Gas Committee, the authority on gas supplies. This report concluded that the natural gas reserves in the United States are 35 percent higher than previously believed. The new estimates show “an exceptionally strong and optimistic gas supply picture for the nation,” according to a summary of the report.⁷

A Wall Street Journal Market Watch article titled “U.S. Gas Fields From Bust to Boom” similarly reported that huge new gas fields have been found in Louisiana, Texas, Arkansas and Pennsylvania, and cited one industry-backed study as estimating that the U.S. now has enough natural gas to satisfy nearly 100 years of current natural gas-demand.⁸ It further noted that

Just three years ago, the conventional wisdom was that U.S. natural-gas production was facing permanent decline. U.S. policymakers were resigned to the idea that the country would have to rely more on foreign imports to supply the fuel that heats half of American homes, generates one-fifth of the nation’s electricity, and is a key component in plastics, chemicals and fertilizer.

But new technologies and a drilling boom have helped production rise 11% in the past two years. Now there’s a glut, which has driven prices down to a six-year low and prompted producers to temporarily cut back drilling and search for new demand.⁹

There is now wide agreement among gas industry experts that this is not a short-term phenomenon but is a long-term structural change in the natural gas market. PGE should reflect this structural change, and the expectation of lower long-term natural gas prices, in its IRP analyses. It has not done so.

It is our understanding that the Sierra Club does not oppose the development of shale gas resources using fracturing technologies as long as production is governed by a robust and effective regulatory structure. According to Sierra Club's policy; all gas should be produced using rigorous best management practices to limit environmental damage.¹⁰

⁷ *Estimate Places Natural Gas Reserves 35 percent Higher*, New York Times, June 9, 2009.

⁸ Available at <http://online.wsj.com/article/SB12410459891270585.html>.

⁹ Id.

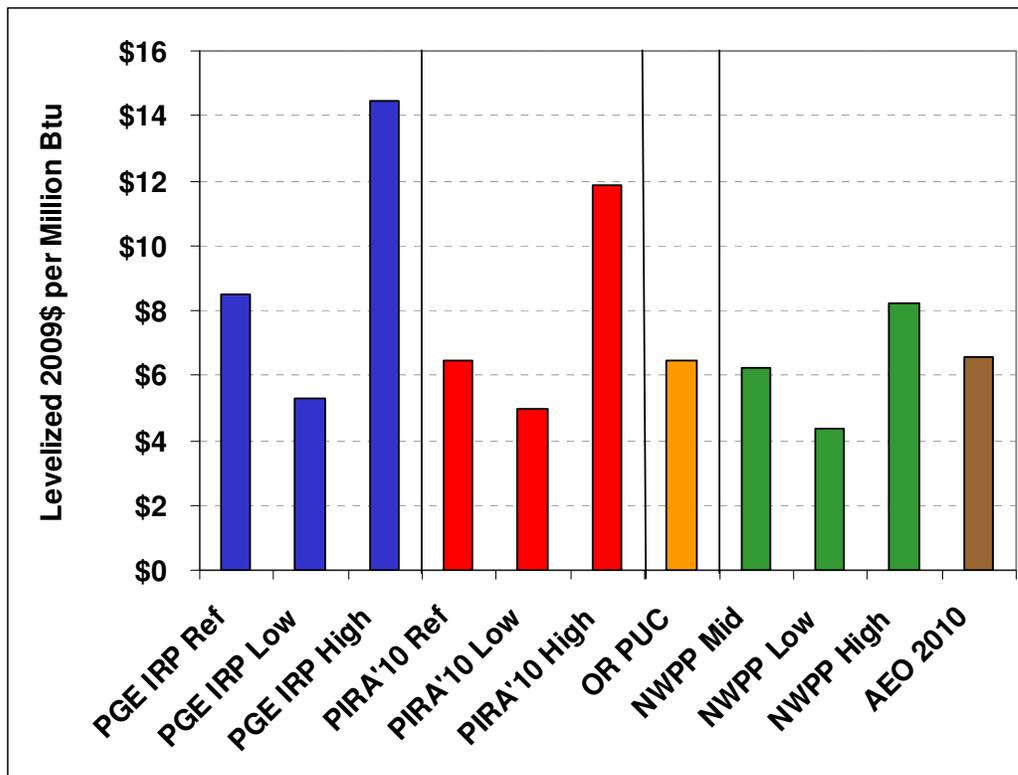
¹⁰ The Sierra Club’s shale gas policy is available at <http://www.sierraclub.org/policy/conservation/NaturalGasFracturing.pdf>.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Finding No. 2. PIRA has significantly reduced its projected natural gas prices from the forecasts used in the PGE IRP analyses. These new forecasts confirm our conclusion that the gas prices used in the IRP analyses were unreasonably high.

PGE’s May 7, 2010 response to PEAC Data Request Question No. 77 provided PIRA’s new April 2010 reference natural gas price forecast and its new February 2010 high and low gas price forecasts. As can be seen in Figure 4, below, on a levelized basis these forecasts are substantially lower than the gas price forecasts that PGE used in the IRP analyses. The new PIRA forecasts also appear to be much more consistent with the natural gas price forecasts from NWPPC, AEO 2010 and the Oregon PUC staff.

Figure 4: 2010 PIRA Natural Gas Price Forecasts vs. The Gas Prices Used in IRP Modeling Analyses and the NWPPC, Oregon PUC Staff, AEO 2010 and NYMEX Futures Prices (Levelized in 2009\$)



Confidential Figure 5 then compares PIRA’s new annual reference case natural gas price forecasts with the other reference case forecasts included in Figure 2 above.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 5: 2010 PIRA Natural Gas Price Forecasts vs. The Gas Prices Used in IRP Modeling Analyses and the NWPCC, Oregon PUC Staff, AEO 2010 and NYMEX Futures Prices (2009\$)

[Confidential. Please See Page 12 of Confidential Version]

These new gas-price forecasts confirm our finding that the natural gas prices that PGE used in its IRP analyses were much too high and that the results of those analyses, therefore, are biased against natural gas-fired generation and in favor of the continued operation of the Boardman plant.

For this reason, alone, little or no weight should be given to the claims and modeling results presented in the November 2009 Final IRP and the IRP Addendum filed by PGE in April 2010 regarding (a) the reasonableness of making the emissions controls investments needed operate the Boardman plant through 2040 and (b) the better economics of the Boardman through 2020 portfolio over portfolios that would retire the Boardman plant in earlier years.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Finding No. 3. PGE has not analyzed whether adding a new combined cycle natural gas-fired unit would be the lowest cost option if Boardman were retired at any time between 2014 and 2020.

PGE has assumed in the early Boardman retirement portfolios that the plant would be replaced by an equivalent natural gas-fired combined cycle generating unit. However, the Company made no attempt to determine whether such a replacement was a “least-cost replacement of Boardman.”¹¹ Instead, the Company assumed a new gas-fired unit would be built in place of Boardman because it “is a replacement of one non-intermittent base load resource by another.”

Thus, the Company is unable to say that it wouldn’t be less expensive to replace Boardman with some combination of a mid- to long-term power purchase agreement (“PPA”), additional energy efficiency, additional renewable resources plus, perhaps, some new gas-fired capacity at some point in time. This is a critical flaw in the IRP modeling process and, as a result, PGE may be overlooking alternatives to Boardman that are better from economic, environmental and reliability perspectives than building a new natural gas-fired central station power plant.

In fact, PGE did not optimize any of the portfolios it considered in the IRP. Instead of allowing the Aurora model to identify lowest cost portfolios of new gas-fired units, new renewable resources and new amounts of cost-effective energy efficiency, PGE pre-selected the supply-side and demand-side resources that would be added in each portfolio. The Company also failed to modify or adjust its portfolios in light of its initial modeling results. Thus, the Company really can’t say that there are not lower cost, lower risk portfolios than the 16 it has examined.

Finding No. 4. PGE has not adequately considered the availability of a substantial amount of under-utilized gas-fired combined cycle and gas turbine capacity in and around the state of Oregon that could provide much, if not all, of the replacement energy if the Boardman plant were retired.

The IRP explains that all portfolios were limited to 300 MW of market capacity purchases each year and to 100 MWa of short- and mid-term energy purchases.¹² However, it appears that PGE only considered a multi-year PPA as a supply side alternative in four portfolios: the Bridge to IGCC in Wyoming portfolio, the Bridge to Nuclear in Idaho portfolio, the Boardman through 2011 portfolio and the Boardman through 2020 portfolio. The potential for a PPA was not considered in the Boardman through 2014 or the Boardman through 2017 portfolios. This is a significant flaw given that there appears to be substantial available gas-fired capacity and energy in Oregon and the Northwest to form a medium-term to long-term PPA (4-5 years or longer) that could, if necessary, replace the power that would be generated at Boardman for at least the

¹¹ PGE Response to PEAC Data Request Questions Nos. 65 and 66.

¹² IRP Addendum, at page 19.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

medium term (4-5 years) while longer term options such as additional energy efficiency and renewable resources develop and, perhaps, a new combined cycle unit is built.

For example, in its Opening Comments in this proceeding, the Northwest and Intermountain Power Producers Coalition (“NIPPC”) noted the following:

NIPPC understands that PGE’s preferred plan for the future of the Boardman plant is still under development, so NIPPC defers a detailed review of PGE’s arguments regarding future operation of the Boardman plant until PGE’s plan is better defined and supported. Nevertheless, NIPPC feels compelled to point out within the context of the Commission’s review of the utility’s IRP, that PGE’s recommendation to continue operation of the Boardman plant at least over the near to mid-term due to claims of insufficient sources of replacement power does not match market realities. The Northwest Power & Conservation Council identified in its Fourth Power Plan that substantial un-contracted merchant plant capacity remains uncommitted and is available for contract under long-term PPA. In 2010, a conservative estimate found on the order of 3,000 MW currently exists in the region and is available to meet capacity shortfalls from the closure of the Boardman plant.¹³

Moreover, information from the NWPPCC reveals that there is substantial under-utilized gas-fired combined cycle capacity in the region.

Table 1: Pacific Northwest Combined Cycle Capacity Factors in 2007 and 2008.¹⁴

Name	Technology	Primary Fuel	Installed Capacity (MW)	Initial Service Year	State	2007 Capacity Factor	2008 Capacity Factor
Beaver 1 - 7	CC	NG	586.2	1974	OR	7.10%	2.83%
Big Hanaford CC1A-1E	CC	NG	322.0	2002	WA	12.55%	11.07%
Chehalis Generating Facility	CC	NG	593.3	2003	WA	36.32%	40.96%
Coyote Springs 1	CCCG	NG	266.4	1995	OR	61.64%	64.61%
Coyote Springs 2	CC	NG	287.0	2003	OR	64.53%	67.47%
Encogen 1-4	CCCG	NG	176.4	1993	WA	11.73%	6.32%
Frederickson Power 1	CC	NG	318.3	2002	WA	32.27%	39.27%
Goldendale CC 1A & 1B	CC	NG	280.3	2004	WA	28.29%	55.04%
Grays Harbor Energy Facility (Satsop)	CC	NG	650.0	2008	WA	0.00%	14.37%
Hermiston Generating Project CC2A & 2B	CCCG	NG	234.5	1996	OR	55.47%	59.19%
Hermiston Power Project	CCCG	NG	689.4	2002	OR	50.97%	61.60%
Klamath Cogeneration Project	CCCG	NG	501.5	2001	OR	55.41%	69.10%
Lancaster (Rathdrum Generating Station)	CC	NG	270.0	2001	ID	53.93%	57.90%
March Point 1 - 4	CCCG	NG	167.0	1991	WA	69.32%	69.91%
Mint Farm	CC	NG	319.0	2008	WA	0.00%	25.71%
Port Westward CC1A & 1B	CC	NG	399.0	2007	OR	49.27%	81.08%
River Road Generating Plant	CC	NG	248.0	1997	WA	70.04%	74.40%
Sumas Cogeneration Station	CCCG	NG	125.5	1993	WA	20.64%	19.67%
Tenaska Washington Partners Cogeneration	CCCG	NG	253.4	1994	WA	32.52%	27.53%

¹³ Opening Comments of the Northwest and Intermountain Power Producers Coalition, February 2, 2010, at pages 17 and 18.

¹⁴ NWPPCC File name Existing Projects 030210.xls.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

PGE disputes the availability and deliverability of power through a PPA in the November 2009 Final IRP.¹⁵ However, the Company does not appear to have conducted any detailed analyses to support its claims:

- In its response to PEAC Data Request Question No. 053, PGE acknowledged that its “position regarding the amount of uncommitted merchant generation in the Pacific Northwest, as noted on page 48 of the IRP, is therefore not based on formal analysis or studies.”
- In its response to PEAC Data Request Question No. 071, PGE noted that it “has not performed an assessment of potential power purchase agreements for energy or capacity for delivery during the period of July 1, 2014 through December 31, 2020. Doing so would require speculation as to both supply availability and price in the absence of conducting a market solicitation or competitive bidding process. We believe this would not be a sound basis for performing IRP analysis.”
- In its response to PEAC Data Request Question No. 101, PGE was unable to provide any assessments or analyses of system constraints that would affect the ability to build a replacement unit or buy power from a replacement source in the event that Boardman is retired at some time between January 1, 2014 and December 31, 2020.

PGE also has acknowledged that it has not studied the impacts of retiring the Boardman plant on the transmission grid.¹⁶

Finding No. 5. PGE overstates its need for the capacity and energy from the Boardman plant through the use of high load forecasts and by understating the potential for energy efficiency.

PGE assumed high energy and peak load growth through 2030 in its IRP modeling analyses. For example, as explained in the IRP Addendum, PGE used a reference case energy load growth rate, including embedded energy efficiency, of 1.9 percent per year between 2010 and 2030.¹⁷ PGE also examined futures with higher (2.7 percent per year) and lower load growth (1.2 percent per year).¹⁸

However, the energy and peak load growth rates that PGE used in the IRP are higher than both PGE’s actual energy growth between 1998 and 2008 and the current forecasts of the Northwest Power and Conservation Council for Oregon.

In fact, as shown in Table 2, below, information in the *2008 Oregon Utility Statistics* published by the Commission, reports that PGE’s total energy loads grew from 19,258,992 MWh in 1999 to 19,992,632 MWh in 2008. This represented a total growth in

¹⁵ At page 48

¹⁶ PGE’s Response to PEAC Data Request Question No. 103.

¹⁷ IRP Addendum, at page 28.

¹⁸ IRP Addendum, at page 30.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

energy load of less than four percent during the entire nine year period or an average annual growth rate of only 0.4 percent per year. Interestingly, PGE’s average number of customers, excluding ESS customers, grew by 14 percent during this same nine year period, from 714,000 to 811,000. Average usage per customer declined.

Table 2: PGE Historical Sales and Peak Loads from 1999 through 2008

Portland General Electric Company
TEN-YEAR SUMMARY
SELECTED STATISTICS

	Oregon Total ^(A)					Residential Averages in Oregon			
	Revenue From Retail Energy Customers	Energy Sold to Retail Customers (MWh) ^(B)	Delivery to ESS Customers (MWh) ^(B)	Average ^(B)		Number of Customers	Revenue Per kWh (Cents)	Per Customer	
				Number of Customers	Revenue Per kWh (Cents)			Revenue	kWh
1999	\$973,326,617	19,258,992	NA	714,130	5.05	627,396	5.90	\$697	11,802
2000	\$1,038,204,376	19,872,544	NA	726,039	5.22	637,331	6.02	\$702	11,663
2001	\$1,096,155,658	19,040,188	NA	733,058	5.76	643,596	6.59	\$725	11,001
2002	\$1,384,322,786	18,771,884	0	741,949	7.37	649,674	8.05	\$874	10,864
2003	\$1,283,136,445	18,425,854	0	750,496	6.96	658,232	7.82	\$844	10,785
2004	\$1,262,880,182 [C]	17,764,138	775,878	762,336	7.11 [E]	668,830	8.05	\$875	10,870
2005	\$1,264,877,648 [C]	17,540,047	1,213,906	775,533	7.21 [E]	680,093	8.10	\$872	10,768
2006	\$1,361,008,240 [C]	18,432,527	998,574	788,831	7.38 [E]	691,931	8.29	\$907	10,944
2007	\$1,439,248,223 [C]	17,461,742	2,164,687	800,587	8.24 [E]	701,952	9.31	\$1,020	10,953
2008	\$1,483,317,814	17,575,806	2,417,316	811,315	8.44	710,991	9.62	\$1,066	11,080

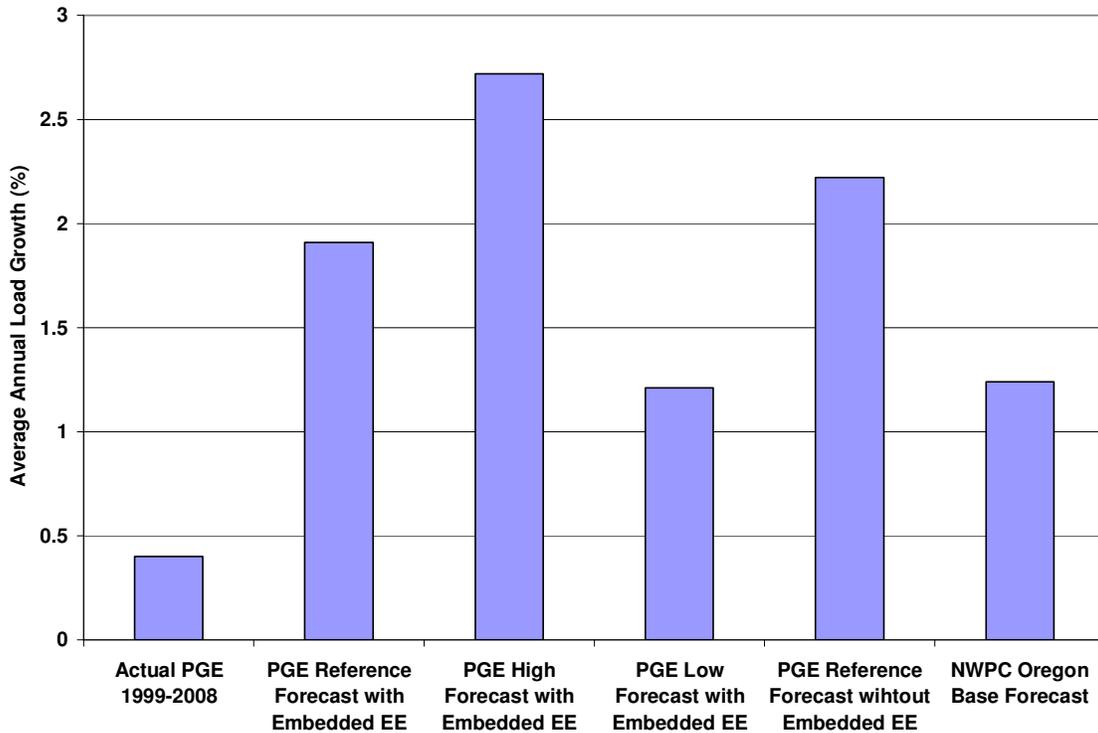
Despite this recent history, PGE assumed in its IRP analyses that its future energy load growth rate will increase significantly from the 0.4 percent average annual rate the Company actually experienced between 1999 and 2008 to an average 1.9 percent increase per year beginning in 2010. However, PGE has not provided much evidence to support such a change.

PGE also claims that its energy growth forecasts are consistent with the NWPC’s Draft Sixth Plan forecasts (now adopted as the Sixth Plan Forecasts).¹⁹ However, that claim does not appear to be accurate, as shown in Figure 6, below.

¹⁹ November 2009 Final IRP, at page 37.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 6: PGE Assumed Load Growth vs. NWPC Oregon Forecast²⁰



Thus, PGE’s Reference and High Forecasts with Embedded EE and its Reference Forecast without Embedded EE are all significantly higher than the NWPC Oregon Base Forecast. Only the PGE Low Forecast with Embedded EE is comparable to the NWPC Oregon Forecast. Consequently, it is extremely hard to see how PGE’s energy forecasts are ‘consistent’ with those of the NWPC.

NWPC also anticipates that energy efficiency could have a much greater impact on load growth than PGE does. In fact, NWPC’s Sixth Plan assumes that energy efficiency could reduce energy load growth in the State of Oregon from 1.24 percent per year between 2010 and 2030 to an average of only 0.34 percent per year, a reduction of nearly 73 percent. PGE, on the other hand, assumes that energy efficiency will only reduce its load growth by a cumulative 28 percent through 2030.²¹

²⁰ The information in this Figure is taken from Tables 3-1 and 3-2 on pages 36 and 37 of the November 2009 Final IRP.

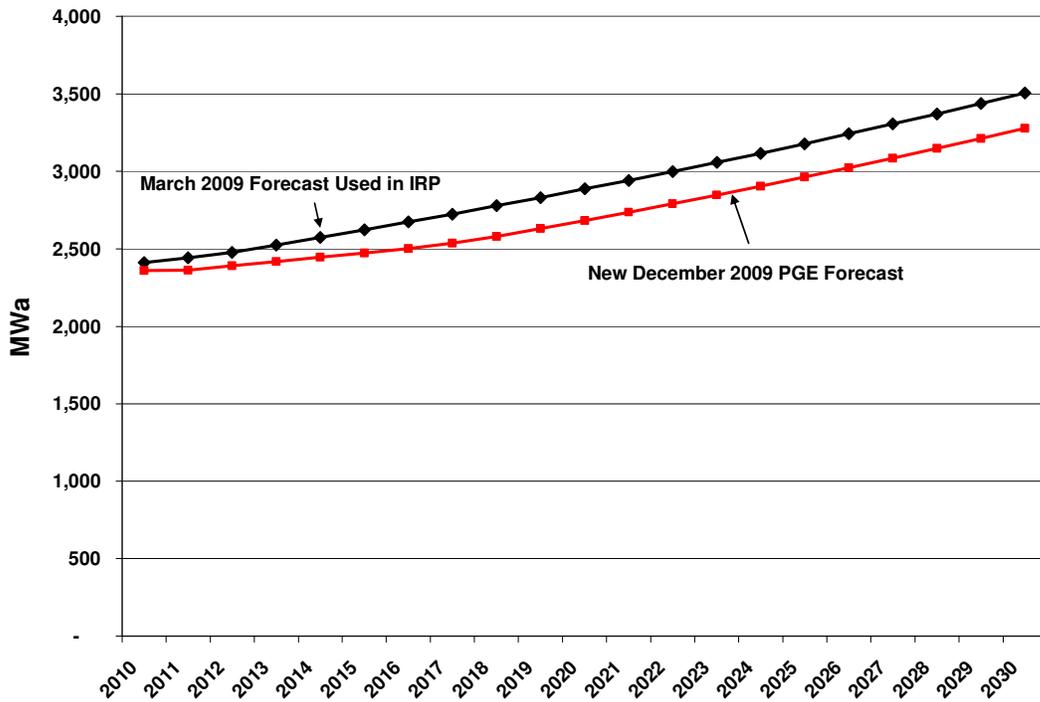
²¹ See Table ...on page ... of the IRP.

Public Utility Commission of Oregon
 Docket No. LC 48
 Comments on PGE 2009 Integrated Resource Plan
PUBLIC
 Protected Materials Redacted

Finding No. 6. PGE has significantly reduced its long term energy and peak load forecasts in December 2009.

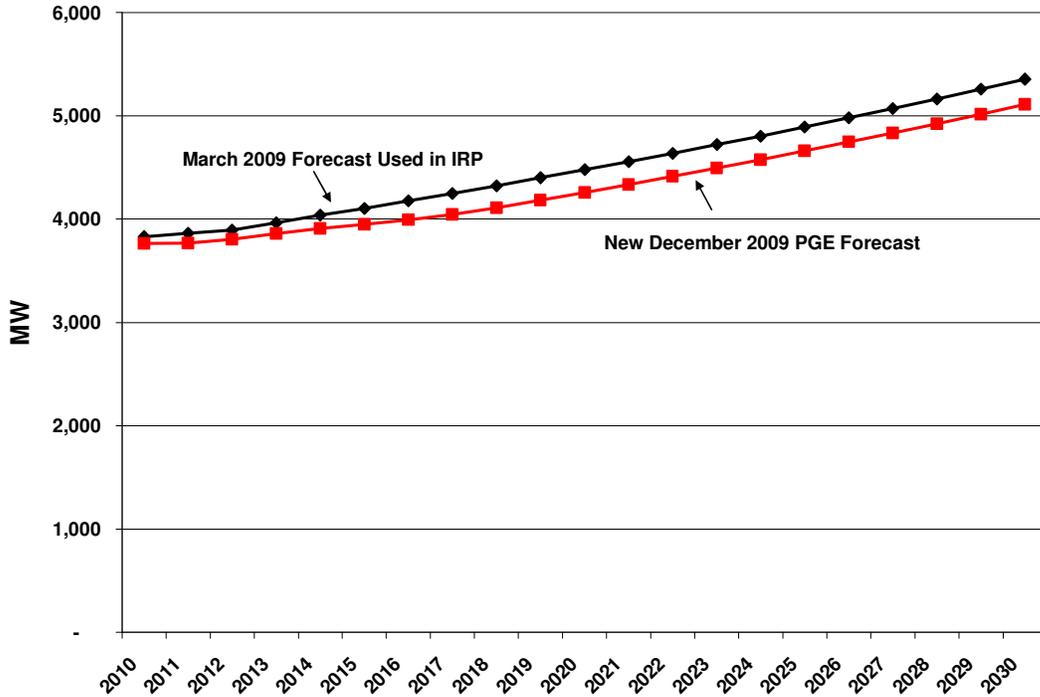
PGE’s May 5, 2010 response to PEAC Data Request Question No. 78 provided the Company’s December 2009 energy and peak load forecasts. As shown in Figures 7.a. and 7.b., below, the new December 2009 forecasts are substantially below the March 2009 load forecasts that PGE used in its IRP modeling.

Figure 7.a: PGE March 2009 Energy Forecast Used in IRP vs. Company’s December 2009 Forecast



Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 7.b.: PGE March 2009 Peak Load Forecast Used in IRP vs. Company’s December 2009 Forecast

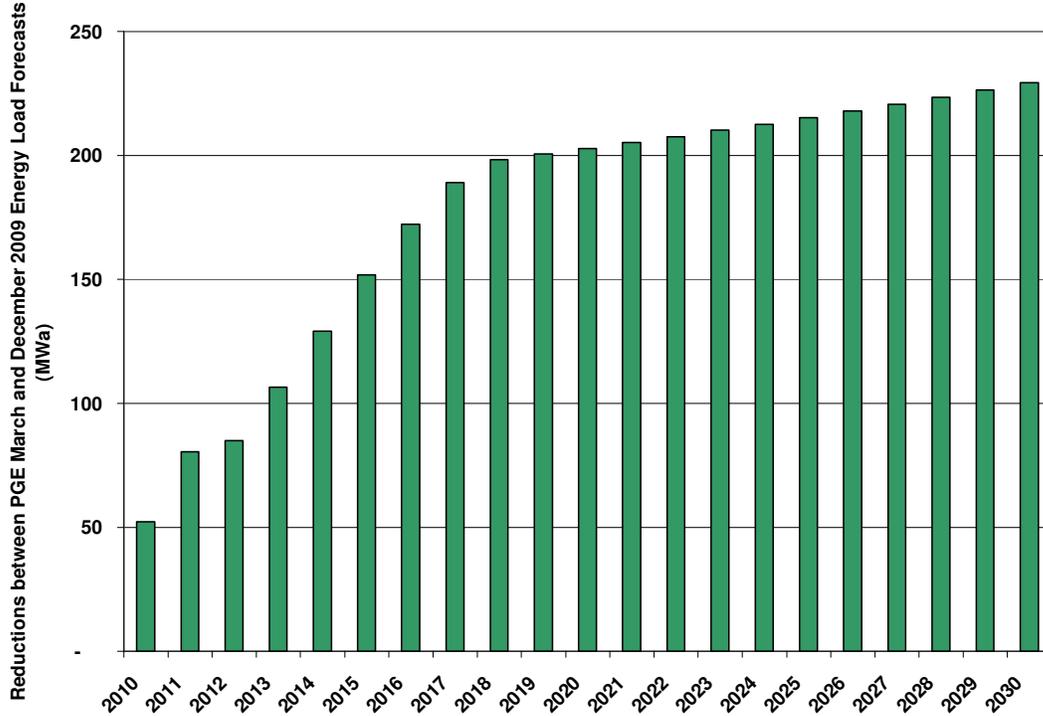


Even though PGE has only slightly reduced its projected long-term 2010-2030 average energy and peak load growth rates,²² the annual reductions are significant as shown in Figures 8.a. and 8.b. below, and reduce PGE’s need for the capacity and energy from the Boardman plant.

²² PGE reduced its 2010-2030 long-term energy load growth rates from an average 1.9 percent per year in the March 2009 forecast to 1.7 percent per year in December 2009. The Company similarly reduced its long-term peak load growth rate from 1.7 percent in the March 2009 forecast to 1.5 percent in the December 2009 forecast. These remain substantially higher than the Company’s historical growth between 1999 and 2009 and the load growth projected by NWPCC for Oregon.

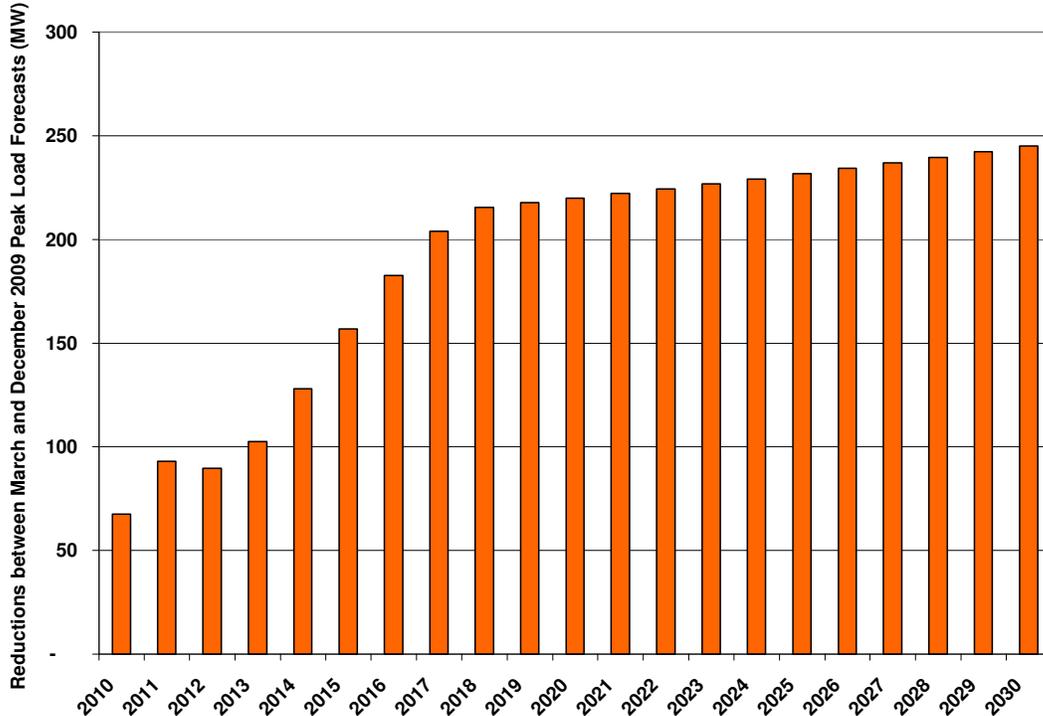
Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 8.a.: Annual Reductions in PGE Energy Load Forecasts between March 2009 Forecast Used in IRP and December 2009 Forecast



Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 8.b.: Annual Reductions in PGE Peak Load Forecasts between March 2009 Forecast Used in IRP and December 2009 Forecast



Consequently, PGE has reduced the energy forecast used in its reference case IRP analyses by between 5.8 percent in 2015 to 6.5 percent in 2030. PGE similarly has reduced the peak load forecast used in its IRP analyses by 3.8 percent in 2015 increasing to 4.6 percent in 2030. It is reasonable to expect that these reductions in energy and peak loads substantially affect PGE’s need for the energy and capacity from the Boardman plant. However, we have not seen any evidence that PGE has rerun its IRP analyses in light of its December 2009 forecasts.

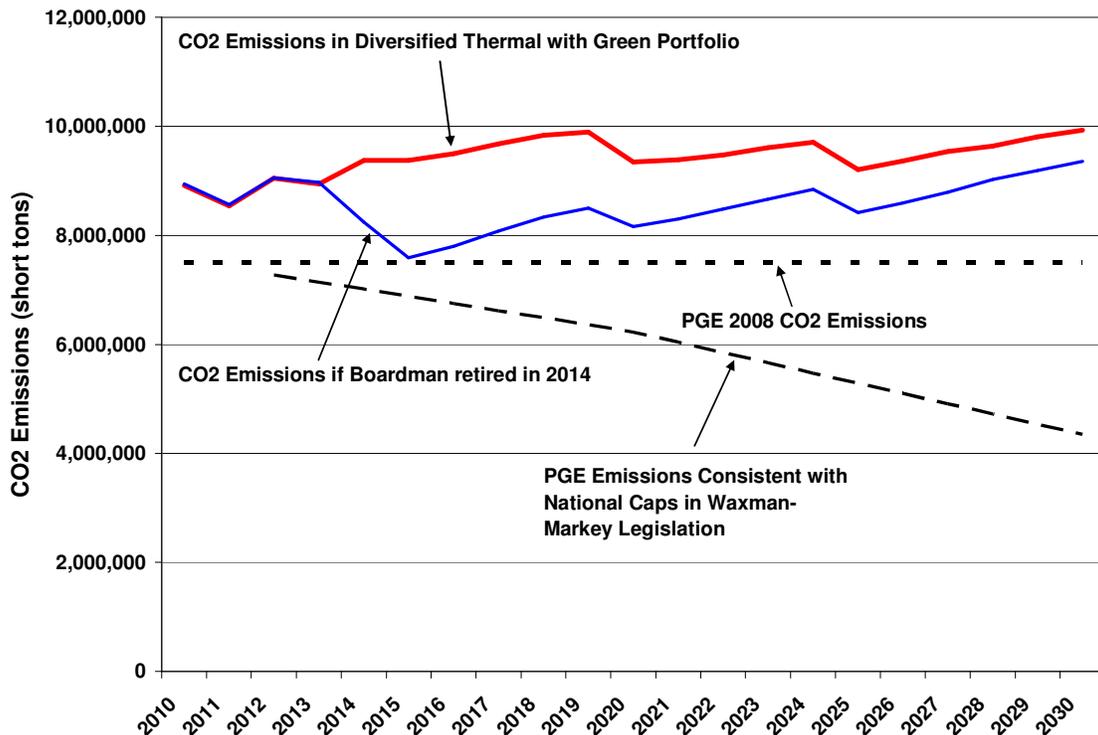
PGE’s response to PEAC Data Request No. 78 says that some of the difference between these two forecasts is due to the inclusion of Schedule 109 Incremental Energy Efficiency Funding (authorized by Senate Bill 838) and that the effect of these incremental EE savings was incorporated in the IRP. However, it is unclear how much of the difference between the March 2009 and December 2009 energy and peak load forecasts these incremental EE savings actually represent. In any event, it still appears, though, that PGE’s December 2009 energy and peak load forecasts are significantly lower than the earlier forecasts used in the IRP modeling.

Public Utility Commission of Oregon
 Docket No. LC 48
 Comments on PGE 2009 Integrated Resource Plan
PUBLIC
 Protected Materials Redacted

Finding No. 7. The results of PGE’s IRP modeling analyses show that if PGE continues to operate the Boardman plant past 2020, its annual CO₂ emissions will be significantly higher in 2030 than they were in 2007. Even if PGE retires the Boardman within the next ten years, its annual CO₂ emissions in 2030 still will be higher than they were in 2007. Therefore, PGE must start to aggressively plan to achieve actual reductions in its CO₂ emissions rather than assuming, as it does in its IRP, that it will be able to continue emitting the same or higher levels of CO₂ by purchasing emissions allowances. Making large investments in the Boardman plant and continuing to operate the plant through 2040 would be a step in the wrong direction.

PGE is to be commended for examining a fairly wide range of CO₂ prices in its IRP modeling analyses. However, as shown in Figures 9 and 10, below, the results of those analyses show that the Company’s annual CO₂ emissions in both the Diversified Thermal with Green (i.e., Boardman through 2040) and the Boardman through 2014 portfolios will be significantly higher in 2030 than they were in 2007 – although the annual emissions in the Boardman through 2014 portfolio would be substantially lower than in the Diversified Thermal with Green portfolio.

Figure 9: Annual PGE CO₂ Emissions in Diversified Thermal with Green and Boardman through 2014 Portfolios with Reference Case CO₂ Prices



Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 10: Annual PGE CO₂ Emissions in Diversified Thermal with Green and Boardman through 2014 Portfolios with High CO₂ Prices (\$65/ton)
[Confidential. Please See Page 23 of Confidential Version]

Unfortunately, PGE has not provided the annual CO₂ emissions for its Boardman through 2020 portfolio. However, Figure 11-16 in the IRP Addendum similarly shows that PGE's annual CO₂ emissions in the Boardman through 2020 portfolio with reference case CO₂ prices also would be approximately 10% to 15% higher in 2030 than they were in 2007. It is important to remember that the CO₂ emissions in Figures 9 and 10 are for PGE's reference case and high CO₂ price scenarios. The Company's annual CO₂ emissions in these portfolios can be expected to be even higher in the scenarios with the no CO₂ or low CO₂ prices.

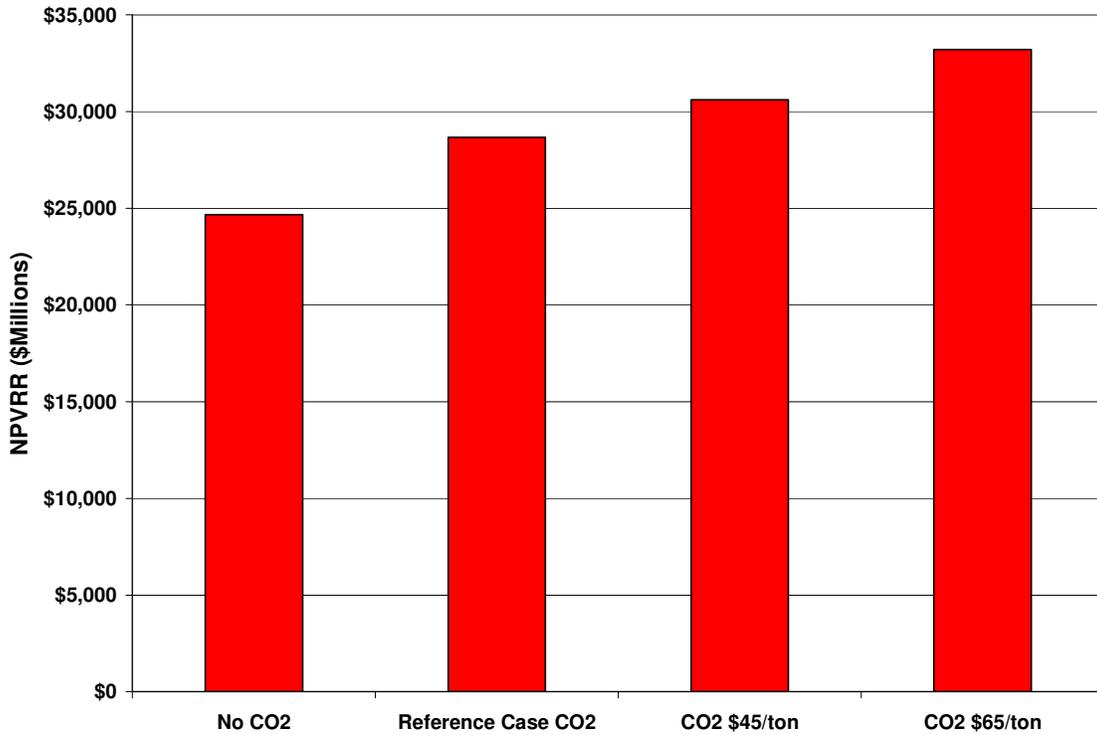
A comprehensive system for federal regulation of CO₂ and other greenhouse gases is inevitable. It is generally expected that this federal regulation will require steep reductions in greenhouse gas emissions. However, as shown in Figures 9 and 10, PGE's IRP analyses show that its annual CO₂ emissions will increase over time, not decrease. Consequently, PGE's projected future CO₂ emissions would be in conflict with evolving state, regional and national climate policies.

Moreover, ratepayers will face significant financial risk associated with a decision to lock in increasing CO₂ emissions for the coming decades at a time when those emissions will be costly. This financial risk is quite substantial as is illustrated in Figure 11, below,

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

which compares the NPVRR of PGE's Diversified Thermal with Green portfolio in the No CO₂ scenario with its NPVRR in the reference and high CO₂ price scenarios.

Figure 11: NPVRR of Diversified Thermal with Green Portfolio in PGE CO₂ Price Scenarios



Thus, the NPVRR of the Diversified Thermal with Green portfolio could increase by as much as 35 percent, or approximately \$8.5 billion, depending on how CO₂ prices actually evolve over time.

Retiring the Boardman plant in the near future will not, on its own, bring PGE's projected greenhouse gas emissions into compliance with expected federal limits but would be a major step in the right direction. Continuing to operate the plant through 2040 would be a major step in the wrong direction and would make it much harder to achieve actual reductions in PGE's CO₂ emissions.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Finding No. 8. The results of PGE’s stochastic analyses are distorted in favor of the continued operation of the Boardman plant by (a) the failure to shock CO₂ costs and (b) by the use of unreasonably high natural gas prices.

The Commission should give very little weight to the stochastic analyses presented by PGE in the IRP for three reasons.

First, I agree with PGE’s assessment of the greater importance of deterministic scenario analyses in resource planning:

We have found that the most substantial risks in connection with making future resource choices are those associated with large fundamental or structural shifts – the types of risks best described through scenario analysis. As a result, we believe that scenario analysis should be given the primary emphasis in our overall portfolio risk evaluation.²³

Second, it appears from Table 11A-1 in the IRP Addendum that PGE used even higher average natural gas prices in the stochastic analyses than it did in its deterministic reference case.²⁴ Given this high range of natural gas prices, the Tail Var results in Figures 11A-8 through 11A-10 in the IRP Addendum are not surprising given that the Boardman retirement scenarios have a greater dependence on natural gas. This greater dependence on gas is the direct result of PGE’s arbitrary assumption that Boardman would be replaced by a natural gas combined cycle unit.

Third, PGE ignores CO₂ prices in its stochastic analyses. This is a critical omission that biases the results in favor of the portfolios with continued operation of the Boardman plant because CO₂ prices are most important for the coal alternative as coal is the most carbon-intensive fuel.

Indeed, it is remarkable that PGE failed to shock CO₂ costs in its stochastic analyses because it did shock natural gas prices and load growth rates even though ranges for both of these input assumptions also were considered in PGE’s deterministic scenario analyses. In fact, it is reasonable to expect that there may be great uncertainty and variations in CO₂ emissions allowance prices in a cap-and-trade regime, which appears more likely to be adopted than a flat tax. For example, the prices of auctioned CO₂ emissions allowances are likely to change from one period to the next based on variations in the supply and demand for the allowances. It would seem that such changes would be just as important to consider in stochastic analyses as the potential uncertainty and potential variability in future natural gas prices and load growth. However, PGE has failed to do so.

²³ IRP Addendum, at pages 38 and 39.

²⁴ Id., at page 60.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Finding No. 9. PGE failed to consider the potential for higher coal prices in any of its future scenarios.

Figure 5-2 at page 86 in the IRP presents a range of Reference, High and Low coal prices. However, PGE did not model any futures scenarios with the high coal prices referenced in this Figure although it did model a future scenario with low coal prices combined with High CO₂ prices and high gas prices. This failure to model high coal price scenarios is particularly unreasonable given PGE's acknowledgment that "market conditions [regarding coal] are not static and there is currently uncertainty around a number of key factors."²⁵ According to PGE, these uncertainties included the following:

- Investment in rail infrastructure, from terminals to equipment, could be slower than expected.
- Transportation capacity (rail and locomotives), and the availability of train crews as the workforce ages, can also impact the rail rates faced by shippers.
- Railroads could place more emphasis on growth of inter-model traffic, decreasing available cars and track capacity for coal shipments.
- Volatility in the price of diesel, which is a significant cost to rail routes and the cost of mining.
- The impact of greenhouse gas legislation and any carbon legislation will have a significant impact on the coal industry and will be a key driver for the demand for the coal.
- The commercial viability of carbon capture and sequestration technologies, which will also have an impact on the long term demand and price of coal.
- Global demand, particularly the impact of economic development in China, India and other Southeast Asian countries, could increase demand for Eastern coal.
- Additional Eastern utilities could switch to PRB coal (due to the relative price advantage of PRB coal), even after plant retrofits.
- Producer discipline to respond to changes in demand for coal and shippers' inventory levels in the near term.²⁶

In fact, each of the factors cited by PGE is likely to impact coal demand and prices. In addition, there are broader market factors that also are likely to impact coal demand prices.

For example, a *Market Commentary* in the Coal and Energy Price Report noted a number of factors which may increase the demand for and price of PRB coal: 1) future demand in

²⁵ Id., at page 89.

²⁶ Id.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

the region would create new mines with less favorable stripping ratios, higher production costs and rising coal prices; 2) new safety policies stemming from mining catastrophes in Central Appalachia would likely extend to the PRB region, and, 3) production and other factors have made it clear that the United States was not a cheap source of coal anymore and for the foreseeable future.²⁷

Indeed, a considerable body of evidence indicates that future United States coal markets will not be like past coal markets and that coal commodity prices may be considerably higher. Currently, prices of PRB coal are rising after a decline from historic highs experienced in late 2008. In the short term (the next twelve months), gradual increases can be expected. For the medium and longer term, U.S. coal markets will no longer be a reliable supply of low cost fuel. Instead of being an anomaly, price run-ups that occurred in 2008 may be harbingers of how markets will perform in the future. For example, despite the current recession and relatively low recent prices of coal across the country, industry analysts and market data are suggesting that the price of PRB coal will rise between 2010 and 2012 by approximately 40 percent, and potentially higher.²⁸

Evidence also suggests that after 2012 the prices for PRB coal will rise significantly due to new cost pressures as mining becomes more complex and expensive and as large coal producers cultivate a worldwide base of users. Domestically, coal producers will use PRB's low price to capture a larger portion of the energy market (new plants, retrofits and carbon capture projects). Further success with this strategy will place additional upward pressure on prices and hasten the depletion of PRB reserves.

Future PRB coal supplies come with heightened risks. Recent indications from the United States Geological Survey (USGS) and industry leaders have raised red flag warnings about long term supply sufficiency of economically recoverable coal in the Powder River Basin. These price pressures are structural in nature and will redefine the nation's coal markets going forward. The new market environment will create a much higher floor price for PRB coal, one that is less responsive to the normal patterns of domestic business cycles. This will further erode coal's competitive edge with other power generation fuels in the United States.

One study, conducted by the United States Geological Society (USGS), released in 2008 raised a fundamental question about the size and quality of economically recoverable coal

²⁷ Energy Publishing, Inc. *Market Commentary*, Coal and Energy Price Report, Volume 12, No 88, May 10, 2010.

²⁸ Peabody Energy, Forward Looking Statement, February 18, 2010 estimates PRB 8800 rising from \$10.00 per ton in 2009 to \$14.00 in 2012. NYMEX Futures (March 1, 2010) is reflecting a price movement of \$11.10 per ton in April 2010 to \$14.50 in December 2012. See also: Coal and Energy Price Report, *Powder River Basin prognostication has Arch seeing way to lucrative future*, Volume 12, No. 74, April 20, 2010. Arch's view is more aggressive than NYMEX futures. These market price projections (which are used to establish the value of the two largest publicly traded coal producers in the nation and to set market prices for daily coal trades) are higher than the reference case coal prices that PGE has used in its IRP analyses.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

reserves in the PRB Region.²⁹ The USGS study has raised many questions, but perhaps most important for the PGE Integrated Resource Plan is that it focused on the Powder River Basin. The report demonstrates that the costs of production to continue to mine coal at its current rate will become significantly more costly due to growing geological complexity. The economic modeling and detailed stripping ratio data provided in the study show that the more intensively PRB resources are mined, the more rapidly the structure of production costs increase.

Coal quality also will become more of an issue in the future. Heat rating, and other coal quality factors, will need to be carefully monitored as resource depletion and mine switching are likely to be more frequent occurrences for institutional consumers of coal products. For these reasons, the IRP's assumption that PRB 8800 Btu/lb coal is in higher demand than the 8400 Btu/lb coal it uses and is planning to use (and therefore PGE is less at risk, presumably) is at best a temporary price and quality advantage.

The USGS report prompted press coverage in the Wall Street Journal that uncovered the fact that: a) the United States Energy Information Agency concurred with the findings of the USGS study and was revising the methodology by which the nation's coal reserve levels were being calculated; b) one of the nation's largest coal producers agreed with the findings of the study; and, c) another large power generator had purchased its own mine due to risks and uncertainties it perceived with the traditional mining industry.³⁰

A recent analysis of PRB coal offered by Arch Coal, a major mine owner in the PRB region, expects intensified mining (beyond its current rate) and sales from the area.³¹ The company points to shrinking stockpiles of PRB coal, diminished production of steam coal from Central Appalachia and historic price patterns in the PRB (which indicate a coming period of volatile upward price swings). The company is viewing a \$2 to \$5 per ton increase in the price of coal in the near to medium term as a realistic estimate of its potential.

The plans for intensified use of the PRB region support the case for more rapid increases in the cost of production of coal in the PRB region. PGE's coal supply projections of an increase of PRB production from 40% to 50% of the nation's coal supply would increase annual production by approximately 90 million tons according to the EIA from the Northern Great Plains region. Arch Coal's long-term view suggests a doubling of these production levels.³² The USGS analysis that issued its red flag warnings about rising production costs did so assuming 2006 production levels. Even assuming EIA's slow growth rates compared with Arch's more aggressive production estimates by 2015,

²⁹ United States Geological Society, *Assessment of Coal Geology, Resources and Reserves in the Gillette Coalfield, Powder River Basin, Wyoming*, Open-File Report: 2008-1020.
<http://pubs.usgs.gov/of/2008/1020/>

³⁰ Smith, Rebecca, *U.S. Foresees A Thinner Cushion of Coal*, Wall Street Journal, June 8, 2009.

³¹ See the Arch Coal, *Investor Presentation*, February 2010, pages 11-14 and 27, 28.

³² See Arch Coal, Raymond James Conference, November 10, 2009, Slide # 15.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

production will have increased by 80 million tons annually from the Northern Great Plains PRB region above 2006 production levels.³³

All of these developments suggest that PGE's reference case coal prices may be too low and that the price of 8400 Btu PRB coal may be higher than PGE now anticipates.

Finding No. 10. PGE does not appear to have adequately considered the potential costs of complying with new or revised air emissions requirements and the proper disposal and management of coal combustion wastes.

Prudent electric resource planning requires the consideration of costs for new or revised air emissions requirements and the proper disposal and management of coal combustion wastes.

PGE has considered the costs of complying with the Clean Air Act's Best Available Retrofit Technology ("BART") requirement pursuant to the Act's Regional Haze requirements, and has evaluated future carbon regulation, as described above. However, PGE failed to consider the potential capital and operational costs of complying with additional forthcoming air emissions regulations or the potential remedy in *Sierra Club v. Portland General Electric*. PGE's failure to consider the costs of complying with these potentially more stringent air emissions requirements in the IRP biases PGE's evaluation of the costs of its recommended and alternate Action Plans.

1. The Pollution Controls Required as a Remedy for Violations of the Clean Air Act, and Under EPA's New Air Toxics Rule will be More Expensive to Install and Operate than the Pollution Controls Analyzed by PGE in the 2009 IRP.

As an initial matter, the type of equipment PGE proposes to install to satisfy the BART and reasonable further progress requirement is not the "top-of-the-line" equipment available to reduce the emissions identified today. This is an important point because compliance with new or revised emissions standards or court injunctive relief may increase the already significant costs of retrofitting and operating the Boardman plant into the future. During the April 26, 2010, presentation by PGE regarding the 2009 IRP, Company spokesman Jim Lobdell indicated that the remedy for the *Sierra Club v. Portland General Electric* lawsuit could result in installation of controls at Boardman, assuming the company is liable for violating the Clean Air Act. As explained below, Mr. Lobdell is right.

First, if the plaintiffs prevail in their lawsuit, the company will have to comply with stringent New Source Performance Standards and Best Available Control Technology (BACT) requirements at the Boardman plant.³⁴ For example, the applicable New Source Performance Standards mandate a scrubber for flue gas desulfurization operated to reach

³³ Energy Information Administration, *2009 Energy Outlook, Supplemental Tables 120-121*

³⁴ See *Sierra Club v. Portland General Electric, Co.*, Civ. No. 08-1136-HA, Complaint, (alleging violations of 42 U.S.C. § 7411 and 42 U.S.C. § 7475).

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

a 90% reduction in actual emissions,³⁵ and immediate compliance is required. Oregon's BART rule mandates only an 80% reduction in actual emissions.³⁶ Both these emissions reductions requirements far exceed what PGE now proposes in its petition to DEQ for a new BART rule, however, which would provide only a 2% reduction from actual emissions for sulfur dioxide.

In addition to New Source Performance Standards, the plaintiffs in *Sierra Club v. Portland General Electric* have also alleged violations of the new source review program in Oregon.³⁷ One of the remedies for these violations is that PGE would have to install BACT and operate in compliance with a BACT emissions limitation for both sulfur dioxide and nitrogen oxides. New Source Performance Standards, the 90% control requirement for sulfur dioxide discussed above, are the *floor* for a BACT determination, which requires the maximum degree of pollution reduction achievable at the plant, taking into account a variety of factors including costs. Recent BACT determinations for coal-fired power plants require a 98-99% reduction in sulfur dioxide. For nitrogen oxides, BACT would undoubtedly require some add-on pollution control equipment, most likely a Selective Catalytic Reduction ("SCR") unit that would decrease nitrogen oxide emissions by closer to 93% compared to the 84% reduction required in 2017 under the reasonable further progress requirements.³⁸ Similar to the New Source Performance Standards, immediate compliance with illegally avoided new source review requirements is required.

Second, EPA is on schedule, and under court order, to promulgate new air toxic emission limitations from coal-fired power plants in November 2011. EPA should have begun regulation of air toxics from electric generating units years ago, but implementation of appropriate controls was delayed by the last administration in Washington, D.C. The litigation around these rules has resolved in the form of a date certain deadline for EPA to promulgate regulations by November 2011. Understanding the regulatory history of these standards is important in discerning the likelihood of PGE's success in escaping regulation under these rules.

In 2005, EPA attempted to remove coal fired plants from the list of facilities subject to regulation under the Clean Air Act's stringent air toxics provisions.³⁹ EPA promulgated the Clean Air Mercury Rule (CAMR) a few months later to regulate mercury emissions from coal-fired power plants under a less stringent provision of the Clean Air Act.⁴⁰ In

³⁵ 40 C.F.R. § 60.43Da(a).

³⁶ OAR 340-223-0030; Implementation Plan Revision: Regional Haze Rule at 154 (June 19, 2009) available at <http://www.deq.state.or.us/qa/haze/docs/May09/2008ORRHplan.pdf>.

³⁷ See *Sierra Club v. Portland General Electric, Co.*, Civ. No. 08-1136-HA, Complaint, (alleging violations of OAR Chapter 340, Divisions 28 and 31 (1997); OAR Chapter 340, Division 224 (2003).

³⁸ Implementation Plan Revision: Regional Haze Rule at 154 (June 19, 2009) available at <http://www.deq.state.or.us/qa/haze/docs/May09/2008ORRHplan.pdf>.

³⁹ 70 Fed. Reg. 15,994 (Mar. 29, 2005).

⁴⁰ 70 Fed. Reg. 28,606 (May 18, 2005).

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

New Jersey v. EPA (Feb. 8, 2008), the U.S. Court of Appeals for the DC Circuit vacated CAMR and told EPA that it must promulgate a standard for electric generating units under the more stringent air toxics provisions of the Clean Air Act, and that such rule must cover all toxic air pollutants emitted in significant amounts by coal fired power plants - not just mercury.

EPA was sued when it failed to satisfy this requirement by the deadline set in the statute.⁴¹ The binding settlement of that suit requires EPA to promulgate a new air toxics rule for coal-fired power plants by November 16, 2011.

Existing sources at the time that an applicable MACT standard is made effective are required to comply with the standard by an EPA-set compliance date that is “as expeditiously as practicable, but ... no ... later than 3 years after the effective date of such standard.”⁴² After that date, it is illegal to operate out of compliance with the federal standard. The law does not allow exemptions from these requirements. There are some compliance extensions available for very specific grounds and for very limited time periods (i.e. one year). The law is clear that extensions outside these narrow circumstances are illegal. In *Natural Resources Defense Council v. EPA*, the D.C. Circuit rejected EPA’s argument that it could grant sources additional time to comply, finding that “Congress has ... not provided EPA with authority ... to extend the compliance date [beyond specific circumstances enumerated in the statute] ...”⁴³

When EPA issues the air toxics rule, it is reasonable to expect that it will require installation and operation of a sulfur dioxide scrubber that will reduce hydrochloric acid (HCL) and hydrogen fluoride (HF). The rule could require installation and operation of a Selective Catalytic Reduction (SCR) unit to control dioxin, furans, volatile organic compounds, organic hazardous air pollutants, and ammonia. An SCR can also maximize oxidation of mercury, a significant co-benefit for mercury reduction through scrubbing. Thus, the new air toxics rule should not be viewed as just pushing limits lower, but rather as an opportunity for EPA to mandate other technology options currently in use, either alone or in combination with sorbent injection. These other options are available and deployed on many coal-fired power plants, and can achieve higher removal efficiencies for a wider range of air toxics than sorbent injection alone. The costs for compliance with these new air toxics standards either equal or exceed the costs now contemplated for compliance with the BART rule and the reasonable further progress requirements, but speed up the required investments significantly.

The liability trial in *Sierra Club v. PGE* is set for late May 2011. The timing of an ultimate judicial decision on liability and the appropriate remedy is difficult to predict, but could reasonably be expected by early 2012. Compliance with the MACT rule is most likely to be required by 2014, with a possible one-year extension until 2015.

⁴¹ *American Nurses Association v. EPA*, No. 1:08-cv-02198 (D.D.C.).

⁴² 42 U.S.C. § 7412(i)(3)(A).

⁴³ 489 F.3d 1364, 1374 (D.C. Cir. 2007).

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

2. PGE's 2009 IRP Fails to Analyze Costs of Compliance with New Coal Combustion Waste Rules.

PGE has not appropriately considered the costs associated with disposing of its coal combustion wastes. Coal combustion wastes (CCW), also known as “coal ash” or “coal combustion products,” consist of fly ash, bottom ash, boiler slag and flue gas desulfurization sludge, and are typically disposed of in landfills and surface impoundments. PGE disposes of its CCW in an on-site dry landfill. Unlike other fossil fuels, coal contains a high amount of non-combustible, inorganic material. In essence, coal is part fuel, part rock: a matrix of hydrocarbons and other minerals and metals, some of which are toxic.⁴⁴ The mining process also adds inorganic contaminants when the contents of adjacent strata intermix with the coal.⁴⁵

The burning of coal to produce energy, releases its hydrocarbon content to the atmosphere, leaving behind these inorganic materials, now in considerably higher concentrations.⁴⁶ While the primary constituents of CCW are relatively inert,⁴⁷ the waste can also contain significant amounts of toxic materials including arsenic, selenium, lead, mercury, cadmium, chromium, boron, thallium, and aluminum.⁴⁸ High concentrations of non-toxic materials can also present significant problems. Most CCW, for instance, exhibits high to moderately high pH, carrying a potential to alter the chemistry of surrounding environment, and risk the release of otherwise latent toxic compounds in the surrounding area.⁴⁹ CCW also exhibits relatively high concentrations of radioactive material.⁵⁰ CCW can contain heavy metals such as arsenic, nickel, cadmium, chromium, lead, manganese, selenium and thallium, as well as sulfates, chlorides, boron,

⁴⁴ Stanley P. Schweinfurth, *An Introduction to Coal Quality*, in *The National Coal Resource Assessment Overview: U.S. Geological Survey Professional Paper 1625-F*, Chapter C, 7-9 (Brenda S. Pierce and Kristin O. Dennen eds., 2009) available at <http://pubs.usgs.gov/pp/1625f/downloads/ChapterC.pdf>.

⁴⁵ D.F. Pflughoeft-Hassett, E.A. Sondreal, E.N. Steadman, K.E. Eylands and B.A. Dockter, *Production of Coal Combustion By Products: Volumes, and Variability*, in *Proceedings of the: The Use and Disposal of Coal Combustion By Products at Coal Mines: a Technical Interactive Forum* (Kimerly Vories and Dianne Throgmorton eds., April 10-13, 2000), available at www.techtransfer.osmre.gov/NTTMainSite/Library/proceed/ccb2000/front.pdf.

⁴⁶ Matthew Pearl, *Recent Developments: The aftermath of the December 2008 Incident in East Tennessee Illuminates the Inadequate Regulation of Coal Ash Impoundments*, 16 U. Balt. J. Envtl. L. 195 (2009).

⁴⁷ Alan Kolker, Robert B. Finkelman, Ronald H. Affolter and Michael E. Brownfield, *The Composition of Coal Combustion By-Products: Examples from a Kentucky Power Plant*, in *Production of Coal Combustion By Products: Volumes, and Variability, Proceedings of the: The Use and Disposal of Coal Combustion By Products at Coal Mines: a Technical Interactive Forum* 17-18 (Kimberly Vories and Dianne Throgmorton Eds. April 10-13, 2000).

⁴⁸ *Id.*

⁴⁹ U.S. EPA, *Human and Ecological Risk Assessment of Coal Combustion Wastes*, 2-2 (2007).

⁵⁰ Mara Hvistendahl, *Coal Ash Is More Radioactive than Nuclear Waste*, *Scientific American*, Dec. 13, 2007, available at <http://www.sciam.com/article.cfm?id=coal-ash-is-more-radioactive-than-nuclear-waste>.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

polyaromatic hydrocarbons (PAHs), benzene, phenols, polychlorinated biphenyls (PCBs), cyanide, dioxins and furans.

EPA has identified risks to human health and the environment from the disposal of CCW in landfills and surface impoundments. For example, EPA's "Coal Combustion Waste Damage Case Assessment" dated July 9, 2007, recognized 24 proven cases of danger to human health or the environment and another 43 "potential" damage cases related to CCW. All but one of the 24 proven damage cases involved unlined disposal units.⁵¹

A series of spills in late 2008 and early 2009, including the major spill of approximately one billion gallons of CCW at Tennessee Valley Authority's Kingston, TN coal plant in December 2008, drew the nation's attention to CCW storage. Based in part on these spills and an additional series of regulatory determinations regarding improper management and disposal of CCW from coal-fired power plants, EPA recently forwarded regulations to address CCW under the federal Resource Conservation and Recovery Act (RCRA) to the White House.

Specifically, EPA is considering several options including 1) regulating CCW as hazardous waste under Subtitle C of RCRA, which would include a tracking system and federally enforceable permits; 2) regulating CCW as non-hazardous waste under Subtitle D of RCRA, which would include inducements for state solid waste programs and implementation of federal minimum regulations for landfills; 3) a hybrid approach, by which CCW would be considered a solid waste if certain conditions are met, but a hazardous waste if they are not; and 4) another hybrid approach whereby wet CCW (in surface impoundments) would be regulated as hazardous wastes and dry CCW (in landfills) would be regulated as non-hazardous wastes.

EPA also recently announced that it may develop regulations setting financial responsibility requirements for power plants under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, better known as Superfund), citing, among other things, the "significant cleanup costs that can be generated by this industry sector."⁵²

The costs associated with the EPA's anticipated regulation of coal combustion wastes are uncertain and will depend on how EPA classifies the wastes, as well as plant specific factors (that is, wet versus dry storage, lined versus unlined, whether stored on the surface or not). One utility, Progress Energy Carolinas, stated the following in its December 1, 2009 Plan to Retire 550 MWs of Coal Units without SO₂ Controls:

EPA is currently considering re-characterizing the nature of and regulation of coal combustion products (bottom ash, fly ash and related materials, hereinafter CCPs) in response to TVA's Kingston Plant ash pond

⁵¹ U.S. EPA, Notice of Data Availability on the Disposal of Coal Combustion Wastes in Landfills and Surface Impoundments, 72 Fed. Reg. 49714, 49718-19 (Aug. 29, 2007).

⁵² 75 Fed. Reg. 816,822 (Jan. 6, 2010).

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

impoundment failure. Speculation is focusing on EPA's regulation of CCPs as a hazardous waste. A narrow usage exclusion may be possible where the finished product of CCP is fully encapsulated. Existing uses that involve land application or unconfined uses may be prohibited. If EPA characterizes CCPs as a hazardous waste or otherwise increases the regulatory requirements applicable to CCPs, the handling, storage and disposal of this material will result in significantly increased costs of operation, and more sophisticated handling equipment and disposal requirements. Classification of power plant CCP operations as activities that produce hazardous wastes as defined by the Resource Conservation and Recovery Act (RCRA) would trigger a number of additional regulatory requirements as well as potential liability associated with closure of impoundments, leachate management and site remediation. Phase out of surface impoundments is under consideration by EPA.⁵³

Although the industry cost estimates may be exaggerated in order to dissuade the EPA from regulating CCW as hazardous waste, they do predict significant costs. For example, an October 30, 2009, letter to the Federal Office of Management and Budget from the Utility Solid Waste Activities Group⁵⁴ warned that:

If [coal combustion wastes] were regulated as hazardous wastes, the economic impact on the utility industry would be enormous, resulting in power plant closures, increased electricity rates for consumers, corresponding power reliability concerns, and virtually eliminating all [CCW] beneficial uses.⁵⁵

Testimony before Congress by a representative from EPRI similarly stated that:

A national coal combustion products regulation will alter the technology and economics of coal-fired power plants. Some owners would decide to prematurely shut down rather than incur the costs of compliance, while others would convert their ash handling and disposal systems and continue to operate in the post-regulation market.⁵⁶

The cost to clean up the damage from the December 2008 release from Tennessee's Kingston plant has been estimated to range from \$933 million to \$1.2 billion.⁵⁷

⁵³ Power Plant Study, at pages 7 and 8.

⁵⁴ The Utility Solid Waste Activities Group is described as an informal consortium of 80 utility operating companies, the Edison Electric Institute and others.

⁵⁵ Power Plant Study, at page 2.

⁵⁶ Written Testimony of Ken Ladwig, Senior Research Manager at EPRI, before the Subcommittee on Energy and Environment of the United States House of Representatives, dated December 10, 2009.

⁵⁷ "TVA Reports 2009 Fiscal Year Third Quarter Results," available at www.tva.gov/news/release/julsep09/3rd_quarter.htm.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Despite the uncertainty associated with the EPA's possible regulation of coal combustion wastes, PGE could reflect this issue in its resource planning analyses. The traditional way to address uncertainty in resource planning is to identify a wide range of the potential costs for key input assumptions.⁵⁸ Thus, PGE could identify ranges of the possible costs for the different ways in which the EPA may regulate coal combustion wastes (that is, hazardous or not, etc.) and then apply those ranges of costs in sensitivities in its resource planning analyses.

In sum, it appears that PGE has not adequately factored into its analyses the potential economic risks of continuing to operate the Boardman plant in the face of new or more stringent air emissions and coal combustion waste management requirements.

Finding No. 11. PGE has not provided persuasive evidence that the retirement of the Boardman plant before the year 2020 would adversely affect the reliability of the electric grid in Oregon or its ability to provide reliable service to its customers. Instead, PGE limited its assessment of reliability to whether it would need to purchase power from the market and not to whether it would be unable to do so or would, in any way, be unable to provide power to its customers.

PGE has explained how it has interpreted reliability in the IRP:

Throughout this discussion it should be understood that the loss of load probability metrics calculated are best interpreted as indicators of *market dependence*. Reliability in this IRP is interpreted to mean, "To what extent can PGE rely on its own and contracted resources to meet load?" Portfolios that are more reliable in this sense are less exposed to fluctuations in market price and hypothetical curtailment events in which PGE would be unable to secure spot market power needed to meet load.⁵⁹

Consequently, PGE is not measuring how often it might actually be unable to serve load or the magnitude of the loads it would be unable to serve. These are the traditional measures of the reliability of a utility system. Instead, PGE is merely measuring how often it might have to purchase power from another system or merchant generator without any quantification of how often it would be unable to obtain that power.

Moreover, the LOLP figures presented in Figure 11A-12 on page 66 of the IRP Addendum show that the reliability, as measured by PGE, of the Diversified Thermal with Green portfolio is only slightly better than reliability of either the Boardman through 2014 or the Boardman through 2020 portfolios and is actually slightly worse than the reliability of the Boardman through 2017 portfolio. The EUE and Tail Var UE figures

⁵⁸ For example, Duke considers ranges of potential CO₂, SO₂ and NO_x allowance costs in its IRP analyses.

⁵⁹ IRP Addendum, at page 39.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

presented in Figure 12A-5 on page 97 of the IRP Addendum similarly show relatively comparable levels of reliability between the Diversified Thermal with Green and the four Boardman retirement portfolios. The Diversified Thermal with Green portfolio actually appears to have a slightly higher Tail Var UE than the four Boardman retirement portfolios, suggesting, in PGE's view, a slightly lower reliability.⁶⁰

Finding No. 12. Fuel diversity is an important consideration. However, PGE has failed to demonstrate that the relatively HHI differences between portfolios are in any way significant.

Fuel diversity is an important consideration for a utility like PGE and for a regulatory commission. However, PGE has not offered any evidence to prove that the HHI differences between portfolios shown in Figures 11A-13 and 11A-14 and 12A-6 and 12A-7 are in any way significant. This is especially true for the relatively minor HHI differences between portfolios shown in Figures 11A-13 and 12A-6.

In fact, each of the Boardman retirement portfolios has the high HHIs shown in these Figures precisely because PGE failed to consider any alternative in place of Boardman other than adding a new combined cycle gas-fired unit. All of these portfolios could have had lower HHIs had PGE considered replacement portfolios that included greater investments in energy efficiency and renewable resources plus some new gas or a PPA from a gas-fired unit. Instead, PGE arbitrarily chose to replace Boardman in each portfolio with a comparably sized gas-fired combined cycle unit.

It is even harder to understand the significance of the Technological HHI differences between portfolios shown in Figures 11A-14 and 12A-7. In Figure 11A-14, for example, two of the three portfolios with the lowest HHIs feature new nuclear and IGCC technologies that carry the highest construction cost risk and the greatest technological uncertainty. Moreover, PGE itself believes that relying completely on the market, i.e., the third of the three best performing portfolios in Figure 11A-14, is a very risky strategy. Consequently, a low Technological HHI does not appear to correlate with low risk. Indeed, the opposite could be argued, that is, investing in a large number of untested technologies would be an extremely risky strategy but would lead to lower Technological HHIs.

⁶⁰ The reliability of the Boardman through 2014 portfolio actually is better than that of the Diversified Thermal with Green and the Boardman through 2040 portfolios if the year 2014 is excluded. PGE assumes that Boardman would be retired in June of 2014 in the Boardman through 2014 portfolio. For the remainder of that year, PGE would buy replacement power through the market. This, by PGE's definition, decreases the reliability of Boardman through 2014 portfolio in that year. In each of the other years examined by PGE (2012-2013, 2015-2020 and 2025), the reliability of the Boardman through 2014 portfolio is the same as or is better than the reliability of either the Diversified Thermal with Green or the Boardman through 2020 portfolios. This is true for the EUE, Tail Var and LOLP criteria used by PGE to measure reliability. See Attachment A to PGE's response to PEAC Question No. 90.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Increased investments in energy efficiency and renewable resources can reduce a utility's dependence on natural gas without the adverse environmental impacts and financial risks that would be associated with a continued reliance on coal, the most carbon intensive fuel. Repowering older fossil-fired units with newer, more efficient natural gas-fired combined cycle technology is another option. In addition, many utilities regularly limit their exposure to natural gas price uncertainty and volatility through financial or physical hedging.

Finding No. 13. Despite these flaws and biases, the results of PGE's IRP modeling show that investing \$510 million in a scrubber and other environment control equipment for the Boardman plant is not part of a lowest cost, low risk resource plan.

PGE has proposed an Action Plan that would retire the Boardman plant at the end of 2020. The Company also has proposed an Alternate Action Plan that would allow PGE to make the \$510 million of environmental control investments necessary to operate the plant through 2040 as well as acquiring an additional 15 percent of the Boardman plant output by exercising the Bank of America Lease Option.⁶¹ However, even if the Commission accepts all of the assumptions used by PGE in its IRP analyses, the results of the Company's own modeling shows that continued operation of the Boardman plant through 2040 is not an economically viable part of either a recommended or an alternate Action Plan.

Retirement of the Boardman plant during the period 2014 through 2017 is a lower cost option than operating the plant through 2040

PGE's presented a slide at the March 15, 2010 Technical Meeting that showed the NPVRR for eight early Boardman portfolios that the Company had modeled using its IRP reference case assumptions. These portfolios examined the retirement of the Boardman plant in the years 2014, 2017, 2018, 2019, 2020, 2021, 2022, and 2023. However, PGE did not include the NPVRR for continuing to operate Boardman through 2040.

Figures 12 and 13, below, compare the NPVRR from PGE's Aurora model runs for the scenarios in which the Boardman plant is retired in each of the years 2014 through 2023 and 2040. Although the NPVRR in Figure ... are biased by the same assumptions that have been discussed above (e.g., extremely high gas prices, replacement of Boardman by a gas-fired combined cycle unit, and high forecast energy and peak loads), the Company's modeling showed that the NPVRR of each of these early retirement portfolios was lower than the \$28,674 (in 2009\$ millions) NPVRR of PGE's Diversified Thermal with Green portfolio that assumes continued operation of Boardman through 2040.

⁶¹ IRP Addendum, at page 126.

Public Utility Commission of Oregon
 Docket No. LC 48
 Comments on PGE 2009 Integrated Resource Plan
PUBLIC
 Protected Materials Redacted

Figure 12: NPVRR of Early Retirement and Boardman through 2040 Portfolios with PGE Reference Case Gas Prices

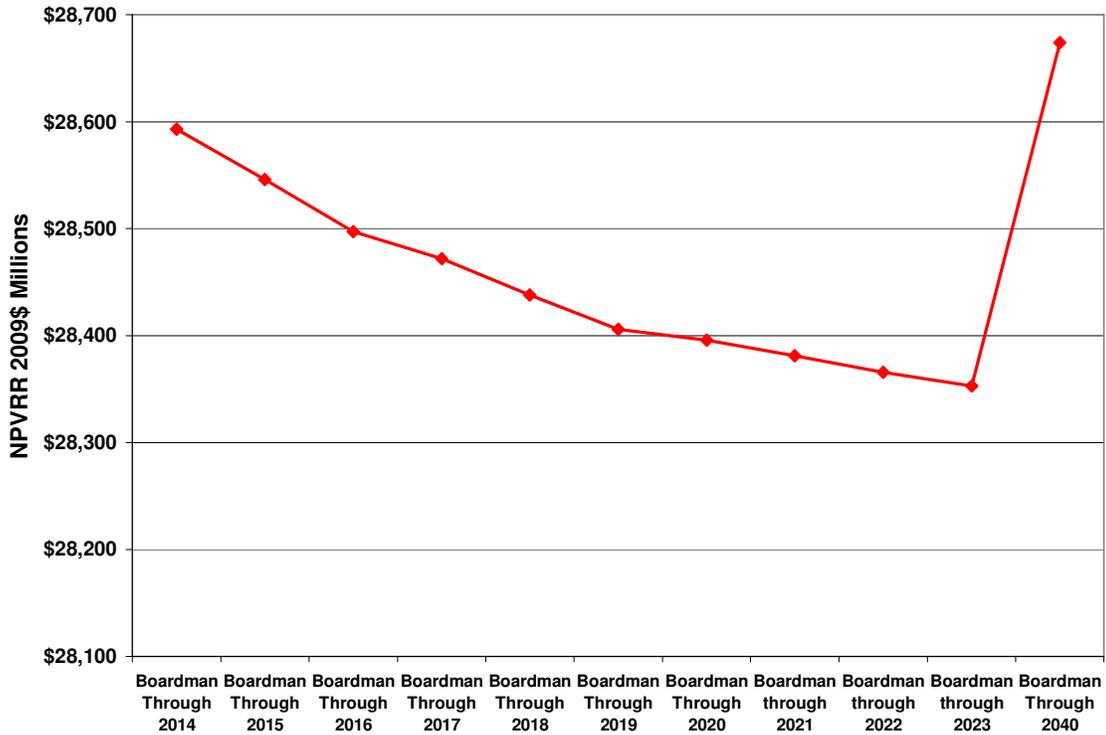
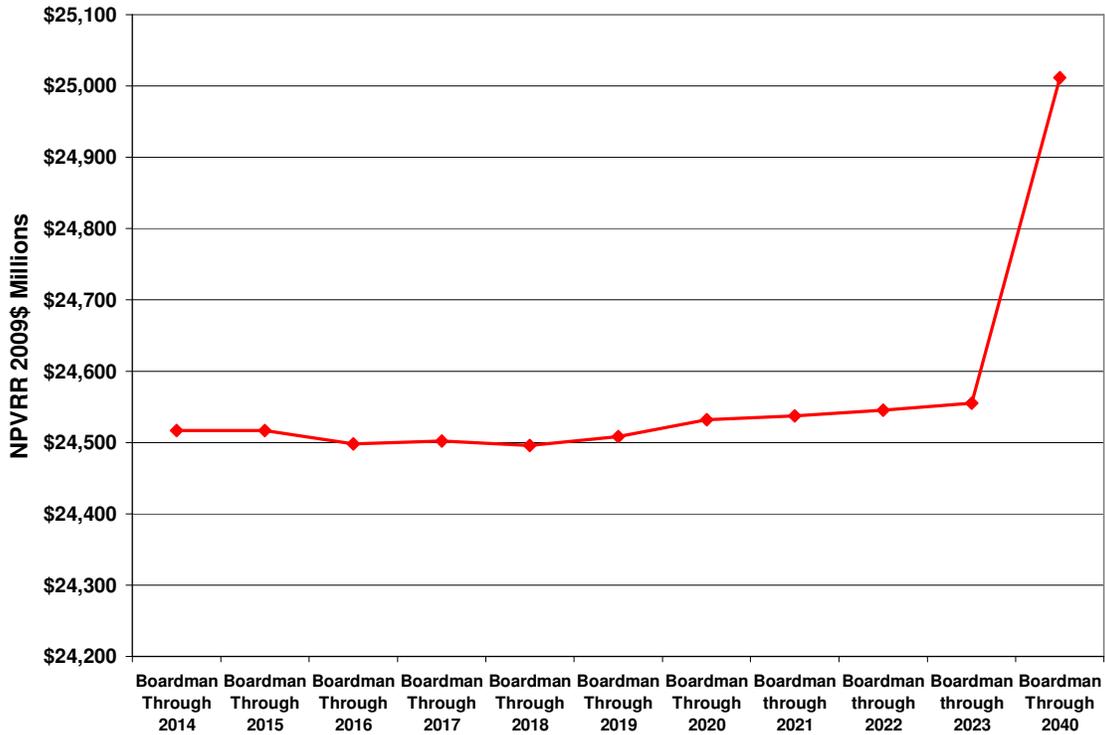


Figure 13 then presents the same comparison but reflects the low gas prices that PGE used in the IRP analyses. These low gas prices are more comparable to the base or reference gas price forecasts from the NPWCC, the Oregon PUC staff and others than PGE’s Reference or High IRP gas price forecasts.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 13: NPVRR of Early Retirement and Boardman through 2040 Portfolios with PGE Low Case Gas Prices

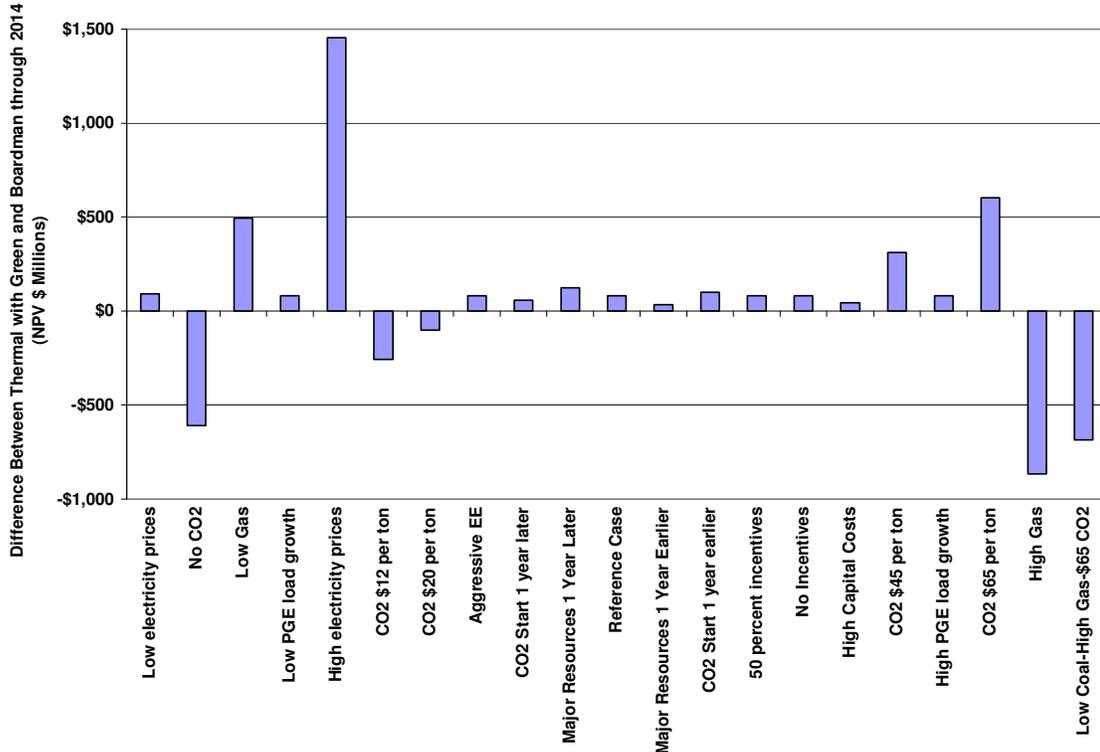


Consequently, the Company’s own modeling analyses show that retirement of the Boardman plant in any of the years between 2014 and 2019 is a lower cost option than continued operation through 2040 even with the biased assumptions discussed earlier in these comments. Indeed, when less biased, and more reasonable, gas prices are used, continuing to operate the Boardman plant through 2040 (i.e., the Diversified Thermal with Green portfolio) can be seen to be significantly more expensive than any of the early retirement portfolios.

Figure 14, below, shows the NPVRR differences between the Boardman through 2014 and the Diversified Thermal with Green portfolios in each of the 21 futures scenarios modeled by PGE for the IRP. The Diversified Thermal with Green portfolio is the more expensive option in 16 of the 21 scenarios modeled by PGE.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 14: NPVRR Difference between PGE Diversified Thermal with Green and Boardman through 2014 Portfolios (2009\$ Millions)

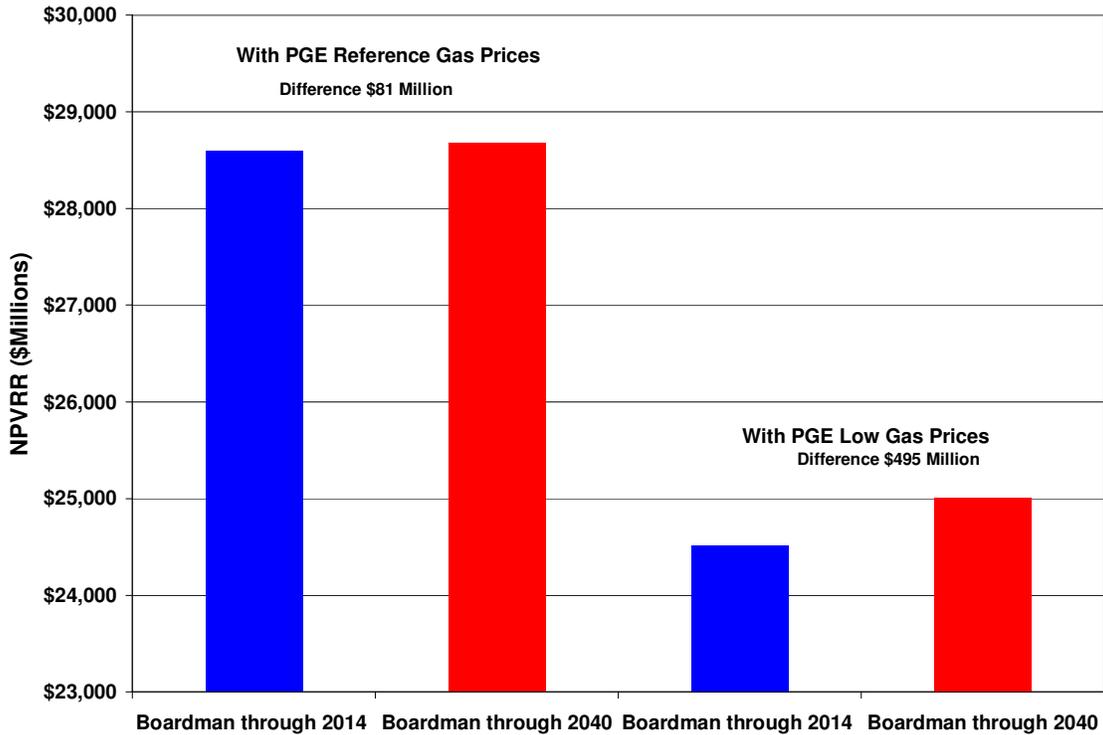


It is important to recognize that the five scenarios in which the Diversified Thermal with Green portfolio is the lower cost option include the two scenarios with completely unrealistic high gas prices and the three scenarios with no CO₂ prices or low CO₂ prices – and the Diversified Thermal with Green portfolio is only significantly lower cost than the Boardman through 2014 portfolio in the more unrealistic scenarios with high gas prices and no CO₂ prices. Thus, in order to accept that the Diversified Thermal with Green portfolio is a lower cost option than retiring Boardman in 2014 it is necessary to accept either that gas prices will be dramatically higher than anyone now projects, that there will be no federal regulation of greenhouse gases at any time between 2010 and 2040 or that federal regulation will lead only to low CO₂ prices.

On the other hand, as shown in Figure 15, below, the NPVRR benefit to the Boardman through 2014 portfolio increases to \$495 (2009\$ Millions) in PGE’s low gas price future scenario. This is a more reasonable scenario in which the assumed gas prices are only slightly lower than the current mid NWPCC forecast, the Oregon PUC staff forecast, the AEP 2010 forecast and current NYMEX futures.

Public Utility Commission of Oregon
 Docket No. LC 48
 Comments on PGE 2009 Integrated Resource Plan
PUBLIC
 Protected Materials Redacted

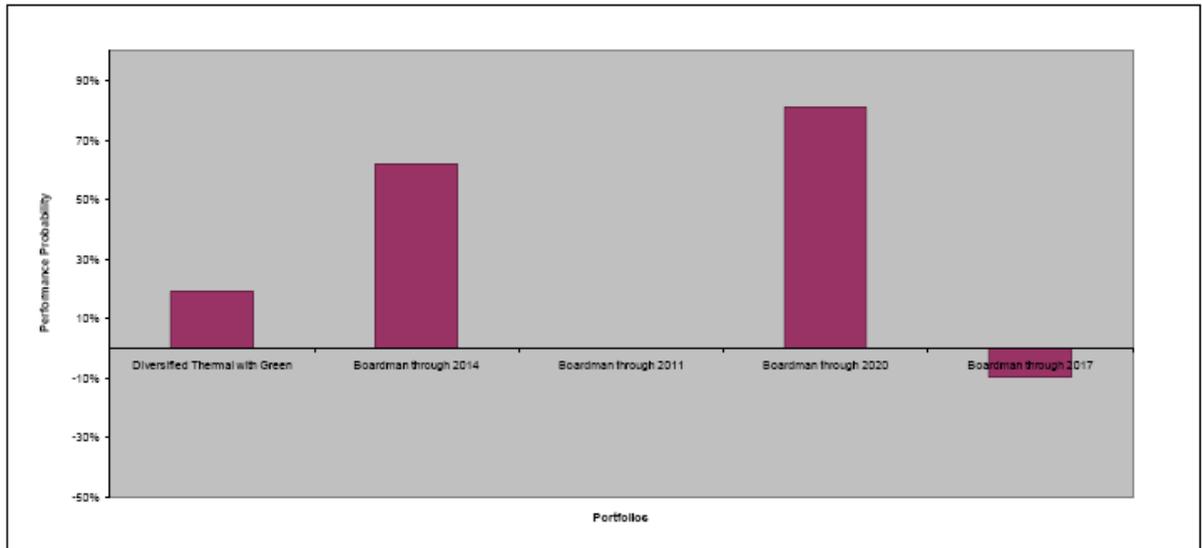
Figure 15: Net Present Value Revenue Requirement Benefit to Retiring Boardman in 2014 as Compared to Operating the Plant through 2040 with PGE Reference and Low Gas Prices



In the IRP Addendum, PGE presented Figure 12A-2 with the Combined Probabilities of Good and Bad Outcomes for Boardman Portfolios. This Figure is reproduced below. It shows that the Boardman through 2014 and the Boardman through 2020 portfolios both have significantly higher probabilities of achieving good outcomes and avoiding bad outcomes than the Diversified Thermal with Green portfolio. Unfortunately, the Boardman through 2017 portfolio included in this Figure is the completely unrealistic scenario in which the plant is assumed to be retired immediately after the investments are made in a new scrubber and other emissions controls.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 12A-2: Combined Probability of Good and Bad Outcomes for Boardman Portfolios



PGE states that “Better portfolios have a high probability of *combined* good vs. bad outcomes.”⁶² Under that criterion, the Boardman through 2014 portfolio certainly is a “better” portfolio than the Diversified Thermal with Green portfolio.

Finding No. 14. The results of PGE’s modeling analyses show that by 2020 Boardman will no longer be a baseload generating unit even if \$510 million is invested in environmental upgrades.

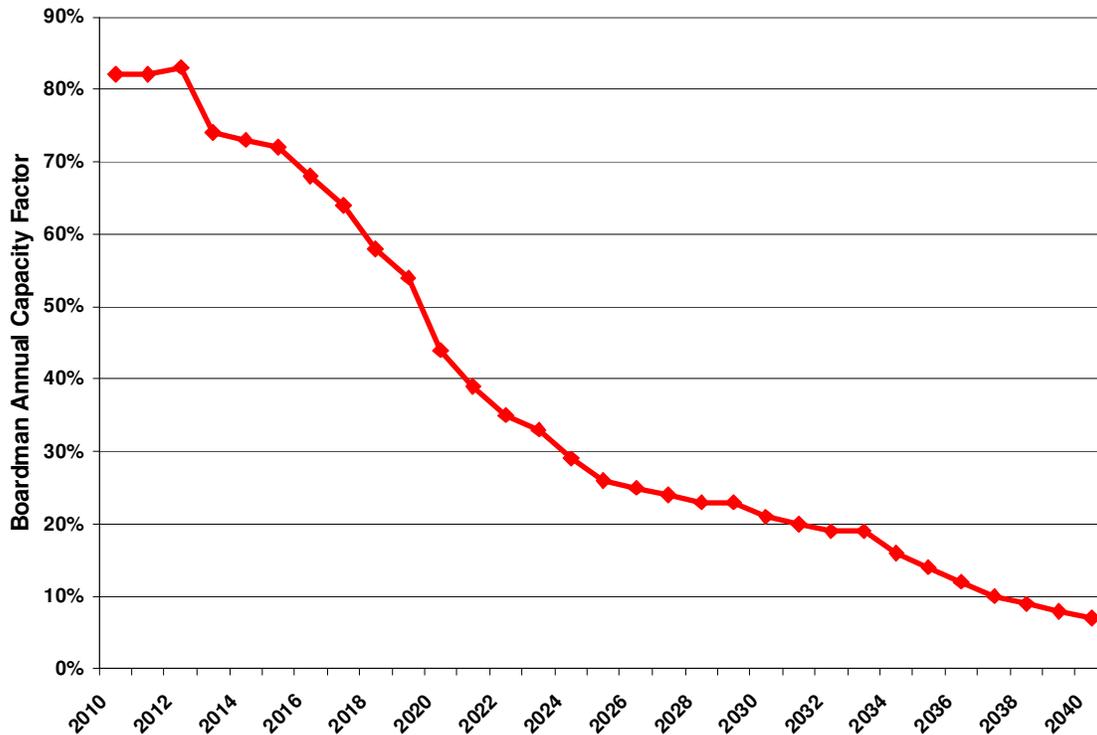
The Boardman plant has historically been operated as a baseload unit on PGE’s system. The results of PGE’s IRP modeling analyses shows that this will change, beginning in the 2016-2017 timeframe, when the unit’s annual capacity factors would start a slow, inexorable decline.

Figure 16, below, presents the annual Boardman plant capacity factors calculated by the Aurora model for PGE’s preferred Diversified Thermal with Green portfolio. As can be seen, by 2020 the Boardman plant would have a capacity factor of only 44 percent which is more indicative of an intermediate unit than a baseload plant and suggests perhaps seasonal dispatch and operation during peak load hours. By 2030, the unit would have a capacity factor of only 20 percent, which suggests less seasonal dispatch and increased dispatch as a peaking unit.

⁶² IRP Addendum, at page 93.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

Figure 16: Boardman Capacity Factors 2010-2040 in Diversified Thermal with Green Portfolio



This steady decline in performance raises serious questions about the prudence of investing \$510 million for environmental upgrades on a coal-fired unit that would no longer be operating at the 70 percent to 80 percent annual capacity factors typically achieved by baseload generating facilities.

Finding No. 15. PGE’s analyses that purport to show that retirement of the Boardman plant in 2020 would be a lower cost and lower risk option than retirement in an earlier year are biased in favor of continued operation.

PGE claims that the Boardman through 2020 portfolio provides the best combination of cost and risks for customers when compared to other viable portfolios.⁶³ However, this claim is not credible because the analyses on which it is based are biased by each of the assumptions that have been previously discussed in these comments. This is true for each of the analyses whose results are presented in Figures 12A-1, 12A-2, 12A-3, 12A-4, 12A-8, 12A-9, and 12A-10 in the IRP Addendum and at pages 31 through 34 of PGE’s Presentation at the OPUC’s April 26, 2010 Public Meeting.

⁶³ IRP Addendum, at page 88.

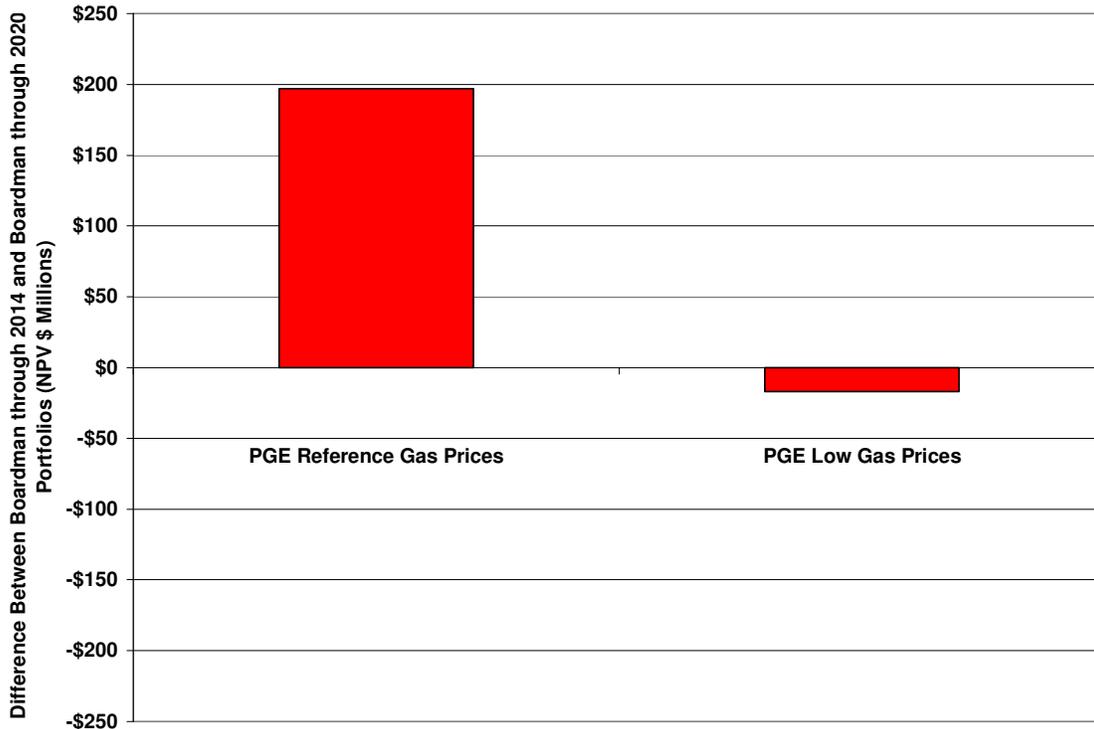
Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

In particular, the very high natural gas prices used by PGE and the Company’s assumption that Boardman would be immediately replaced by a natural gas-fired combined cycle unit together bias the comparisons between retiring the Boardman plant in 2020 and earlier years. Indeed, PGE itself notes the following in the IRP Addendum:

“Boardman through 2014” and “Boardman through 202” are more exposed to gas price risk than “Diversified Thermal with Green,” because a gas-fuelled CCCT is the assumed replacement technology for Boardman in these portfolios.⁶⁴

For example, as shown in Figure 17, below, the \$197 million (in 2009\$) NPVRR benefit shown for the Boardman through 2020 portfolio with PGE’s reference case gas prices becomes a \$17 million (in 2009\$) benefit for the Boardman through 2014 portfolio with PGE’s low gas prices.⁶⁵ As shown in Figure 1 and Figure 4, above, PGE’s low IRP gas price forecast is only moderately lower than the reference case forecasts from NWPCC, the Oregon PUC staff, AEO 2010, and PIRA 2010.

Figure 17: NPVRR Differences between PGE Boardman through 2014 and Boardman through 2020 Portfolios (2009\$ Millions)



⁶⁴ Id., at page 101.

⁶⁵ Table D Addendum-2, Scenario Analysis Detail, IRP Addendum, at page 134.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

The risk assessments presented in Chapter 12 of the IRP Addendum (and PGE's April 26, 2010 Presentation to the OPUC) are similarly biased because, as has been discussed earlier in these comments, two of the four worst performing scenarios for the Boardman through 2014 portfolio are those with the extraordinarily high gas prices in PGE's "High Gas Price" forecast.

In addition, PGE's claim that a 2020 closure would have "over \$600 million lower cost than [a] 2014 case (nominal \$)" and "an NPV benefit for customers of over \$400 million" also are not credible because they too are based on (1) PGE's high reference case natural gas prices, (2) PGE's arbitrary assumption that Boardman would be immediately replaced by a gas-fired combined cycle unit and (3) by PGE's failure to consider whether there were lower cost options for replacing Boardman including additional spending on energy efficiency, addition renewable resources and a mid- to long-term PPA.

PGE has claimed that the lower rates from delaying the retirement of Boardman until the end of 2020 are driven by:

- Lower power costs 2014-2020
- Does not accelerate depreciation between 2011 and 2014
- Delays capital investment for a replacement source⁶⁶

A review of PGE's workpapers reveals that the Company's assumption that a new capital-intensive replacement source of power would be required immediately after Boardman is retired is the major factor leading to the asserted higher cost of the Boardman through 2014 portfolio during the years 2010 through 2021. This is due to the heavily front-loaded capital costs from the new combined cycle unit that PGE assumes would be added in 2015.

Confidential Table 3, below, compares the difference in revenue requirements for the years 2010 through 2021 for the Boardman through 2014 and the Boardman through 2020 portfolios, disaggregated by major cost categories. A positive number in Table 3 means that the Boardman through 2014 Portfolio is more expensive than the Boardman through 2020 Portfolio. A negative number means that the Boardman Through 2014 Portfolio is less expensive.

Table 3: Boardman through 2014 vs. Boardman through 2020 in the Years 2010 through 2021 [Confidential. Please See Page 45 and 46 of Confidential Version]

⁶⁶ PGE March 15, 2010 Presentation on the *Boardman 2020 Alternative*, at Slide No. 35.

Public Utility Commission of Oregon
Docket No. LC 48
Comments on PGE 2009 Integrated Resource Plan
PUBLIC
Protected Materials Redacted

The bottom line is that PGE should examine whether there are less expensive alternatives for replacing the Boardman plant than adding a new combined cycle unit if the plant were retired in 2014, 2015, 2016, 2017, 2018 and 2019.