

## Memorandum

To: File

From: Michael Deen and Kevin O'Meara

Date: January 28, 2014

Re: Updated: Physicians for Social Responsibility "Economic Analysis of Columbia Generating Station"

---

### Executive Summary

During December many PPC members received an email communication from the Physicians for Social Responsibility (PSR) group highlighting the recently released economic study regarding the continued operation of Columbia Generating Station (CGS). The study was conducted by Portland-based consultant Robert McCullough and his associates. The report asserts that power from CGS has been above market prices over the last several years and that BPA should conduct procedures to cease operations at CGS and replace the power through a portfolio of market purchases going forward.

PPC makes a point of seeking the best available information on any issue impacting the power and transmission purchased by preference utilities. PPC staff analysis has raised concerns with this PSR Report similar to those we noted about the earlier draft of this report. For example, the report does not appear to account for all of the reliability, economic, and legal issues surrounding the recommendations. Additionally, on purely economic grounds, the PSR report conflicts with the results of economic studies on the value of CGS conducted on behalf of Energy Northwest by the IHS Cambridge Energy Research Associates (IHS CERA) consulting group as well as BPA's evaluations.

This memorandum also responds to criticisms of the IHS CERA study released by PSR on January 2<sup>nd</sup> as well as a recent Newsweek article from January 24<sup>th</sup> which relies primarily on analysis from Mr. McCullough and the PSR Report.

At this time it is PPC staff's analysis that the PSR Report does not provide compelling evidence in support of the recommendation to seek market replacement power and cease operation of CGS as economically advisable for BPA or its preference customers.

## **Introduction**

On December 10, 2013, a report entitled “Economic Analysis of the Columbia Generating Station” was released by Portland-based consulting firm McCullough Research on behalf of the Physicians for Social Responsibility. PSR is an environment and nuclear issues activist group. The fundamental recommendation of the PSR Report is that BPA should formally evaluate market replacement options for Columbia Generating Station and seek an RFP for replacement power from the wholesale market.

Although the report is quite verbose, totaling over 200 pages with more than 80 figures and charts, the fundamental economic argument made for shutting down the plant is simple. The PSR Report observes that the variable production costs<sup>1</sup> for operation of CGS have been somewhat above the spot market price of electricity at the Mid-C hub over the past 5 years. The report also conducts an analysis which purports to show that market price for electricity will continue to be below CGS variable production costs.

In addition to the pure market cost argument, the PSR Report also brings up several ancillary arguments regarding other “challenges” faced by CGS. The report points out that CGS is not technically “zero carbon” as the fuel refinement process produces a minimal level of emissions and also alleges that the plant is disadvantageously located at the Mid-C hub given the challenges faced by over-generation due to wind power growth in the region. PSR also argues that the Energy Northwest governance structure is fundamentally flawed.

Finally, on January 24<sup>th</sup>, Newsweek published an article by David Cay Johnston which relies heavily on analysis by Mr. McCullough and criticizes the economics and environmental attributes of the long term fuel deal between Energy Northwest, TVA, DOE, and US Enrichment Corporation.

Each of these issues will be addressed in the following sections of this memorandum.

## **Economic and Financial Analysis**

After careful review, we find that there are several fundamental flaws that undermine the value of the PSR Report’s recommendations. First and foremost of

---

<sup>1</sup> “Variable production costs” is used in this context to denote the costs that can be avoided if CGS is shut down indefinitely and does not produce power, such as fuel, variable O&M, and replacement capital expenditures. Fixed costs such as debt repayment are “sunk” regardless of whether the plant produces power or not.

these is the basic premise that a simple comparison of spot energy market prices to the variable costs of CGS is the appropriate metric for deciding on the continued operation of the plant. In addition to pure energy, CGS provides valuable capacity, dispatchability, and risk mitigation that would not be present under the market replacement recommendation presented by PSR.

Quite simply, controlling an actual generating resource is not equivalent to a portfolio of market purchases. Under market purchase contracts, particularly for very large amounts of power over long periods of time, counterparty risk becomes a significant issue. This is the risk that the party or parties promising to deliver the power may become bankrupt or otherwise take steps to avoid performing under the contract. A particular problem with counterparty risk is that the risk is exacerbated precisely under the circumstances that the power is most needed, which is a situation in which the market price of power greatly exceeds the terms of the original contract. For example if the price of power goes to \$1000 per MWh, and BPA has displaced CGS with 1000 MW of power at \$30 per MWh, the counterparties would be losing approximately \$1 million per hour under the contracts. This amount of money provides tremendous incentives for counterparties to find ways to not perform under the contracts.

Aside from counterparty risk, there is the basic risk of price uncertainty in wholesale markets. As the PSR report observes, the variable cost of CGS operations has been slightly above spot prices in recent years. However, a single unanticipated shift in the markets can easily wipe out years of anticipated benefits of displacement. This phenomenon can easily be observed historically with the Western Energy Crisis of 2000-2001. The cost of market power during that short time period easily dwarfs the modest benefits that would have been achieved through displacement in recent years. In 2001 alone the operation of CGS compared to the market saved BPA ratepayers \$1.4 billion.

The PSR Report quotes CGS budget estimates for 2014 production costs of \$39.48 per MWh and states that these are “comparable” to forward prices at the Mid-C hub of \$32.09 per MWh. However, there is no guarantee that if CGS shut down today that BPA would be able to actually secure replacement power at that market price for such a significant amount of energy on a firm basis. In order to provide large amounts of power on a firm forward basis, particularly over multiple years, suppliers are likely to require a significant premium.

To put these values in context from a risk perspective, we can take at face value the delta between 2014 projected CGS operating costs of \$39.48 per MWh and the Mid-C forward price of \$32.09 per MWh. A \$7.39 price delta per MWh for 1000 aMW of power is equivalent to approximately \$65 million annually. This benefit is approximately 5% of the benefit of CGS generation relative to the market in

2001. In other words, a single year of market prices similar to 2001 could negate 20 years of the magnitude of annual benefits projected by the PSR report.

Of course the events of 2000-2001 specifically are not the issue. The fundamental point is that the relatively predictable costs of CGS provide an important and valuable hedge against fluctuations in power markets, which can change rapidly and unexpectedly from current expectations. The example also highlights the fact that the risk proposition is asymmetric for a short power supply position—power prices are bounded on the low end but can rise without restriction.

The PSR Report also alludes to the fact that CGS costs themselves may at some point in the future exceed current expectations. While this is true, we certainly do not expect nearly the variability that is possible in wholesale power markets. Further, if unexpected events in the future do significantly increase costs beyond forecasts, the option to reevaluate the plant's effectiveness will still exist at that time.

The PSR Report's methodology for long term forecasting of market prices also contains a very significant methodological flaw regarding natural gas price forecasting. In order to forecast the long term market price of electricity in the Northwest, the PSR report employed the AURORAxmp forecasting model. A central assumption in this model is the price of natural gas. Natural gas price is extremely important to the AURORAxmp simulation as natural gas generation sets the marginal price for electricity in a large number of hours for a given year.

Although the PSR Report's long-term forecast of prices does include stochastic variation of hydro and wind generation, it employs a single gas price curve from the Energy Information Administration's ("EIA") Annual Energy Outlook 2013 forecast. Making a long term decision to irrevocably shut down a large baseload generating resource on the basis of a single point gas price forecast of multiple decades is questionable economics.

Finally, a more appropriate comparison of the long term replacement cost of CGS is likely to be a dispatchable generating resource controlled by BPA. This is exactly the type of comparison undertaken by consultant group IHS CERA in their report "Columbia Generating Station: Economic assessment" which was released publicly in December.<sup>2</sup> This study examined the potential of replacing CGS long term with new natural gas combined cycle facilities from 2014 through 2043. The

---

<sup>2</sup> The full IHS CERA report is available on the Energy Northwest website at <http://www.energy-northwest.com/ourenergyprojects/Columbia/Pages/Regional-Value.aspx>

study found a net benefit of approximately \$1.6 billion for continued operation of CGS.

PPC Staff has also taken time to review the recently released PSR criticism of the IHS CERA study. This criticism focuses on the fundamental assumption that the appropriate benchmark for CGS replacement power is new natural gas baseload resources as well as a number of the specific assumptions regarding both the costs of CGS going forward and costs of the proxy natural gas plant. PSR is particularly critical of the IHS CERA assumptions regarding gas prices, which start significantly higher than the PSR Report.

As articulated above, for reasons of operational flexibility, risk mitigation, and capacity value, ownership of a physical baseload generating resource has significant value relative to a portfolio of market purchases. Regarding criticisms of the specific assumptions in the IHS CERA study, particularly the gas price, it is exactly this type of forecast dispute that highlights the risky nature of the PSR recommendation. The expected benefit is highly dependent on the accuracy and stability of the forecasted power prices. Not only is a 30 year forecast of power prices based on a single natural gas forecast likely to be wrong, it is likely to be very wrong in ways that cannot even be anticipated at this time.

### **Long Term Fuel Deal and Newsweek Article**

On January 24<sup>th</sup>, Newsweek published an article by David Cay Johnston entitled “Kentucky-Fried Politics.”<sup>3</sup> The fundamental premise of the article is that BPA ratepayers somehow provided a massive subsidy to Kentucky as part of the long term fuel deal executed by Energy Northwest in 2012. In particular, the article asserts that BPA (and presumably its ratepayers) were pushed into a deal with substantial costs for uranium for which they have no use.

The 2012 fuel deal was a complicated transaction involving Energy Northwest, the Department of Energy (DOE), the Tennessee Valley Authority (TVA), and the United States Enrichment Corporation (USEC). Although the motivations for the deal are different for each party involved, the bottom line from the perspective of Northwest rate payers is that ENW received low cost uranium that can ultimately power CGS through 2028.

The fundamental driver of the economic benefit to BPA ratepayers is the fact that the uranium received by ENW was produced from depleted uranium tails acquired from DOE *at no cost*. Thus, although the process of enrichment through USEC at

---

<sup>3</sup> The article can be retrieved at <http://mag.newsweek.com/2014/01/24/kentucky-fried-politics.html>

the aging Paducah facility is relatively inefficient, the ultimate cost of fuel for CGS will be significantly lower than otherwise.

Specifically, in the first rate period of the fuel deal, BPA power rates were reduced by approximately \$21 million per year as a result of lower fuel costs. On a long term basis, ENW has secured a high degree of price certainty for its fuel supply through 2028 at a net cost vastly below current spot or forward market prices. Accounting for payments from TVA, ENW has secured approximately \$236 million of fuel for less than \$65 million.

## **Other Issues Raised by the PSR Report**

### *Carbon Content of CGS Power*

The PSR Report spends a substantial amount of effort to point out that incremental generation from CGS is not completely carbon free. This is due to the carbon content of the energy used in the fuel enrichment process. While this is technically true, the relevance is unclear. Any production of power or material will have some carbon content in the lifecycle. The relevant point is that even accepting that there are some carbon emissions in the enrichment process, the incremental carbon from CGS generation is vastly less than alternative generation sources, even high efficiency natural gas generation or market purchases which likely include coal or natural gas generation.

Even if one accepts the PSR Report numbers at face value, the average carbon content from fuel production at CGS amounts to approximately 119 pounds of carbon dioxide per MWh. For comparison, the average direct emission from natural gas generation in the United States is 1,135 pounds of carbon dioxide per MWh based on EPA data.

### *CGS Location and Relationship to Oversupply Conditions*

The PSR report also observes that CGS is located in the heart of the Mid-Columbia, which is generally far from load centers and has also been prone to oversupply events in some recent years due to the convergence of high wind generation output and hydro flows in some hours.

The relevance of the location of CGS relative to load centers is unclear given that the PSR report advocates for replacement power procured at the Mid-C hub, which is the same location that CGS currently occupies.

Although oversupply has been an operational challenge in some hours over the past several years, the magnitude of the problem is miniscule compared to the

generation of CGS. BPA curtailed 97,557 MWh of energy due to oversupply in 2011, and 49,614 MWh in 2012. No curtailments were made in 2013. This represents an approximate total of less than 6 aMW per year. Shutdown of a generating plant with 1,170 MW of generating capacity would be greatly disproportionate to the magnitude of the issue at hand.

Indeed, BPA's 2013 White Book shows that under critical water conditions BPA already faces significant capacity deficits. Removal of CGS would exacerbate this shortage.<sup>4</sup>

### *Energy Northwest Institutional Structure*

A final aspect of the PSR Report worthy of mention, although not directly tied to the report's final recommendations, is criticism of the complexity and terms of the Energy Northwest institutional and governance structure. Specifically the report cites issues of "management without ownership" and periods of historical difficulty and conflict in decision making between BPA, Energy Northwest, and customers over plant investment decisions.

The ownership and governance structure for Energy Northwest and CGS specifically is fairly unique and complex due to the historical circumstances of its foundation. However there is fundamental alignment between budgetary decision making and the public agencies that ultimately pay the costs of the CGS through rates. Specifically, Washington public utilities, which bear a pro-rata share of any CGS costs through BPA rates, control the appointment of the majority of ENW executive committee members, with the remainder appointed by the Governor of the state of Washington. Additionally, CGS budgets are subject to intense scrutiny by BPA customers and interested parties through public BPA rate and cost processes.

Further, although BPA has never failed to approve a final budget for CGS and has not invoked binding arbitration to which it is entitled, BPA and its customers frequently have substantial influence on final budgets. There are numerous examples in which Energy Northwest has made substantial changes to the timing, level, and types of expenditures in its budgets for CGS as a result of public processes with BPA and public utility customers.

---

<sup>4</sup> The White Book is BPA's annual load and resource balance study that examines energy and capacity needs for both BPA and the region as a whole. For sustained winter peaking analysis, see for example Figure 1-3, Pacific Northwest Loads and Resources Study, available at <http://www.bpa.gov/power/pgp/whitebook/2013/2013WBK-Summary-Final.pdf>