



# MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

*Rely on us.*

TO: Susan Ackerman, Chief Energy Officer  
FROM: Matthew A. Schroettig, Power Resources Counsel  
DATE: November 8, 2019  
SUBJECT: Columbia Generating Station  
OBJECTIVE: Information Only

---

## Issue

Recently, EWEB has received public comment regarding the Columbia Generating Station (CGS) nuclear plant. Several questions focused on EWEB's ability to refuse power generated by CGS, the comparative economic viability of the plant, and the potential to replace its output with renewable generation. The following analysis responds to those questions, and provides additional information and context to interested parties. This memorandum is an update to the 2018 backgrounder previously provided to the Board.

## Background

Today, roughly 30% of EWEB's power production comes from owned, co-owned, or non-BPA contract resources, whereas roughly 70% of EWEB's power supply comes from BPA.<sup>1</sup> This is due to the December 2008 Power Sales Agreement between EWEB and BPA, effective through September 30, 2028, and commonly referred to as the "Regional Dialogue Contract."

BPA markets power from the Federal Columbia River Power System (the "Federal System") composed of 31 federal hydroelectric projects, one non-federal nuclear project, several non-federally-owned hydroelectric and thermal projects in the Pacific Northwest, and from various contractual rights. The federal projects are operated by the United States Bureau of Reclamation and the Corps of Engineers and are located primarily in the Columbia and Snake River Basins. The sole nuclear project, CGS, is operated by Energy Northwest, a joint action agency representing a consortium of 27 public utility districts and municipalities across Washington.

## Columbia Generating Station

The Columbia Generating Station (CGS) nuclear generator has a capacity of roughly 1,200 MW and represents approximately 4% of the electricity used in the northwest. The output of CGS is sold to BPA at the cost of production under a formal net billing agreement in which BPA pays the costs of maintaining and operating the facility. As a part of the BPA Federal System, under the Regional Dialogue Contract EWEB does not have the option to refuse power from CGS. The existing Power

---

<sup>1</sup> Available at: <http://www.eweb.org/about-us/power-supply>

Sales Agreement will expire in 2028, and EWEB is currently working with BPA and the region to discuss renewal options. However, for reasons discussed below, maintaining CGS as a foundational component of the northwest resource mix is in the best interest of EWEB’s customer owners; is consistent with EWEB’s organizational core values of Safe, Reliable, Responsible, and Community; is in alignment with EWEB’s existing position on carbon emissions reductions; and supports a least-cost approach to decarbonizing the electric sector.

In 2016, Seattle City Light (SCL) passed a Resolution declaring its intent to focus all future resource acquisitions on “clean and safe energy sources that generate the lowest amount of greenhouse gases or radioactive waste.”<sup>2,3</sup> The Resolution went on to direct SCL “to promote the transition of electricity generation in the Pacific Northwest away from energy facilities that burn fossil fuels or use nuclear power.” The Resolution has been widely interpreted to mean that SCL intends to call for the closure of CGS, or to encourage BPA to somehow differentiate distinct resources within the Federal System as part of the upcoming 2028 contracting discussions.

Regarding safety, CGS has more than 30 years of safe operation. In its most recent annual assessment, the Nuclear Regulatory Commission (NRC) again rated CGS at the top performance level for public safety.<sup>4</sup> In both 2017 and 2018, the Northwest Public Power Association (NWPPA) awarded Energy Northwest first place in safety performance for utilities with more than 1 million hours of employee exposure.<sup>5</sup> At the same time, CGS has been subject to considerable negative pressure and public discourse by the Physicians for Social Responsibility (PSR). The SCL resolution followed a concerted effort on the part of the Oregon and Washington chapters of PSR, which had commissioned a report on CGS by a local economist, Robert McCullough, in 2013. The report concluded that northwest ratepayers would save roughly \$1.7 billion by closing CGS.<sup>6</sup> This initial report has been updated a number of times, most recently on January 22, 2018.<sup>7</sup>

The updated report asserts that the output of CGS could be replaced with renewable generation resources for a benefit of roughly \$325.9 million between January 2018 and June 2027. In summary, the relevant conclusions of the report are: (1) energy from CGS can be replaced at lower cost from renewable resources and the market, and (2) replacement of CGS with intermittent, non-dispatchable resources would not impact reliability or resource adequacy. As discussed below, EWEB management believes that both of these conclusions are in error and substantially misleading.

## **CGS – Energy Replacement Cost**

The heart of the report is a comparison of the projected power costs of CGS from 2018 to 2027 with the levelized cost of energy (LCOE) from new renewable resources taken from “Lazard’s Levelized Cost of Energy Analysis – Version 11.0”; a study produced by the international Lazard financial advisory and asset management firm. The Lazard study projects a range of potential LCOE values for new resources on a national and international basis.

---

<sup>2</sup> <https://seattle.legistar.com/View.ashx?M=F&ID=4525087&GUID=D7276CCF-CF14-4530-AF34-72B74D630C9E>.

<sup>3</sup> It is also worth noting that 27 regional PUDs, COUs, Cooperatives, and stakeholder organizations, along with the WA Governor’s office, have signed Resolutions in support of Energy Northwest and the continued operation of CGS. Available at: <https://www.energy-northwest.com/ourenergyprompts/Columbia/Pages/Member-Support.aspx>.

<sup>4</sup> Available at: <https://www.tri-cityherald.com/news/local/hanford/article212389649.html>

<sup>5</sup> Available at: <https://www.nwppa.org/wp-content/uploads/2017-Safety-Awards.pdf>

<sup>6</sup> See:

[https://d3n8a8pro7vhm.cloudfront.net/oregonpsrorg/pages/1266/attachments/original/1516225007/Economic\\_Analysis\\_of\\_the\\_Columbia\\_Generating\\_Station\\_%28McCullough\\_Research\\_2013%29.pdf](https://d3n8a8pro7vhm.cloudfront.net/oregonpsrorg/pages/1266/attachments/original/1516225007/Economic_Analysis_of_the_Columbia_Generating_Station_%28McCullough_Research_2013%29.pdf).

<sup>7</sup> See:

[https://d3n8a8pro7vhm.cloudfront.net/oregonpsrorg/pages/1271/attachments/original/1517357684/20180104\\_Update\\_of\\_CGS\\_costs\\_and\\_implications\\_23\\_%282%29.pdf](https://d3n8a8pro7vhm.cloudfront.net/oregonpsrorg/pages/1271/attachments/original/1517357684/20180104_Update_of_CGS_costs_and_implications_23_%282%29.pdf).

The McCullough Research analysis takes a “median” LCOE from this report for new solar generation of \$37.50 per MWh and \$33 per MWh for new wind generation. These values might be realistic in some parts of the United States, such as the desert Southwest for solar, or the Midwest plains for wind, but they are unrealistic in the Pacific Northwest.

This is primarily because the Lazard analysis assumes extremely high capacity factors for the wind and solar resources. Specifically, the report assumes a 55% factor for wind and 30% factor for solar. This means that for 100 MW of installed generation, the report assumes that wind will generate 55 aMW and solar will generate 30 aMW on an annual basis.

In contrast, the NWPCC’s 7<sup>th</sup> Power Plan developed capacity factors of 32% for wind and 19% for solar in the Pacific Northwest. These values were vetted extensively by regional experts. Applying these more reasonable capacity figures to the Lazard leveled costs results in values of \$59.21 per MWh for solar and \$56.72 per MWh for wind.

In addition to drastically understating the cost of new renewable resources in the northwest, the McCullough Research report ignores the value difference in energy between baseload generation and intermittent resource output. BPA has a specific set of rates that calculate the cost of converting variable resource output to a flat annual block of power known as Resource Support Services (RSS). Under the BPA rates in place at the time of the latest McCullough report, these services cost \$15.46 per MWh for a wind resource and \$15.83 per MWh for a solar resource.

As a result, using regionally vetted capacity factors from the NWPCC and BPA’s latest rates, the least expensive replacement for CGS using intermittent renewable generation would be wind power, with a leveled cost of approximately \$76.20 per MWh.<sup>8</sup> Conversely, the average projected cost of power for CGS for 2018 to 2028 is \$42.93 per MWh. This difference in costs of \$33.27 per MWh at the average annual CGS output of 1,062 aMW leads to a *cost increase* of \$310 million annually were the report’s recommendations to be implemented.

This result is consistent with a scenario analysis conducted in the 7<sup>th</sup> Power Plan that examined the change in regional portfolio cost for the planned retirement of a 1,000 MW carbon free resource. That analysis found an increase in regional power costs of \$3 to \$6 billion on a net present value basis over 20 years.

Lastly, the latest McCullough report goes into some detail comparing CGS power costs to Mid-C market prices. However, this is not a valid comparison. Market purchases are not directly comparable to physical generating assets that are dispatchable, carbon-free, and have well defined costs. Additionally, the output of CGS is so substantial on a regional basis that replacing that power through the market, even if it were possible, would have a significant impact on market prices and reliability.

### **CGS – Capacity and Reliability Impacts**

The McCullough report does not address resource adequacy or reliability implications of replacing the output of CGS with 3,000 to 5,500 MW of intermittent resources. This is in contrast to the analysis of the NWPCC. The NWPCC conducts a rigorous, annual Pacific Northwest Power Supply Adequacy Assessment, which looks forward five years. The assessment conducted in 2017 for adequacy in 2022 shows potential resource deficiencies based on the planned retirements of the

---

<sup>8</sup> This is the sum of \$56.72 per MWh LCOE, \$4.32 per MWh Variable Energy Resource Balancing Services (VERBS) charges, and \$15.16 per MWh for RSS.

Boardman, Centralia and Colstrip Units 1 & 2. Retirement of CGS would significantly exacerbate these issues.<sup>9</sup>

Notably, the 7<sup>th</sup> Power Plan does not rely on the large-scale development of intermittent resources to meet regional capacity needs, instead calling for demand response measures as available or natural gas generation. This is specifically because “power production from wind and solar PV projects creates little dependable peak capacity and increases the need for within-hour balancing reserves....”<sup>10</sup>

Replacing CGS output with intermittent resources would be doubly restrictive for BPA in terms of capacity. Not only would the baseload capacity of CGS be gone, but hydro system flexibility would also be further burdened by the need to balance the intermittent resources within the hour, potentially drastically increasing costs for BPA, and consequently for EWEB customer owners.

### **EWEB’s Carbon Reduction Goals**

EWEB was an early advocate of addressing climate change, and has publicly supported carbon pricing in Oregon. As part of its support for Oregon’s then-proposed “Cap-and-Invest” legislation, in November 2017 the EWEB Board adopted Resolution 1736, a section of which is dedicated to publically stating EWEB’s support for a least-cost approach to decarbonizing the electric sector.<sup>11</sup>

Additionally, in December 2017, the Public Generating Pool (PGP), a group of 10 Oregon and Washington consumer-owned electric utilities (including EWEB), along with Benton PUD and Energy Northwest, co-sponsored a study from E3 that looked at several ways to simultaneously achieve the environmental and economic goals in the electric sector.<sup>12</sup> The stated purpose of the study is to contribute to the discussion on how to meet the Pacific Northwest’s decarbonization goals by exploring how the region’s electric sector could effectively and efficiently achieve those goals in a least-cost manner.<sup>13</sup>

Also relevant is the study’s conclusion regarding the impact of retiring existing carbon-free resources (i.e., nuclear generation) on the region’s ability to achieve the goal of an 80% reduction in emissions below 1990 levels by 2050.

### **CGS – Retirement of Existing Carbon-Free Resources**

Given ongoing regional discussions surrounding the relicensing of the Snake River Dams, along with the continued discourse surrounding CGS, the E3 study included a sensitivity analysis of the impacts of retiring 2,000 aMW of existing zero-carbon generation. Though this is not specific to CGS, the conclusion is relevant given both the relative size of CGS (1,200MW nameplate) and the resulting cost of replacing those resources.

In summary, the study concluded that if the region is to achieve its goal of an 80% reduction in emissions, the retirement of 2,000aMW of carbon-free generation would require the installation of 5,500 MW of new renewable generation, along with 2,000 MW of new natural gas capacity for resource adequacy, at an additional total cost to the region of \$1.6 billion per year.<sup>14</sup>

---

<sup>9</sup> See Pacific Northwest Power Supply Adequacy Assessment for 2022. Available at: <https://www.nwcouncil.org/media/7491213/2017-5.pdf>.

<sup>10</sup> See 7<sup>th</sup> Power Plan, page 3-5. Available at: <https://www.nwcouncil.org/7thPlan>.

<sup>11</sup> See: <http://www.eweb.org/Documents/board-meetings/2017/12-05-17/m11-res-no-1736-approval-of-eweb-2018-state-legislative-agenda.pdf>.

<sup>12</sup> Available at: <https://www.ethree.com/e3-completes-study-of-policy-mechanisms-to-decarbonize-the-electric-sector-in-the-northwest/>

<sup>13</sup> See: [http://www.publicgeneratingpool.com/wp-content/uploads/2017/12/E3\\_PGP\\_GHGReductionStudy\\_2017-12-15\\_FINAL.pdf](http://www.publicgeneratingpool.com/wp-content/uploads/2017/12/E3_PGP_GHGReductionStudy_2017-12-15_FINAL.pdf).

<sup>14</sup> Id.

The carbon-free energy from CGS is one of the reasons EWEB is able to claim the lowest emissions of any Oregon Consumer Owned Utility (at 0.041 lbs CO<sub>2</sub>/KWh), according to the Oregon Department of Energy.<sup>15</sup> This carbon-free benefit highlighted in a 2014 study by IHS Cambridge Energy Research Associates, which concluded that the operation of CGS prevents about 3.6 million metric tons of carbon dioxide emissions every year when compared to combined-cycle natural gas turbines, the most likely replacement resource.

Looking nationwide, the continued retirement of nuclear facilities is resulting in an increase in carbon emissions and an increase in ratepayer costs. For example, an April 2018 report by the Brattle Group concluded that the retirement of four plants in Ohio and Pennsylvania would result in an increase of over 21 million metric tons of carbon dioxide emissions annually, cause a loss of zero- emissions generation greater than the total amount of renewable generation in the entire PJM region, and raise gross electricity costs for customers by approximately \$400 million for Ohio, \$285 million for Pennsylvania, and \$1.5 billion across all of PJM.<sup>16</sup>

### **Conclusion and Next Steps**

Currently, EWEB does not have the option to refuse power from CGS under the existing Regional Dialogue Contract with BPA. In 2028, the existing Power Sales Agreement with BPA will expire, and EWEB is currently working with BPA and the region to discuss options for renewal. However, the available analysis strongly indicates that, so long as it remains possible to do so in safe and reliable manner, continued operation of CGS is in the best interest of EWEB's customer owners.

Finally, the Strategic Plan provides staff with the tools necessary to analyze and propose resource options that are in the best interest of EWEB customer owners, the June 5, 2018 revision to which affirmed EWEB's commitment to responsible and sustainable stewardship. Moving forward, EWEB recently began the process of developing its next fully integrated resource plan for the Board's consideration, to be completed at the end of 2021. Management recommends that all future resource decisions be analyzed in the context of that planning process.

---

<sup>15</sup> Available at: <https://www.oregon.gov/energy/energy-oregon/Pages/Electricity-Mix-in-Oregon.aspx>

<sup>16</sup> Available at: <http://www.brattle.com/news-and-knowledge/news/report-by-brattle-economists-estimates-the-impacts-of-nuclear-retirements-in-ohio-and-pennsylvania>