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# Improving the Analysis of the Martin Drake Power Plant

How HDR's Study of Alternatives Related to  
Martin Drake's Future Can Be Improved

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# 1. INTRODUCTION

Martin Drake units 5, 6, and 7 (Drake) are three coal-fired electric generators owned by Colorado Springs Utilities (CSU) located in downtown Colorado Springs. Drake's future is uncertain: expensive environmental retrofits are required in the next few years if Drake is to continue being operated into the future. For example, the utility faces a critical January 30, 2018 deadline for Regional Haze compliance. CSU must decide very soon whether and in what year to retire each Drake unit if these environmental retrofit costs are to be avoided.<sup>1</sup>

CSU prepares a 20-year forward-looking integrated resource plan twice a decade, most recently its *2012 Electric Integrated Resource Plan* (2012 IRP). The 2012 IRP is not a recipe to which CSU will strictly adhere; rather, it is a roadmap to guide CSU's decisions on managing its assets, including Drake. In support of the upcoming 20-year plan, CSU commissioned the independent consulting firm HDR to prepare a report regarding the future of Drake.

In many ways the HDR report, *Study of Alternatives to the Potential Decommissioning of the Martin Drake Power Plant*, is similar to an integrated resource plan. The report studies CSU's system comprehensively over a 30-year window in an effort to find the lowest cost sources of power for the residents of Colorado Springs. It lays out a number of different multi-year investment alternatives so that CSU might choose an alternative which best balances financial costs, social costs such as health risks and pollution costs, and the risks ratepayers must bear. Like the 2012 IRP, each scenario contains a roadmap into the 2020s and 2030s, laying out future opportunities and challenges and the decisions that will be made and finalized years into the future.

The HDR report differs from the 2012 IRP in two important ways. First, the HDR report is designed to assist in making a specific decision in an immediate time frame: Should CSU spend significant amounts of money on retrofits at Drake so that it may legally operate past 2017, or should CSU find alternative sources of electric generation to meet customer need? Second, the HDR report differs from the IRP because it explicitly values social costs and benefits in addition to strictly financial costs and benefits. To best serve the interests of its ratepayer-owners, CSU's decisions should weigh the financial implications carefully, but they can and should also weigh the environmental and societal factors. HDR describes this concept as sustainable return on investment (SROI), and quantifies the presented alternatives by their SROI as well as their strictly financial return on investment (FROI).<sup>2</sup>

CSU must also consider the asymmetric risks present in the various alternatives. Continuing its heavy reliance on coal may yield a short-term financial benefit, but due to the growing risk of state and federal recognition (and costly regulation) of the externalities posed by coal mining, burning, and waste storage,

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<sup>1</sup> HDR. *Study of Alternatives Related to the Potential Decommissioning of the Martin Drake Power Plant* (henceforth "HDR study"), November 18, 2013, p. 16.

<sup>2</sup> HDR study, p. 8.

these costs could become internalized financial expenses. In other words, the regulatory risks that Drake faces could very likely result in direct rate increases for customers. Those risks cannot be ignored, even though it is difficult to quantify the magnitude of the potential costs that Drake will face. CSU should avoid the error of picking up a nickel in front of a steamroller: the upside is of small benefit, but the worst case is disastrous.

The findings of the HDR report make clear that operating Drake 15, 20, or 30 years into the future is too costly and too risky to be justified. In addition, we find that the HDR report contains a number of assumptions and inputs that we find to be unreasonable and that tend to bias the report in favor of retaining Drake and coal generation. When these errors are corrected, it is clear that spending large amounts of money on retrofits at Drake cannot be justified.

After a close review of the HDR report, Synapse recommends that HDR recalculate the FROI results using the adjustments detailed below. CSU should incorporate the SROI results, recalculated FROI results, and the asymmetric risks associated with coal retrofit investments in its decision making. CSU should focus on the decision to retire Drake 5 in 2015 to avoid the capital costs associated with dry sorbent injection (DSI), and should limit the alternatives considered to those which retire all coal-fired Drake units by the end of 2017, 2019, or 2022.

## 2. OVERVIEW OF HDR REPORT

The HDR report presents the results of twelve different alternatives over a 30-year modeling window. Alternative 1 is the “base case” that assumes the operation of Drake for 20 years (until 2034) with the installation of sulfur dioxide (SO<sub>2</sub>) scrubbers (the NeuStream System) on units 6 and 7 in 2015, and dry sorbent injection (DSI) on unit 5 in 2015. The base case also assumed installation of selective catalytic reduction (SCR) to control oxides of nitrogen (NO<sub>x</sub>) on all Drake units in 2023.

The HDR report considers a broad range of alternatives. Notably, the overall conclusion from HDR is that the economic impact of the various alternatives is “minimal” given the time scale and the total budget of CSU. The following are the primary points taken from the HDR report:

- The various retirement dates for Drake are “financially similar and not materially different.”<sup>3</sup> In other words, the difference in costs between spending more money on Drake and spending money on an alternative over the 20 year period is not significantly different, even before accounting for asymmetrical risks.
- HDR’s estimate of the social return on investment (SROI), which accounts for externalities such as health and pollution, determines that Alternative 2 has the largest SROI. Continuing to

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<sup>3</sup> HDR study, p.10.

operate Drake until 2034 creates an approximate \$1 billion social and environmental liability over the 20-year period.<sup>4</sup> Operating Drake after 2034 creates an even larger deficit.

- Customer rates would not increase significantly if Drake is retired within the next few years. HDR estimated that utility rates would increase less than 5% over the next five years as a result of retiring Drake under Alternative 2.<sup>5</sup> In fifteen years, rates would be lower if CSU retires Drake under Alternative 2 compared to keeping it open.
- Keeping Drake open exposes CSU customers to substantial risk from future environmental regulations. HDR noted that the (small) financial advantage of keeping Drake open is wiped-out if there is any cost applied to carbon emissions.<sup>6</sup>
  - A “low” CO<sub>2</sub> cost of \$10/ton in 2020 eliminates the relative economic advantage of keeping Drake open under all early retirement scenarios.
  - A “high” CO<sub>2</sub> cost of \$15/ton in 2020 would create an estimated a \$119 million benefit for retiring Drake under Alternative 2 and a \$174 million benefit under the 30 percent renewable generation Alternative 9.
  - Other environmental regulations – including 1-hour SO<sub>2</sub> requirements – could create additional expenses for keeping Drake open.
- Keeping Drake open exposes CSU customers to fuel price volatility.<sup>7</sup>

The HDR report concludes that under the SROI metric, there are clear and substantial benefits to retiring Drake in the near term. Under the FROI metric, the HDR report concluded that economic benefit of keeping Drake open, before accounting for asymmetrical risk, is minimal over the study period. The HDR report notes that Drake is old and faces substantial risk of increased maintenance costs. The HDR study notes that Drake units 5, 6, and 7 have exceeded their estimated design life of 35 years, and that the age of the units creates additional financial risks that units could experience higher maintenance costs and outages.<sup>8</sup>

Overall, the HDR report shows that Drake is marginal at best within the FROI context. When social costs are taken into account, the HDR report shows that Drake is clearly a liability. Synapse reviewed several assumptions in the HDR report and concluded that the financial liabilities under the FROI analysis of Drake are understated. Adjusting those assumptions, discussed in more detail below, further indicates that Drake should be retired in the near term.

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<sup>4</sup> HDR study, p.13, Table 1.2-1.

<sup>5</sup> HDR study, p.78.

<sup>6</sup> HDR study, Table 12.0-1.

<sup>7</sup> HDR study, p.10.

<sup>8</sup> HDR study, p. 58.

## 3. FINANCIAL RETURN ON INVESTMENT ADJUSTMENTS

HDR's analysis of the CSU system involved calculating the FROI of twelve different electric utility planning alternatives over a 30-year horizon. In general we find that their approach is sound. However, there are a number of important modeling decisions and calculations that leave room to refine and improve on the FROI estimates of the alternatives from which CSU must choose. These areas include both load and fuel price forecasts, construction and operational costs of retrofit equipment, management of the Drake site, future environmental compliance obligations to regulate greenhouse gas emissions, effluent, and coal combustion residuals. HDR's analysis also fails to appropriately quantify or otherwise account for the potentially catastrophic financial implications of the asymmetric risks that lie within some of the alternatives.

### 3.1. Forecast Errors

Determining the net present value (NPV) of costs borne and revenues received over the next 30 years requires forecasting the future. To forecast future costs and requirements of each alternative planning scenario, HDR relied on a variety of data sources including CSU itself, federal agencies, and third parties. While all forecasts used by HDR have some impact on determining the FROI (and SROI) of the alternatives, a few forecasts warrant careful review because they have a particularly large impact on the final results. To the extent that the data were available, Synapse reviewed the most influential forecasts and identified areas for improvement; details can be found below. Updating and improving the forecasts detailed below will result in more reasonable and robust FROI estimates, thereby allowing CSU the opportunity to make a decision concerning the Drake units with the best available information.

#### Load

The load forecasts in the HDR report are too high. The load forecast used by HDR is briefly described in its report; Table A-10 presents the annual forecasted sales from 2013 – 2043.<sup>9</sup> This forecast does not include future energy efficiency or demand response programs. It appears that CSU provided HDR with the forecast, which has an associated date of February 19, 2013.<sup>10</sup> While the HDR report provides no details about the methodology for generating this forecast, the 2012 IRP includes details on Colorado Springs Utilities' forecast used just a few months earlier. That forecast, calculated in March 2011 by CSU staff, was developed with econometric modeling, with "the population forecast from the Colorado State Demographer in the Colorado Department of Local Affairs" described as the "key forecast."<sup>11</sup>

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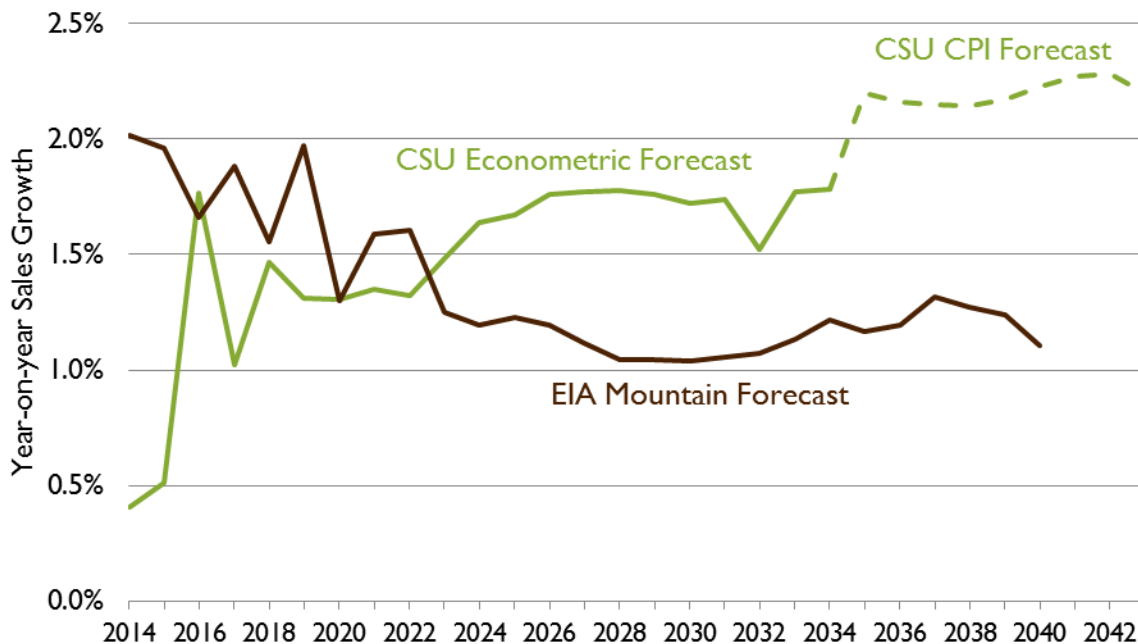
<sup>9</sup> HDR study, Appendix A, Table A-10.

<sup>10</sup> HDR study, p. 20. Synapse attempted to contact HDR and CSU to clarify the nature of the forecasts provided by CSU for the HDR report; however, CSU's attorneys instructed HDR not to provide any information to Synapse or Sierra Club without prior approval. Sierra Club contacted CSU to request approval, but CSU did not respond to those requests.

<sup>11</sup> Colorado Springs Utilities. *2012 Electric Integrated Resource Plan*, August 6, 2012, p. 8.

The latter years of the load forecast raise concerns on two fronts. For years 2035 – 2043, it does not appear that the CSU econometric study was used, nor was the forecast of local population provided by the Colorado State Demographer or anyone else. Instead, the sales growth in these years grows exactly as the Moody’s CPI for El Paso County grows.<sup>12</sup> No independent location-specific consideration was given to population growth, energy intensity, or any other relevant factor—just local consumer price index (CPI). The econometric-based forecasts have annual increases between 0.4 percent and 1.8 percent, but the CPI-based forecasts grow between 2.1 percent and 2.3 percent per year. This CPI rate also contradicts the general assumption made by HDR for the study, where “a 2 percent per year value was utilized.”<sup>13</sup> The load forecast relied on by HDR therefore appears to use a rate of growth that is too high in 2035 - 2043.

**Figure 3-1 Year-on-year Sales Growth Forecasts**



Source: CSU, AEO 2013

Further contrasting with HDR’s CPI approach, the Energy Information Administration’s *Annual Energy Outlook 2013* Reference Case forecast for the Mountain Region’s electricity consumption is dramatically less than CSU’s forecast, from 2024 through the end of the study.<sup>14</sup> The Mountain Region is a much larger area—comprising Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, and New

<sup>12</sup> See 2013 Electric Planning Forecast 02 19 2013 – 30 yr for D.xls, Sheet 1, columns B and H, rows 267 ... 374.

<sup>13</sup> HDR study, p. 17.

<sup>14</sup> U.S. Energy Information Administration, *Annual Energy Outlook 2013*, April 2013, Table 2.8. Energy Consumption by Sector and Source – Mountain.

Mexico—and comparisons should be made with care. Nevertheless, this region is generally expected to have substantial growth, yet the EIA expects electricity consumption to grow more slowly than the forecast used by HDR. Figure 3-1 contains the year-on-year sales growth in the CSU and EIA Mountain forecasts. Note that CSU’s forecasted growth is substantially higher than the EIA’s forecasted growth, both in the latter years of CSU’s econometric forecast (2024 – 2034) *and* in CSU’s CPI-based forecast (2035 – 2043). By 2040, CSU’s forecasted annual growth is *twice* the EIA’s forecast.

Synapse believes that HDR should be using a forecast much closer to the EIA forecast for years 2024 – 2043. HDR’s use of an overly-high load forecast tends to favor scenarios that keep Drake on line through the end of the study period.

## Fuel Price

The HDR report overstates the relative value of Drake because it relies on unrealistically low fuel price estimates. Because coal and natural gas fuel the vast majority of electricity generated by CSU now and in the foreseeable future, using robust price forecasts for these fuels is essential. These costs can be divided into two portions: the cost of the fuel itself, and the cost of delivery. HDR’s fuel prices are significantly lower compared to the forecasts made in the U.S. Energy Information Administration’s *Annual Energy Outlook 2013* (AEO 2013) —particularly the price used for coal.

Fuel price estimates include both commodity and transportation components. The cost of fuel transportation to specific CSU sites is highly dependent on a number of complex details that are not included in the HDR report or CSU’s 2012 IRP. Therefore, Synapse cannot comment on the appropriateness of these estimates. However, the estimated commodity prices for coal and gas used in the HDR study are unrealistic because they deviate significantly from EIA estimates. The coal mine mouth prices used in the HDR report are 25 – 35 percent less than EIA estimates over the entire 2014 – 2040 timeline.<sup>15</sup> The gas prices, while more in line with EIA estimates, are also a bit lower than EIA’s—a difference that grows markedly in the out years (Figure 3-2). A wide variation in the near term can be explained if HDR’s prices reflect CSU’s current supply contracts, but as those contracts come up for re-negotiation, CSU’s price of coal will converge to the market price. This price will likely be much higher than the estimates in the HDR report. The large coal deviation and smaller natural gas deviation don’t simply cancel each other out when considering alternatives—they lead to a bias in favor of coal.

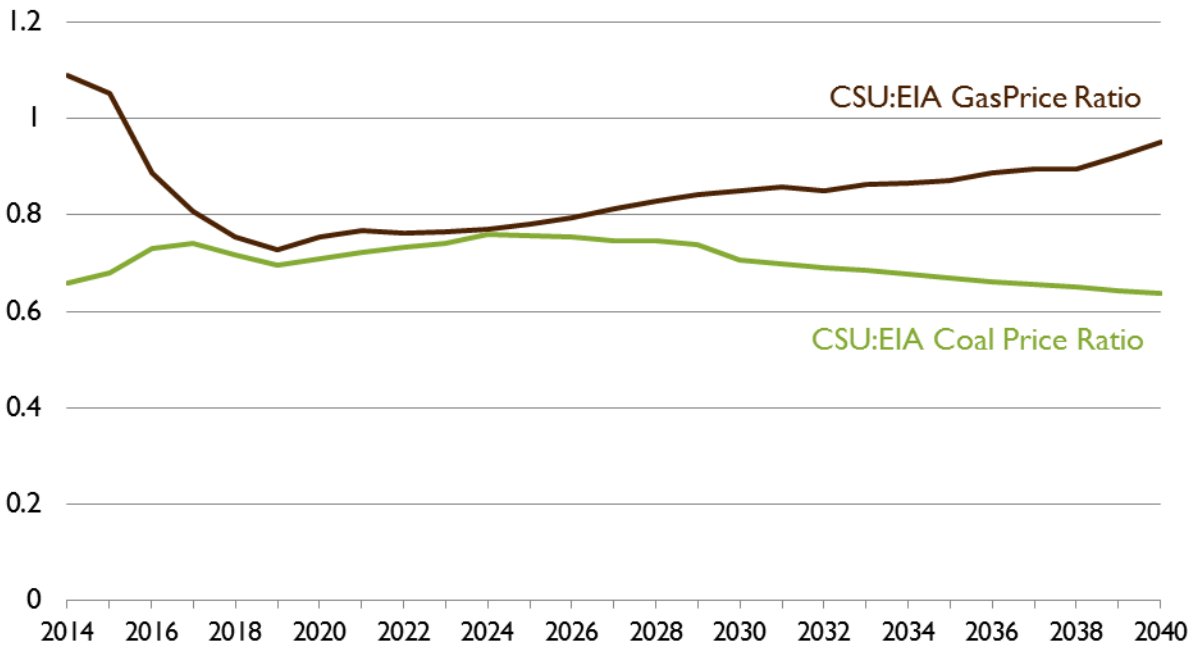
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<sup>15</sup> U.S. Energy Information Administration, *Annual Energy Outlook 2013*, April 2013, Table 3.8. Energy Prices by Sector and Source – Mountain.





Figure 3-2 CSU-to-EIA Coal and Gas Forecasted Price Ratios



Source: CSU, AEO 2013

### 3.2. Underestimated Capital Costs

Capital costs associated with new resources and retrofits of existing retrofits figure strongly in both SROI and FROI analysis. HDR uses sensitivity analysis to study potential capital cost forecast risks. Recognizing that “retrofit projects are known to have higher risks for cost overrun,” HDR created a sensitivity analysis with “20 percent variation in total project costs.”<sup>16</sup> This approach is problematic. First, it assumes symmetric risk: that costs are as likely to be 20 percent lower than estimated as 20 percent higher than estimated. It also assumes that a 20 percent cost overrun (or underrun) is a somewhat extreme case. Synapse has been engaged on many projects involving FGD installations (i.e. scrubbers), and in our experience pre-project engineering estimates tend to represent a lower bound of installation costs.<sup>17</sup> As an example, consider the case of Public Service of New Hampshire’s Merrimack Station scrubber. The original estimate for the scrubber installation was \$250 million, and the final price tag was \$422 million.<sup>18</sup> Synapse is not privy to the contract specifics of the NeuStream installation at Drake, but if the city of Colorado Springs is not adequately protected from cost overruns by preexisting ironclad price guarantees, HDR should consider a project cost substantially higher than the estimated cost of

<sup>16</sup> HDR study, p. 55.

<sup>17</sup> Many of these estimates and final installation costs are protected by confidentiality agreements.

<sup>18</sup> Rayno, Gary. *PSNH on Defense Over Scrubber Cost Escalation*, December 11, 2013. Available at: <http://www.unionleader.com/article/20131211/NEWS02/131219890&template=mobileart>.

\$110 million<sup>19</sup> because industry experience suggests that this is a highly likely outcome. This scenario is particularly relevant in the case of a new and relatively untested technology such as NeuStream. Both HDR and Synapse recognize that retrofit project final costs are frequently higher than estimates; our recommendation is that HDR include a higher cost for the NeuStream retrofit in its base case, not just in its sensitivity analysis.

### 3.3. Expected Financial Costs Omitted from the FROI Altogether

HDR omitted a number of financial costs from their FROI calculation. In some cases, the omitted costs are admittedly difficult to accurately quantify. However, these costs – even if they are uncertain – must be included in order to calculate FROI correctly. Using a price of \$0 due to uncertainty is inappropriate because it assumes that the cost will never be incurred. Instead, HDR must use a best estimate price in the FROI and sensitivity.

#### Costs of Initial Operations

HDR notes that because Drake is to be “the first full-scale Neumann FGD application, start up problems can be expected during the first year or two of operation.”<sup>20</sup> However, instead of incorporating these expected additional costs in the base case analysis, HDR models them only as a sensitivity. If a cost is likely, it should be modeled in the base case. By failing to do so, both with respect to capital costs and initial operations, HDR underreports the expected financial costs of the NeuStream FGD system. HDR should correct this by including the expected value of initial operations costs, along with realistic capital costs, in the base case FROI analysis.

#### Costs of Site Remediation and Salvage Value

With respect to Drake site remediation and reuse, HDR omits two financial implications in some or all of its alternatives. First, it assumes site abandonment with little or no remediation in some of its alternatives. Even if the Colorado Springs, state, or federal government do not require cleanup immediately upon retirement of the Drake units, the risk that a future city, state, or federal government will require cleanup requires that CSU keep the liability on its books. CSU has a fiduciary duty to the ratepayers to include the future cost of full site remediation in all of its alternatives, because that is a cost that will be imposed on the city it serves in one form or another. HDR should include full site remediation in all alternatives, within the FROI analysis, because those costs will be borne by CSU eventually.

Furthermore, once the Drake site is remediated, the land itself has value. Whether CSU sells or leases the land, the revenue streams that CSU gains as a result of the new use of the Drake site should be

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<sup>19</sup> Gillentine, Amy. *NeuStream: Q-and-A on Drake coal scrubber*, March 7, 2013. Available at: <http://csbj.com/2013/03/07/neustream-q-and-a-on-drake-coal-scrubber/>.

<sup>20</sup> HDR study, p. 57.

included in the FROI analysis. There is no evidence in the HDR report that either of these site remediation and reuse issues is included in the FROI reporting.

### **Costs of Environmental Regulations**

There are a number of costs associated with environmental regulation that are made explicit and are included in the HDR analysis. For example, both Regional Haze and National Ambient Air Quality Standards (NAAQS) requirements (as currently formulated) are considered in FROI analysis, in the form of the NeuStream retrofit and selective catalytic reduction (SCR) equipment. However, there are a number of other environmental regulations on the horizon, and these regulations, while not finalized, are likely to impose additional financial costs on the operation of Drake. These costs must be incorporated in the FROI, even though the precise dollar amount is uncertain. The regulations for which HDR does not include costs within the FROI calculations are discussed below. Properly including these costs would make the operation of Drake into the 2020s appear far more expensive from an FROI perspective.

### ***Restrictions on Greenhouse Gas Emissions***

HDR acknowledges the high likelihood of future regulations on greenhouse gas emissions through Clean Air Act Section 111(d) or some other means, stating that “at the time of this report, the US EPA is also in the process of developing rules associated with limiting CO<sub>2</sub> emissions from existing power plants.”<sup>21</sup> HDR discusses the accompanying financial cost in a number of portions of the report, including the first bullet in *1.2 Decision Drivers* and in more detail in *9.1.1 Restrictions on Greenhouse Gas Emissions*.<sup>22,23</sup> While HDR repeatedly warns the reader of upcoming greenhouse gas regulations and the significant associated financial risk, HDR does not include these expected costs in the FROI analysis. This omission is significant; although the costs are uncertain, their potential magnitude is substantial. HDR acknowledges the cost potential in sensitivity analysis, running a “low” case and a “high” case for the costs of future greenhouse gas regulation compliance.<sup>24</sup> Because HDR does not include any cost of compliance in the FROI analysis base case, the result is a base case that is lower than the “low” case. As Synapse states in its *2013 Carbon Dioxide Price Forecast*, “prudent planning requires electric utilities ... to use a reasonable estimate of the future price of carbon dioxide (CO<sub>2</sub>) emissions when evaluating resource investment decisions with multi-decade lifetimes.”<sup>25</sup> For example, investor owned utilities (which must show prudence before public utility commissions) such as Idaho Power,<sup>26</sup> Kansas City Power and Light

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<sup>21</sup> HDR study, p. 16.

<sup>22</sup> HDR study, p. 10.

<sup>23</sup> HDR study, p. 47.

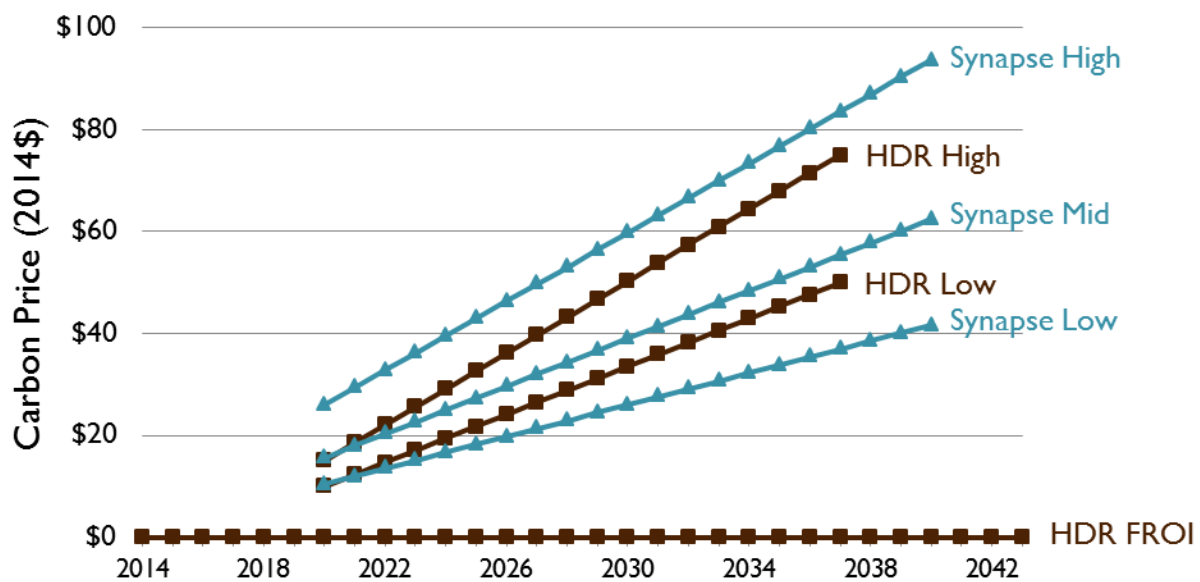
<sup>24</sup> HDR study, p. 60, Table 10-1.

<sup>25</sup> Patrick Luckow et al. *2013 Carbon Dioxide Price Forecast*, November 1, 2013, p. 1.

<sup>26</sup> Idaho Power 2013 Integrated Resource Plan Advisory Council Materials. Available at: [http://www.idahopower.com/AboutUs/PlanningForFuture/irp/2013/IRPAC\\_Materials.cfm](http://www.idahopower.com/AboutUs/PlanningForFuture/irp/2013/IRPAC_Materials.cfm).

Company,<sup>27</sup> and Portland General Electric<sup>28</sup> all included CO<sub>2</sub> prices in their most recent IRPs. By not including any carbon price in the FROI analysis, HDR's FROI calculations presume that there is zero chance that there will be any state, regional, or national carbon pricing scheme—be it a tax, cap and trade, or otherwise—between today and 2043. This position is at odds with HDR's statement on the likelihood of greenhouse gas emissions throughout its report, with Synapse's analysis, and with the planning models used by electric utilities across the country. Synapse recommends that HDR include a (non-zero) carbon price when calculating FROI in the base case. As shown in Figure 3-3, the November 2013 Synapse Mid forecast is similar to the HDR Low forecast, and would be a reasonable base case carbon price assumption to use in HDR's FROI calculations.

**Figure 3-3 Synapse and HDR CO<sub>2</sub> Price Trajectories**



Source: Synapse, HDR

Omitting a carbon price in the FROI calculation is a substantial error, as it fails to include a substantial future cost. Ignoring these costs causes Drake retrofit FROI costs to appear too low relative to early retirement scenarios. Similarly, scenarios with higher quantities of renewable generation installed in earlier years have a more favorable FROI than the HDR study suggests, once realistic forecasts of CO<sub>2</sub> emissions costs are considered.

<sup>27</sup> KCPL 2013 Integrated Resource Plan Annual Update, June 2013, p. 24.

<sup>28</sup> PGE Integrated Resource Plan 2013. 2nd Stakeholder Presentation & Discussion. May 28, 2013. Available at: [http://www.portlandgeneral.com/our\\_company/energy\\_strategy/resource\\_planning/docs/may\\_28\\_presentation.pdf](http://www.portlandgeneral.com/our_company/energy_strategy/resource_planning/docs/may_28_presentation.pdf).

### ***Effluent Limitation Guidelines***

Effluent Limitation Guidelines (ELGs), covered by Title III of the Clean Water Act, are national standards for wastewater discharge. A proposed ELG rule amending the effluent limitations for the steam electric power industry was published on June 7, 2013.<sup>29</sup> Compliance with new ELGs is likely to cost \$50 million in capital costs, with fixed operations and maintenance (O&M) costs at approximately \$80 per kilowatt-year.<sup>30</sup> While less expensive than the cost of the NeuStream system, these costs are substantial and will likely be faced by CSU should Drake operate in 2022 or later.<sup>31</sup> These expected costs should have been included in the FROI calculations as well as Section 9.1 of the HDR report.

### ***Coal Combustion Residuals***

Coal combustion residuals (CCRs) are currently considered exempt wastes under the Resource Conservation and Recovery Act (RCRA). EPA has published a proposed rule that would list the residuals under either Subtitle C (hazardous) or Subtitle D (non-hazardous) of the RCRA. While the final regulation is still uncertain, it is clear that CSU will face capital costs and operating costs under a CCR rule. If EPA determines that CCRs are hazardous, then the capital costs could be very high. Depending on a number of factors, the CCR rule will go into effect sometime in the late 2010s. The costs to CSU could be as high as \$170 million in capital costs with fixed O&M costs between \$20 and \$55 per kilowatt-year.<sup>32</sup> These costs should also be included in the FROI analysis.

## **4. SUBSTANTIAL RISKS OF RETROFITTING**

There are a substantial number of important and asymmetric risks associated with retrofitting Drake that were neglected in the HDR analysis.

### **4.1. NeuStream Underperformance**

HDR notes the uncertainty associated with installing a new technology, such as NeuStream, that has not been widely adopted. HDR discusses the risk of NeuStream operability, availability, and reliability in

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<sup>29</sup> U.S. Environmental Protection Agency. *Proposed Effluent Guidelines for the Steam Electric Power Generating Category*. Available at: <http://water.epa.gov/scitech/wastetech/guide/steam-electric/proposed.cfm>.

<sup>30</sup> Synapse Energy Economics. *Forecasting Coal Unit Competitiveness: Coal Retirement Assessment Using Synapse's Coal Asset Valuation Tool (CAVT)*, October 11, 2013. Available at: <http://www.synapse-energy.com/Downloads/SynapseReport.2013-10.EF.CAVT-Report.13-020A.pdf>.

<sup>31</sup> U.S. Environmental Protection Agency. *Proposed Effluent Guidelines for the Steam Electric Power Generating Category*. Available at: <http://water.epa.gov/scitech/wastetech/guide/steam-electric/proposed.cfm>.

<sup>32</sup> Synapse Energy Economics. *Forecasting Coal Unit Competitiveness: Coal Retirement Assessment Using Synapse's Coal Asset Valuation Tool (CAVT)*, October 11, 2013. Available at: <http://www.synapse-energy.com/Downloads/SynapseReport.2013-10.EF.CAVT-Report.13-020A.pdf>.

Section 9.5.3.<sup>33</sup> However, HDR does not even mention the very real and very costly possibility that the NeuStream system may not remove enough sulfur from the Drake emissions to meet Regional Haze rule requirements. In setting the Regional Haze pollution limits for Drake, the Colorado Department of Public Health and Environment clearly indicated that Drake will be required to meet an SO<sub>2</sub> standard regardless of which technology it selects:

Although the technology being tested by CSU does not technically meet the definition of “available” as set forth in the BART rules, the Division is willing to allow CSU the opportunity to prove the technology and if successful, the opportunity to install the NeuStream-S FGD scrubber. This process will be required to meet the emission limits established for the LSD technology established in this BART determination. Regardless of the technology utilized, Drake has to meet the LSD-based BART limits within 5 years of EPA approval of the BART SIP.<sup>34</sup>

If the experimental NeuStream system fails to scrub SO<sub>2</sub> adequately, CSU will have to choose between either retiring Drake immediately after spending over \$100 million in an attempt to keep it operational, or spend *another* \$150 million (or very possibly more) on an FGD system with broad market share to keep Drake operational. This risk is exacerbated because the new one-hour standard for SO<sub>2</sub> under NAAQS is more stringent than the current NAAQS rule. Under the one-hour standard, coal-fired power plants will have to be compliant to the SO<sub>2</sub> standard in nearly every hour of the day, rather than on a rolling 30-day basis.<sup>35</sup> HDR’s observation that “as the first full-scale Neumann FGD application, startup problems can be expected during the first year or two of operation” suggests that CSU may have difficulty meeting the new NAAQS standards during that timeframe, and may suffer substantial financial penalties as a result.<sup>36</sup>

## 4.2. Regulatory Risk

Colorado Springs Utilities faces a long list of regulatory risks, each of which could saddle CSU with tens or hundreds of millions of dollars of additional cost obligations. Some of these risks are specific to coal (Martin Drake and Nixon 3), whereas others are simply more costly for coal operations than natural gas. Synapse believes that each of the following regulatory outcomes is *likely*—the uncertainty lies in the timeline of when the regulations are enacted and the magnitude of additional cost.

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<sup>33</sup> HDR study, p. 56.

<sup>34</sup> *Best Available Retrofit Technology (BART) Analysis – Colorado Spring Utilities Drake*, page 7. Available at: <http://www.colorado.gov/cs/Satellite/CDPHE-AP/CBON/1251595092457>.

<sup>35</sup> On June 2, 2010, the Administrator signed a notice establishing a new one-hour primary SO<sub>2</sub> NAAQS of 75 parts per billion (ppb), which is attained when the three-year average of the 99<sup>th</sup> percentile of one-hour daily maximum concentrations does not exceed 75 ppb. 75 Fed. Reg. 35520, June 22, 2010.

<sup>36</sup> HDR study, p. 57.

## Greenhouse Gas Emissions

As discussed earlier and acknowledged by HDR, Clean Air Act Section 111(d) regulations, or some other form of greenhouse gas regulations, will impose a new cost on operating Drake, Nixon 3, and CSU's gas-fired plants. Due to the higher carbon intensity of coal, the cost imposed on Drake will be 2-3 times as high as some other fossil plants owned by CSU. As noted earlier, despite explicitly acknowledging the likelihood of these costs, HDR omitted them in the base case, resulting in a "base case" with lower emissions costs than the "low" case. This omission assumes that there will be zero carbon regulation over the next 20 years, which HDR admits is an unlikely scenario.

## Regional Haze

HDR asserts regulatory risk for Regional Haze, observing that "the risk of reductions being required or BART purposes is probably low before 2020, moderate in the mid 2020s, and high in the mid 2030s and beyond."<sup>37</sup> Choosing to operate Drake for another 15, 20, or 30 years includes a high chance of additional capital investments necessary for Drake, whereas retiring Drake within the next few years eliminates that risk entirely.

## Renewable Energy Standard

Colorado Springs Utilities is affected by Colorado's Renewable Energy Standard (RES). Whereas investor-owned utilities are required to meet a 30 percent renewable standard by 2020 and large electric cooperatives are required to meet a 20 percent renewable standard by 2020, municipal utilities like CSU are currently only obligated to include 10 percent renewables in their energy mix by 2020. Colorado's RES was established in 2004,<sup>38</sup> and expanded in 2007,<sup>39</sup> 2010,<sup>40</sup> and again in 2013.<sup>41</sup> Given this trend, it is certainly possible that Colorado will again expand its RES in the future. Should that happen, CSU would likely the life of Drake 5, 6, and 7 instead of pursuing additional wind, solar, hydro, or other renewable sources, either through self-build or power purchase agreement (PPA).

# 5. CONCLUSION

CSU faces an important decision that must be made soon: Should CSU spend significant amounts of money on NeuStream retrofits at Drake, or should it retire Drake in 2017 before the Regional Haze rule requirements take effect? If Drake is to be retrofitted, will it operate for an additional two or five years,

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<sup>37</sup> HDR study, p. 50.

<sup>38</sup> Colorado Amendment 37, passed November 2, 2004.

<sup>39</sup> Colorado HB 07-1281.

<sup>40</sup> Colorado HB 10-1001.

<sup>41</sup> Colorado SB 13-252.

or will it operate for decades thereafter? CSU hired an independent firm, HDR corporation, to provide an independent analysis and to assist in making the decision. We believe that HDR's FROI and SROI dual approach is a sensible one for a municipal utility that should consider both financial and non-financial impacts on its resident ratepayers.

HDR's SROI results are clear: retiring Martin Drake sooner is better for Colorado Springs. Alternative 2 has the highest SROI under HDR's analysis, and it includes retiring Drake 5 in 2015 and Drake 6 and 7 in 2019.

While we find that the framework of HDR's FROI analysis is sound, there are a number of opportunities to improve HDR's FROI estimates and remove biases. HDR should consider revising its load, coal price, and natural gas price forecasts as described above. Furthermore, HDR should include site remediation, the operating costs associated with a carbon price, and the capital and operating costs associated with effluent limitation guidelines and coal combustion residues in its FROI calculations. HDR should have included the likelihood of much higher capital costs for the retrofits, along with the significant risk of underperformance and higher initial operating costs. HDR recognizes many of these costs in its sensitivity analysis, stating for example that "the imposition of a significant carbon tax or penalty could make many of the alternatives more attractive than the base case" and that "additional charges for the cost of byproduct disposal can also have a very material impact on the relative performance of the alternatives improving their relative FROI performance to the base case."<sup>42</sup> Had HDR included these financial costs in the FROI analysis—as well as costs associated with ELGs, CCR, and the likelihood of cost overruns—it is almost certain that a plan including the early retirement of Martin Drake would have been shown to be financially superior to the base case. In fact, including a more comprehensive FROI analysis may have demonstrated that retiring Drake 5 in 2015, retiring Drake 6 and 7 in 2017, and incorporating more wind as the most attractive alternative on both an FROI and an SROI basis.

Continuing Drake operations is a poor option on the basis of a properly calculated FROI; in that respect Synapse agrees with HDR's overall assessment that "the key question to be addressed by CSU and the Colorado Springs community is when to actually retire the plant."<sup>43</sup> Ongoing operations at Drake also entail a long list of financial risks that could harm Colorado Springs ratepayers in the future. These costs are tied to operating Drake; retiring Drake would eliminate these risky positions from CSU's portfolio. Even HDR's uncorrected FROI shows very little potential financial benefit in return for this significant risk; once the HDR analysis is corrected as discussed above, even that small benefit will likely turn into a liability.

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<sup>42</sup> HDR study, p. 87.

<sup>43</sup> HDR study, p. 91.