

Before the Public Service Commission
of the State of Wyoming

In the Matter of the Application of Cheyenne Light, Fuel and Power
Company and Black Hills Power, Inc. d/b/a Black Hills Energy to Establish
Intermediate Low-Carbon Energy Portfolio Standards and Requirements

Docket No. 20003-__-EN-22

Docket No. 20002-__-EN-22

(Record No. _____)

March 31, 2022

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EXHIBITS

- Exhibit 1 – Black & Veatch Report
- Exhibit 2 - January 27, 2022 DOE RFI Letter
- Exhibit 3 - Wyodak Facility Ownership and Operation Agreement
- Exhibit 4 - Wygen II Revenue Requirement Analysis
- Exhibit 5 - Neil Simpson II Revenue Requirement Analysis

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF WYOMING

IN THE MATTER OF THE APPLICATION OF)	
CHEYENNE LIGHT, FUEL AND POWER COMPANY)	Docket No. 20003-__-EN-22
AND BLACK HILLS POWER, INC. d/b/a BLACK)	Docket No. 20002-__-EN-22
HILLS ENERGY TO ESTABLISH INTERMEDIATE)	(Record No. _____)
LOW-CARBON PORTFOLIO STANDARDS AND)	
REQUIREMENTS)	

Cheyenne Light, Fuel and Power Company and Black Hills Power, Inc. d/b/a Black Hills Energy (“Cheyenne Light,” “Black Hills Power” or collectively “Black Hills”), hereby submit this Application to establish intermediate low-carbon portfolio standards and requirements pursuant to Wyo. Stat. § 37-38-102 and Chapter 3, Section 38 of the Rules of the Public Service Commission of Wyoming (the “Commission”).

Cheyenne Light is incorporated under the laws of the State of Wyoming with a principal place of business at 1301 W. 24th St., Cheyenne, Wyoming. Black Hills Power is incorporate under the laws of the State of South Dakota with a principal place of business at 7001 Mount Rushmore Road, Rapid City, South Dakota. Cheyenne Light and Black Hills Power are public utilities as defined by Wyo. Stat. §37-1-101 and have been granted authority by the Commission to provide electric utility service in Wyoming.

Background and Summary of Application

In 2020, the state of Wyoming enacted new statutes requiring the Commission to establish low-carbon energy portfolio standards (Wyo. Stat. § 37-18-101 – 102). To implement the requirements of these statutes, the Commission created Commission rule, Chapter 3, Section 38, requiring all public utilities to file an application with intermediate standards and requirements by March 31, 2022. This rule applies to all generating units owned by a public

utility regulated by the Wyoming Commission or co-owned with another Wyoming Commission regulated utility.

Cheyenne Light and Black Hills Power submit this Application in compliance with Wyoming Statutes and Commission rules for two utility owned coal fired generation facilities – Wygen II and Neil Simpson II. Wygen II is a 90 MW coal-fired steam generator wholly owned by Cheyenne Light located at the Gillette Energy Complex. Wygen II began operation on January 1, 2008 and obtains all its fuel from the adjacent Wyodak coal mine. Neil Simpson II is an 80 MW coal-fired steam generator wholly owned by Black Hills Power located at the Gillette Energy Complex. Neil Simpson II began operation on September 5, 1995 and obtains its fuel from the adjacent Wyodak coal mine.

Black Hills Power has ownership interests in two additional coal fired generation facilities that are not a part of this report – Wygen III and Wyodak. Wygen III is a coal-fired steam generator with 110 MW of total capacity located at the Gillette Energy Complex. Black Hills Power has a 52% ownership in the plant; Montana-Dakota Utilities has a 25% ownership in the plant; and the City of Gillette has a 23% ownership in the plant. This facility is not subject to the reporting requirement under Commission rule Section 38 as the facility has an owner (the City of Gillette) not subject to the Commission’s jurisdiction,¹

Wyodak is a coal-fired generating facility with a total capacity of 362 MW located at the Gillette Energy Complex. Black Hills Power has a 20% ownership in the plant; PacifiCorp has an 80% ownership in the plant. Black Hills Power and PacifiCorp have a Facilities Ownership and Operation Agreement that addresses capital additions. As Operator, it is PacifiCorp’s

¹ Section 38 (d): No application under subsection of this Rule is required for any unit in a Coal Fired Electric Generation Facility where a utility subject to this Commission’s jurisdiction has a part-ownership interest in the facility with another utility or utilities, one or more of which is not subject to the Commission’s jurisdiction pursuant to W.S. §37-1-101.

responsibility to prepare cost estimates of capital additions, and construct and install any such additions with costs shared pursuant to ownership interests:

At any time either party shall determine a capital addition is desirable or useful (other than replacements budgeted under the maintenance and repair provisions of this Agreement), the Operator shall have prepared a cost estimate of such capital addition, and, if the parties agree, proceed with construction and installation, the costs thereof to be borne by the parties in proportion to their Percentage Shares.²

Further, it is the responsibility of PacifiCorp, as the Operator of the facility, to undertake any capital additions required by law or regulation:

Except as hereinafter provided, at any time a capital addition is required by law or by order or regulation of a governmental regulatory authority having effect of law, the Operator shall proceed with construction and installation, the costs thereof to be borne by the parties in proportion to their Percentage Shares.³

For cost and efficiency purposes, pursuant to the Facility Ownership and Operation Agreement, and given its minority ownership in the facility, Black Hills Power is relying on PacificCorp to submit an initial analysis of the Wyodak facility. Black Hills Power asks that the Commission excuse the joint application requirement at this time for these reasons, and Black Hills Power will incorporate the analysis of the facility, including customer impact calculations into its final report in March of 2023.

Black Hills retained Black & Veatch to evaluate carbon capture utilization and storage (“CCUS”) solutions for removal of carbon dioxide (“CO₂”) on the Neil Simpson II and Wygen II facilities. Through this evaluation, Black & Veatch identified the most mature CCUS technology for the units, plant performance with CCUS technology installed, and projected capital and O&M costs for operation of the units. Black & Veatch produced a report that outlines the

² Exhibit 3, page 9.

³ *Id.*

analysis and findings and contains information as required by Commission rule (“B&V Report”).
See Exhibit 1 – Black & Veatch Report.

Black Hills approach to achieve a portfolio of low-carbon dispatchable resources is based on three guiding principles for innovation:

1. Minimize customer cost impact and maintain safe, reliable service
2. De-risk through demonstration projects or with commercially available technology
3. Evaluate emergent strategies as carbon capture technologies evolve

According to the B&V Report, “amine-based solvent CO₂ capture systems are the most common and proven technology.” It is important to note that while amine-based solvent CO₂ capture has been demonstrated in process industries, at this time, Black Hills knows of no full-scale, commercial carbon capture project within the electric utility industry. With this in mind, and if determined feasible, Black Hills would plan to first implement a partial capture demonstration project.

The cost estimates for CCUS in the B&V report are intended to determine the magnitude of investment only for CCUS technology that is proven and commercially available. The feasibility of adding carbon capture requires further economic evaluation. This economic evaluation will include securing firm pricing comparing coal to gas conversion to CCUS. The investment required to achieve 50% CO₂ reduction with coal to gas conversion is approximately \$20 MM as compared to the investment to achieve 90% CO₂ reduction with CCUS which is approximately \$468MM. Black Hills has determined that there is also significant financing risk with CCUS since over half of 45Q tax credits applied for with current CCUS projects have been disallowed. Furthermore, the credits are also subject to recapture if the CO₂ stored in a secure

geological formation leaks into the atmosphere within three years of disposal. These tax credits are available for 12 years so although they support a financial analysis benefit, they are not expected to be available for the life of a CCUS project.

Statutory and Regulatory Required Information

Pursuant to Wyo. Stat. § 37-38-102 and Chapter 3, Section 38(a) of the Commission Rules, Cheyenne Light and Black Hills Power provides the following in support of this Application:

Chapter 3, Section 38(a)(i):

A. Description of Potential Suitability

Wygen II and Neil Simpson II are physically well situated for the installation of CCUS technology. The location at the Gillette Energy Complex provides adequate space for the necessary equipment as outlined in the B&V Report and access to necessary resources and materials.

The installation of CCUS technology on both Wygen II and Neil Simpson II is estimated to require 5.7 acres which is available at the existing plant locations.⁴ This estimate of necessary space is based on scaling of the existing plants and operation sites already hosting carbon capture facilities and further analysis will be required when a specific technology is selected by Black Hills.⁵

B. Proximity

Wygen II and Neil Simpson II are located in Campbell County, Wyoming within the Powder River Basin in northeastern Wyoming. Researchers have discovered that the Powder River Basin contains geological structures and materials that are ideal for CO₂ removal and

⁴ See B&V Report, page 5-8.

⁵ *Id.*

storage.⁶ There are several currently operational CCUS projects within 100 miles of the Gillette Energy Complex that are demonstrating that CO₂ can be safely and permanently sequestered within the Powder River Basin.⁷ The B&V Report describes the existing projects in detail at page 6-6.

C. Environmental

Black Hills has determined that installation of CCUS on Neil Simpson II and Wygen II could have an impact on the environment. The operation of the CCUS addition could emit air pollutants, other than CO₂, that may have an impact on ambient air quality in the area. The CCUS addition may generate wastewater and solid waste that may need to be discharged to the waters of the state and buried in the land. The CCUS addition could require a significant amount of water usage that would apply stress on existing aquifers in the area. Black Hills currently uses air cooled condensers to cool the existing steam turbine exhaust at the complex which significantly reduces water demand as compared to traditional power plant cooling systems using large amounts of water with cooling tower systems.

There are several permits that may be needed for the installation of CCUS:

1. Air Quality Permit modification to incorporate control system into permit and verify there were no increases of criteria air quality pollutants. This is estimated to take six to twelve months;
2. Water Rights Permit for additional water if needed and available. This is estimated to take one to two years;

⁶ *Id.*, page 6-2.

⁷ *Id.*, page 6-6.

3. Underground Injection Well Permit if a suitable underground formation is found nearby for sequestration or oil enhancement recovery. This is estimated to take one to three years;
4. Storm Water Permit for the construction of the new facility as it will be over 1 acre. This is estimated to take one month; and
5. Surface Water Discharge Permit if the control unit generates wastewater that needs to be discharged. This is estimated to take one year.

The timing of these permits varies but most critical is the air quality permit which would be required prior to beginning the project and required for CPCN approval. The remaining permits could be developed concurrently during the development, construction and commissioning of the CCUS project.

D. Estimated Annual Dispatchable and Reliable Low-Carbon Electricity

With CCUS technology installed, the Wygen II unit is estimated to generate 57.6 MW of low-carbon dispatchable capacity and the Neil Simpson II unit is estimated to generate 50.3 MW of low-carbon dispatchable capacity. Details of this estimated generation is included in the B&V Report at page 5-6.

E. Description of Estimated Impact on Operation

The installation of CCUS technology on both Wygen II and Neil Simpson II will have impacts on the operation and efficiency of the units. Wygen II is estimated to have a reduction of 14.7% of steam turbine output, a reduction of 36% of net plant output, and an impact of 6,383 Btu/kWh HHV on net plant heat rate.⁸

⁸ *Id.* at page 5-6.

Neil Simpson II is estimated to have a reduction of 14.7% of steam turbine output, a reduction of 37.4% of net plant output, and an impact of 7,042 Btu/kWh HHV on net plant heat rate.⁹ In addition to the CCUS installation cost, the cost of replacing the reduction in capacity from 90 MW to 57.6 MW for Wygen II and from 80 MW to 50.3 MW for Neil Simpson II would be addressed in future resource plans and likely require additional dispatchable generation or demand side resources. The total resource reduction is 32 MW from Wygen II and 30 MW from Neil Simpson II for a total of 62 MW of resources needed post a CCUS conversion on these two units.

In addition to the anticipated impacts to net dependable capacity and heat rate, carbon capture technology is very much in its infancy and therefore, it is reasonable to expect detrimental impacts on plant availability and reliability for mine mouth coal generation units with a solid history of providing dispatchable and reliable, low-cost electricity for customers.

F. Past and Projected Generation

The table below provides the generation of both Wygen II and Neil Simpson II for the past five years and projected net generation for the current year and the next two subsequent years in MWh:

	2017	2018	2019	2020	2021	YTD Feb. 2022	Projected 2022	Projected 2023	Projected 2024
Wygen II	745,363	769,549	730,720	716,789	649,020	116,923	709,560	716,470	702,558
Neil Simpson II	544,560	643,824	664,557	651,324	615,139	106,787	630,720	603,059	438,253

⁹ *Id.* at page 5-7.

Chapter 3, Section 38(a)(ii) – Description of Proposals:

Cheyenne Light developed and submitted a proposal to the Wyoming Energy Authority (“WEA”) for a proposed carbon capture demonstration project in October 2021. The project was based on the Cryogenic Carbon Capture system™ which would have been designed and constructed by Sustainable Energy Solutions (SES), a Chart Industries company.

While this effort did not result in a grant from WEA, Black Hills believes that a pilot demonstration project is a prudent step toward successful full-scale implementation of carbon capture. Black Hills will likely pursue other grants to this end.

The Department of Energy (“DOE”) issued a request for information (“RFI”) in December 2021 that stated, “further innovation, demonstration, and large-scale deployment of carbon management solutions are needed to reach the Biden Administration’s goals of 100% carbon-free electricity by 2035 and a net-zero-carbon economy by 2050.” Black Hills responded to the DOE RFI in January 2022 with a description of our current activities pertaining to carbon management solutions.¹⁰ By participating in the DOE RFI process, Black Hills expects to learn about emerging carbon management technologies, including those that might provide benefit to our customers in the context of the low-carbon electricity generation standard.

Chapter 3, Section 38(a)(iii) – Offsets or Revenue Streams:

A. Availability of Tax Credits

Eligibility of carbon sequestration tax credits is determined by Section 45Q of the United States Internal Revenue Code (“IRC”) (26 U.S. Code § 45Q) enacted on October 3, 2008. These credits cover CO₂ that is captured by the taxpayer at a qualified facility and: disposed of by the taxpayer in secure geological storage, injected into wells for enhanced oil recovery, or are

¹⁰ Exhibit 2.

utilized for a commercial purpose. To be a qualified facility, construction must commence before January 1, 2026, and be placed into service before January 1, 2031. In addition, an electric generation facility must capture not less than 500,000 metric tons of CO₂ annually to be eligible for the tax credit. The Build Back Better Act proposed expansion of these credits by extending the date a facility must begin construction and lowering the capture threshold to decrease costs and increase installation of CCUS technology; however, at this time it is uncertain if any legislation will be passed.

The carbon sequestration tax credits initially earned are subject to disallowance and recapture. The qualification of carbon sequestration tax credits is based on a three-step process that includes: capture of the CO₂, transport of the CO₂, and the storage or utilization of the CO₂. Cheyenne Light would need to contract with a third party for the transport and secure storage of the captured CO₂. There is additional risk of disallowance when selling the CO₂ to a third party due to the chain of custody requirements to demonstrate the CO₂ requirements for storage or use as outlined in the IRC and the Regulations thereunder. Our discussions with Credit Suisse, a certified accounting consulting firm, have further emphasized that it would be critical to have continued monitoring and tracking of the sequestered CO₂ to ensure that a company is able to retain the value of the tax credits. Industry publications indicated that one half of the 45Q credits initially claimed have been disallowed. Furthermore, the credits are also subject to recapture if the CO₂ stored in a secure geological formation leaks into the atmosphere within three years of disposal. These tax credits are available for 12 years so although they support a financial analysis benefit, they are not expected to be available for the life of a CCUS project.

B. Revenue from Carbon Dioxide Sales

There are two pipelines that traverse the state of Wyoming from the southwest corner of the state to the northeast portion. They are owned by Denbury, Inc. and Exxon Mobile, respectively. Both companies buy and charge for CO₂ to transport in their pipelines for use with oil enhanced recovery and sequestration. There is a potential to sell captured CO₂ under the right conditions as well as exchange 45Q Tax Credits in exchange for CO₂ transport.

C. Availability of Grants

As mentioned above, Black Hills has pursued grants from the WEA and will continue to pursue opportunities with the WEA and the State of Wyoming. Ten billion dollars was set aside in the U.S. Infrastructure Bill passed by Congress and signed by the President. Black Hills will work with WEA and its electric association, Edison Electric Institute, to pursue funding from the U.S. Department of Energy who will manage the selection of projects and disbursement of funds.

Chapter 3, Section 38(a)(iv) – Cost Projection:

Black & Veatch conducted an economic analysis of the installation of CCUS technology on Wygen II and Neil Simpson II. In this analysis, capital costs were developed for each unit, while costs for transport and sequestration of captured CO₂ were shared between the two sites as a common cost. The cost summary is below and is described in more detail in the B&V Report on page 7-1 and Appendix B:

Description	Common Costs	Wygen II	Neil Simpson 2
ISBL Direct Cost – Technology Provider Scope	-	\$102,414,000	\$96,096,000
OSBL Direct Cost and All Labor and Construction Costs – EPC Scope	-	\$261,848,000	\$247,080,000
OSBL Indirect Costs – EPC Scope	-	\$103,823,000	\$97,967,000
Transport and Sequestration – EPC Scope	\$71,421,000	-	-
Total Project	\$71,421,000	\$468,085,000	\$441,143,000

The capital cost estimate is based on a division of responsibility between two major work scope areas: the technology provider and an engineering, procurement, and construction (EPC) contractor. The work inside the boundary lines (or “ISBL”) of the carbon capture process system is the responsibility of the technology provider, while the interconnecting ductwork and ancillary systems such as external cooling loops and booster fans located outside the boundary lines (or “OSBL”) of the carbon capture process system are the responsibility of the EPC contractor. The major components of the ISBL and OSBL work scopes are provided in the B&V Report on page 7-3. The 2021 IRP modeled a carbon capture scenario for Wygen II, as well as an option to pick carbon capture on Neil Simpson II. The present value revenue requirement (“PVRR”) for the Wygen II scenario was \$1.034 billion as compared to the Base Plan value of \$679 million, meaning the addition of carbon capture technology resulted in an increase of \$355 million PVRR.

To illustrate the significant investment impact, the cost of CCUS was compared to the original installed cost of constructing the plants. The installed cost of Wygen II in 2008 was \$182.5 million for the entire plant including required emission controls. Adding CCUS to Wygen II is \$505.9 million¹¹ which is over two times the cost of original construction. Neil Simpson II’s original construction cost in 1995 was \$118.9 million compared to adding the \$474.8 million CCUS¹² is three times the original cost.

¹¹ This amount includes a portion of the Transport and Sequestration common costs (\$71,421,000) based on capacity of the plants – (53% for Wygen II and 47% for Neil Simpson II).

¹² *Id.*

Chapter 3, Section 38(a)(v) – Rate Recovery:

A. Estimated Annual Collection in Customer Bills

Black Hills has completed high-level revenue requirement analysis on the capital costs referenced above in the cost projections, which is attached hereto as Exhibit 4 and 5. The high-level revenue requirement analysis does not account for any life extension costs on the coal plants to operate beyond their 30-year design life. As discussed in section E, the dispatchable and reliable replacement capacity to make up for the capacity reductions of Wygen II and Neil Simpson II is not included. The analysis also does not include an estimation of additional O&M dollars to maintain the systems or additional general and administrative costs that would be allocated to the companies for the increased asset base or the utilization of 45Q tax credits. As mentioned above, the 45Q tax credits are subject to disallowance and recapture and with half of the 45Q tax credits being disallowed it is too uncertain to include in the revenue requirement analysis. The tables below show the first six years of estimated revenue requirement, in millions of dollars, if Cheyenne Light and Black Hills Power were to install the above referenced CCUS system:

Cheyenne Light - Wygen II	2029	2030	2031	2032	2033	2034
Estimated Revenue Requirement	\$4.68	\$62.76	\$60.97	\$59.23	\$57.54	\$55.89

The analyzed Wygen II CCUS project would have an estimated cost per kWh of \$0.04175 based on the first six-year average annual revenue requirement of approximately \$58.5 million and with estimated annual sales of 1,400,000,000 kWh. An increase in rates of \$0.02788 per kWh for a typical residential customer using 607 kWh per month would produce a \$25.34 increase or 15.63% over their current average monthly bill. A typical commercial customer

using 975 kWh per month would see a \$40.71 increase or 15.14% over their current average monthly bill.

Black Hills Power - Neil Simpson II	2029	2030	2031	2032	2033	2034
Estimated Revenue Requirement	\$4.49	\$60.29	\$58.54	\$56.84	\$55.19	\$53.58

The analyzed Neil Simpson II CCUS project would have an estimated cost per kWh of \$0.02951 based on the first six-year average annual revenue requirement of approximately \$56.1 million and with estimated annual sales of 1,900,000,000 kWh. An increase in rates of \$0.02951 per kWh for a typical residential customer using 771 kWh per month would produce a \$22.75 increase or 13.13% over their current average monthly bill. A typical small general service customer using 3,523 kWh per month would see a \$103.97 increase or 15.57% over their current average monthly bill. This analysis includes impacts to all Black Hills Power customers, which includes customers in South Dakota, Wyoming, and Montana.

As detailed out in Wyo. Stat. § 37-18-102 (c) (iii), utilities can request from the Commission up to a two percent surcharge from customers to offset incremental costs incurred to meet the low carbon standards. Wyo. Stat. § 37-18-102 (c) (iii) reads:

To the extent a public utility can demonstrate that it will incur incremental costs to comply with the reliable and dispatchable low-carbon energy standard...a rate recovery mechanism that collects a surcharge from customers not to exceed two percent (2%) of each customer’s total electric bill to provide for the recovery of the prudently incurred incremental costs.

The allowable two percent surcharge on customers’ bills will not cover the estimated revenue requirement for the CCUS projects. For Cheyenne Light, the estimated revenue from a two percent surcharge is approximately \$3.5 million when the annual revenue requirement is \$58.5 million, only covering about 6% of the revenue requirement. For Black Hills Power, the

estimated revenue from Wyoming customers on a two percent surcharge is approximately \$350 thousand when the estimated Wyoming annual revenue requirement is \$4.9 million, only covering about 7% of the revenue requirement.

B. Proposal for Higher Rate of Return on Equity

At this time Black Hills is not making a proposal for a higher return on equity (“ROE”) than what is currently authorized from the Commission. A higher ROE in the future could be warranted with the uncertainty of CCUS. For Cheyenne Light and Black Hills Power, the currently authorized Return on Equity is 9.90%.

Chapter 3, Section 38(a)(vi) – Technical Analysis Plan:

The following plan has been developed using the previously described guiding principles for innovation:

By late 2022, Cheyenne Light will issue a request for proposals (“RFP”) for competitive, firm lump-sum bids to engineer, procure, construct, commission, and warrantee a 20% to 90% carbon capture project at Wygen II. Cheyenne Light will evaluate bids with the assistance of a qualified power plant integrator to determine the readiness and capabilities of the short-listed bidders to fully commercialize the demonstration project.

While the RFP development process is underway, Cheyenne Light will continue to meet with potential sequestration partners to develop this key piece of the plan. The sequestration process is expected to be critical in achieving the expected 45Q tax credits that are instrumental in minimizing customer cost. With the RFP results, Cheyenne Light expects to gain a better sense of the investment costs required for a broad range of carbon capture implementation at Wygen II.

Black Hills will evaluate other alternatives to CCUS, comparing candidate resource alternatives including coal to gas conversion. Black Hills Power has completed studies on coal to gas conversion and plan to convert Neil Simpson II to gas in 2025 based on the utility's 2021 IRP filing. Black Hills Power will issue RFPs for the conversion of Neil Simpson II in 2022. Additionally, Cheyenne Light plans to explore coal to gas conversion on Wygen II in lieu of CCUS as well. CCUS captures up to 90% of the CO₂ and coal to gas conversion reduces CO₂ production by approximately 50%. Coal to gas conversion investments are approximately 5% of the cost of full-scale CCUS projects.

In March 2023, Black Hills plans to include the RFP results to the Commission, along with the additional financial analysis in its final plan. A plan timeline is presented below in Part B, based on favorable RFP results and project implementation. Black Hills Power and Cheyenne Light will file IRPs in 2024 which will include further analysis of this recommended low-carbon electricity generation plan.

A. Identification of Facilities

Commission rules require a Technical Analysis Plan to be developed for all Wyoming Coal Fired Generation Facilities that are owned or owned in part with another utility or utilities. Cheyenne Light and Black Hills Power have included Wygen II (wholly owned by Cheyenne Light) and Neil Simpson II (wholly owned by Black Hills Power) in this report. Wygen III (25% Black Hills Power ownership) is not subject to this rule, as it is partially owned by the City of Gillette – which does not fall under the Commission's jurisdiction.¹³ Wyodak (20% Black Hills Power ownership) is subject to this rule, and the Facility Ownership and Operation Agreement between the parties designates capital addition budgeting, installation and construction the

¹³ See Section 38 (d).

responsibility of the Operator, PacifiCorp.¹⁴ For cost and efficiency purposes, pursuant to the Facility Ownership and Operation Agreement, and given its minority ownership in the facility, Black Hills Power is relying on PacificCorp to submit an initial analysis of the Wyodak facility. Black Hills Power asks that the Commission excuse the joint application requirement at this time for these reasons, and Black Hills Power will incorporate the analysis of the facility, including customer impact calculations into its final report in March of 2023.

B. Timeline and Description

Black Hills has developed the following timeline for development of this Technical Analysis:

2022:

- Development and issuance of an RFP for firm, lump sum proposals for carbon capture project and coal to gas conversion at Wygen II.
- Development and issuance of an RFP for coal to natural gas conversion of Neil Simpson II.

2023:

- Evaluation and assessment of RFP results (both carbon capture and coal to gas conversion).
- Submit final Low-Carbon report

2025:

- Achieve commercial operation of coal to gas conversion at Neil Simpson II

2026:

- Commence carbon capture project execution at Wygen II if securing Section 45Q tax credits

2029:

- Achieve commercial operation on carbon capture project

2030:

- Achieve low-carbon standard.

¹⁴ See Exhibit 3.

C. Estimated Incremental Costs and Proposed Regulatory Recovery

As discussed above, utilities can request from the Commission up to a two percent surcharge from customers to offset incremental costs incurred to meet the low carbon standards. The allowable two percent surcharge on customers’ bills annually provides approximately \$3.5 million for Cheyenne Light to use on Wygen II and approximately \$350,000 for Black Hills Power to use on Neil Simpson II.

D. Estimated Generation and Projected Costs Comparison

The actual and forecasted retail sales for Cheyenne Light and Black Hills Power are included in the tables below. The Black Hills Power table includes the sales in total as well as broken out for each jurisdiction.

		Black Hills Power Retail Sales (in kWh's)			
		WY	MT	SD	Total
2021	Actual	165,969,680	145,876,690	1,517,606,160	1,829,452,530
2022	FCST	181,052,281	149,403,497	1,562,164,963	1,892,620,741
2023	FCST	179,257,135	148,018,179	1,568,309,575	1,895,584,889
2024	FCST	179,857,599	148,624,429	1,571,469,457	1,899,951,485
2025	FCST	171,420,128	126,445,491	1,576,424,082	1,874,289,701
2026	FCST	180,029,125	112,454,333	1,573,600,611	1,866,084,069
2027	FCST	176,001,552	138,162,392	1,558,487,534	1,872,651,478
2028	FCST	176,912,326	138,877,356	1,566,552,406	1,882,342,088
2029	FCST	177,890,942	139,645,576	1,575,218,013	1,892,754,531
2030	FCST	177,797,417	139,572,158	1,574,389,850	1,891,759,424

Cheyenne Light Retail Sales (in kWh's)			
		WY	Total
2021	Actual	1,283,361,620	1,283,361,620
2022	FCST	1,315,519,222	1,315,519,222
2023	FCST	1,318,229,007	1,318,229,007
2024	FCST	1,322,116,222	1,322,116,222
2025	FCST	1,305,906,043	1,305,906,043
2026	FCST	1,326,153,483	1,326,153,483
2027	FCST	1,328,059,852	1,328,059,852
2028	FCST	1,329,883,201	1,329,883,201
2029	FCST	1,331,632,680	1,331,632,680
2030	FCST	1,333,290,923	1,333,290,923

The projected capital costs for 20%, 40%, 60%, and 80% carbon removal portfolio standards (for Wygen II and Neil Simpson II combined) are tabulated below. The Base Case in the below tabulation represents the full-scale, 90% CCUS sizing basis:

Scaled Facility Size	20%	40%	60%	80%	Base Case
ISBL Direct Cost - Technology Provider Scope	\$75,578,869	\$114,556,143	\$146,107,712	\$173,634,644	\$198,510,000
OSBL Direct Cost and All Labor and Construction Costs - EPC Scope	\$193,764,558	\$293,692,151	\$374,582,165	\$445,154,059	\$508,928,000
OSBL Indirect Costs - EPC Scope	\$76,827,666	\$116,448,966	\$148,521,864	\$176,503,626	\$201,790,000
Transport and Sequestration - EPC Scope	\$14,284,200	\$28,568,400	\$42,852,600	\$57,136,800	\$71,421,000
Total	\$360,455,293	\$553,265,660	\$712,064,341	\$852,429,129	\$980,649,000

Operating and maintenance (O&M) cost estimates are tabulated below for 20%, 40%, 60%, and 80% carbon removal portfolio standards, by each facility:

Wygen II					
O&M Cost Estimates for Various Carbon Removal Portfolio Standards					
Scaled Facility Size	20%	40%	60%	80%	Base Case
Fixed Operating Costs	\$3,308,022	\$3,308,022	\$3,308,022	\$3,308,022	\$3,308,022
Variable Operating Costs	\$2,743,995	\$4,159,119	\$5,304,642	\$6,304,045	\$7,207,179
Maintenance Material	\$1,324,603	\$2,007,723	\$2,560,699	\$3,043,139	\$3,479,107
Consumables	\$1,327,872	\$2,012,677	\$2,567,018	\$3,050,649	\$3,487,693
Waste Disposal	\$91,520	\$138,718	\$176,925	\$210,258	\$240,380
Total	\$6,052,017	\$7,467,140	\$8,612,663	\$9,612,067	\$10,515,201

Neil Simpson II					
O&M Cost Estimates for Various Carbon Removal Portfolio Standards					
Scaled Facility Size	20%	40%	60%	80%	Base Case
Fixed Operating Costs	\$3,104,542	\$3,104,542	\$3,104,542	\$3,104,542	\$3,104,542
Variable Operating Costs	\$2,575,209	\$3,903,287	\$4,978,348	\$5,916,277	\$6,763,859
Maintenance Material	\$1,243,125	\$1,884,226	\$2,403,188	\$2,855,952	\$3,265,104
Consumables	\$1,246,193	\$1,888,876	\$2,409,118	\$2,863,000	\$3,273,161
Waste Disposal	\$85,891	\$130,186	\$166,042	\$197,325	\$225,594
Total	\$5,679,751	\$7,007,830	\$8,082,890	\$9,020,819	\$9,868,401

E. Estimate of Highest Economically Feasible Portfolio Standard

Coal to gas conversions for Neil Simpson II and Wygen II are estimated to be approximately 5% of the cost of CCUS and are therefore expected to be the most economically

feasible solutions for a low-carbon portfolio standard, based on cost estimates available at this time. However, Cheyenne Light and Black Hills Power will proceed with an RFP process to complete the technical analysis for compliance with this rule.

Exhibits

Cheyenne Light provides the following exhibits in support of this Application:

- Exhibit 1 Black & Veatch Report
- Exhibit 2 January 27, 2022 DOE RFI Letter
- Exhibit 3 Wyodak Facility Ownership and Operation Agreement
- Exhibit 4 Wygen II Revenue Requirement Analysis
- Exhibit 5 Neil Simpson II Revenue Requirement Analysis

Notices

Notices regarding this Application should be sent to:

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Conclusion

The investment required to achieve 50% CO₂ reduction with coal to gas conversion is approximately 5% of the investment to achieve 90% CO₂ reduction with CCUS. Coal to gas conversions also result in lower operations and maintenance costs than CCUS and do not carry the technology risk, CO₂ off-taker risk, and uncertainty surrounding 45Q tax credits. Therefore, as of March 2022, coal to gas conversions are considered to be the least-cost and lowest-risk option for a dispatchable and reliable low-carbon electricity generation standard. Based on further economic analysis using traditional IRP analysis, Cheyenne Light will determine the feasibility and recommendation for compliance throughout the remainder of 2022 and provide our recommended plan for compliance in the March 2023 required final report.

WHEREFORE, Cheyenne Light, Fuel and Power Company and Black Hills Power, Inc. respectfully requests that the Public Service Commission of Wyoming approve this Application as filed and accept the preliminary plan for low-carbon portfolio standards.

Dated this 31st day of March

CHEYENNE LIGHT, FUEL AND POWER COMPANY
and BLACK HILLS POWER, INC.

By:


Kyra Coyle
Director, Regulatory and Finance

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STATE OF WYOMING)
) SS.
COUNTY OF LARAMIE)

I, Kyra Coyle, being duly sworn, do hereby depose and say that I am Director of Regulatory and Finance for Cheyenne Light, Fuel and Power Company and Black Hills Power, Inc., the Applicants in the foregoing Application; that I have read such Application; and that the facts set forth therein are true and correct to the best of my knowledge, information, and belief.



Kyra Coyle
Director – Regulatory and Finance

Subscribed and sworn to before me this 31 day of March, 2022.

(SEAL)





Notary Public

My Commission Expires: APRIL 5, 2024