# White paper deep dive:

## Minnesota's growing decarbonization challenge

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# Mission

Shape and drive bold policy solutions to achieve equitable carbon-neutral economies.

# Vision

A just, prosperous, and resilient future powered by a shared commitment to a carbon-neutral economy.

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# Today's Speakers

**Joe Dammel**
Managing Director, Buildings

**Isak Kvam**
Senior Communications Associate, Writer

**Caitlin Eichten**
Senior Policy Associate, Buildings

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Fossil Gas and Health Consultant

# In a nutshell

- Future of gas
  - Climate
  - Health
  - Building electrification
- Energy transition
- Grounding future policy


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# Data sources

- Utility filings to the Minnesota Public Utilities Commission
  - Gas Jurisdictional Annual Reports
  - Rate case testimony and workpapers
  - Utility rate books
  - Other natural gas utility annual reporting
- Utility filings to the Pipeline and Hazardous Materials Safety Administration (PHMSA)
- Data from U.S. Census Bureau American Community Survey


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# Key questions our research aimed to answer

- To what extent are Minnesotans using **gas to heat their homes**?
- What is the **current state** of Minnesota's gas distribution system?
- Are there any **significant trends** in the system, consumption, and emissions?
- How do **the buildings sector's emissions** compare to Minnesota's economy-wide goals and to other economic sectors?
- What are utilities' plans for **replacement** of the gas distribution system and how much will it **cost** ratepayers?

# Study findings


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# Natural gas is the predominant fuel used for home heating in MN

| Fuel | U.S. (percent) | Minnesota (percent) | Minnesota (units) |
|---|---|---|---|
| Utility gas | 46% | 65% | 1,516,671[22] |
| Electricity | 41% | 19% | 435,364 |
| Bottled, tank, or LP gas | 5% | 11% | 259,065 |
| Fuel oil, kerosene, etc. | 4% | 1% | 27,701 |
| Coal or coke | 0% | 0% | 283 |
| Wood | 1% | 2% | 36,781 |
| Solar energy | 0% | 0% | 1,536 |
| Other fuel | 1% | 1% | 24,177 |
| No fuel used | 1% | 1% | 20,612 |
| Total | 100% | 100% | 2,322,190 |

- Natural gas heats approximately two of every three homes in Minnesota.
- Compared to the national average, a larger proportion of Minnesota's housing units are heated with natural gas and propane.
- The share of homes heated with electricity and fuel oil in the state are both less than half the national average.
- Among renter-occupied households in Minnesota, 39% heat their homes with electricity.

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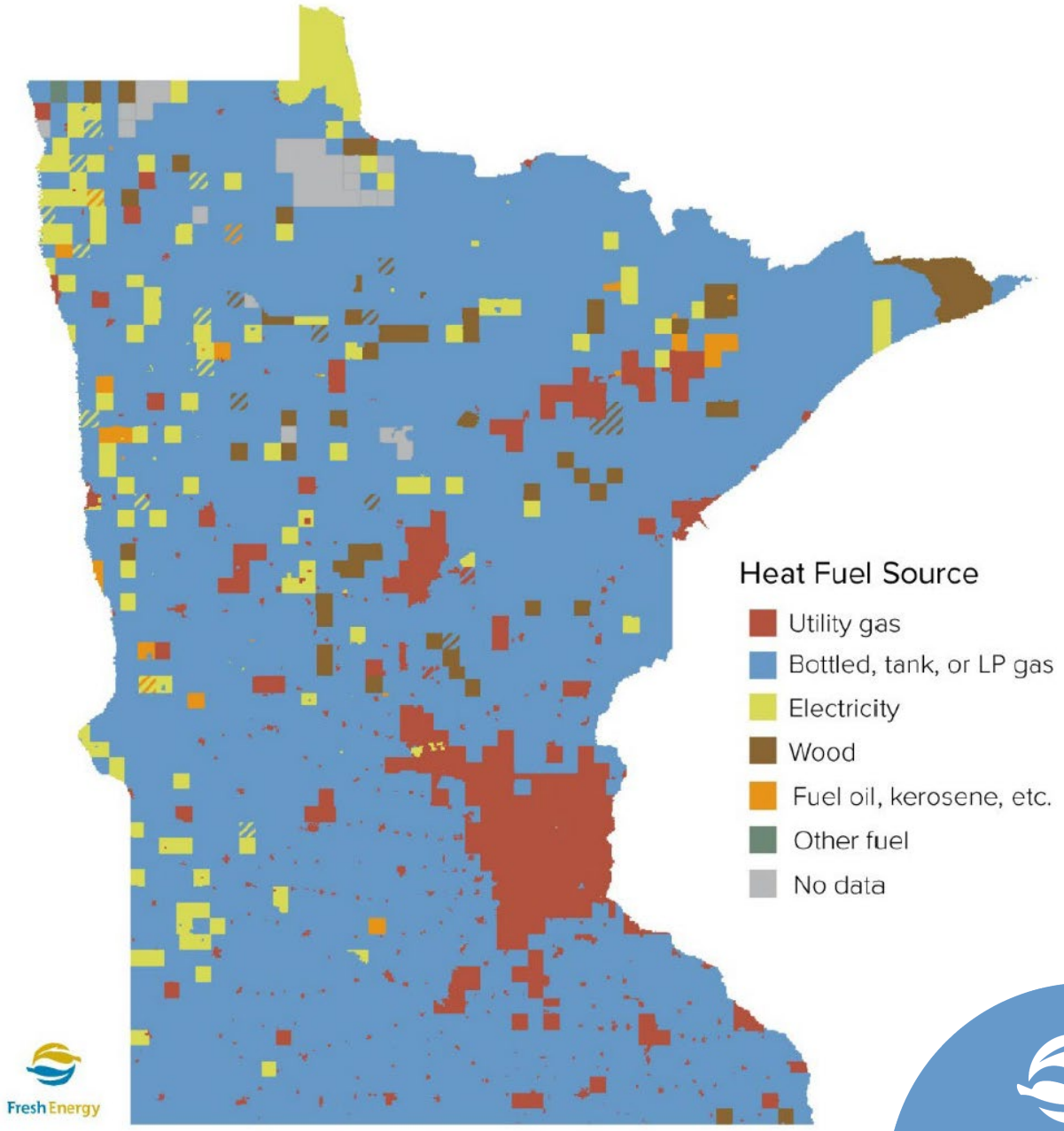
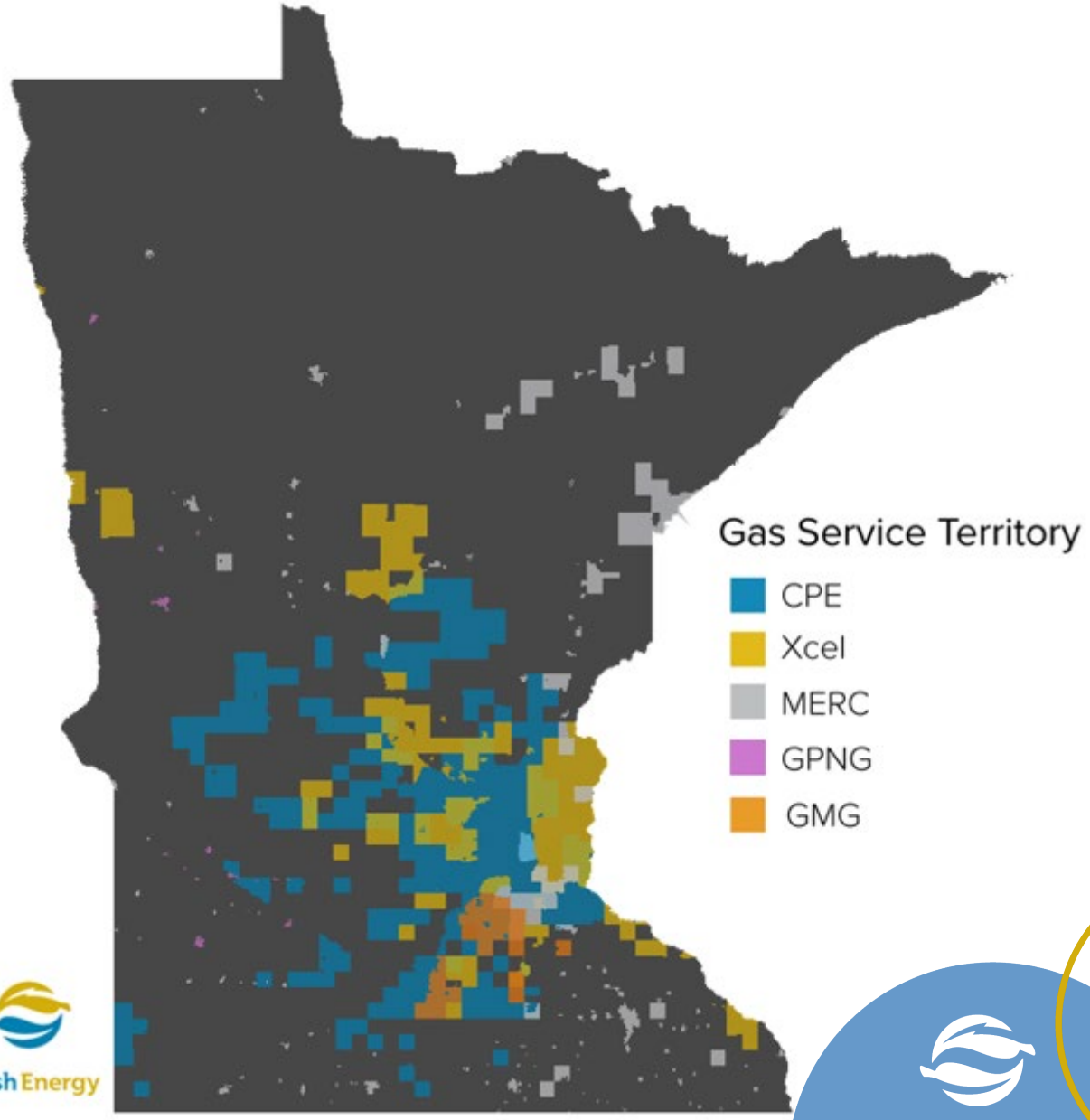
- The map shows the predominant home heating fuel by county subdivision in Minnesota
- Natural gas service covers much of the larger population centers in the state.
- In areas of the state with no natural gas infrastructure or service, buildings rely upon propane, electricity, and wood for the majority of their fuel needs.



- Most customers receive natural gas service from an investor-owned utility (or IOU), which are regulated by the Minnesota Public Utilities Commission.
- IOUs serve approximately 94% of the state's natural gas sales, with the remaining 6% served primarily by municipal utilities.
- Minnesota's five gas IOUs are:
  - CenterPoint Energy (CPE),
  - Xcel Energy (Xcel),
  - Minnesota Energy Resources Corporation (MERC),
  - Great Plains Natural Gas Co. (GPNG), and
  - Greater Minnesota Gas (GMG).
- The map approximates the service territories where the IOUs operate based on the lists of communities served that the gas utilities provide in their rate books.



# Minnesota is primarily served by investor-owned natural gas utilities

| | Total customers as a percent of all IOU customers | Total number of customers | Number of residential customers | Percent of total customers that are residential |
|---|---|---|---|---|
| **CPE** | 54% | 905,186 | 833,463 | 92% |
| **Xcel Gas** | 29% | 480,711 | 444,425 | 92% |
| **MERC** | 15% | 246,146 | 221,933 | 90% |
| **GPNG** | 1% | 22,278 | 19,091 | 86% |
| **GMG** | 1% | 10,246 | 9,235 | 90% |
| **Total** | 100% | 1,664,567 | 1,528,146 | 92% |

- The three largest IOUs (CenterPoint, Xcel, and MERC) collectively make up 98% of natural gas IOU customers in Minnesota.
- 92% of all natural gas IOU customers in Minnesota are residential customers.

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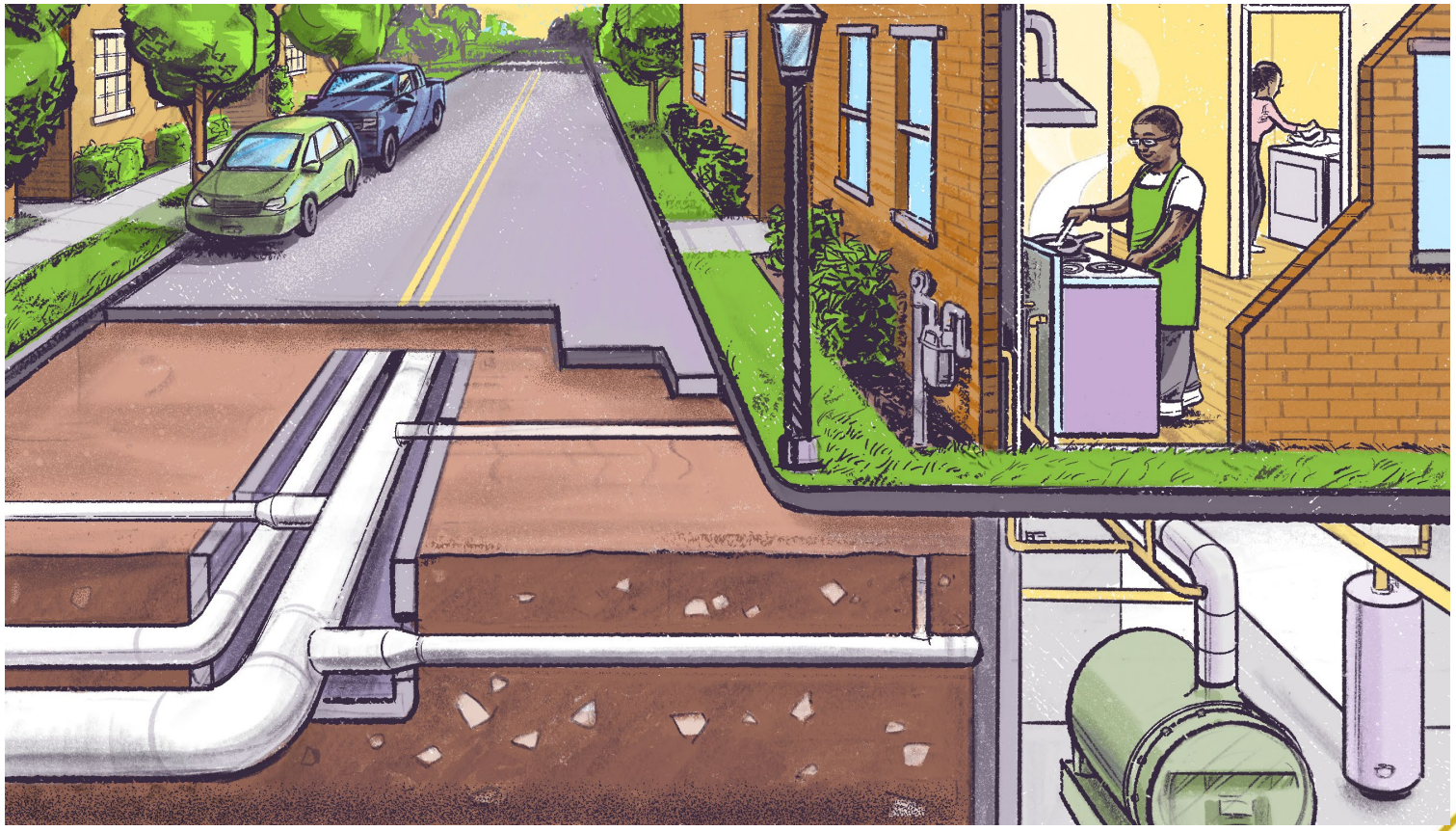
- Utilities distribute natural gas to customers via a vast, underground natural gas distribution system comprised of pipes, valves, and meters.
- Two general kinds of distribution pipes transport natural gas within the utility's distribution system:
  - Gas mains are the larger, underground pipes that deliver large volumes of gas to communities and through neighborhoods.
  - Service lines are the smaller pipes that run beneath yards and sidewalks before reaching the building's gas meter.



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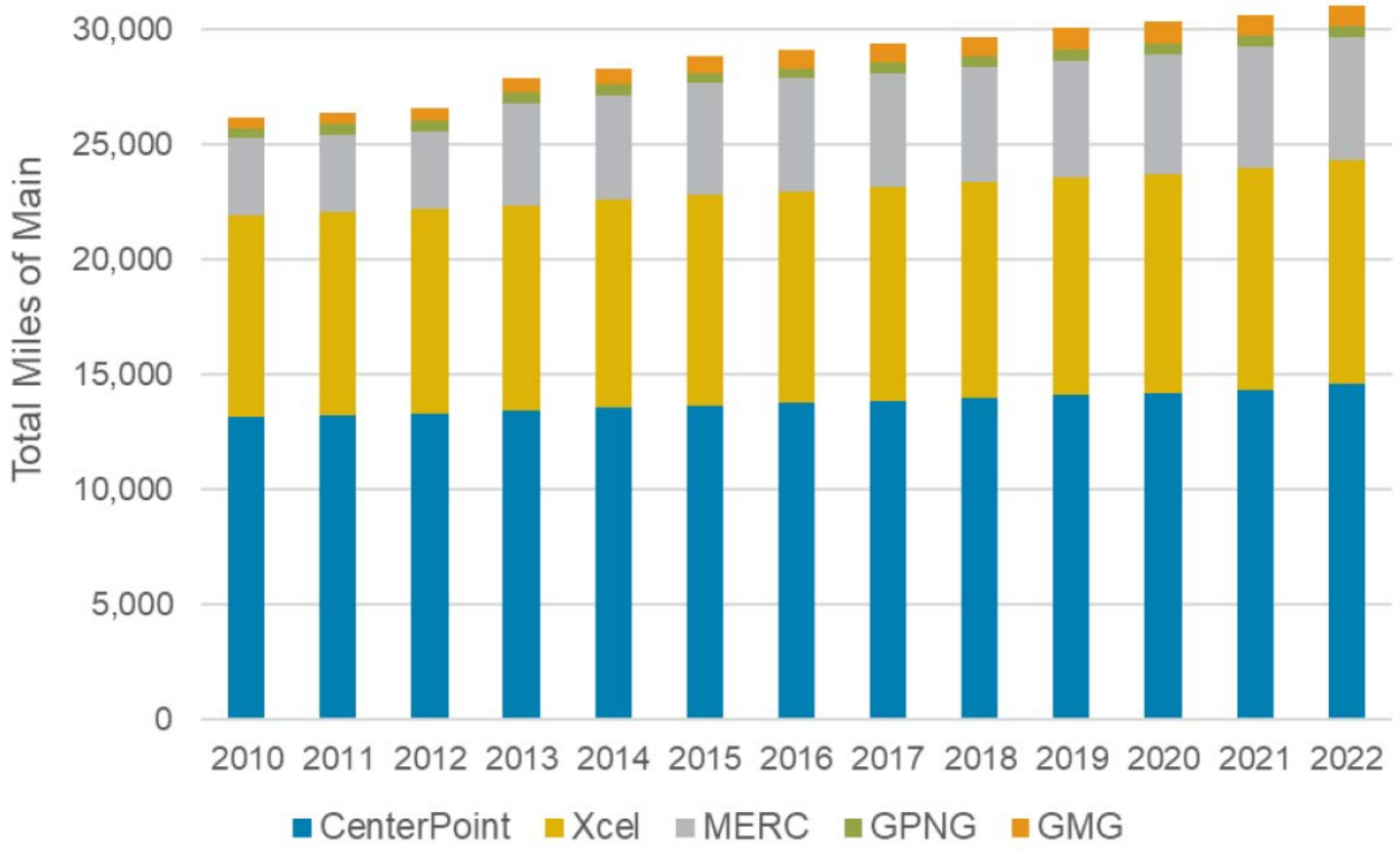
# Minnesota's natural gas distribution system is incredibly large

Minnesota's gas mains could circumvent the earth nearly 1.5 times!

| | Miles of Main (2022) | Times Around Earth |
|---|---|---|
| **CPE** | 14,608 | 0.59 |
| **Xcel** | 9,735 | 0.39 |
| **MERC** | 5,329 | 0.21 |
| **GPNG** | 466 | 0.02 |
| **GMG** | 925 | 0.04 |
| **Total IOUs** | 31,063 | 1.25 |
| **All MN Utilities** | 34,483 | 1.38 |

# The total miles of gas mains in Minnesota have risen steadily

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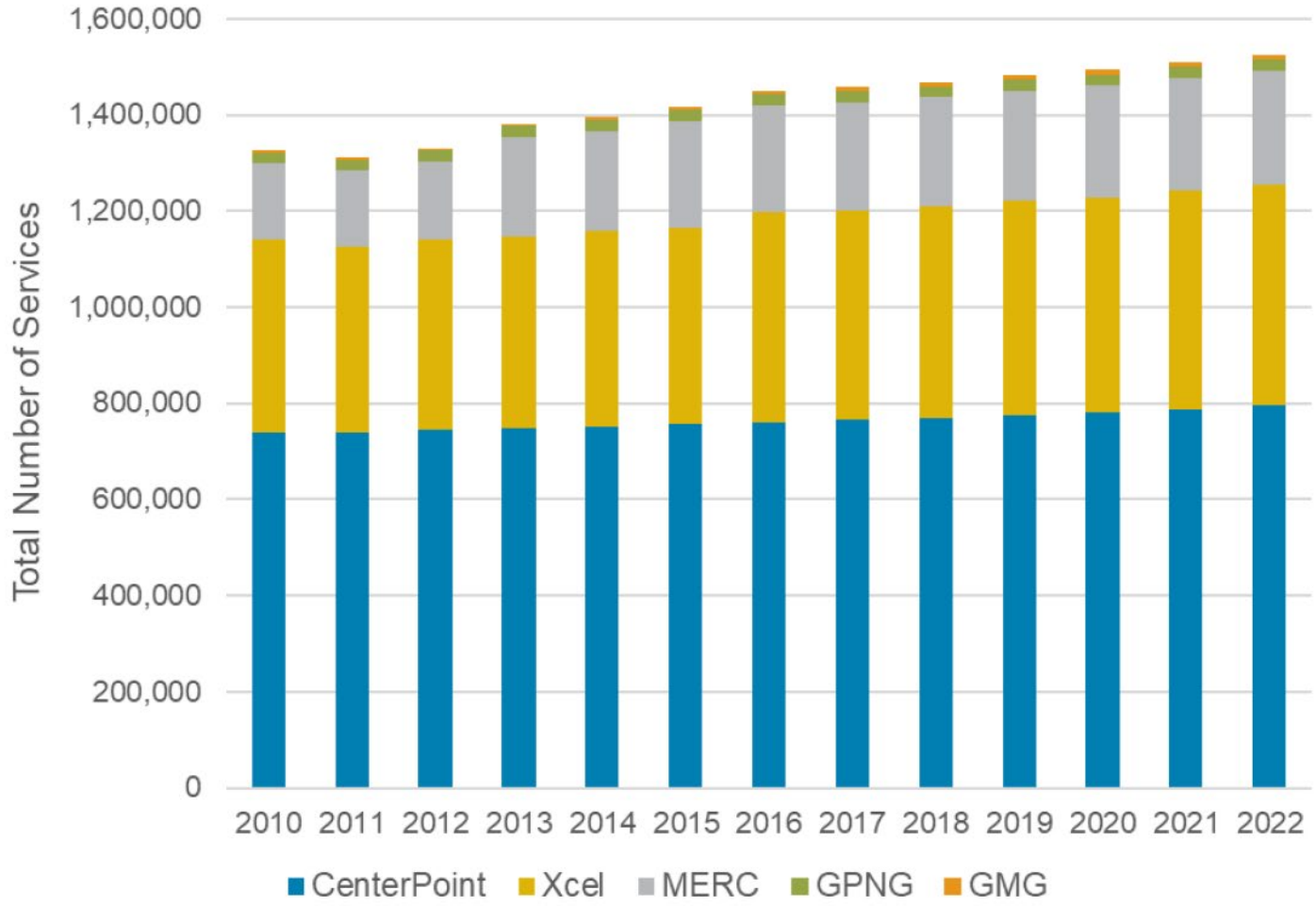
# The total number of gas service lines has also increased

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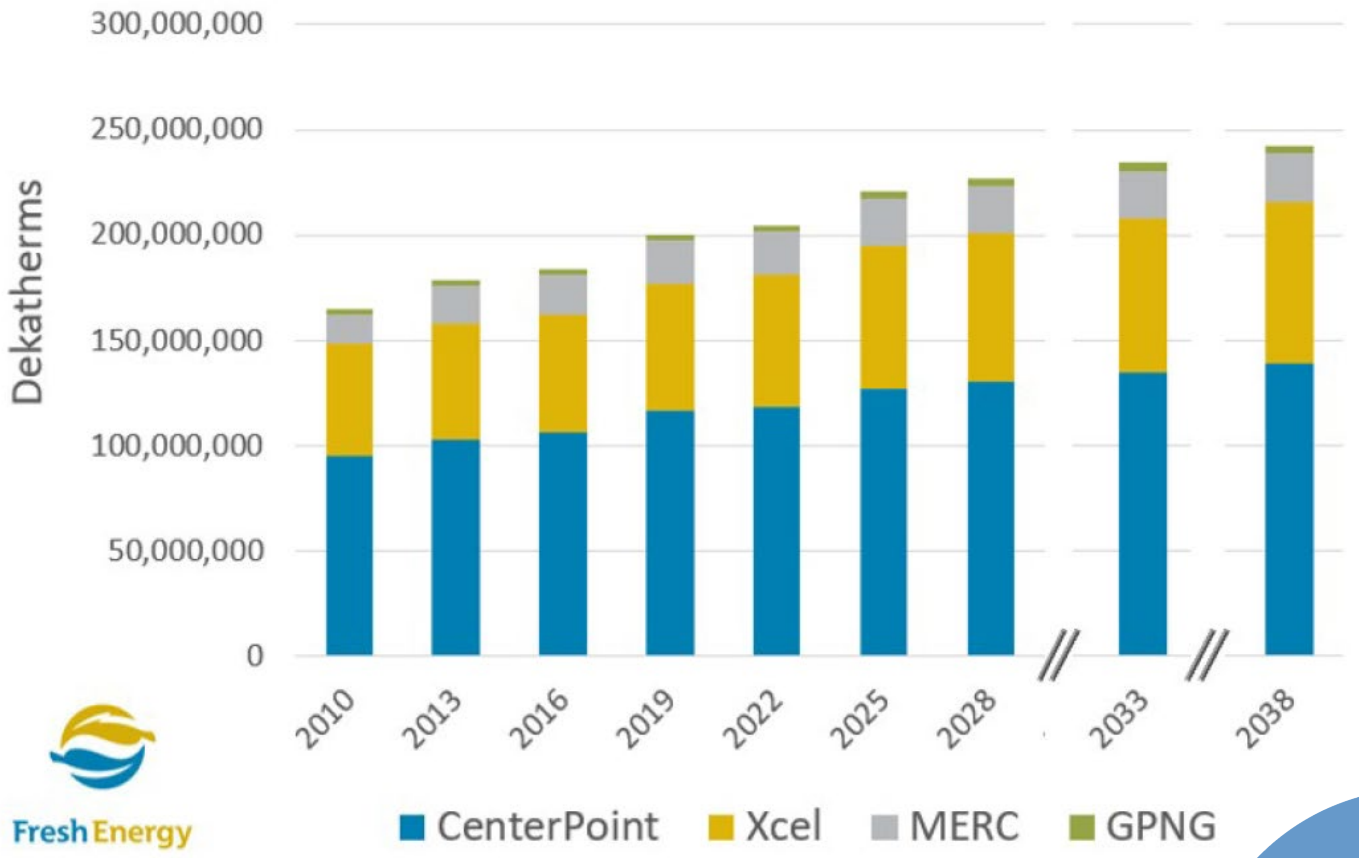
# Minnesota's natural gas deliveries to buildings are increasing

- Gas utilities report gas sales, which correspond to gas consumption
- 1 dekatherm = 1 million BTU
- Sales data are normalized for weather variation
- Utility data show steady growth historically and into the next 15 years

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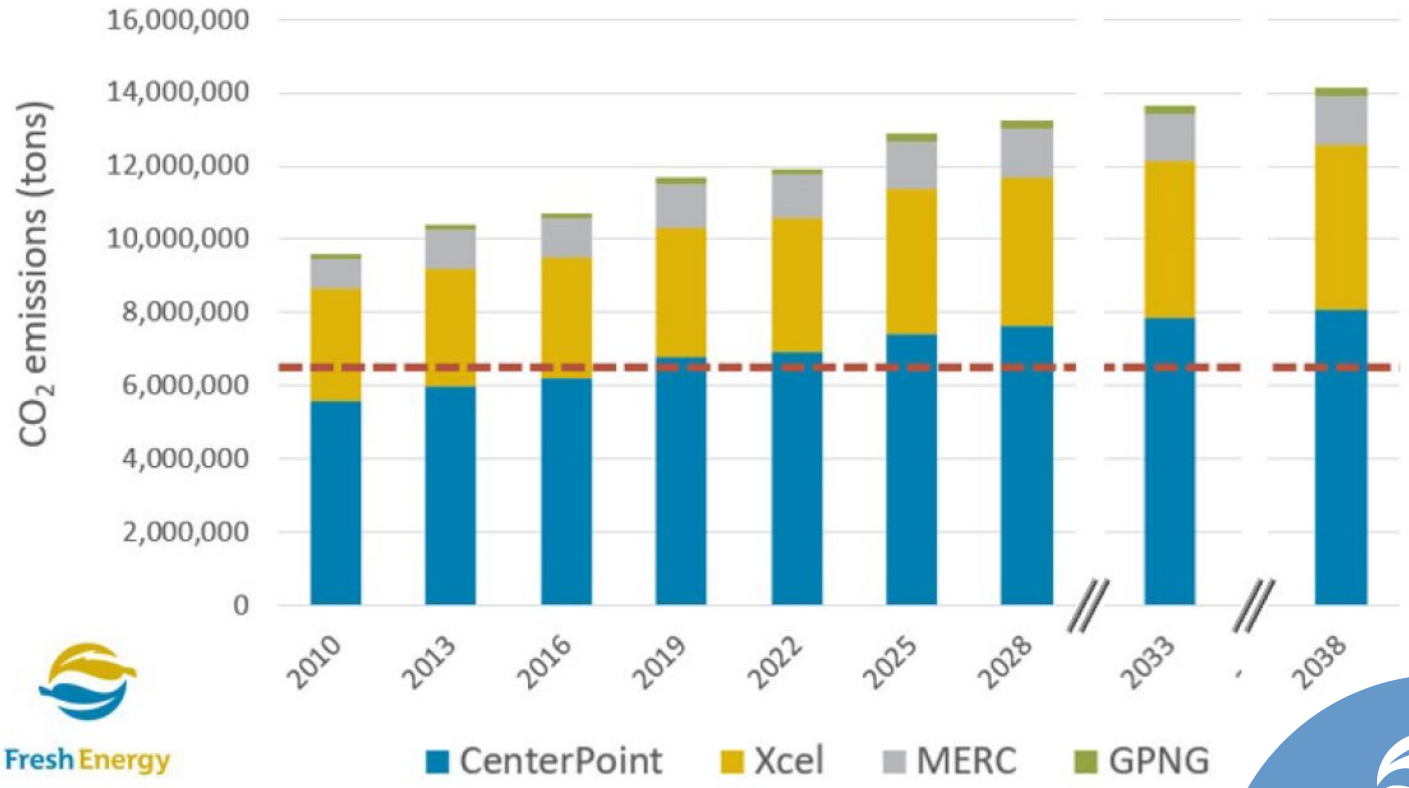
# Minnesota is not on track to meet its buildings emissions reduction goals

- Gas sales can be converted to $CO_2$ emissions
- Increasing gas sales = Increasing $CO_2$ emissions
- Minnesota's buildings emissions reduction goal: 50% by 2035
- Natural gas emissions could be over twice the state reduction goal by 2035

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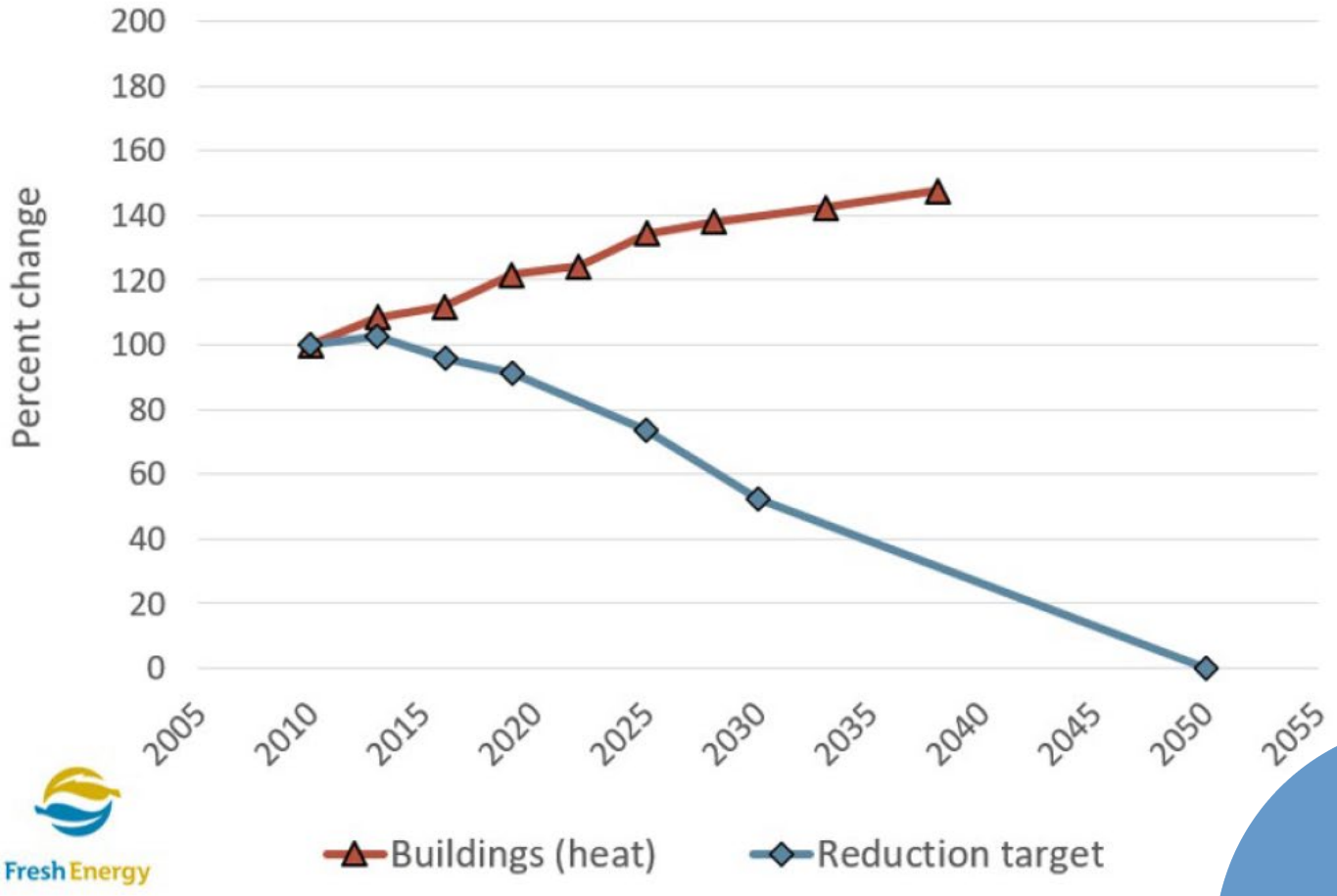
# Natural gas emissions from buildings increase, while statewide emissions decrease

- Minnesota has a statewide emissions goal: Net zero by 2050
- Natural gas emissions from buildings go up to over 140% of 2010 emissions by 2038
- Minnesota statewide emissions declined by 2019, unlike buildings
- Buildings natural gas emissions are growing in opposition to the statewide emissions goals

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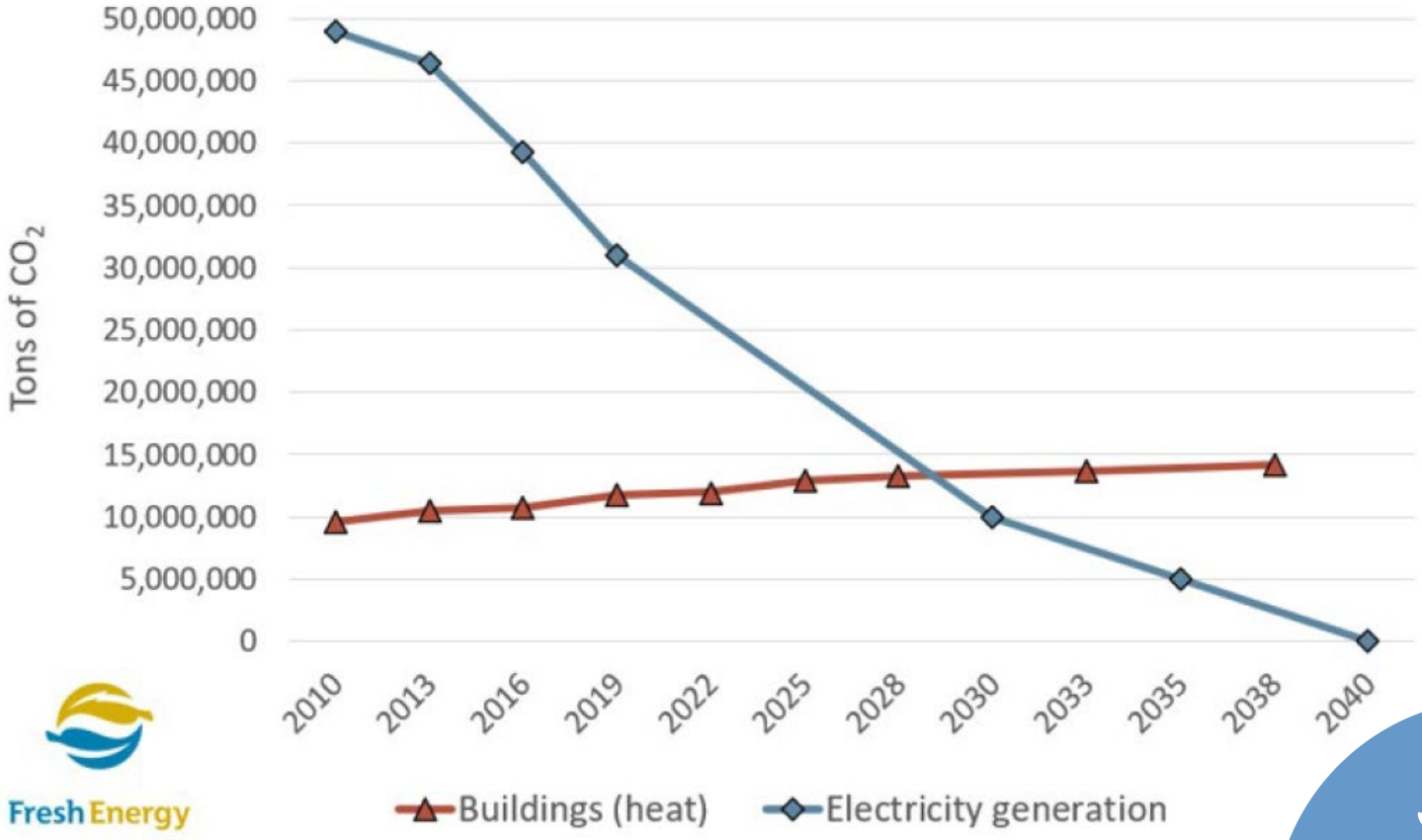
# Natural gas emissions from buildings could exceed electricity generation by 2030

- Historical emissions from electricity generation:
  - 2010 - ~50 million tons
  - 2019 - ~30 million tons
- MN carbon-free electricity standard (2023):
  - 2030 - ~10 million tons
  - 2040 – Net zero
- Buildings natural gas emissions already surpassed the 2030 electricity target in 2022

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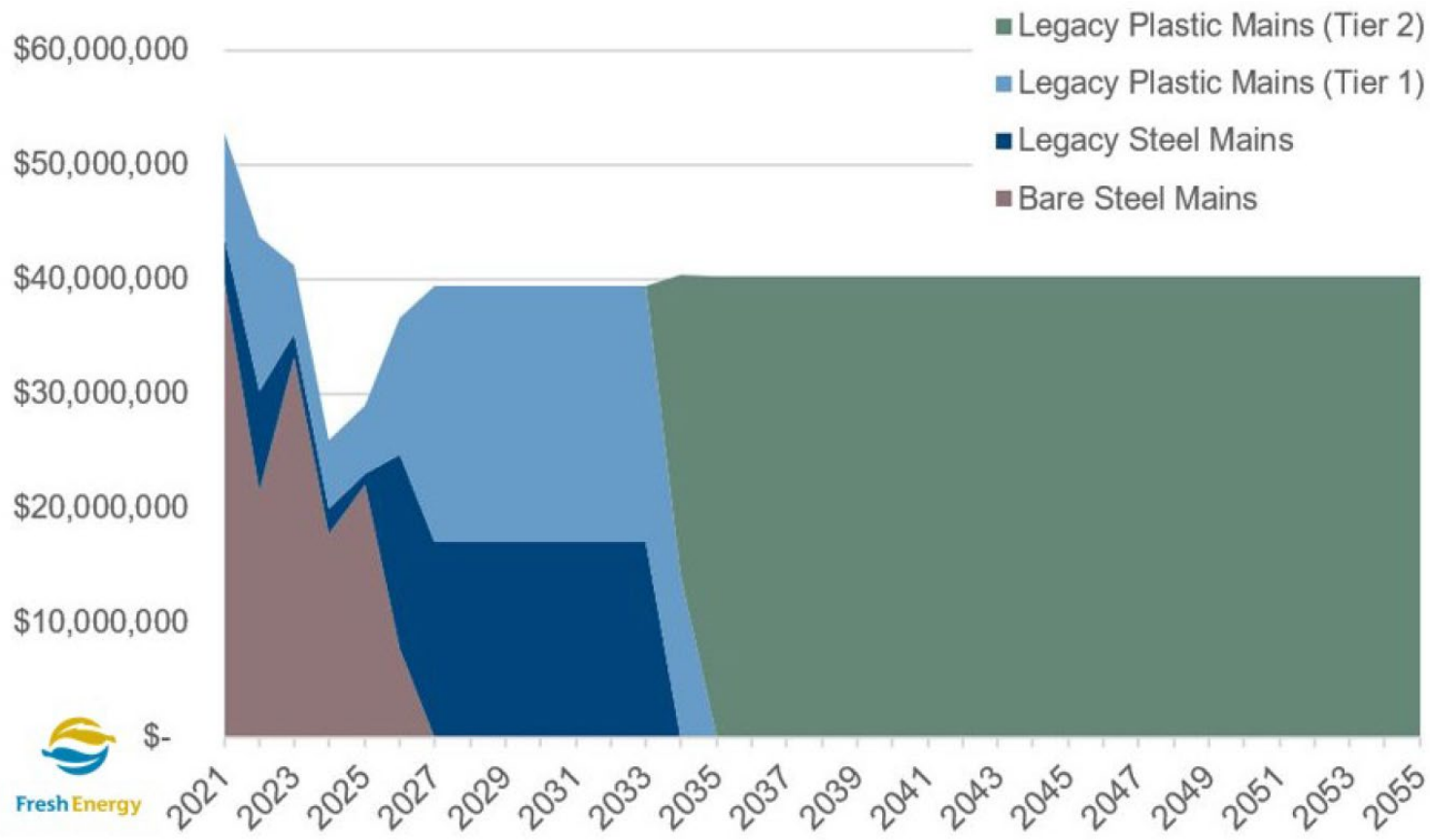
# Gas infrastructure is being rapidly replaced, increasing costs and the risk of stranded assets

- Minnesota's gas utilities have also accelerated the replacement of the existing system over the past decade, and they continue planning to spend on these projects far into the future.
- The figure shows the cost of CenterPoint's gas main replacement projects, using projections reported by the utility in its most recent rate case.



# The challenge with replacing existing gas infrastructure is three-fold

1. Replacing pipe generally **increases costs by growing rate base**, but does not add utility customers who can provide additional revenue to offset these costs.

2. New utility pipe has an **expected useful life of decades**, which runs well beyond Minnesota's 2050 goal for net zero GHG emissions. This **means we will be paying for replacement projects well into the latter part of this century,** when Minnesota's buildings sector emissions should be net zero.

3. Utilities have a fundamental obligation to provide safe and reliable gas service, and an important part of that obligation necessitates continued investment in the system for the foreseeable future.

    - Although these investments are driving increasing rates and increasing use of natural gas which **runs counter to Minnesota's GHG reduction goals,** utilities must be able to fulfill their core objective of safety and reliability.

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# Rate base represents the potential stranded asset risk

- The public faces the risk of addressing utility assets that are not fully depreciated, but are also not being utilized due to customer defection, also known as stranded assets.
- Rate base is essentially the unrecovered gas distribution infrastructure, and therefore represents the potential stranded asset risk.

| | Average rate base ($) |
|---|---|
| **CPE** | 1,567,305,700 |
| **Xcel Gas** | 1,031,566,216 |
| **MERC** | 466,426,959 |
| **GPNG** | 39,298,585 |
| **GMG** | 44,409,541 |

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# Takeaways

- Grounding and context
- The gas system in MN is big (and getting bigger)
  - Natural gas serves roughly 2/3 of Minnesotans
- Emissions are trending up and stand to make up a larger slice of Minnesota's GHG emissions pie as other sectors reduce emissions
- Gas utilities are spending on accelerated replacement programs
- The current trajectory is incompatible with state goals
- Telling a compelling story with disparate data

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# Q&A


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