

**BEFORE THE WASHINGTON
UTILITIES AND TRANSPORTATION COMMISSION**

WASHINGTON UTILITIES AND
TRANSPORTATION COMMISSION,

Complainant,

v.

CASCADE NATURAL GAS
CORPORATION,

Respondent.

DOCKET UG-260127

**CASCADE NATURAL GAS CORPORATION
DIRECT TESTIMONY OF PATRICK KINNEY**

May 29, 2026

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Exh. PK-2

Docket UG-250456 UTC Acknowledgment Letter

1 I. INTRODUCTION

2 Q. Please state your name and business address.

3 A. My name is Patrick Kinney and my business address is 8113 West Grandridge
4 Boulevard, Kennewick, Washington 99336.

5 Q. By whom are you employed and in what capacity?

6 A. I am employed by Cascade Natural Gas Corporation (“Cascade” or “Company”), a
7 wholly-owned subsidiary of MDU Resources Group, Inc. (“MDU Resources”), as a
8 Thermal Energy Network Manager. In this capacity, I lead the Company’s efforts to
9 identify, evaluate, and develop thermal energy networks (“TEN”).

10 Q. Please briefly describe your educational background and professional experience.

11 A. I hold a bachelor’s degree in mechanical engineering technology from Central
12 Washington University, a bachelor’s degree in computer science from Western
13 Governors University, and a master’s degree in business administration from Western
14 Governors University. Additionally, I am a licensed Professional Engineer in
15 Washington State. I also hold certified energy manager and certified building
16 commissioning professional certifications from the Association of Energy Engineers.
17 Before joining Cascade, I worked for seven years, nonconsecutively, at UMC, a design-
18 build mechanical contractor and energy services company in Washington State. I had
19 several roles of progressing responsibility focused on developing and implementing
20 energy conservation projects for standalone buildings and district energy installations.
21 I have also worked for the Pacific Northwest National Laboratory, spending three years

1 working as a Senior Sustainability Engineer. In that role I managed overall
2 sustainability for the laboratory with a focus on energy and water management.

3 **II. SCOPE AND SUMMARY OF TESTIMONY**

4 **Q. What is the purpose of your testimony in this docket?**

5 A. My testimony will address the Company’s proposed TEN pilot project.

6 **Q. Are you sponsoring any exhibits in this proceeding?**

7 A. Yes, I sponsor the following exhibit:

- 8
 - Exh. PK-2 Docket UG-250456 UTC Acknowledgment Letter

9 **III. BACKGROUND INFORMATION**

10 **Q. What is a thermal energy network (“TEN”)?**

11 A. A TEN is a class of district energy system,¹ typically encompassing systems that
12 support bidirectional transfer of heat to/from connected buildings through a common
13 piping system. Components of a TEN include heat sourcing/sinking infrastructure,
14 distribution piping for energy conveyance, and heat generation/transfer systems. TENS
15 can use a wide range of technologies for each major component of the system. Heat
16 sourcing/sinking can be accomplished from geo-exchange, direct-use geothermal,
17 ambient air, or waste heat recovery. Energy conveyance typically consists of water-
18 based systems using ambient temperature water in uninsulated pipes or directly serving
19 heating and cooling loads with conditioned water in insulated piping. TENS typically

¹ International Energy Agency Technology Collaboration Programme on District Heating and Cooling, *District Heating Network Generation Definitions* (IEA DHC, February 2024), https://www.iea-dhc.org/fileadmin/public_documents/2402_IEA_DHC_DH_generations_definitions.pdf.

1 use heat generation/transfer equipment to heat or cool the water to a suitable
2 temperature for productive use in buildings via heat pumps and heat exchangers.

3 **Q. Please describe common system types of TENS and how they function.**

4 A. Two general types of TENS are being developed. In an “ambient loop” system, ambient
5 temperature water is conveyed in a single or double (supply/return) pipe configuration.
6 The ambient water is used by distributed heat pumps to serve end heating/cooling loads
7 and is kept within a wide temperature range, with about 45 degrees Fahrenheit (“°F”)
8 to 85 °F being typical. The utility maintains that temperature band using a wide array
9 of energy sources, with geo-exchange being a predominate system type.

10 In a “district energy” system, conditioned hot and/or chilled water is distributed
11 directly to customer buildings from a central location. This central location contains
12 the heat pumps and equipment used to operate the system. Customer end heating and
13 cooling loads are served directly.

14 **Q. Is one TEN system type better than the others?**

15 A. No, there is not a “one-size-fits-all” approach to TENS. Each site and surrounding
16 location needs to be evaluated to understand the best approach. For example, it is
17 common for existing commercial buildings to use “high” temperature (greater than
18 140 °F) hot water for heating loads. This makes connecting to an ambient loop
19 impractical, because it would require significant investments to retrofit heating,
20 ventilation, and air conditioning (“HVAC”) systems ahead of the building’s life cycle.

21 Certain building types, like new multifamily construction or residential
22 buildings, might be best served by an ambient loop system. These types of buildings
23 generally require low temperatures to serve end loads, can have an HVAC terminal unit

1 in each zone, and baseline system types are often some derivative of an air source heat
2 pump system.

3 Furthermore, items like the energy sourcing infrastructure need to be evaluated
4 given the area and site. Geo-exchange may not be viable given the ground conditions
5 or as cost effective as other technologies. For example, sewer heat recovery can offer
6 similar or better performance characteristics than geo-exchange, but there may not be
7 a sewer line with sufficient flow in practical range of a given site.

8 In a short analysis completed by the National Lab of the Rockies (formally, the
9 National Renewable Energy Laboratory), researchers evaluated five existing sites that
10 deployed ambient loop and traditional district energy systems. Ultimately, the
11 researchers found “no significant difference in reported system performance and cost
12 between centralized and decentralized systems.”²

13 **Q. What are the differences between traditional utility gas service and TENS?**

14 A. In traditional gas service, natural gas is sourced by the utility, distributed through a
15 piping system, and delivered to a customer’s building, terminating at a utility meter.
16 The customer then owns, operates and maintains all downstream equipment used to
17 combust the natural gas and use its energy for heating loads.

18 TENS are similar in nature. In a TEN, energy is sourced by the utility,
19 distributed through a piping system, and delivered to a customer’s building. The

² Hyejin Oh and Koenraad Beckers, *Cost and Performance for Five Existing Geothermal Heat Pump-Based District Energy Systems in the United States*, NREL/TP=5700-86678 at v (PDF 6) (Golden, CO: National Renewable Energy Laboratory, 2023), <https://docs.nrel.gov/docs/fy23osti/86678.pdf>.

1 customer either uses the energy delivered directly (district energy system) or uses
2 electricity to run a heat pump to serve end loads (ambient loop system).

3 In contrast to utility natural gas service, TENS are required to deliver
4 combustion free energy, making heat pumps the default equipment for use in a TEN.
5 Additionally, TENS can incorporate systems and equipment that would otherwise be a
6 customer's obligation in gas service. For example, the individual heat pumps may be
7 owned by the TEN utility to capture the value of items like the federal Investment Tax
8 Credit.

9 **Q. What are some of the benefits of TENS?**

10 A. TENS offer several benefits to customers and society at large. From a customer
11 perspective, TENS can potentially offer life cycle cost savings as compared to
12 standalone equipment. TENS can achieve economies of scale by aggregating load and
13 increasing load diversification, and economies of scope through heat recovery and
14 ancillary services like demand response. Life cycle savings are especially true for large
15 campus installations like universities and hospitals which commonly deploy TENS
16 (district energy) as opposed to distributed systems. Because TENS are inherently highly
17 energy efficient, they also provide a convenient way to comply with other
18 requirements, such as meeting Washington State Energy Code or Clean Building
19 Performance Standards.

20 From a societal standpoint, TENS could mitigate the significant impact of
21 heating system electrification on the electric grid. As compared to a baseline of
22 decentralized air source heat pumps, TENS could reduce winter peak electrical demand

1 by 25 to 62 percent.³ TENs also shift the cost burden for energy efficient heating
2 systems from individual customers to the utility, potentially enabling faster adoption.

3 **Q. What is the regulatory framework for TENs in Washington?**

4 A. In 2024, House Bill (“HB”) 2131, titled “Thermal Energy Networks,” passed the
5 Washington State Legislature, codified as RCW 80.28.480-460, RCW 43.31.033 and
6 modifying other existing RCW sections. This act modified the definition of a gas
7 company, allowing a gas company to “own, control, operate, or manage any thermal
8 energy network within this state.”⁴ The act also enables gas companies to propose
9 including TENs as part of multiyear rate planning, and provides that the Washington
10 Utilities and Transportation Commission (“Commission”) may approve the merger of
11 gas and thermal energy rate bases if it is “in the public interest.”⁵

12 Additionally, this act established a pilot program, giving gas companies
13 “priority for development thermal energy network pilot projects in the gas company’s
14 service territory,” given a formal, written, announcement to the Commission within 12
15 months of the effective date of the act.⁶ The pilot program established several items for
16 the Commission to consider for pilot approval, which Cascade has provided in previous

³ Chelsea Mattioda et al., *Benefits of Thermal Energy Networks: A comparison to Air-Source Heat Pumps* at 10 (presentation, Synapse Energy Economics, 2024), <https://www.synapse-energy.com/sites/default/files/Benefits%20of%20Thermal%20Energy%20Networks%20Presentation%2024-119.pdf>.

⁴ HB 2131, Section 1(14), 68th Leg., 2024 Reg. Sess. (Wash., 2024); RCW 80.04.010(14).

⁵ HB 2131, Section 7(1); RCW 80.28.480(1).

⁶ HB 2131, Section 3(2)(a); RCW 80.28.460(2)(a).

1 filings.⁷ Participation in the pilot program is also a requirement to access a TEN-
2 specific grant that is available only to gas companies, as outlined in RCW 43.31.033.

3 **Q. Please describe previous TENs filings from Cascade.**

4 A. In Docket UG-250456, on June 5, 2025, Cascade filed its notification of intent to
5 develop a thermal energy network pilot and received the Commission’s
6 acknowledgement letter on June 26, 2025.⁸ In that filing, Cascade responded to all
7 “must consider” and “may consider” items required from RCW 80.28.460 for WUTC
8 review regarding the proposed pilot.

9 On November 19, 2025, Cascade filed a petition to use an alternative process
10 as described by RCW 80.28.470. This filing also included preliminary project cost
11 information to be reviewed by the Commission for the cost validation requirement
12 outlined in RCW 80.28.450.⁹ Additionally, the filing included information regarding
13 potential outside funding sources, a high-level technical description of the pilot, and
14 expanded responses to two must/may consider items from the previous filing.¹⁰
15 Cascade received Order 01 on January 15, 2026, authorizing the alternative process,
16 validating pilot costs, acknowledging the compliance of submitted pilot criteria,

⁷ RCW 80.28.460(3)-(4), (6); *In re the Petition of Cascade Nat. Gas Corp., For Order Regarding Bellingham Tech. Coll. Thermal Energy Network Pilot Project*, Docket UG-250456, Petition for the intent to Deploy a Thermal Energy Network Pilot Project, Pursuant to RCW 80.28.460(2)(a), at 2-10 (Jun. 5, 2025).

⁸ Kinney, Exh. PK-2.

⁹ Docket UG-250456, Petition for the use of an alternative process per RCW 80.28.470(2) at 1 (Nov. 19, 2025).

¹⁰ *Id.* at 2-5.

1 acknowledging the compliance of submitted project metrics, and verifying the TEN
2 project cost difference against current business practice.¹¹

3 **Q. Please describe the TEN grant program.**

4 As part of the 2024 Washington State Supplemental Budget, the Washington State
5 Department of Commerce (“Commerce”) was appropriated \$5 million dollars to fund
6 the TEN grant program as outlined in HB 2131.¹² An additional \$20 million also
7 included as future biennia projected costs for additional funding in the 2025 capital
8 budget.¹³

9 The grant program is available only to gas companies participating in the TEN
10 pilot program.¹⁴ Grant funding is intended to “offset the costs necessary to build and
11 operate the project” and will be split between the gas companies that have applied for
12 the grant.¹⁵ In accordance with statute, grant award and funding was subject to
13 completing the Commission cost validation process and compliance with RCW
14 80.28.460 must/may consider criteria for funding.¹⁶

15 In the 2025 Washington State Capital Budget, the \$5 million was budgeted
16 again, however the \$20 million future grant funding was removed from the budget,
17 indicating no additional future grant funding for TENs.¹⁷

¹¹ Docket UG-250456, Order 01 Authorizing Alternative Process; Acknowledging Compliance ¶¶ 17-21 (Jan. 15, 2026).

¹² SB 5949, Section 1027, 68th Leg., 2024 Reg. Sess. (Wash., 2024).

¹³ *Id.*

¹⁴ RCW 43.31.033(3).

¹⁵ RCW 43.31.033(4), (6).

¹⁶ RCW 43.31.033(5).

¹⁷ SB 5195, Section 6084, 69th Leg., 2025 Reg. Sess. (Wash., 2025).

1 **IV. THERMAL ENERGY NETWORK PILOT PROJECT**

2 **Q. Please describe Cascade’s TEN pilot.**

3 A. Cascade is evaluating the potential to deploy a TEN at the Bellingham Technical
4 College in Bellingham, Washington. The TEN would seek to install a traditional district
5 energy system, supplying hot and chilled water to two existing buildings. The TEN
6 would use an open-loop geo-exchange system as the main heat source. Heat recovery
7 chillers would be used to generate the hot and chilled water for TEN service. The TEN
8 would serve existing space heating, domestic hot water, and space cooling loads.

9 The open-loop geo-exchange system is planned to drill about 1000-foot depth
10 wells to access a water reservoir from the abandoned Bellingham Coal Mine. The
11 Bellingham Coal Mine was identified early on as a potential resource due to its location
12 under the technical college. A traditional open-loop and closed-loop were also
13 evaluated; however, the groundwater aquifer was deemed not productive enough to
14 support the pilot loads and the closed-loop system was estimated to be roughly double
15 the cost of an open-loop.

16 The central utility plant is planned to use heat recovery chillers to serve about
17 180 °F district hot water and about 42 °F district chilled water. The heat recovery
18 chillers will source heat from the geo-exchange system and internal waste heat recovery
19 from simultaneous heating and cooling loads. The central utility plant will house all
20 balance of equipment needed to operate the system.

21 Hot and chilled water piping would be routed from the central utility plant to
22 the connected buildings. The piping will likely be direct bury, pre-insulated steel pipe.
23 At the buildings, energy transfer stations will be installed to delineate the boundary
24 between the utility and customer equipment. Additionally, some in-building work will

1 be required to connect the energy transfer stations to the existing building level heating
2 and cooling systems.

3 **Q. Why was an ambient loop system not chosen for the pilot?**

4 A. The two proposed buildings to connect to the TEN are designed around high
5 temperature hot water (180 °F). Specific building level terminal equipment includes:
6 main air handlers, hot water air terminal units, hot water convectors, finned tube
7 radiators, etc. Converting the existing equipment to low temperature equivalents would
8 have been a massive, cost prohibitive, undertaking—requiring the full conversion of
9 existing HVAC systems. On the other hand, the hot water system is straightforward to
10 interconnect with a district energy system. The new TEN hot water connections will
11 connect where existing boilers and water heaters are, requiring no downstream changes
12 to equipment.

13 Additionally, the buildings have existing natural gas fired boilers and water
14 heaters which create a footprint issue and an electrical infrastructure issue with
15 converting to distributed heat pumps. Boilers and water heaters are compact, requiring
16 smaller mechanical/electrical rooms to install. The physical footprint was identified as
17 a challenge to fit distributed heat pumps. Regarding electrical infrastructure, boilers do
18 not require significant electrical infrastructure, and the buildings have relatively small
19 cooling loads and equipment. Distributed heat pumps would likely require new
20 electrical infrastructure, adding cost and complexity and further compounding the
21 space constraints.

22 While the pilot does not plan to use distributed heat pumps, there is still an
23 ambient temperature piping loop that connects the TEN's heat recovery chillers to the

1 geo-exchange field. In the future, this loop could be expanded to directly serve
2 distributed heat pumps in a true ambient loop style system.

3 **Q. Did Cascade evaluate other potential sites for a pilot?**

4 A. Yes, other potential sites were considered and evaluated at a high level. However, most
5 sites had significant challenges either from a timing or complexity issue. With the
6 passage of HB 2131, which enabled TENs and created the pilot program, there was
7 roughly a year to engage potential customers, selecting a site, beginning early project
8 development, and formally declaring intent to deploy a pilot.

9 **Q. Has Cascade received support from the local community for its pilot project?**

10 A. Yes, Cascade has received support from the local community. In fact, the project
11 concept had community history before Cascade's involvement. The project was first
12 conceived by local community professionals and professors from Western Washington
13 University. The individuals were interested in using geothermal energy in Bellingham
14 and understood the potential of the underground water resources available. This
15 community group is still actively engaged in the project.

16 Additionally, Cascade has discussed the TEN pilot project in its Equity
17 Advisory Group to gauge opinion and interest in this type of utility offering.

18 **Q. What is the potential for the pilot project to be expanded in the future?**

19 A. The TEN pilot is well positioned to expand and serve additional loads. The most logical
20 path for expansion would be to serve additional technical college buildings. The
21 proposed TEN is well suited to accommodate both existing and future building designs,
22 capable of serving heating and cooling loads directly or incorporating distributed heat
23 pumps. Expanding to other buildings on the campus would also help for potential

1 expansion into the surrounding neighborhood. The pilot project is still relatively small
2 and needs additional load to improve system economics. By expanding to serve campus
3 buildings, the technical college could reach a scale to be a significant anchor customer
4 of the TEN.

5 The surrounding neighborhood is largely residential. The geo-exchange system
6 could be expanded into an ambient loop to serve the single-family residences that
7 border the technical college. Beyond the residential there are commercial buildings that
8 could be very attractive for connection to the TEN. For example, a nearby cold storage
9 facility could be connected to the TEN and offer year-round waste heat, greatly
10 improving system performance and economics.

11 **Q. When will the pilot project enter service?**

12 A. Cascade expects the TEN pilot project will be placed into service by early to mid-2028.
13 Cascade will seek to request extensions to the deadlines posed in HB 2131 under
14 RCW 80.28.460(2)(a).

15 **Q. Is Cascade seeking cost recovery of the TEN pilot in this MYRP?**

16 A. No, Cascade will seek cost recovery at a later date. Please see the Direct Testimony of
17 Michael Parvinen (Exhibit MPP-1HCT) for a discussion of the Company's proposed
18 cost recovery for the TEN pilot.

19 **V. CONCLUSION**

20 **Q. Does this conclude your Direct Testimony?**

21 A. Yes.