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OREGON

The Closing of Boardman Coal Plant and the Hubris of Fossil Fuel Opponents

By
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October 2024

About the Author

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INTRODUCTION

In 1975, the state of Oregon issued permits for Portland General Electric (PGE) to build a coal-fired power plant in Boardman, Oregon.[1] With a 550-megawatt (MW) capacity, Boardman constituted a significant source of electricity—enough to power 90,000 homes. In 2009, it produced 15% of PGE's total electricity supply.[2]

PGE, Oregon's largest investor-owned utility, provides power to about 45% of Oregonians—nearly 2 million people. PGE serves customers in parts of the Clackamas, Polk, Multnomah, Marion, Yamhill, and Washington counties.[3] Before Boardman's premature shutdown in 2020, it was expected to operate until 2040, giving it a 60-year lifespan.

Because Boardman was commissioned in 1975 yet began operations in 1980, there was a legal dispute about whether it fell under the 1977 Clean Air Act amendments. Had Boardman been subject to the 1977 requirements, PGE would have been required to install additional pollution controls, known as "scrubbers," to reduce particulate matter and sulfur dioxide emissions. For decades, Boardman did not fall under these guidelines.

Carbon dioxide, a comparatively benign byproduct of combustion, was not yet a concern to federal and state regulators. The federal Environmental Protection Agency (EPA) and its state-level regulatory partners were primarily focused on the six "criteria" pollutants enumerated in the original Clean Air Act of 1970: carbon monoxide, sulfur dioxide, nitrogen dioxide, lead, total suspended particulates, and volatile organic compounds. During the 1980s, the focus on "total" suspended particulates changed to an emphasis on reducing "fine" particulates, since smaller particles can be inhaled more deeply into the lungs. EPA started regulating particulate matter of 10 microns or less in diameter ("PM-10"), and eventually lowered the threshold to "ultra-fine" particulates smaller than 2.5 microns in diameter ("PM-2.5").

Regulatory concerns continued to evolve in the 1980s. Global warming became a top-tier issue, and carbon dioxide replaced carbon monoxide as the focus of regulation and international activism.

In Oregon, this concern resulted in the creation of the Oregon Global Warming Commission in 2007 and the adoption of statewide greenhouse gas (GHG) reduction goals. The legislature also adopted SB 838 in 2007, which mandated Renewable Portfolio Standards (RPS) for large electric utilities. Under the terms of SB 838, the large utilities (primarily PGE and PacifiCorp) were required to procure enough Renewable Energy Certificates (RECs) to equal 15% of retail sales by 2015, 20% by 2020, and 25% by 2025. This was referred to as the "25 by 25" requirement. A REC is an intangible commodity aimed to represent the "environmental attributes" of certain power facilities (mostly large wind and solar farms). SB 838 was an important symbolic victory for activists as it planted the flag for future campaigns to force fossil fuels out of Oregon's energy supply system.

In this context, because PGE's Boardman coal plant was the largest single source of CO2 in the state, it became an inviting target for environmental activists. An initiative by the EPA to reduce precursors to regional haze offered an opportunity for activists to press their case for the shutdown of Boardman.

THE FIGHT TO CLOSE BOARDMAN

During the first 25 years of operation, Boardman was a reliable, low-cost source of electricity for PGE. However, during the 2000s, the federal Environmental Protection Agency (EPA) began focusing greater attention on the causes of regional haze in the Grand Canyon and nearby states. In 2005, the EPA mandated national emissions controls to reduce regional haze. These controls were known as Best Available Retrofit Technology (BART).[4]

Boardman, the largest industrial emitter in Oregon, was identified as a cause of said haze—particularly at Mount Hood and in the Columbia River Gorge. Consequently, PGE was required to install BART at the power plant. In November 2007, PGE proposed to Oregon's Department of Environmental Quality (DEQ) $300-400 million in pollution controls at Boardman. Although predicted to reduce haze-causing pollution and mercury emissions by 75% and 90%, respectively, this would cause higher prices for ratepayers.[5]

DEQ rejected this proposal and countered: PGE should spend $191 million more to reduce nitrogen oxide at Boardman, which contributes to acid rain. The $500 million controls reduce pollutants but do nothing about carbon dioxide emissions.

In September 2009, PGE announced its plan: install $560 million worth of pollution controls in the 2010s and continue Boardman's operation until 2040.[6] Because coal

power was cheap, Boardman could feasibly absorb these costs. PGE identified this plan as the least-cost, least-risk option out of 15 scenarios.[7] Other options included nuclear power, buying power from other suppliers, or an emphasis on natural gas.

PGE had limited options; DEQ's rules only allowed three possible years—2011, 2014, and 2017—for an early closure of Boardman. Later that September, a consortium of environmental groups sent a letter urging PGE to attempt a 2020 closure.[8]

Thoroughly convinced that PGE had the legal authority to negotiate a 2020 closure date, this consortium (composed of the Oregon Environmental Council, Northwest Energy Coalition, and Renewable NW) opposed the continued use of fossil fuels for electricity generation.[9] They supported the proposed controls but preferred Boardman to shut down promptly. BART was merely focused on reducing traditional pollutants like sulfur dioxide and nitrogen oxide, not carbon dioxide.

Some even wanted Boardman to close earlier than 2020. The former conservation director at the Friends of the Columbia Gorge, Michael Lang, stated: "the best deal for ratepayers and the environment is to close by 2014 [and] we'll demonstrate that even PGE's own data supports that conclusion," (despite PGE already running an analysis on the 2014 closure option).[10]

This letter was co-authored by Oregon's self-proclaimed ratepayer advocacy group, the Citizens' Utility Board (CUB). CUB is a non-profit organization created by a 1984 ballot initiative. This was at a time when many Oregonians did not fully trust the Oregon Public Utilities Commission (OPUC)—the governmental rate regulation organization—to regulate investor-owned utilities.[11][12] These feelings induced CUB's stated purpose: "represent consumers and hold for-profit utilities accountable."[13]

In addition to environmental concerns, these groups claimed the 2020 option would lower rates for two reasons:

1. They speculated that future state or federal regulators would impose carbon taxes. (As *environmental* organizations, this was something they already supported.) Since coal plants have heavy carbon emissions, carbon taxes would necessitate an earlier closure.

2. The 2020 option—compared to earlier ones—would give PGE enough time to find a replacement source without excessively raising rates.

If the cost of replacing Boardman were less than the $560 million in pollution controls, ratepayers *and* the environment would be better off.

Oregon's investor-owned utilities are required to submit an Integrated Resource Plan (IRP) to the OPUC within two years of the acknowledgment of the last IRP. In effect, it is generally filed every three years. Integrated Resource Plans estimate future energy needs and identify the optimal portfolio of resources to meet those needs at a combination of low cost and low risk.[14] OPUC's acknowledgment of the plan increases the likelihood that the utility will be able to recover expenses in future rate cases. Due to this, OPUC's approval is essential.

In November 2009, PGE submitted its third IRP. Although challenging, PGE contemplated an early closure. The IRP stated: "An early closure [of Boardman] would trigger the need to consider a major replacement resource during a timeframe in which additional resource needs are already considerable."[15]

This invites the question: Why would replacing Boardman be difficult? The answer is that coal produces dispatchable power, which can be ordered on and off from a central command center. This allows the grid operator to keep electricity demand and supply in equilibrium, which is necessary to avoid overloading the grid or losing frequency.

Dispatchable resources can run 24 hours a day. Some are slow to start up (e.g., coal and nuclear) but will produce steady "baseload" power to ensure minimum demand is met. Other dispatchable resources such as hydropower and natural gas can be ramped up and down quickly, making them excellent resources for peak-hour needs.

Wind farms and solar plants are known as "intermittent resources." These are weather-dependent and cannot be dispatched on command to meet consumer needs. In addition, grid-scale batteries, which are now being paired with wind and solar facilities, cannot store electricity for more than 4-6 hours. Therefore, the grid cannot run entirely on intermittent sources coupled with batteries.

This point was emphasized in January 2009 when the electricity generation from all 25 utility-scale wind farms in the Columbia River Gorge (one of the windiest spots in the Northwest) dropped to zero for three consecutive weeks.[16]

In early 2010, PGE formally considered a 2020 closure date. If approved, Oregon would make history as having the youngest and largest coal plant to shut down because of environmental regulations.

In January 2010, PGE sent a letter to the OPUC stating a desire to either close the plant completely or transition to a different fuel source by 2020.[17] Since this option is more environmentally friendly than a 2040 shutdown, PGE was confident it could win over the DEQ. The OPUC also supported this alternative.

In April 2010, PGE officially requested an early closure of Boardman.[18] In this plan, it would receive $45 million worth of pollution controls and cease operations in 2020. The DEQ originally rejected this plan but allowed PGE ample time to amend it. After months of negotiations, the DEQ's policy-setting board unanimously approved PGE's new plan: Boardman would receive $103 million in pollution controls and close in 2020.[19]

However, one stipulation allowed the possibility for Boardman to operate until 2040. If additional regulations were adopted that would force PGE to invest the original $500 million in pollution controls, Boardman would be able to continue operations.[1] But due to a lawsuit filed in 2008 (*Sierra Club v. PGE*), this provision was nullified.[2]

In *Sierra Club v. PGE*, the plaintiffs—a syndicate of environmental groups led by the Sierra Club—argued Boardman should have been subject to the aforementioned 1977 Clean Air Act amendments and that PGE's operation of Boardman violated federal law.[20] In 2011, PGE settled with the Sierra Club. The settlement required PGE to spend $2.5 million to make supplementary pollution reductions and restore environmental damages associated with Boardman's emissions.

REPLACING BOARDMAN

Before considering an early shutdown of Boardman, PGE planned to build a natural gas-powered plant adjacent to it, Carty Generating Station.[21] At 450 MW, Carty is almost as big as Boardman and provides necessary dispatchable power. Despite having a similar capacity and location, Carty was not built to replace Boardman. Instead, it was built to supplement already existing electric generating sources.

In its 2016 IRP, PGE stressed the need for 850 MW of new dispatchable resources. Because of 2016 legislation (discussed in the next section) that made coal power infeasible, natural gas and hydropower were the only two dispatchable options left on the table. However, PGE would not be able to build any new hydro facilities; it would have to buy hydro output through short-term contracts, if available. Naturally, natural gas was the more viable option.

PGE briefly hinted at replacing Boardman with two additional natural gas-powered plants next to Carty. This plan would allow them to capitalize on the gas infrastructure already in place in Boardman, Oregon.[22] Environmentalists vehemently opposed it. Amy Hojnowski from the Sierra Club said, "Right now, it looks like a shell game. They're manipulating the process to get the outcome they want, which is a self-built expansion of their existing gas infrastructure at the Boardman site."[23] Essentially, PGE would prefer a self-built expansion because it would potentially drive up its stock price (while providing dispatchable power).[3]

With activists organizing against natural gas, PGE shifted to a new plan: building a $1 billion wind farm in the Columbia River Gorge. Since wind generation is subject to random failures, natural gas backups are still required—albeit less than the original plan. OPUC opposed this because, despite federal tax credits, a long-term capital investment in wind generation would put a substantial burden on the ratepayer.[24] It preferred that PGE purchase short-term hydro contracts.

In December 2017, OPUC approved PGE's latest plan,[25] which involved short-term hydroelectric/natural gas contracts and a 350 MW facility in the Columbia River Gorge comprising wind, solar, and storage—Wheatridge Renewable Energy Facility.[26] Many of these contracts run out in the mid-2020s, giving rise to an uncertain future.

THE PRELUDE TO HOUSE BILL 2021

In February 2015, Oregon legislators Chris Edwards (D) and Tobias Read (D) introduced Senate Bill 477: the "Coal to Clean" bill. Written and backed by the Sierra Club, SB 477 would require phasing coal out of Oregon's energy supply by 2025.[27] In addition, it mandates that coal's replacement must emit 90% less carbon dioxide. For comparison, natural gas emits 50% less carbon and therefore is not an option.

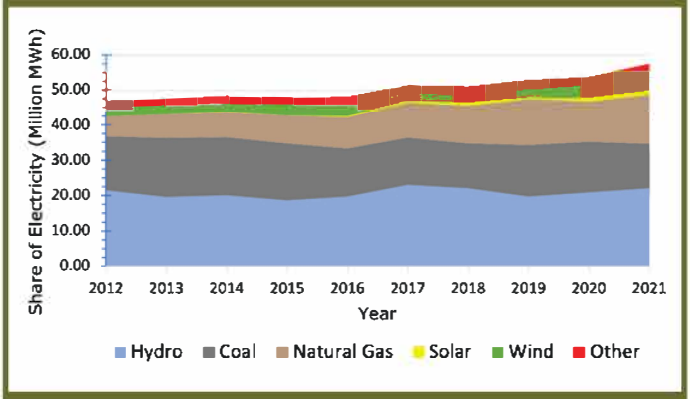
Because wind and solar are subject to random fluctuations, as more are added, they must be backed up by fast-starting dispatchable resources at an increasing rate. Put simply, as the share of intermittent sources increases, the amount of natural gas generation increases as well. Employing emissions data from 26 countries, a 2016 paper from the National Bureau of Economic Research (NBER) confirms this relationship:

> "[A] 1% percent increase in the share of fast-reacting fossil generation capacity is associated with a 0.88% percent increase in renewables in the long run."[28]

1. These additional regulations never occurred.
2. This lawsuit requires PGE to cease only coal operations in Boardman by December 31, 2020. Despite never happening, using other sources of electricity at the plant would still be legal.
3. The close relationship between self-built expansions and a utility's stock price is discussed in "The Ratemaking Process" section of this report.

Oregon's experience is consistent with this relationship. Figure 1 shows that as wind and solar increased over a 10-year period, natural gas increased as well. Specifically, the market share of wind generation went up by 72%, but natural gas increased by 93% (solar output was negligible). Because Senate Bill 477 did not allow natural gas to replace coal, it would have been impossible for PGE and PacifiCorp (Oregon's second-largest utility) to prioritize reliability and continue the expansion of intermittent generation.

Figure 1: Oregon's Electricity Mix (2012 - 2021)



Source: Oregon Department of Energy

With Boardman's inevitable 2020 closure, the "Coal to Clean" bill focused on importing electricity from out-of-state coal plants. Combined, PGE and PacifiCorp have a stake in over 2,000 MW of power from coal plants in Montana and Wyoming. When SB 477 was proposed, coal comprised 33% of Oregon's electric generation.[29]

Replacing such a significant share not only would be costly, but it may not have even reduced carbon dioxide emissions. Since Oregon utilities do not have full ownership of these coal plants, they are not mandated to shut down. The plants could simply sell their coal-generated power at a cheaper price to utilities in other states. If this happened, ratepayers would be paying for faux clean energy. Realizing this, PGE spokesman Steve Corson gave Senate Bill 477 a clever nickname: the "stop-the-electrons-here" bill.[30]

With high costs and dubious benefits, the Citizens' Utility Board had sufficient reason to oppose this bill. They did not. CUB director Bob Jenks supported the bill even before any cost-benefit analysis was made[31], prioritizing emissions reductions over ratepayer interests.

To the dismay of environmental activists, the "Coal to Clean" bill died during the 2015 legislative session, but this was not the last "stop-the-electrons-here" bill.[32]

In October 2015, the environmental group Renew Oregon proposed two ballot measures (Initiative Petitions 63 and 64).[33] The first would have required utilities to stop importing electricity from coal-fired power plants by 2030. In addition, it would have upgraded Oregon's Renewable Portfolio Standards (RPS) from the current 25% renewable energy by 2025 to 50% by 2040.[4]

The second initiative included an enforcement strategy that garnished wages from RPS-incompliant utility executives. To make it on the September 2016 ballot, each measure needed 88,000 signatures; both were on track to meet that goal. Predictably, utilities did not support either. Instead, they joined forces with the environmentalists to create the Clean Electricity & Coal Transition Plan.

THE PROBLEMATIC CREATION OF THE CLEAN ELECTRICITY & COAL TRANSITION PLAN

In late 2015, PGE, PacifiCorp, CUB, and environmental groups drafted House Bill 4036: the Clean Electricity & Coal Transition Plan.[5] This would (1) phase coal out of Oregon's energy supply by 2030 and (2) update the RPS to 50% clean energy by 2040. The creation of HB 4036 prompted a deal from Renew Oregon; if HB 4036 passed, they would drop the ballot measures.[34]

Oregon's constitution mandates alternating short and long legislative sessions every two years. During odd-numbered years, sessions are 160 days. During even-numbered years, they are only 35. During short-session years, it is easier to rush through complex bills that could otherwise experience friction during the vetting process. This happened in 2016 with the Clean Electricity & Coal Transition Plan (HB 4036).

With a powerful coalition of environmental and utility lobbyists backing the bill, legislators were overwhelmed with support for HB 4036. Additionally, the ratepayer advocate group, CUB, signed on to the bill. Concerningly, the OPUC did not have a seat at the table—despite existing to protect ratepayers' interests.

Furthermore, Governor Kate Brown ordered the Public Utility Commission not to publicly discuss the bill. The chair of the Commission, Susan Ackerman, commented on this situation, "I don't have dispensation to speak. The

4. Renewable Portfolio Standards require investor-owned utilities to meet a certain percentage of their annual electricity sales with renewable energy resources within a given timeframe. Oregon's original RPS was adopted in 2007.
5. The environmental groups included the NW Energy Coalition, Oregon Environmental Council, Oregon League of Conservation Voters, Natural Resources Defense Council, Renewable Northwest, and the Sierra Club.

governor can fire any of us at any time."[35] (The OPUC is an executive branch agency, meaning that commissioners are appointed and fired by the Governor.)

In emails obtained by *The Oregonian*, the OPUC stated that the bill would hurt ratepayers while doing nothing to reduce carbon dioxide emissions. Even worse, the OPUC believed "no one on the group that crafted the bill represented the public interest in the discussion."[36] This is directly calling out the Citizens' Utility Board, which was created for consumers. The director Bob Jenks has regularly aligned himself with environmental causes without prudent consideration for costs or risks (e.g., Initiative 63, Senate Bill 477).

When publicly questioned about this bill, Jenks said, "The transition from coal to cleaner energy is happening, and the question becomes what's the responsible way to get there. The ballot measures are out there. This bill is a compromise, and we think it's a good compromise."[37]

In late 2015, Susan Ackerman asked Bob Jenks why he thought the bill was in ratepayers' best interests. In emails Cascade obtained via a public records request, Jenks cited the "well-funded network of activists" who "cannot separate good ideas from bad ideas" as the cause of this legislation.[38] He also discussed the political infeasibility of a carbon tax. This email can be found at the end of this paper.

The bill went through many iterations and was ultimately amended to Senate Bill 1547. The Clean Electricity & Coal Transition Plan passed and was signed by Governor Kate Brown on March 8, 2016.[39] This bill included a stipulation: If the prohibition on fossil resources resulted in cost increases greater than 4% for ratepayers or might compromise grid reliability, utilities would not have to comply.

This seemed like a prudent fail-safe but likely will be difficult to implement in practice. Decisions to shut down generating facilities or invest in new ones take years of due diligence, regulatory approval, and construction. If utilities withdrew from a coal-fired resource for regulatory compliance, they could not simply reverse that decision to take advantage of the 4% off-ramp.

It's also not clear how or when the 4% cost premium would be computed. Utility rate cases are long and complex affairs. Once the PUC approves an IRP and the utility starts the process of procuring the preferred resources, decisions about resource acquisition and rates are difficult to unwind.

Even if the off-ramp could be used to protect grid reliability, the utility still would be required to reach 50% non-carbon-emitting electricity by 2040 without using coal past 2029.

FAILED BILLS AND ROGUE SENATORS

For over a decade, the idea of a "cap and trade" program periodically floated around Oregon's legislature. "Cap" refers to a limit on emissions. The government then issues allowances for emitting a certain amount of carbon. Companies can buy and sell these allowances, creating a market and a price of emissions. (This is the "trade" part.) By design, the government creates an artificial scarcity of these allowances. This increases the cost of emissions and creates incentives for companies to switch to less carbon-intensive energy sources.

The Oregon legislature tried to pass a cap-and-trade bill multiple times but to no avail. Because it directly raises costs all over the economy, cap and trade has never been popular.

In 2019, Democrats introduced House Bill 2020. This 100-page bill was littered with climate policies, including cap and trade. After months of amending and seven different votes, HB 2020 passed Oregon's House of Representatives. Upon reaching the Senate, 11 Republicans walked out to prevent a quorum—the number of legislators necessary to call a vote.

In an entertaining chain of events, Governor Kate Brown issued a $500 fine for every day the Senators missed, then sent the state police after the rogue legislators.[40] This led to several Senators fleeing the state. In a famous quote, Senator Brian Boquist warned the police to "send bachelors and come heavily armed. I'm not going to be a political prisoner in the state of Oregon."[41]

After less than a week of hiding and thankfully no bloodshed, Senate President Peter Courtney announced that HB 2020 did not have enough support to pass. Three Democrats would have joined the Republicans voting "nay." With a 17-10 vote, HB 2020 was sent back to committee and died.

The Democrats' fifth attempt at passing a cap-and-trade bill (SB 1530) failed in the short 2020 legislative session.[42]

THE PASSAGE OF HOUSE BILL 2021

After many failed climate bills, the long 2021 legislative session looked promising. With support from PGE, PacifiCorp, CUB, renewable energy companies, and climate groups, the newest climate bill, House Bill 2021, passed without much opposition. Why did this climate bill pass, while others failed? The answer lies in the text of the bill.

Despite having *more* ambitious emission reduction goals than previous bills, House Bill 2021 is not a cap-and-trade bill. It does not levy a tax on carbon and, therefore, is focused on only one sector: energy. HB 2021 does not directly mandate investment in clean energy, either. Instead, it sets emission reduction goals relative to a baseline level:[6]

- 80% reduction by 2030
- 90% reduction by 2035
- 100% reduction by 2040

For comparison, a previous, failed climate bill set reduction goals of 80% by 2050. As explained earlier, the grid needs dispatchable power. Meeting the 2040 goal will be virtually impossible, which is why the bill has an "off-ramp": The OPUC can place a temporary pause on compliance if (A) rates rise more than 6% in a given year or (B) resource adequacy standards are not met.[43]

THE RATEMAKING PROCESS

Below is a brief introduction to how utilities earn profit. This may explain why PGE would consciously support unattainable renewable energy goals (e.g., House Bill 2021).

Publicly regulated utilities are mandated to follow a certain rate-making formula. The traditional revenue requirement formula for an investor-owned utility is as follows:

$$\mathbf{R = O + (V - D)*r}$$

Where:

- R = total revenue (price of electricity × quantity of electricity), wholly paid for by ratepayers
- O = operating expenses
- V = gross value of total property
- D = accrued depreciation
- r = rate of return the utility is allowed to receive

Note: (V – D) = rate base, which is essentially the current value of a utility's property. "r" is a fixed value and is multiplied by the rate base (V – D). As (V – D)*r increases, a utility will make more money. Since r is fixed, a utility needs to increase the rate base to increase revenue. That is, as a utility owns more property, it will earn more revenue.

Because of House Bill 2021, PGE is required to overbuild intermittent projects. These heightened costs—which end up in "R"—are transferred to the ratepayers, which simultaneously increases PGE's revenue. Therefore, PGE's support of HB 2021 (or any similar legislation) is in their investors' self-interest since it inflates its rate base.

EFFECTS OF THE CLEAN ELECTRICITY & COAL TRANSITION PLAN

As previously mentioned, the 2016 Clean Electricity & Coal Transition Plan was drafted behind closed doors and hurriedly passed in the short 2016 session. The utilities wrote it with the Citizens' Utility Board and a powerful coalition of environmental groups. Since House Bill 2021 had more ambitious goals, the Clean Electricity & Coal Transition Plan was essentially nullified. Nevertheless, the preliminary analysis done on this bill is still valuable for comparison. If a weaker bill has negative impacts, then the stronger one should as well.

Unlike a carbon tax whose distortionary effects can be easily traced, it is harder to estimate the effects of legislation that mandates certain types of energy. This is because the future prices of different resources are unpredictable, whether solar, wind, nuclear, or natural gas. The energy market is dynamic; it is hard to estimate the effects of legislation, even previous legislation.

With this in mind, the two utilities provided preliminary estimates of the cost "savings" of the Clean Electricity & Coal Transition Plan—House Bill 4036 (amended into SB 1547). Compared to the threatened ballot measure (Initiative 63), House Bill 4036 was projected to save ratepayers hundreds of millions of dollars. However, compared to the default (no new legislation), it would cost ratepayers dozens of millions *at least*. Figure 2 shows the estimates from PacifiCorp.[44][7]

Figure 3 shows PGE's estimates under three future scenarios. This graph is from PGE's presentation to OPUC (with labels changed for clarity).[45] Cascade was unable to obtain the dollar value costs of HB 4036. The Y-axis shows the average yearly rate impact of each piece of legislation. The numbers in green are the savings of HB 4036 compared to the ballot measure (Initiative 63). This is essentially the differences in the peaks of the red and blue bars ($280, $360, and $220 million, respectively).

Compared to Initiative 63, House Bill 4036 was predicted to save PGE customers hundreds of millions of dollars, but

6. The "baseline level" is defined in House Bill 2021 as the average annual emissions of greenhouse gas for the years 2010, 2011, and 2012 associated with the electricity sold to retail consumers.
7. Note: These are preliminary estimates for House Bill 4036, which was amended to Senate Bill 1547. After amending, it was marginally different. Additionally, there is room for variance in these estimates because of uncertainty, price volatility, innovation, etc. There are no public, subsequent analyses of this legislation. This should strictly be used as a reference point.

compared to the reference case with no legislation, it would cost ratepayers. These costs are shown by the contrast between the blue bar and the X-axis.

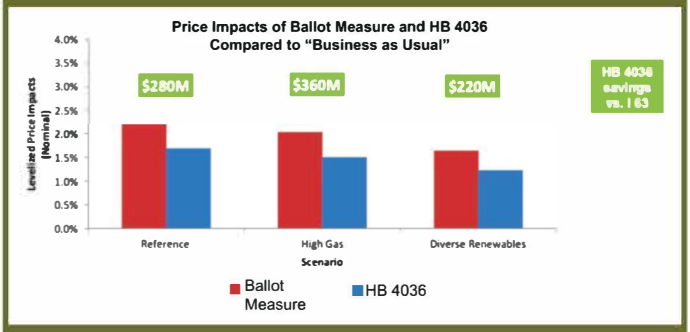
Figure 2: PacifiCorp's Estimated Costs of HB 4036 vs. Ballot Initiative 63 Summary of Cost Impact to Customers*

	Average Annual % Change from 2015 Revenue Requirement 2017 through 2030	Total Nominal Cost/(Benefit) From 2017 through 2030 ($ million)
Cost/(Benefit) of I-63 Relative to Existing Policy	4.3%	$752
Cost/(Benefit) of HB 4036 Relative to I-63	(3.4%)	($604)
Cost/(Benefit) of HB 4036 Relative to Existing Policy	0.8%	$149

*Does not consider fuel volatility risk, market price risk, or future CO_2 policy risk benefits, beyond assumed impacts of the Clean Power Plan.

Source: PacifiCorp Slideshow Presented to Public Utility Commission

Figure 3: PGE's Rate Impacts of the HB 4036 vs. Ballot Initiative 63



Source: PGE Slideshow Presented to Public Utility Commission

IS HOUSE BILL 2021 ACHIEVABLE?

House Bill 2021 was passed without any preliminary price impacts. Compliance goals start in 2030, so it should not substantially change PGE's short-term resource base. Unless there is a technological breakthrough, the effects of HB 2021 will be significant starting in 2030.

PacifiCorp attempted to address this concern in its 2023 Integrated Resource Plan (IRP), but the resources needed to fulfill House Bill 2021 do not exist. To account for this, PacifiCorp has named them "non-emitting peaking resource."[8] These are emission-free resources able to be used whenever the grid reaches a shortfall. Although the technology to make these resources is non-existent, PacifiCorp plans to add 1,240 MW of them.[46]

PGE's future portfolios also require technology that does not exist. Instead, PGE calls them "generic GHG [greenhouse gas] free dispatchable resources." They have different names but fulfill the same purpose. In case these resources are not invented, PGE ran a 2040 simulation with only existing technology.[47]

In this simulation, 6,000 MW each of additional wind, solar, and battery storage are added to the Northwest. Despite adding 18,000 MW, the grid still has resource adequacy problems—especially in the winter. These problems are not trivial, either. In a sample simulation, there is an energy shortfall in three of the seven days (because of decreased wind generation combined with shorter days/cloud cover). Figure 4 shows the outcome of this simulation.

Note: Figure 4 provides a sample seven-day period in the winter of 2040. The red dashed line represents the load (or the amount of electricity required to run the grid). Each peak in the red dashed line represents that day's peak load. Any electricity below the horizontal axis is built-up storage. Notice how it is directly related to the amount of electricity that surpasses the load requirements (the red dashed line). The blue dotted line represents the amount of unserved energy.

For the first four days, solar, hydro, wind, and storage & DERs satisfy the load requirements; the dotted blue line is at zero. Distributed Energy Resources (DERs) are smaller generation units located on-site (e.g., rooftop solar panels, batteries, etc.). The fourth day has significant excess wind, which is stored in batteries.

Despite this, energy generation is insufficient to meet load requirements on the fifth, sixth, and seventh days of the week. This is represented by the dotted blue line above zero.

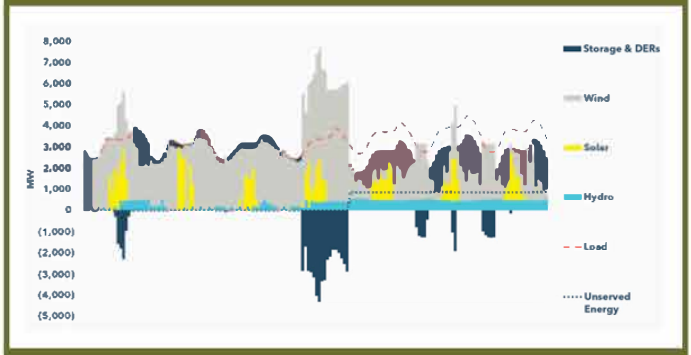
How would this situation affect consumers? Utilities would be forced to implement rolling blackouts, the planned blacking out of certain areas to keep energy demand and supply in equilibrium.

Shortfalls like this are disastrous. The North American Electric Reliability Corporation (NERC) develops energy reliability standards for the federal government. Their reliability standard is a one-day-in-ten-years loss of load expectation (LOLE). This means there needs to be less than one day of energy shortfall per decade.[48] In this

8. Environmentalists are hopeful that hydrogen-fueled electricity will become this "non-emitting peaking resource." Currently, the technology is not scalable, there are still upstream emissions when producing hydrogen, and there are safety concerns. Also, hydropower is considered emissions-free and dispatchable. But despite the Northwest's rivers, there are insufficient amounts of hydropower for compliance.

simulation, there are three days in one week.

Figure 4: PGE 2040 House Bill 2021 Compliant Simulation
Example Week in 2040 with only Northwest Resources



Source: PGE 2023 Integrated Resource Plan

Perhaps this catastrophe will not happen. Politicians may allow for a pause on HB 2021 compliance, which could help if dispatchable power is available. But the figure above shows how concerning our future is: The companies advocating for these goals are betting on technology that does not exist.

WHAT ARE THE EFFECTS OF HOUSE BILL 2021?

As established, the long-term effects of House Bill 2021 are either frequent blackouts or the unplanned use of carbon-emitting energy. The former would be catastrophic. The latter would be expensive. This section takes a closer look into the latter.

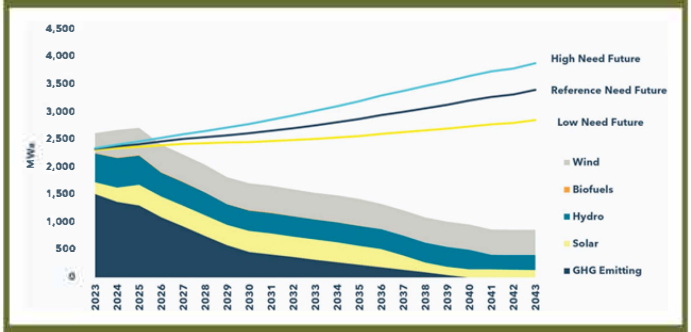
To (attempt to) meet a high need for renewables, resource overbuilding is required. Overbuilding necessitates new transmission lines. This makes it possible for a utility to tap into power elsewhere when the wind is not blowing in one place, or clouds are covering solar panels in another. Despite substantial overbuilding, the system is *frequently* resource inadequate.

In PGE's 2023 IRP, it anticipates House Bill 2021 to "raise the costs associated with generation resources relative to a 2023 baseline." This is because many hydro and natural gas contracts (that were supposed to replace Boardman) will run out in 2025. Afterward, the cost of generation is expected to increase 21% by 2030.

A CONCERNING NORTHWEST FUTURE

In its 2023 IRP, PGE provided a projected annual load-resource balance.[49] Energy load is how much energy is required for the grid to operate. Based on PGE's planned resource additions, it is expected to hit a shortfall in 2027 (where energy demanded exceeds energy supplied). As shown in Figure 5, this deficit grows throughout the planning horizon.[9]

Figure 5:
PGE Future Energy-Load Resource Balance



Source: PGE 2023 Integrated Resource Plan

When a company has a temporary unexpected shortfall, it can purchase power from elsewhere. But in this case, PGE cannot rely on other Northwestern utilities, for they are predicted to experience similar shortfalls. The Pacific Northwest Utilities Conference Committee (PNUCC), a non-profit trade association of Northwestern utilities, submits an annual forecast for the Northwest regional planning area. This region is comprised of Oregon, Idaho, Washington, and parts of Montana, Nevada, Utah, and Wyoming.

In its analysis, the Northwest is expected to hit a shortfall of over 900 MWa starting as early as 2024-2025.[10] This deficit grows to over 8,000 MWa in 2032-2033. Therefore, Oregon will not be able to rely on other sources in the Northwest to reach resource adequacy. Figure 6 shows the Northwest's annual energy resource balance.[50]

What about other regions? Could the Northwest import power from elsewhere in the United States? The answer is no, if other states continue to follow their clean energy goals.[51]

9. The only new resources included in these estimates are from PGE's 2021 Request for Proposal (RFP).
10. MWa (average megawatt) is one million watts delivered continuously 24 hours a day for a year. The theoretical possible electricity of a given generating source is measured in megawatts. Average megawatts are the actual amount of energy produced in a year.

Figure 6: Northwest Annual Energy Resource Balance (MWa)

Average Megawatts	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32	2032-33
Firm Requirements										
Load [1]	21,814	22,791	23,694	24,558	25,545	26,225	26,485	26,681	26,841	27,006
Exports	520	502	502	501	501	501	501	501	501	501
Total	22,334	23,293	24,195	25,060	26,046	26,726	26,986	27,182	27,342	27,507
Firm Resources										
Hydro [2]	11,459	11,439	11,424	11,462	11,424	11,402	11,200	11,200	11,161	11,005
Small Thermal/Misc.	28	28	28	28	28	18	11	11	11	11
Natural Gas [3]	4,107	4,497	4,801	4,551	4,546	4,544	4,474	4,426	4,225	4,222
Renewables-Other	276	275	273	274	269	268	268	266	264	260
Solar	503	503	503	502	502	501	501	500	498	483
Wind	1,757	1,747	1,747	1,721	1,661	1,623	1,611	1,596	1,596	1,622
Cogeneration	41	41	34	32	31	31	31	31	31	31
Imports	488	488	467	467	453	380	324	310	310	222
Nuclear	1,116	994	1,116	994	1,116	994	1,116	994	1,116	994
Coal	2,583	2,356	1,593	1,065	1,068	891	593	479	497	508
Total	22,357	22,366	21,985	21,096	21,097	20,652	20,127	19,810	19,708	19,357
Surplus (Deficit)	22	(927)	(2,210)	(3,963)	(4,949)	(6,074)	(6,859)	(7,372)	(7,634)	(8,150)

Source: PNUCC's Northwest Regional Forecast of Power Loads and Resources

In February 2024, officials from Georgia, Indiana, Colorado, and Arizona testified before the U.S. House Energy Subcommittee on Energy, Climate, and Grid Security about the effect of federal carbon dioxide regulation on consumer prices. Nick Myers, a commissioner on the Arizona Corporation Commission, testified about the rate impacts of building more wind-solar-storage facilities while simultaneously closing coal-fired generators:

> *"Personally, it pains me to have to approve accelerated cost recovery for early shutdown of coal plants while at the same time authorizing recovery on new purchase power agreements – and then, because the utilities are ultimately responsible for keeping the lights on, we also have to approve the building of reliable dispatchable generation in the form of natural gas. If you're keeping count, that means our ratepayers are paying three times for the same energy generation that could be had by simply keeping our existing generation online until natural retirement."*

Twenty-three states have a 100% carbon-free goal.[52] President Joe Biden wants the United States grid to be carbon-free by 2035.[53] As shown in Figure 7, the Western U.S. is at an elevated risk of an energy shortfall in the next few years. Other regions are expecting a deficit as well.

Even with PGE's required focus on reliability, these goals are unattainable. When states approach these deadlines without eliminating the shortfalls, only one option will be left: to disregard the unrealistic clean energy goals.

This is preferable to blackouts but will hurt ratepayers. It would require permitting and building new carbon-emitting power plants. This is expensive, especially when utilities recently shut down other ones.

The overbuilding of intermittent sources and storage is also expensive. As the percentage of mandated clean energy increases, the price increases exponentially. Because wind and solar are intermittent and batteries are not an actual source of power, they need to be overbuilt at an increasing rate when dispatchable resources cannot back them up.[54][11]

11. Batteries also experience self-discharge: the loss of electricity over time through internal chemical reactions. Thus, they are not a "one-to-one" transfer of energy.

Figure 7: Short-Term Risk Area Map (2023-2027)

Source: NERC's 2022 Long-Term Reliability Assessment

The National Renewable Energy Laboratory (NREL) recognizes these exponentially increasing costs. Figure 8 shows these costs in dollars per megawatt hour. In each of the four optimistic scenarios, the costs increase substantially. Below is an explanation of the four scenarios, taken from page vii of NREL's *Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035*.

- ***All Options*** *is a scenario in which all technologies continue to see improved cost and performance consistent with the National Renewable Energy Laboratory's (NREL's) Annual Technology Baseline (NREL 2021). This scenario includes the development and deployment of direct air capture (DAC) technology, while the other three main scenarios assume DAC does not achieve the cost and performance targets needed to be deployed at scale.*

- ***Infrastructure Renaissance*** *assumes improved transmission technologies as well as new permitting and siting approaches that allow greater levels of transmission deployment with higher capacity.*

- ***Constrained*** *is a scenario where additional constraints to deployment of new generation capacity and transmission both limits the amount that can be deployed and increases costs to deploy certain technologies.*

- ***No CCS*** *assumes carbon capture and storage (CCS) technologies do not achieve the cost and performance needed for cost-competitive deployment. This scenario also acts as a point of comparison to demonstrate the potential benefits of achieving cost-competitive deployment of CCS at scale. This is the only scenario that includes no fossil fuel capacity or generation in 2035, and therefore it is the only scenario that includes zero direct GHG emissions in the electric sector.*

CONCLUSION AND RECOMMENDATIONS

The future of electricity generation in Oregon is unsettling. The 2010 decision to shut down Boardman showcases this. What was originally a sensible, low-cost decision to burn coal for necessary baseload generation became a political battle that would produce a purely symbolic victory for environmental groups (including CUB): a reduction in carbon dioxide emissions that will never have a material effect on the global climate.

PGE has yet to find a long-term replacement for Boardman. Recent hydro contracts run out in the mid-2020s, merely pushing off the decision. Coupled with the mandates in House Bill 2021, Oregon's deficit is predicted to be larger than the capacity that came from Boardman.

Figure 8: Exponentially Increasing Costs of Renewable Energy

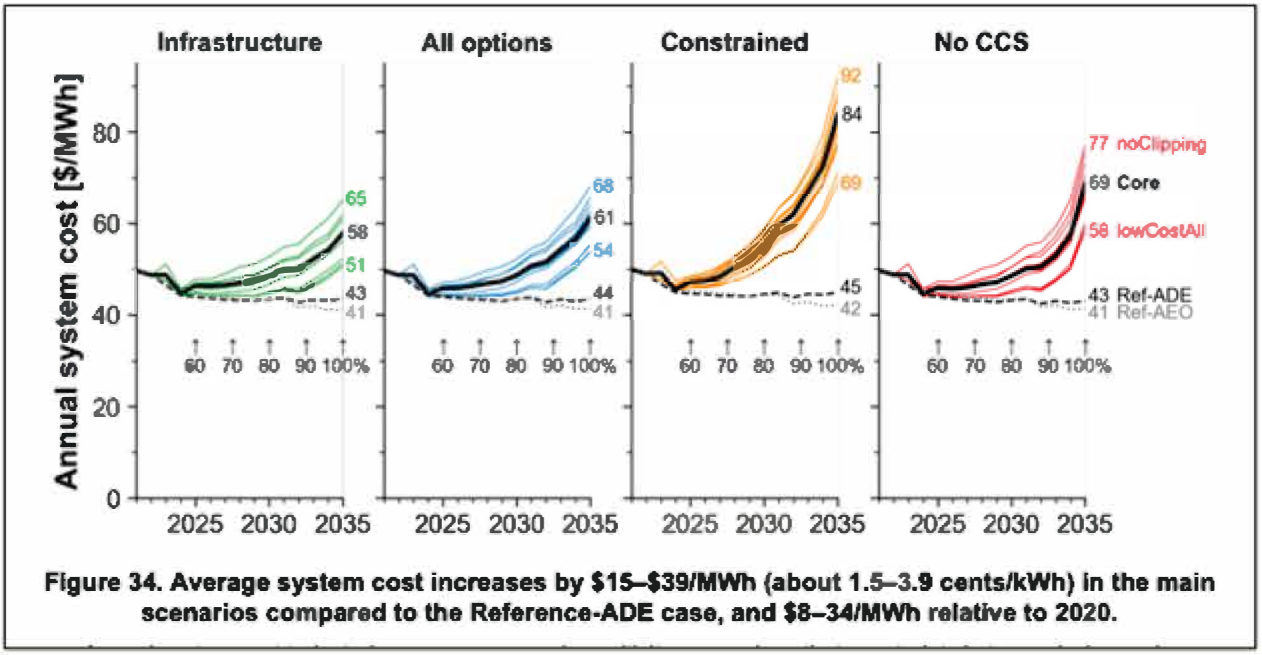


Figure 34. Average system cost increases by $15–$39/MWh (about 1.5–3.9 cents/kWh) in the main scenarios compared to the Reference-ADE case, and $8–34/MWh relative to 2020.

Source: NREL Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035

Maintaining reliability while decreasing emissions is possible, but not at this level. Overbuilding will cause rates to rise, and the deficits will not disappear, causing even greater price increases. By the time the crisis is felt at the consumer level, the activists, politicians, and utility executives who agreed to phase out fossil fuels will have moved on, no longer accountable for the disaster.

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From: Bob Jenks [redacted]
Sent: Wednesday, December 30, 2015 1:39 PM
To: ACKERMAN Susan
Subject: CUB's support for the legislation

Susan

I wanted to apologize. I did not get your phone message about wanting the detail of the legislation until after we met on it. Hopefully, my now, you have seen the complete language.

Your bigger question in your phone message was why I think this is in the public interest.

I do think this is in the public interest. I also know that Jason and other people disagree with me. There are several reasons I think this is helpful for Oregon today.

The context for this is that there is a very significant and well-funded network of activists who want to pursue policies that attack carbon emissions, reduce coal and expand renewables. While a carbon tax does not poll well, elimination of coal and increasing renewables if very popular. This is not limited to Portland – the polling data I have seen suggests that an initiative on this would pass in Multnomah, Washington, Clackamas, Benton, Lane, Jackson, Columbia, Clatsop, Lincoln, Tillamook and Hood River Counties and would be close in Yamhill and Marion Counties. In addition, timing makes very little difference to the general public. They support removing coal from Oregon in 2030, but also 2025 and 2020.

At the same time, the leadership of the environmental/climate organizations cannot separate good ideas from bad ideas and the utilities are willing to accept unhelpful ideas if they can predetermine ratemaking treatment.

(Note: This portion of the email was cut off in the public records request, which was on paper.)

component. To the degree we can settle the coal policy issue; it will allow us to focus on other things in the IRP and rate cases.

Finally, I think settling coal plants will create the ability of the State to create a carbon policy if it wants to. I know a lot of people who believe that rather than focusing on coal, the focus should be on getting a price on carbon. However, a price on carbon is not politically feasible until we reduce the amount of coal. PacifiCorp's industrial customers will see a rate increase of about 1.5 times the $ per ton cost of price on carbon. A $10/ton price on carbon creates a 15% industrial rate hike. A $20/ton price creates a 30% rate hike. Residential customer will also see big rate increases, though the percentages will be smaller. I cannot see the legislature doing this to the rural economies that PacifiCorp serves. But, if the State has already established a coal policy that will lead to the phasing out of coal, then it does not need to put a price on carbon -- we no longer need a price signal to reduce coal, we have reduced coal through a mandate. This means that the state can create a carbon policy, and exempt coal from that policy. But without doing something about coal first, I do not see how state carbon policy is politically feasible.

--
Bob Jenks

Executive Director
Citizens' Utility Board of Oregon
[redacted]