Brayton Point Capacity Payment Requirement Analysis

Prepared for Consumer Advocates of New England

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1. INTRODUCTION

Brayton Point is a four-unit, 1,500 MW power station in Somerset, MA. Of the four units, the first three are coal-fired with a combined capacity of 1,124 MW. Unit four is primarily oil-fired with a capacity of 435 MW. In February 2014, at the outset of the auction for ISO New England's 2017-2018 commitment period, Brayton Point's owner, EquiPower Resources, elected to retire all four main units at the station, along with several small diesels also located at the station.[16] Without the Brayton Point units in the supply stack, that auction cleared at a record high of $15/kW-month, with administrative payments of $7.025/kW-month to existing resources. Because Brayton Point's owner also owns 1,600 MW of other capacity resources in New England, many of the state consumer advocates in New England are concerned that EquiPower Resources's decision to retire Brayton Point was not based on the economics of continued operation. Instead, the retirement decision may have been an exercise of market power that resulted in an artificially high market clearing price and exaggerated revenues for EquiPower Resources. In order to address their concern, the state consumer advocates asked Synapse Energy Economics to analyze the financial situation of the three coal-fired units at Brayton Point station.

The following brief report describes the results of an analysis of Brayton Point's coal units' estimated forward going costs, and presents an estimate of what a prudent business owner would set as the static de-list price and permanent de-list price for these units. The static de-list price is the price below which an owner would want to remove a resource from a single commitment period, while the permanent de-list price is the price below which an owner would want to remove a resource from all future commitment periods. We approximated these values by calculating (a) the monthly capacity payment requirements and (b) thirty-year levelized requirements as estimations for the static and permanent de-list prices, respectively. Our analysis of going-forward costs indicates that each of the three coal-fired units would require a price in the range of only $5/kW-month to continue operation economically.

2. ANALYSIS

2.1. Coal Asset Valuation Tool

Synapse was able to calculate the forward going costs of operating the Brayton Point coal units using our Coal Asset Valuation Tool, or "CAVT." CAVT was developed as a spreadsheet-based database and model capable of forecasting the forward-going costs for individual coal units associated with complying with current and proposed environmental regulations. It aggregates publicly available coal unit

[16] Brayton Point is owned by EquiPower Resources, a subdivision of Energy Capital Partners, a private equity firm. EquiPower Resources purchased Brayton Point from Dominion Energy New England in 2013.

characteristics and operations data from the U.S. Energy Information Administration's (EIA) Form 860[17] and Form 923,[18] and the U.S. Environmental Protection Agency's (EPA) Air Markets Dataset.[19] CAVT uses energy market forecasts from EIA's Annual Energy Outlook 2012 Electricity Market Module Assumptions.[20] Environmental control cost assumptions come from ICF's Integrated Planning Model (IPM) v.5.13 which was developed for the EPA,[21] the Electric Power Research Institute (EPRI), and other EPA control cost documentation. Detailed information on the source data can be found in Table 1.

Table 1. Sources used in CAVT for estimating forward-going costs of coal unit operations.

Assumption	Source used by CAVT
FGD	Sargent & Lundy (2013) *IPM Model – Updates to Cost and Performance for APC Technologies: Wet FGD Cost Development Methodology*. Retrieved from http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/v513/attachment5_1.pdf
Baghouse	Sargent & Lundy (2013) *IPM Model – Updates to Cost and Performance for APC Technologies: Particulate Control Cost Development Methodology*. Retrieved from http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/v513/attachment5_7.pdf
ACI	Sargent & Lundy (2013) *IPM Model – Updates to Cost and Performance for APC Technologies: Mercury Control Cost Development Methodology*. Retrieved from http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/v513/attachment5_6.pdf
SCR	Sargent & Lundy (2013) *IPM Model – Updates to Cost and Performance for APC Technologies: SCR Cost Development Methodology*. Retrieved from http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/v513/attachment5_3.pdf
Coal ash compliance	Electric Power Research Institute (2010) *Engineering and Cost Assessment of Listed Special Waste Designation of Coal Combustion Residuals Under Subtitle C of the Resource Conservation and Recovery Act*. Retrieved from http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001020557
ELG compliance	U.S. Environmental Protection Agency (2013) *Technical Development Document for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category*. Retrieved from http://water.epa.gov/scitech/wastetech/guide/steam-electric/upload/Steam-Electric_TDD_Proposed-rule_2013.pdf
Cooling	U.S. Environmental Protection Agency (2011) *Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule*. Retrieved from http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/upload/technicaldevelopment.pdf

[17] U.S. Energy Information Administration (2013) *Form EIA-860 detailed data*. Retrieved from http://www.eia.gov/electricity/data/eia860/index.html.

[18] U.S. Energy Information Administration (2013) *Form EIA-923 detailed data*. Retrieved from http://www.eia.gov/electricity/data/eia923/.

[19] U.S. Environmental Protection Agency (2012) *Air Markets Program Data*. Retrieved from http://ampd.epa.gov/ampd/.

[20] U.S. Energy Information Administration (2012) *AEO 2012 Electricity Market Module*. Retrieved from http://www.eia.gov/forecasts/aeo/assumptions/pdf/electricity.pdf.

[21] U.S. EPA (2013) *EPA's Power Sector Modeling Platform v.5.13*. Retrieved from http://www.epa.gov/airmarkets/progsregs/epa-ipm/BaseCasev513.html.

While CAVT has been used to explore the state of the economics of the coal fleet on a national level, the model can also produce unit-specific cost analyses. By comparing these estimates of future costs with the estimated future cost of wholesale electricity market purchases, CAVT can determine the future economic viability of continuing to operate a specific unit. More information on CAVT and its functionality can be found in Synapse's 2013 report *Forecasting Coal Unit Competitiveness*.[22]

2.2. Brayton Point Analysis

Cost estimates for operating the three Brayton Point coal units were projected over thirty years (2014-2043) using CAVT Version 4.25. We forecasted only avoidable costs; that is, costs that would otherwise be avoided if the plant were not participating in the capacity market and therefore had no obligation to participate in the energy market.[23] These costs include the fixed costs of plant operation and maintenance (FOM), non-environmental capital additions, and the cost of compliance with environmental regulations. For this analysis, environmental costs include the costs of construction and operation for the controls required for compliance with federal Mercury and Air Toxics Standards (MATS) and National Ambient Air Quality Standards (NAAQS) – flue-gas desulfurization (FGD), selective catalytic reduction (SCR), pulse-jet fabric filters (commonly known as baghouses), and activated carbon injection (ACI) – as well as the controls required for compliance with Section 316(b) of the Clean Water Act (listed in Table 2 as "Cooling"), Coal Combustion Residuals rule (CCR), and Effluent Limitation Guidelines (ELGs). Table 2 illustrates whether each of the Brayton Point units currently has a given control, and if not, when the control is expected to be required.[24] A "Y" in any one cell indicates that the unit already has the required control technology in place, while an "N" indicates that it does not, and that installation costs would begin on the control online date listed.

Table 2. Table of required environmental control equipment.

		FGD	SCR	Bag-house	ACI	Cooling	Coal Ash Residuals	Effluent
Env. Control Online Date		2025	2019	2018	2016	2019	2021	2019
Env. Controls Installed as of 2014?	*Brayton Point 1*	Y	Y	Y	Y	Y	N	N
	Brayton Point 2	Y	N	Y	Y	Y	N	N
	Brayton Point 3	Y	Y	N	Y	Y	N	N

Source: CAVT v.4.25

[22] Knight, P., E. A. Stanton, J. Fisher, B. Biewald. 2013. *Forecasting Coal Unit Competitiveness: Coal Retirement Assessment Using Synapse's Coal Asset Valuation Tool (CAVT)*. Synapse Energy Economics for The Energy Foundation. Available online at http://www.synapse-energy.com/Downloads/SynapseReport.2013-10.EF.CAVT-Report.13-020A.pdf.

[23] Avoidable costs are defined in the ISO-NE market rule Section III.13.1.2.3.2.1.2 (available online at http://www.iso-ne.com/regulatory/tariff/sect_3/mr1_sec_13-14.pdf).

[24] Control online dates are based on the "Mid" environmental retrofit case detailed in Synapse's 2013 report "Forecasting Coal Unit Competitiveness."

If a unit currently has a control, FOM costs are assumed to be incurred beginning in 2014.[25] If a unit requires a control in 2019 (for example), the unit will begin to incur FOM costs in that year, along with the cost of the related capital expenditure.[26] Variable operating and maintenance costs and future costs of carbon regulation are not included, as these costs are assumed to be recouped in the energy market.[27] These estimations represent an upper limit to what would be needed from the capacity market because we assume Brayton Point makes only makes revenues when it operates on the margin of the energy market (i.e., it makes no inframarginal rents from the energy market). This would only be the case if Brayton Point 1, 2 and 3 all operate on the margin, in all hours of operation. While we know this is not the case historically, we assume it for our analysis in order to create an upper bound on required capacity market revenue.

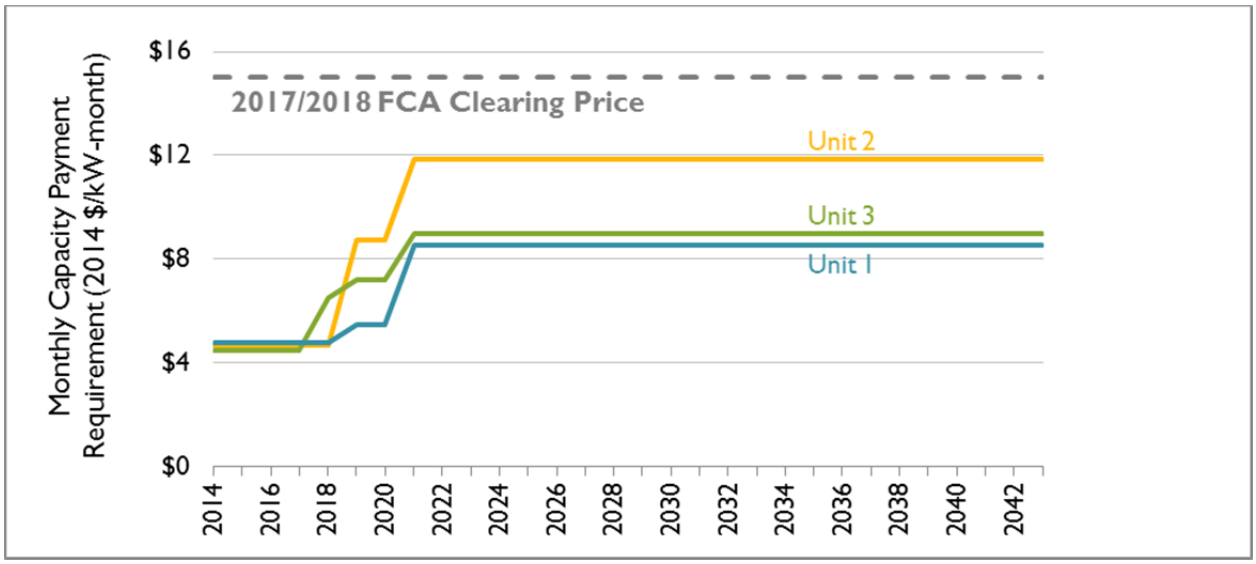
Because we are forced to use publicly available data, our analysis also makes other simplifying assumptions. As such, the price indicated does not strictly represent an expected static or permanent de-list bid price, but rather a price in the range of reasonableness. We assume that other factors listed in the formula for net risk adjusted going forward costs such as replacement power cost and probability of significant decrease, as applied to the Brayton Point units, would not have an influence great enough to change our price projection to one that is outside the bounds of expected auction prices.[28]

2.3. Brayton Point's Capacity Payment Requirement

Based on these assumptions, we defined the monthly capacity payment requirement as the payment price which causes a unit to "break-even" in any given year, and can thus serve as proxies for de-list prices. Figure 1 displays the resulting monthly capacity payment requirements. Note that the payment requirement escalates in the future as each unit requires additional environmental controls. These costs represent the static de-list prices for each year; the static de-list price for 2017, the year associated with the most recent Forward Capacity Auction, is shown in Table 3. Finally, the entire stream of each unit's costs were levelized over thirty years in order to determine a unit-specific permanent de-list bid price, also provided in Table 3.

[25] Capital costs from existing controls are assumed to be "sunk" and are therefore non-avoidable.
[26] Annual capital expenditure costs are calculated by first estimating a total cost for a given control, then levelizing the cost over the control's lifetime, which is 15 years in most cases. Once the control's lifetime has been reached, it is assumed an identical control is reinstalled at the site.
[27] The future capacity factors of these units is assumed to be unchanged, though this does not impact our analysis.
[28] The formula for net risk adjusted going forward costs is defined in the ISO-NE market rule Section III.13.1.2.3.2.1.2 (available online at http://www.iso-ne.com/regulatory/tariff/sect_3/mr1_sec_13-14.pdf).

Figure 1. Future estimated monthly capacity payment requirement for the Brayton Point units.



Source: Synapse analysis conducted with CAVT v.4.25

Table 3. Calculated de-list prices for the Brayton Point units.

	Static de-list price for 2017 (2014 $/kW-month)	Permanent de-list price (2014 $/kW-month)
Brayton Point 1	$4.809	$7.238
Brayton Point 2	$4.698	$9.586
Brayton Point 3	$4.497	$7.677
Plant-wide average	**$4.607**	**$7.992**

Source: Synapse analysis conducted with CAVT v.4.25

3. CONCLUSIONS

Using publicly available information on costs and assuming no net inframarginal rents from the energy market, we would expect capacity prices required for economic operation of the three Brayton Point coal units to be substantially below the starting price in FCA-8 of $15.82/kW-month.