Direct Testimony and Exhibit
Mark L. Lux

Before the South Dakota Public Utilities Commission
of the State of South Dakota

In the Matter of the Application of
Black Hills Power, Inc. d/b/a Black Hills Energy

For Approval to Amend its Phase In Rate Plan

Docket No. EL26-_____

August 4, 2026

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Exhibit MLL-1 Lange II Overview

TABLE OF ABBREVIATIONS AND ACRONYMS

BHC	Black Hills Corporation
BHSC	Black Hills Service Company, LLC
Black Hills Power	Black Hills Power, Inc. d/b/a Black Hills Energy
CO	Carbon Monoxide
Commission	South Dakota Public Utilities Commission
GSU	Generator step-up transformer
Lange II Project	Generating plant that will produce a total of 97.4 MW net capacity (99.6 MW of nameplate capacity) to serve Black Hills Power customers in South Dakota, Wyoming, and Montana
LNG	Liquefied Natural Gas
NERC	North American Electric Reliability Corporation
Notice of Intent	Notification of Intent to Apply for a Permit for an Energy Conversion Facility
NOX	Nitric Oxide
O&M	Operations and Maintenance
PIPR	Phase-In Rate Plan Rider
PRM	Planning Reserve Margin
RICE	Reciprocating Internal Combustion Engine
SCR	Selective Catalytic Reduction
VOC	Volatile Organic Compounds
Wartsila	Wartsila North America Inc.
Wyoming Commission	Wyoming Public Service Commission

I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Mark L. Lux. My business address is 7001 Mount Rushmore Road, Rapid City, South Dakota 57702.

Q. PLEASE DESCRIBE YOUR EMPLOYMENT.

A. I am currently employed by Black Hills Service Company, LLC ("BHSC"), a wholly owned subsidiary of Black Hills Corporation ("BHC"), as Vice President Power Delivery. I am responsible for the following with respect to each of BHC's electric utility subsidiaries: generation fleet, generation dispatch and power marketing, and environmental services. The electric generation and generation dispatch responsibility includes the operation, construction, and dispatch of over 1 gigawatt of electrical power generation assets to serve the customers of BHC subsidiaries, including Black Hills Power, Inc. d/b/a Black Hills Energy ("Black Hills Power").

Q. PLEASE DESCRIBE YOUR EDUCATION AND BUSINESS BACKGROUND.

A. I received a Bachelor of Science degree with honors in Mechanical Engineering from the South Dakota School of Mines and Technology in 1987. I have 37 years of experience working in the mining and electrical power industries. I have nuclear, fossil fuel, and renewable power generation operating experience and have led the construction of over 1 gigawatt of power plants. I have been and continue to be involved in the development, engineering, construction, and commissioning of the Lange II Project as well as the other power plants owned and operated by subsidiaries of BHC.

Q. FOR WHOM ARE YOU TESTIFYING?

A. I am testifying on behalf of Black Hills Power.

II. PURPOSE OF TESTIMONY

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. I discuss the need for new generation and the decision to build Lange II, a dual fuel power plant in Rapid City, South Dakota. I provide a detailed description of Lange II and the associated costs.

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes. I am sponsoring the following exhibit:

Exhibit MLL-1 Lange II Overview

III. LANGE II PROJECT DETAILED OVERVIEW

Q. PLEASE PROVIDE A DETAILED OVERVIEW OF THE LANGE II PROJECT.

A. The Lange II Project is a generating plant that will produce a total of 97.4 MW net capacity (99.6 MW of nameplate capacity) to serve Black Hills Power customers in South Dakota, Wyoming, and Montana. As discussed in the Direct Testimony of Amanda M. Thames (Exhibit 6 to the Application), the Lange II Project was the least cost resource to address an identified capacity need.

The Lange II Project will be located on the northwest side of Rapid City, South Dakota on 160 acres of land owned by Black Hills Power. The Lange II Project is comprised of six, 16.6 MW dual-fuel (natural gas and diesel) reciprocating internal combustion engines ("RICE") and associated balance of plant process equipment. See Exhibit MLL-1 - Lange II Overview.

The Lange II Project allows Black Hills Power to continue to serve its current customer load and is critical to address the identified resource deficiency in the analysis discussed in the direct testimony of Ms. Thames. As discussed, this analysis included

results from a recently completed study on retiring the Ben French units and a Planning Reserve Margin ("PRM") study. In the PRM study, the smaller RICE will contribute to lower PRM's which equate to lower costs to customers. By completing the Lange II project in 2026, Black Hills Power believes that customers will realize additional savings from the inter hour energy imbalance market. The flexible dispatchability of Lange II provides market savings with its ability to ramp up or down within 1 minute and start up within 5 minutes. Following construction completion in 2026, customers will begin to see these additional benefits. The Lange II project will also serve as Black Hills Power's black start units for restoring the bulk electric system in an emergency blackout condition. A black start is the ability of generation to restart parts of the power grid to recover from a blackout where all customers are curtailed with loss of power supply. Black start capability is critical because when a region experiences a blackout, power is typically restored in a gradual manner at the load side substations to allow for additional generation assets to come online and ramp up as large portions of the grid are re-energized. Each black start unit starts which then allows other generating units to start whereby the generators all reconnect to restore the power system for grid reliability. Black Hills Power's current black start units are the Ben French units which are aging and will reach their end of life in 2027. These units are becoming more difficult to maintain with increasing supply chain risks and limited to no equipment manufacturer staff capability to support these older generation units. The Lange II Project provides benefits to customers with dual fuel capability and fuel supply resilience. The dual capability provides certainty for reliable and resilient power supply to serve customers during normal operation or extreme weather events.

Q. HAS THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION HAD AN OPPORTUNITY TO CONSIDER ANY FILING RELATED TO THE LANGE II PROJECT?

A. No. Black Hills Power filed its Notification of Intent to Apply for a Permit for an Energy Conversion Facility ("Notice of Intent") for the Lange II Project with the South Dakota Public Utilities Commission ("Commission") on August 2, 2024 as required by SDCL ch. 49-41B and ARSD 20:10:22.

At the time of the filing of the Notice of Intent, the design of the Lange II Project was expected to generate more than 100 MW of power during peak periods of demand. Upon completion of design work, it was determined that the Lange II Project would only be capable of generating a maximum of 99.6 MW of nameplate capacity. The 99.6 MW generating capacity fell below the statutory permit requirement under South Dakota statute and Black Hills Power motioned the Commission for withdrawal of its Notice of Intent, which was approved by the Commission without prejudice on January 14, 2025.

Q. DID THE WYOMING PUBLIC SERVICE COMMISSION APPROVE A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE LANGE II PROJECT?

A. Yes. On March 24, 2025, Black Hills Power filed with the Wyoming Public Service Commission ("Wyoming Commission") an Application for a Non-Situs Certificate of Public Convenience and Necessity. On June 10, 2025, the Wyoming Commission approved the Application in Docket No. 20002-143-EN-25 (Record No. 17781).

Q. PLEASE DESCRIBE YOUR ROLE IN THE LANGE II PROJECT.

A. I am responsible for supporting the overall project development and management of the construction of the Lange II Project. In that role, I oversee the preparation of plans and specifications, oversee the competitive bid process, manage the selection and sourcing of equipment, and manage the construction process. I also support the process by which the air permit and industrial siting permit were obtained.

Q. PLEASE DESCRIBE THE MAJOR COMPONENTS OF THE LANGE II PROJECT.

A. The itemized major components for the Lange II Project include the RICE engine package with associated balance of plant equipment to support the operation of the engines, electrical transformers, engine hall building, administration control building, warehouse, diesel storage tanks, dual purpose service water storage tank, black start generator, natural gas interconnection piping, and electrical interconnection generator tie line connecting to the existing Lange Substation. The RICE engine package and associated balance of plant equipment for the engine package are depicted in Exhibit MLL-1 attached to my testimony.

Q. PLEASE DESCRIBE THE TECHNICAL SPECIFICATIONS OF THE RICE UNITS.

A. The RICE units will have fuel resiliency (natural gas and diesel), low water usage at less than one gallon per minute per megawatt, minimal temperature derate, and minimal altitude derate. Further, the RICE units are modular and have a low natural gas pressure design which eliminates the need to add gas compressors. The RICE units are fast starting and will ramp from a cold start to full output (16.6 MW) in 5 minutes and from

minimum output (6.64 MW) to maximum output (16.6 MW) in one minute with no starting penalty for maintenance, which enhances dispatchability and regulation at no increased maintenance costs. These fast ramp rates make RICE units ideal for regulating the intermittency of renewable energy and supporting other ancillary services like voltage regulation, frequency response, operating reserves, and the ability to start without being connected to the power grid known as black start capability. These RICE unit capabilities are further defined in Exhibit MLL-1 attached to my testimony.

Q. PLEASE DESCRIBE THE AIR QUALITY CONTROLS TO BE INSTALLED ON THE LANGE II PROJECT?

A. Lange II will have two air quality control systems. The first system is a Selective Catalytic Reduction ("SCR") system which uses catalyst and ammonia to reduce nitric oxide ("NOx") emissions. The second system is an oxidation catalyst system which uses a catalyst to reduce carbon monoxide ("CO") and volatile organic compounds ("VOC's") emissions.

Q. PLEASE DESCRIBE HOW THE SPECIFIC UNITS WERE SELECTED.

A. As discussed in the direct testimony of Ms. Thames, the capacity expansion model simulated generation capacity investments from candidate resource options including RICE as one resource option. The modeling then determined the necessary resources to effectively meet customer needs and selected RICE. Black Hills Power then retained Black & Veatch to complete a competitive bid solicitation of RICE manufacturers evaluating financial, commercial, and technical capability. The competitive bid process is described later in my direct testimony. From the evaluation, Wartsila North America Inc. ("Wartsila") engines were recommended as the equipment manufacturer of choice.

In addition to financial and lead time considerations, technical performance, and domestic market presence was considered.

IV. LANGE II PROJECT RELATED FACILITIES

Q. PLEASE DESCRIBE THE ELECTRIC, FUEL AND WATER INTERCONNECTION FACILITIES REQUIRED FOR THE LANGE II PROJECT.

A. The Lange II Project will utilize a natural gas supply pipeline interconnected to the existing above ground natural gas receiving station that currently supplies gas to the existing Lange combustion turbine, adjacent to the Lange II site, through an approximately 200-foot pipeline tie-in. The existing Lange combustion turbine ("CT") is a 40 MW GE LM 6000 simple-cycle gas-fired CT wholly owned by Black Hills Power. The CT is located in Rapid City, SD and was commissioned on March 10, 2002. There are two valves located at this natural gas receiver station and each valve is governed by a different jurisdictional boundary. The connection to Lange II will be on the valve location governed jurisdictionally by ASME B31.8 codes and not the valve governed jurisdictionally by 49 CFR Subpart 192.

The Lange II Project will be electrically interconnected from the Lange II generator step-up transformer ("GSU") to the existing Lange Substation. The GSU transformer high side bushings are rated at the substation voltage which is 230 kilovolts. From the high side GSU transformer bushings, a half mile 3 phase-230 kV transmission tie line will run west and then south around the north side of the existing Lange substation where it will enter the substation at the point of interconnect at the exiting Lange 230 kV substation.

The Lange II Project has adequate water supply sourced from a short piping tie-line interconnect to an existing onsite water well, which supplies the existing Lange combustion turbine.

Q. PLEASE PROVIDE A DETAILED DESCRIPTION OF THE FUEL STRATEGY FOR THE LANGE II PROJECT.

A. The fuel supply for the Lange II Project will consist of natural gas and diesel fuel. Black Hills Power evaluated three alternatives and determined the best fuel supply was the dual-fuel option. The North America Electric Reliability Corporation ("NERC"), in its 2024 annual long term reliability assessment, indicated a concern of elevated prolonged severe weather conditions that could disrupt the supply of natural gas to generating resources and recommended dual-fuel capability to mitigate this risk. In its evaluation, Black Hills Power considered the capital costs of two options and the cost of procuring firm pipeline capacity as a third option. Black Hills Power considered 1) firm natural gas pipeline capacity; 2) dual-fuel with natural gas and diesel; and 3) liquified natural gas ("LNG") on site storage. Based on the three options, dual fuel with natural gas and diesel was determined to be the least cost solution, while also mitigating risk through fuel diversity. The table below is a summary comparing the capital investment and firm transport cost analysis completed for the three options:

Table MLL-1: Firm Fuel Supply Options/Cost

	Estimated $/year	Low $/year	High $/year
Firm Transport	$3,796,000	$3,796,000	$6,570,000
Dual Fuel Gas/Diesel all 6 engines	$2,968,758	$2,053,373	$4,055,778
LGN On site Storage	$10,920,000	$8,160,000	$15,360,000

Q. PLEASE DESCRIBE THE OPERATIONAL DETAILS OF THE DUAL-FUEL OPTION.

A. As mentioned above, the natural gas supply will be interconnected with approximately 200 feet of natural gas pipeline. This interconnection feed will be located on the east side of Lange II connecting to an existing above ground receiving station 10-inch valve located after the first block valve on the gas line that provides natural gas fuel to the existing Lange combustion turbine, also owned by Black Hills Power. The diesel fuel will be stored in two redundant 300,000-gallon storage tanks. The diesel tanks were sized based on analysis of a 5-year history of gas supply data and history of diesel operation of the Ben French generating units in Rapid City, SD. If needed, the two tanks could provide sufficient fuel to operate the Lange II units 24 hours a day for four days. Additionally, Rapid City suppliers have access to additional local diesel fuel that could be delivered to the Lange II Project site in an emergency.

V. LANGE II CONSTRUCTION

Q. WHAT IT THE ESTIMATED COST OF THE LANGE II PROJECT?

A. The estimated total cost of construction of the Lange II Project is $320.4 million, which includes tariff costs, sales tax, and AFUDC.

Q WHAT IS THE ESTIMATED TARIFF COST FOR THE LANGE II PROJECT?

A. The estimated tariff cost is $11 to $12 million, which includes $10.6 million for the RICE and the remaining for other equipment and facilities. All process equipment, facilities, and construction contracts for Lange II have terms and conditions that allow tariffs/duties to be applied.

Q. WHAT HAS BLACK HILLS POWER DONE TO MITIGATE TARIFF IMPACTS?

A. Black Hills Power has mitigated tariff impacts where it could be securing process equipment from suppliers that were least impacted by the tariffs as determined by a review of the tariff impacts by our outside legal counsel. As an example, the GSU was secured from a domestic manufacturer, and the prefabricated buildings were negotiated such that most of the fabrication would be completed domestically. The motor control centers, switchgear, the ammonia storage tank, lube oil tanks and insulated water tanks were all purchased from domestic manufacturers.

Q. ARE THERE ANY SPARE PARTS INCLUDED IN BLACK HILLS POWER'S ESTIMATED COST?

A. Yes. There is $2 million included in the Phase-In Rate Plan Rider ("PIPR") for spare parts and consistent with manufacturer recommendations, to minimize lost production of the Lange II units. Wartsila recommends stocking spare parts in two general categories: safety spare parts and swing set (or emergency) spare parts. The safety spare parts are in this case and are estimated at $2 million. The safety spare parts include items for continued routine maintenance to ensure reliability. The swing set (or emergency) spare parts are estimated at $4 million and include cylinder heads, piston liners, injection pumps and valves required for major RICE unit maintenance. The swing set will be purchased closer to the first major overhaul estimated to be in approximately 5 years from commercial operation, assuming 25% capacity factor per engine per year. In addition to the RICE unit spare parts, there will be additional balance of plant spare parts estimated at $1.5 million to be purchased following receipt of the equipment and established manufacturer recommended maintenance procedures. These balance of plant

spare parts is not included in this PIPR Application. Black Hills Power has also secured an emergency spare station service transformer due to long lead times. The total cost of the spare emergency transformer is $199,657 and is also included in the PIPR.

Q. PLEASE DESCRIBE THE CONTRACT AND EQUIPMENT PROCUREMENT PROCESS FOR THE LANGE II PROJECT.

A. The Lange II Project procurement involved securing key contracts early to establish a reliable schedule and reduce price risk and then secured fixed priced contracts for the remainder of the project. Black Hills Power secured fixed priced contracts for direct costs including process equipment and construction contracts through a competitive bid process with qualified bidders. This process began with prioritized procurement based on long lead time critical process equipment. Due to the current state of the supply chain, we have experienced extremely long lead times on certain process equipment. Locking in the long lead time, equipment ensured that the construction process can proceed in a timely manner with reasonably priced equipment. After these key contracts were secured, the remainder of the project contracts were secured through competitively bid fixed price contracts.

Q. PLEASE EXPLAIN BLACK HILLS POWER'S COMPETITIVE BID PROCESS RELATED TO THE LANGE II PROJECT.

A. Black Hills Power retained Black & Veatch as the engineer of record for the Lange II Project. Black & Veatch developed the specifications for the plant. Following review and approval by Black Hills Power, Black & Veatch prepared requests for bid proposals that were submitted to various potential and qualified vendors for process, equipment, and construction. Black & Veatch evaluated the bid proposals submitted by the vendors and

made recommendations which were reviewed, and successful bids were accepted by Black Hills Power.

Q. PLEASE PROVIDE A SUMMARY OF THE LANGE II PROJECT SCHEDULE.

A. The Lange II project schedule is approximately 69% complete as of July 31, 2026. All six engines have been delivered. The project remains on schedule with a forecasted commercial operation date of December 2026.

VI. OPERATING AND MAINTENANCE COSTS FOR LANGE II

Q. PLEASE EXPLAIN THE LANGE II PROJECT ONGOING OPERATIONS ONCE IT IS PLACED IN SERVICE.

A. Lange II will be dispatched centrally from our generation dispatch center located at our corporate office in Rapid City, South Dakota. Lange II will be maintained with six full-time employees permanently assigned to the two Lange units (the existing Lange 40 MW gas fired combustion turbine and Lange II 97.4 MW net capacity (99.6 MW name-plate capacity) RICE units. The site employees, including a plant manager, will be located in Rapid City, South Dakota at the Lange II site.

Q. PLEASE PROVIDE THE ESTIMATED OPERATING AND MAINTENANCE COSTS FORECASTED FOR THE LANGE II PROJECT.

A. Black Hills Power estimates its total annual Operation and Maintenance ("O&M") costs for the Lange II Project, exclusive of fuel, to be $4.1 million, as shown on Schedule H-15 in the Cost of Service Study. This annual cost is inclusive of the technical support from Wartsila of $868,200 for the first full year of operation including labor and materials.

Q. WHAT CATEGORY OF COSTS ARE INCLUDED IN THE FORECASTED $4.1 MILLION O&M COSTS STATED ABOVE?

A. The cost categories include labor, fixed O&M, and variable O&M costs. The labor costs include supervision, operation and maintenance. The fixed and variable operations costs include the required annual preventative and major maintenance, consumables, and operating reagents for emission compliance.

Q. WILL ANY OF THE ONGOING O&M COSTS MENTIONED ABOVE BE SHARED WITH THE EXISTING LANGE COMBUSTION TURBINE?

A. No. The ongoing costs in the Lange II Project forecasted O&M already consider cost allocations for shared operations and maintenance labor with other units. The Lange II O&M costs include six full-time employees and a plant manager which are also allocated to Lange, Gillette CT1 and Gillette CT2. The Lange II $4.1 million O&M cost includes only the allocated amount of this labor cost.

Q. WHAT IS THE BASIS FOR THE ESTIMATED O&M COSTS FORECASTED FOR THE LANGE II PROJECT?

A. The O&M costs are based on experience, site visits, and proposals from the RICE unit manufacturer Wartsila. The estimate includes fixed and variable labor and equipment manufactures technical support. The fixed and on-site labor are based on staffing levels determined from site visits and from manufacturer recommended preventative and major maintenance schedules. The variable operating costs are based on operating consumable estimates and assume a 25% capacity factor. The technical support is based on a recent proposal from Wartsila received in November 2025, which includes annual escalation. The escalation equals the lower of three percent (3%) or the US CPI for Field Service,

EU PPI for Parts. Fixed fees are 100% subject to CPI index, Variable Fee, 20% to CPI and 80% to PPI, exchange part 100% PPI.

VII. CONCLUSION

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. Once in service, Lange II, combined with our coal, wind, and gas generation resource portfolio, will enhance reliability, resiliency (including black-start), and cost-effectiveness for customers in South Dakota, Wyoming, and Montana. The resource's fast-start flexibility supports market participation and renewable integration, and its dual-fuel capability reduces fuel-supply risk during extreme conditions.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

VERIFICATION

This Direct Testimony and Exhibit of Mark L. Lux is true and accurate to the best of my knowledge, information, and belief.

/s/Mark L. Lux
Mark L. Lux