



2023 Northern Natural Gas Greenhouse Gas Customer Report

EXECUTIVE REPORT

On September 7, 2023, the Federal Energy Regulatory Commission (FERC) approved an Uncontested Stipulation and Agreement of Settlement between Northern Natural Gas (Northern) and Settling Parties in Northern's general section 4 rate case.¹ As a part of this settlement, Northern agreed to provide a report on Northern's efforts and associated projects that reduce Greenhouse Gas (GHG) emissions.²

Northern is subject to existing and proposed regulatory mandates for the evaluation and disclosure of environmental metrics, not limited to GHG reporting. Northern is also a voluntary participant in environmental initiatives sponsored by the United States Environmental Protection Agency (EPA) and by various industry organizations. In support of these efforts, Northern produces methane emission inventories following established criteria that are reviewed for accuracy and enable parties to compare environmental performance of similarly situated infrastructure.

To supply increased access to this information, Northern prepares this annual GHG Customer Report (GHG Report) which is posted on the Safety and Public Awareness/Environment section of Northern's website.

Northern discloses GHG emissions and savings through the following programs:

- Annual emissions reports to the U.S. Environmental Protection Agency (EPA), submitted pursuant to the mandatory [Greenhouse Gas Reporting Program \(GHGRP\)](#);
- Annual methane emission reduction reports to the U.S. Environmental Protection Agency (EPA), submitted pursuant to the voluntary [Methane Challenge Program](#);
- Annual emissions intensity reports and voluntary participation in the Natural Gas Sustainability Initiative ([NGSI Protocol](#)); and
- Annual emissions intensity reports and voluntary participation in Our Nation's Energy Future, Inc ([One Future Protocol](#)).

As the regulatory landscape evolves, Northern will continue to meet or exceed methane emissions requirements and lean into programs that have a net positive effect on reducing GHG emissions. For example, Northern is prepared to implement new standards from the EPA to reduce methane

¹ *Northern Natural Gas Company, Docket No. RP22-1033-005, Letter Order, 184 FERC ¶ 61,149 (September 7, 2023).*

² This report is a good faith summary of Northern's efforts to address greenhouse gas emissions as required by Article VII of the June 23, 2023, Uncontested Stipulation and Agreement of Settlement filed in Docket No. RP22-1033 before the Federal Energy Regulatory Commission. This report is offered for informational purposes only. No warranty, commitment, obligation or representation – whether express or implied – is intended, made or offered by the issuance of this report.

emissions from new and existing compressor stations. Northern is also preparing for a new Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA) Leak Detection and Repair Advanced Leak Detection Program. PHMSA's new program will prescribe more sensitive and frequent leak detection requirements and more stringent leak remediation response times for the entire pipeline system. Northern has worked closely with regulatory agencies, stakeholders and industry peers throughout the development of these rules to create meaningful advancements in protecting the environment while maintaining safe, reliable and cost-effective service to our customers.

Northern continues to evaluate opportunities to reduce its overall carbon footprint by providing interested counterparties opportunities to integrate lower carbon fuels such as Renewable Natural Gas (RNG). As well, Northern continues to monitor the progress and development of GHG certification and the overall feasibility of introducing hydrogen into Northern's system. Northern remains committed to reducing GHG emissions and delivering reliable, affordable, safe and clean energy to our customers.

NORTHERN METHANE EMISSIONS AND REDUCTIONS DETAIL

Northern is an industry leader in understanding the technologies and processes that drive reductions in methane emissions. Northern recognizes the importance of protecting the environment and working to reduce GHG emissions. To achieve this goal, Northern continuously seeks to identify and implement technologies and processes that improve methane intensity and reduce methane emissions.

Environmental Respect is one of six Core Principles that shapes how Northern conducts business.



To drive Environmental Respect throughout the company, Northern annually establishes goals for methane intensity and methane emissions reductions. These statistics are tracked and reported to leadership monthly.

The company tracks methane emissions savings internally and publicly reports a portion of those activities to the EPA Natural Gas Methane Challenge program and the EPA Natural Gas STAR program. Under Methane Challenge, in 2018, Northern met the commitment to reduce methane emissions from non-emergency blow downs by at least 50% from total potential emissions. Northern met this commitment in the first full year of participation in the program and has continued to meet and exceed this goal in each subsequent year since it was established. The EPA launched the Natural Gas STAR program in 1993 as a voluntary partnership to encourage the adoption of technologies and practices to improve operational efficiency and reduce methane emissions. The program provided a framework to encourage partner companies to implement methane emissions reduction technologies and practices. Northern began participating in the Natural Gas STAR voluntary methane emissions reduction program in 1994 and became a founding partner in the Natural Gas Methane Challenge Program in 2016. The EPA ended the Natural Gas STAR program effective November 2, 2022, but continues to collect data from its Methane Challenge partners.

Measuring Methane Emissions – ONE Future and NGSi Protocol

In August 2016, Our Nation's Energy Future Coalition, Inc. (ONE Future) a nonprofit natural gas industry coalition, published a protocol to calculate and report methane emissions in a consistent manner, using methane emissions values already reported to the EPA by industry. The estimation protocol developed by ONE Future quantifies natural gas methane emissions as a function of natural gas production throughput. ONE Future is focused on improving the management of methane emissions across the entire natural gas value chain, from wellhead to burner tip.

ONE Future's methane emissions estimation protocol follows the EPA's Greenhouse Gas Reporting Rule (GHGRP) or the national GHG inventory prepared annually by the EPA. The source data for Northern's methane emissions rate calculation is data that is already included in Subparts C and W of GHGRP reports that are submitted annually by Northern to the EPA.

In August 2018, Northern became the 14th member company in ONE Future; as of August 2023, there were 54 member companies. Northern has one employee on ONE Future's board of directors and also participates in ONE Future's methane policy and technology committees. Membership in ONE Future allows Northern to have a proactive voice in stakeholder discussions at the national level on potential policies for regulation of methane emissions. Northern's ONE Future data for 2022 was calculated and submitted to ONE Future for review and verification. Northern anticipates final verification of the 2022 data in late 2023.

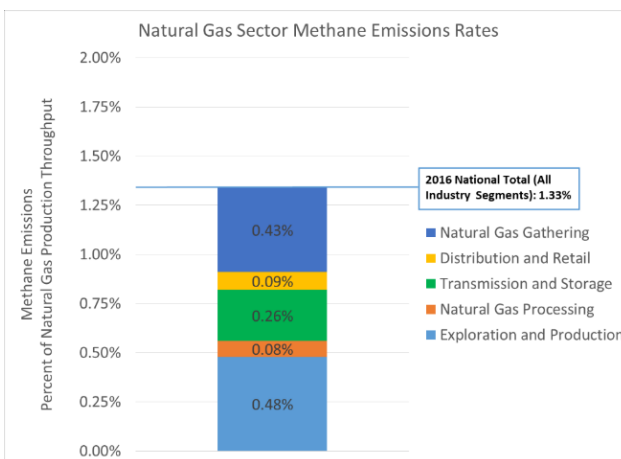
In addition to voluntary participation in the ONE Future protocol, Northern uses the NGSi protocol to calculate annual methane intensity. The NGSi protocol is a voluntary, industry-wide approach for companies to calculate methane emissions intensity from their natural gas operations by segment, including production, gathering and boosting, processing, transmission and storage and distribution. The Protocol describes a methodology for calculating company-level methane

emission intensities and is designed to include methane emissions from facilities that report under Subpart W of EPA's GHGRP as well as facilities that are below the GHGRP reporting threshold. The protocol also includes estimated methane emissions from specific sources not included in GHGRP reporting. Emissions from these sources are calculated using company reported activity data and emission factors from the EPA's Greenhouse Gas Inventory (GHG Inventory). ONE Future follows the NGSi protocol but includes more sources than the current NGSi protocol.

All Northern facility emissions (facilities include compressor stations, storage wells, metering and regulating stations and transmission pipeline) are included in the annual Northern methane intensity inventory. Methane emissions serve as the numerator for the intensity calculation. The denominator is calculated by multiplying the total natural gas throughput of the Transmission and Storage (T&S) segment by the average methane content of the natural gas. After aligning the units of the numerator and denominator (volume or mass), methane emissions intensity is calculated as a percentage.

Northern performs a thorough quality assurance and quality control analysis of emission outputs for accuracy. Annual emission outputs are compared to historic emissions, throughput and intensity from the last two years to verify data accuracy. Lastly, the output, source documentation and calculations are spot checked by an internal review team, including representatives from the corporate audit group, before being published as final. As a result, Northern is confident in the accuracy and completeness of our annual emissions inventory and intensity reporting.

Northern recognizes that minimizing methane releases to the atmosphere is important to our customers and the future of the company, and we are encouraged and continue to work on improving a 2022 methane intensity rate of 0.049%³, which is well below the 2016 average methane emissions rate for the transmission and storage segment of the natural gas industry of 0.26%⁴. Northern is forecasting a 2023 methane emissions rate of 0.048%. Northern has significantly reduced and avoided releases of methane, thus reducing greenhouse gas emissions, enhancing pipeline integrity, making operations safer and reducing customer costs through reductions in lost gas.



³ Using the ONE Future protocol, Northern calculated a methane emissions intensity of 0.049% for 2022. This calculation has been submitted to ONE Future for review and verification. While Northern does not have final verification of the calculation from ONE Future, it does not anticipate that the number will change. Final verification of the 2022 calculation from ONE Future is expected in late 2023.

⁴ ONE Future 2017 Methane Intensity Talking Points and FAQ, January 3, 2019. Distributed by email to the ONE Future Board of Directors on February 5, 2019

Northern 2022 Methane Emissions Intensity⁵

Disclosure Element	Reported Data	Description
Total Methane Emissions (MT)	12,295.77	Total transmission & storage segment methane emissions (from GHGRP and non GHGRP facilities)
Natural Gas Transported (Mscf)	1,453,662,000.00	Total volume of natural gas throughput from GHGRP facilities and non GHGRP facilities
Methane Content of Transported Natural Gas	0.896%	Methane content of transported natural gas (weighted average methane content of all throughput)
ONE Future Methane Emissions Intensity	0.049%	Methane emissions intensity associated with natural gas transmission and storage (methane emissions associated with natural gas transmission and storage divided by total methane throughput)

Methane Emissions Reduction Activities and Savings

Northern is committed to modernization, use of best practices and improved leak detection to reduce methane emissions. Northern adopted maintenance and engineering measures to minimize venting natural gas and reduce methane emissions. Northern uses the annual methane emissions inventory to inform and improve our methane emissions reduction strategy. Methane emissions from blowdown and venting activities have and are likely to continue to offer the greatest reduction



opportunities. Northern has adopted efficient and cost-effective reduction practices, and we continue to evaluate emerging technologies and develop work practices to further reduce blowdown emissions from planned maintenance activities.

⁵ Calculated using the ONE Future protocol

Northern implements the following methane emissions reduction practices:

- ✓ Pump down/third-party portable compression prior to blowdowns.
- ✓ Route gas to lower pressure system (e.g., fuel system).
- ✓ Capture technologies at compressor stations, including recompression for liquefied natural gas storage tank vents at LNG facilities.
- ✓ Scheduling of maintenance efficiently to decrease blowdown occurrences.
- ✓ Hot taps that allow for tie-in activities without venting during construction.
- ✓ Line stops that are used to reduce the length of pipe being blown down.
- ✓ Utilize capped Emergency Shut Down (ESD) testing methods.
- ✓ Utilize flares to reduce methane emissions during maintenance activities to decrease blowdown volumes.
- ✓ Perform voluntary LDAR at compressor stations and metering and regulating (M&R) stations.

Northern is executing plans to increase flare utilization to further reduce venting. Typically, Northern achieves 94.4% methane reduction savings through flaring; 89.75% methane savings through capped blowdowns; 65.0% methane savings through pipeline operations; and 100% methane savings through vapor recovery units.

In addition to the methane reduction techniques implemented in connection with planned maintenance activities, Northern actively monitors the rod packing on reciprocating compressors for leaks. By replacing the packing as leaks are detected, instead of simply basing replacements on run time hours, Northern drastically reduces methane emissions through early detection of leaks. At the same time, Northern is saving money in replacement costs by avoiding the unnecessary replacement of seals that are still functioning properly.

Planned Upgrades to Reduce Methane Emissions including Non-GHG Specific Projects

Northern is planning to implement new standards from the EPA that will reduce methane emissions from new and existing compressor stations and wells. We are also preparing for a new PHMSA Leak Detection and Repair Advanced Leak Detection Program (ALDP) that prescribes more sensitive and frequent leak detection requirements and more stringent leak remediation response times for the entire pipeline system.

Increasing operational efficiency benefits our customers and supports Northern's overall methane emissions reduction strategy. To this end, the company seeks opportunities to increase the efficiency of our fleet.

The company is subject to a wide range of non-GHG regulations which offer opportunities for changes in fleet maintenance and upgrades. While such projects are not designed as a methane emissions mitigation project, they often have the ancillary benefit of methane emissions reduction.

Northern is engaged in a multi-year effort to abandon its oldest pipeline, which is mechanically coupled and more prone to fugitive emissions. The replacement of this pipeline with modern welded pipeline will result in a reduction of fugitive methane emissions.

Additionally, Northern is replacing older compressor stations, which have higher methane emissions, with reciprocating units that have lower methane emissions. An internal study identified older compressor units as the highest methane-emitting units; the ongoing modernization effort to replace these units will have methane-reduction benefits for the life of these facilities.

The following Northern projects had or will soon have either direct or ancillary methane emissions reduction benefits.

- In 2022, Northern replaced a total of seven antiquated compressor units, one unit at the Brownfield, Texas, station, two units at the Spraberry, Texas, station, and four units at the Ogden, Iowa, station.
- In 2023, Northern started construction to replace four units at the North Branch, Minnesota, station.
- In 2023, Northern installed a compressor blowdown system at the Sunray, Texas, compressor station to route natural gas that would otherwise be vented to the atmosphere to the station fuel header during blowdown activities.
- In 2024, Northern plans to install two vapor recovery systems, one at the Spraberry, Texas, compressor station and one at the Paullina, Iowa, compressor station. These vapor recovery systems will capture natural gas packing leak emissions from multiple reciprocating compressors and compress the gas to the station fuel system. The compressors at these facilities are newly installed units which have operating conditions that permit the packing recovery system to be implemented.

A description of Northern's GHG operating emissions associated with Northern's Natural Gas Act Section 7(c) projects, prior notice projects and projects requiring advance notice are attached to this report.

NORTHERN LEAK DETECTION AND REPAIR PROGRAMS

Based on data and field experience, methane emissions are more likely to occur at above ground facilities, such as compressor stations, while leaks from buried pipe are rarer. The technologies for leak detection and repair are specialized to detect leaks depending on the location of the source.

The Northern aboveground Leak Detection and Repair (LDAR) program is a ground-based emissions survey that primarily uses a specialized optical gas imaging camera to survey for leaks.



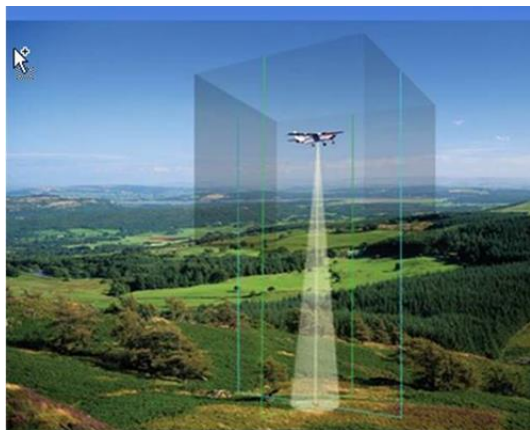
This program is used in a mandatory capacity where designated by state and federal regulations, as well as voluntarily by Northern, as a means to effectively find and repair leaks quickly and efficiently. In 2022, Northern performed 91 leak surveys and found 346 leaks. Of these, 291 were repaired by the end of the year. The remaining leaks were entered into the Northern Enterprise Action Tracking System (EATS) and scheduled for future repair. As of August 2023, an additional 37 leaks were repaired, and the remaining 18 leaks are scheduled for repair during the next scheduled shutdown.⁶

Northern 2022 LDAR Results

LDAR Survey's Performed	91
Leaks Found	346
Leaks Repaired by January 2023	291
Leaks Repaired by August 2023	328
Remaining Leaks Scheduled for Repair (next scheduled blowdown)	18

⁶ As a best practice, the blowdown quantity necessary for repair may be calculated and compared to the leak rate.

For buried pipe, Northern uses a flight-based infrared (IR) leak detection system annually to survey for leaks. In this program, IR sensors use an IR beam to detect and quantify gases present in the atmosphere.



Infrared gas sensors provide fast response times and accurate results. As information is gathered, the remediation is planned according to standards or best practices. Typically, small leaks are fixed in the field or in conjunction with other projects while larger leaks will have a timelier response.

In 2022, Northern contracted Pergam Technical Services to conduct flight-based leak detection surveys of the pipeline system. The project started March 25, 2022, and concluded October 30, 2022. The survey covered 13,326 miles and included all

three of Northern's underground storage fields. All leak indications were investigated by field operations. The testing confirmed 21 equipment leaks and 3 confirmed pipeline leaks. All confirmed leaks were identified and repaired.

INTERCONNECTING LOW-CARBON SOURCES

Northern continues to evaluate opportunities to support our focus on delivering reliable, affordable, safe and clean energy to our customers and on actions to mitigate methane emissions. Northern is evaluating low carbon service options including those related to Renewable Natural Gas (RNG) and hydrogen, as well as how to quantify and certify its operational methane emissions.

Renewable Natural Gas (RNG) - As an open access interstate pipeline, Northern responds to requests for interconnections on the system from all interested parties consistent with Northern's Tariff and the Commission's interconnection policy. As of October 1, 2023, Northern has five operational RNG receipt points on the system, representing a maximum flow of 12,028 Dth/day. Details regarding these operational interconnects are summarized below.

RNG Receipt Point	POI	Location	Capacity (Dth/day)
East Dakota Biogas	79540	Lincoln County, SD	3310
Gevo Biogas	79555	Lynn County, IA	3786
Brightmark Athena Baltic Biogas Rec	79509	Minnehaha County, SD	720
Dodge City Biogas Ford Co.	79338	Ford County, KS	1500
MMPA Biogas - Receipt	79597	LeSueur County, MN	2712

Additionally, Northern has completed construction on five RNG receipt points that are ready for service and will be operational when the customers complete their construction, as well as two additional RNG receipt points that are contracted and under construction. In addition, Northern is exploring additional opportunities with a number of additional RNG producers, while keeping gas quality and safety at the forefront.

Greenhouse Gas (GHG) Certification - Northern continues to monitor the progress and development of certification of GHG emissions in the natural gas industry to better understand the process and the benefits the company can deliver to our customers. Northern is a member of ONE Future and is involved in the GTI Energy's Veritas initiative, which is deploying developing technology in field studies across all segments of the value chain to understand how we can more accurately measure, reconcile and validate emissions. ONE Future will also seek to collaborate with other platforms and methodologies, such as Cheniere QMRV and IMEO, in order to evaluate the alignment of workstreams, simplify execution and foster progress toward globally consistent standards. Northern remains committed to reducing methane emissions and engaging with our customers to understand what would be meaningful to them.

Hydrogen - Northern is monitoring the progress and development of activities related to the use of hydrogen as a supplement fuel to natural gas. The key activities include:

- Evaluating technical feasibility and potential consequences of introducing hydrogen into Northern's system, including participation in industry research conducted by Pipeline Research Council International (PRCI).
- Following federal and state legislative and regulatory activities including provisions for hydrogen such as those reflected in the federal Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act (IIJA)
- Engaging with participants across the natural gas industry to understand customer and partner needs, as we work toward mutual decarbonization goals.

CONCLUSION

Northern is pleased to present this GHG Report in fulfillment of the obligations established by the September 7, 2023, Order Approving the Uncontested Stipulation and Agreement of Settlement, in FERC Docket No. RP22-1033-005. Northern looks forward to meeting with the Settling Parties to present and discuss the Report.

Attachments:

Operating emissions associated with Northern's 2022 Natural Gas Act certificate projects

NORTHERN'S 2022 NATURAL GAS ACT CERTIFICATE PROJECTS

<u>Docket No.</u>	<u>Description</u>
CP22-26	<p>Des Moines A-line Replacement - A section 7 application seeking authority to abandon approximately 29.63 miles of Northern's 16-inch-diameter Des Moines IAB65001 A-line and appurtenances in Boone, Dallas and Polk counties, Iowa. Northern also requests authorization to construct and operate an approximately 9.07-mile extension of its 20-inch-diameter Des Moines IAB65003 C-line and appurtenances in Boone, Dallas and Polk counties, Iowa, to replace the capacity associated with the abandoned A-line.</p> <p>The GHG emissions from the Project were identified and quantified in terms of CO₂e. Construction activities would result in 3,263 tons of CO₂e emissions (equivalent to 2,960 metric tons). Operational emissions are limited to fugitive releases and would result in emissions of up to 3,101 tons per year (2,813 metric tons per year) of CO₂e. There are no downstream emissions associated with the Project, given there would be no changes to the certificated capacity of Northern's system.</p>
CP22-33	<p>Redfield Broderick Well Replacement Project - A prior notice seeking authorization to (1) install and operate an injection and withdrawal well; (2) install a natural gas pipeline lateral; (3) install a water production line; and (4) abandon an existing injection and withdrawal well within Northern's existing underground natural gas storage facility, the Redfield storage field, located in Dallas County, Iowa. The new well will have no impact on the Redfield Storage Fields certificated physical parameters, including total gas storage inventory, reservoir pressure, reservoir and buffer boundaries and certificated capacity.</p> <p>The GHG emissions from the Project were identified and quantified in terms of CO₂e. Construction activities would result in 82.04 tons of CO₂e emissions. There are no changes to GHG emissions from the operation of these facilities.</p>
CP22-42	<p>Ogden to Ventura A-line Capacity Replacement - A section 7 application seeking authority to abandon in-place approximately 82.70 miles of 20-inch-diameter pipeline on Northern's IAM60601 A-line system and appurtenances in Boone, Webster, Wright, and Hancock counties, Iowa. Northern also requests authorization to construct and operate an approximately 6.04-mile extension of its 30-inch-diameter Ogden to Ventura IAM60604 D-line and appurtenances in Wright County, Iowa, to replace the capacity associated with the abandoned A-line.</p> <p>The GHG emissions associated with construction and operation of the Project were identified and quantified in the EA. Construction of the Project may result in emissions of up to about 2,027.64 tons (1,839.44 metric tons) of CO₂e over the duration of construction. Operational emissions are limited to fugitive releases and would result in emissions of up to 56.85 tons per year (51.57 metric tons per year) of CO₂e. There are no downstream emissions associated with the Project.</p>

CP22-46 West Leg 2022 - A prior notice seeking authorization to install and operate an approximately 1.89-mile 16-inch-diameter C-line in Martin County, Minnesota and associated appurtenant facilities.

Construction emissions: 1,072 tons of CO₂e

Operational emissions: 7.2 tons per year of CO₂e

Downstream Impacts:

- Projected actual burn: 92,187 tons per year of CO₂e
- Full burn: 199,108 tons per year of CO₂e

CP22-138 Northern Lights 2023 - A section 7 application seeking authority to install and operate (1) a 2.79-mile extension of Northern's 36-inch-diameter Ventura North E-line; (2) a 1.07-mile, 30-inch-diameter loop of Northern's 20-inch-diameter Elk River 1st and 2nd branch lines; (3) a 1.14-mile extension of Northern's 24-inch-diameter Willmar D branch line; (4) a 2.48-mile extension of Northern's 8-inch-diameter Princeton tie-over loop; (5) a 2.01-mile loop of Northern's 3-inch-diameter Paynesville branch line; (6) a 0.34-mile extension of Northern's 8-inch-diameter Tomah branch line loop; and (7) aboveground appurtenant facilities consisting of a launcher and tie-over valve settings. All Project components are located in various counties in Minnesota and Wisconsin.

Construction emissions: 11,424 tons of CO₂e

Operational emissions: 113 tons per year of CO₂e

Downstream Impacts:

- Projected actual burn: 298,056 tons per year of CO₂e
- Full burn: 982,776 tons per year of CO₂e

CP22-158 Paullina Horsepower Replacement - A 30-day advance notice was filed to replace five vintage Ingersoll Rand® natural gas-fired reciprocating compressor units. This project will replace the five vintage Ingersoll Rand® natural gas-fired reciprocating compressor units (Units 1 to 5), which total 4,400 rated HP with two 2,500-HP Caterpillar 3608TA gas-fired reciprocating compressor units (Units 6 and 7) totaling 5,000 rated HP.

GHG: N/A

CP22-159 Brownfield Horsepower Replacement - A 30-day advance notice was filed to replace one vintage General Electric Frame III natural gas-fired turbine compressor unit. This project will replace one vintage General Electric Frame III natural gas-fired turbine compressor unit with one Solar Taurus 70 gas-fired turbine compressor unit totaling 11,150-ISO-rated HP and approximately 9,230 HP at 60 F ambient, at elevation.

GHG: N/A

CP22-489 Albert Lea North E-line Expansion - A prior notice seeking authorization to install and operate an approximately 1.57-mile expansion of Northern's 36-inch-diameter MNM80105 Ventura Interconnect to Farmington E-line in Freeborn and Steele counties, Minnesota and associated appurtenant aboveground facilities.

Construction emissions: 1,306 tons of CO₂e

Operational emissions: 27.3 tons per year of CO₂e

Downstream Impacts:

- Projected actual burn: 225,883 tons per year of CO₂e
- Full burn: 635,982 tons per year of CO₂e