UTILITY THERMAL ENERGY NETWORKS (UTEN)

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Xcel Energy®

Why We're Doing This

SUSTAINABILITY

Net-Zero Natural Gas

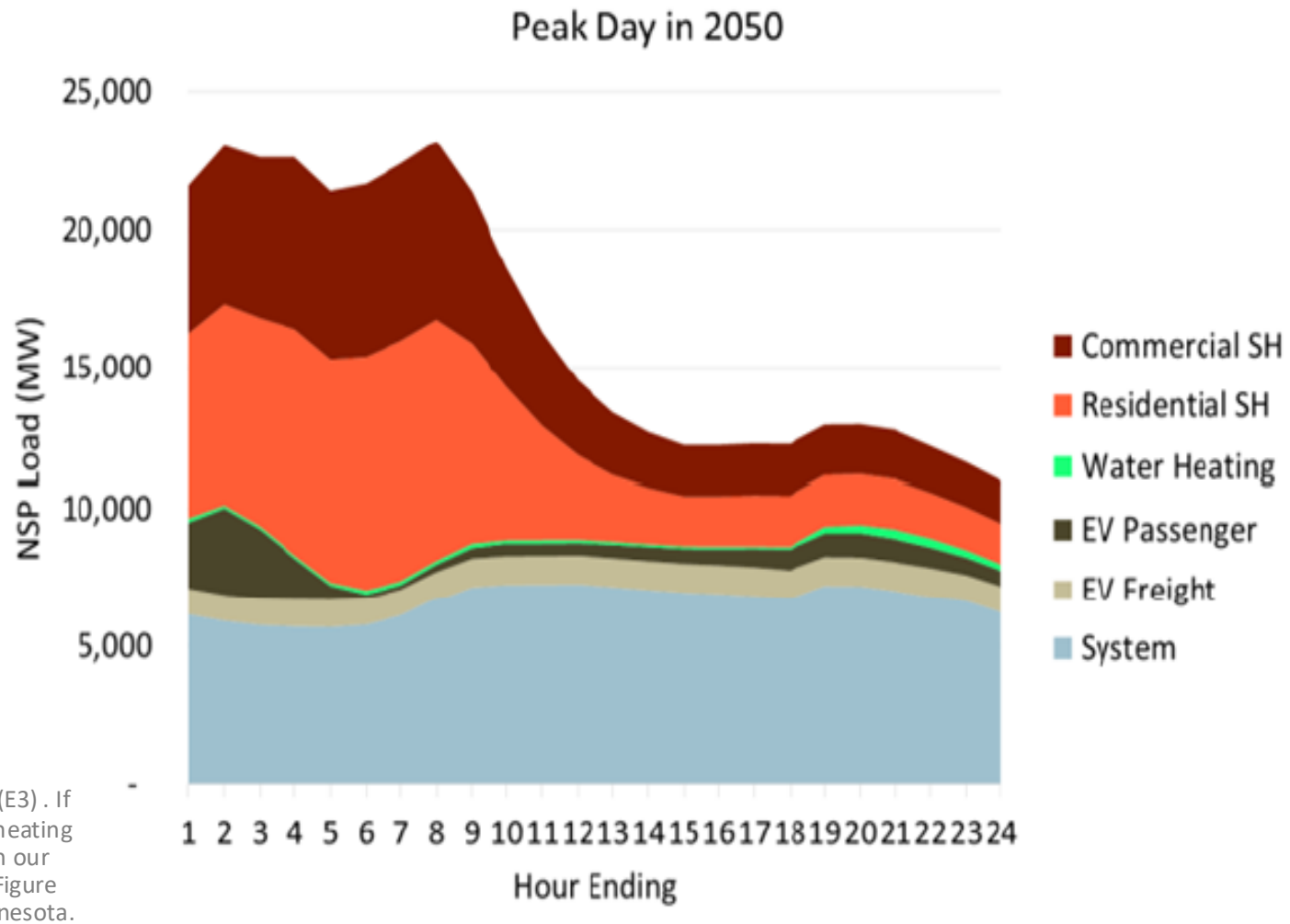
We're committed to operating a gas system that's safe, reliable and increasingly clean while keeping customer bills as low as possible.

On The Coldest Days, Heating Uses The Most Energy

Space Heating

Electric Vehicles

Everything Else

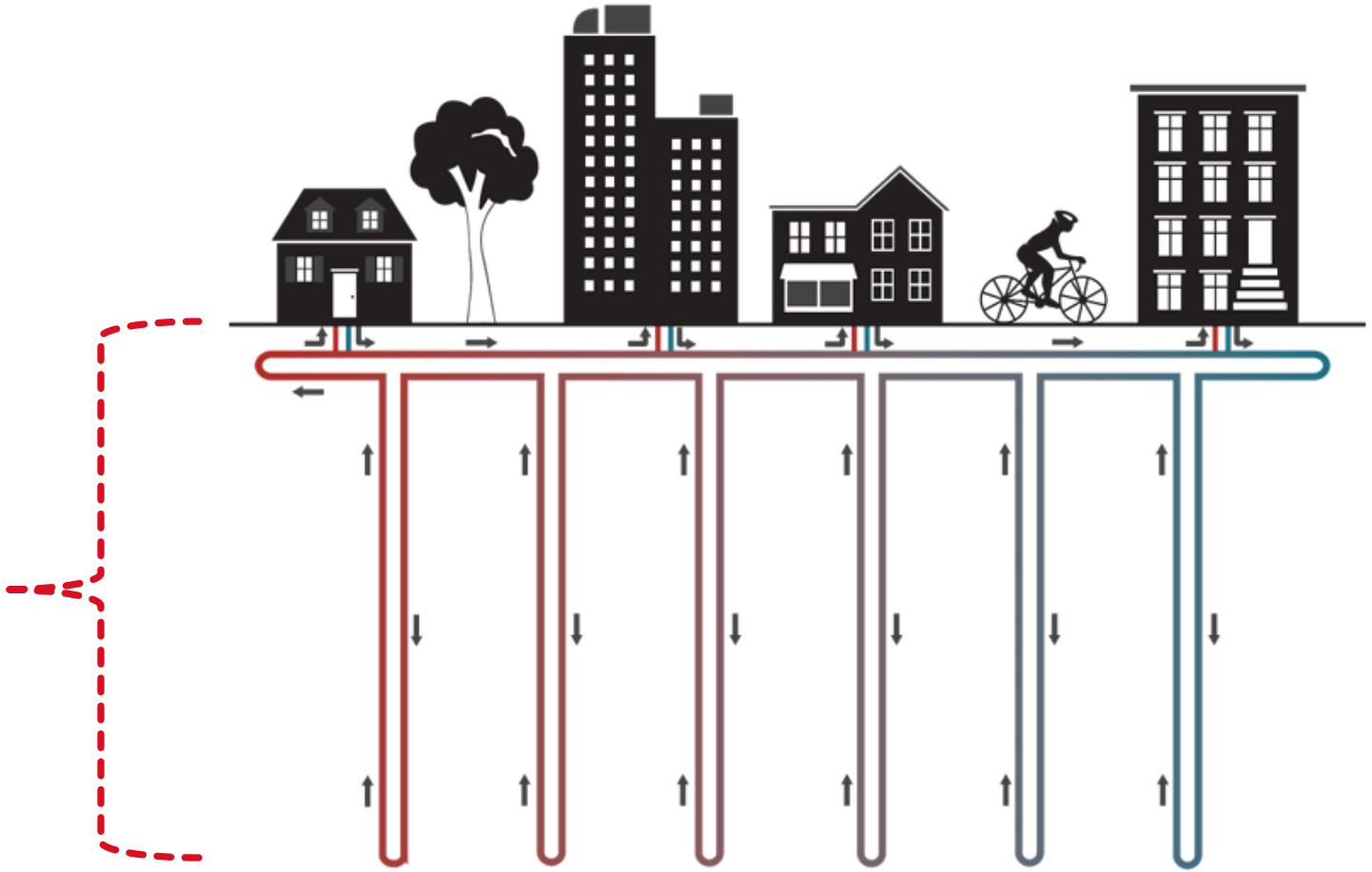


Modeling for Xcel Energy's system by Energy & Environmental Economics (E3) . If most of our customers (both residential and commercial) converted their heating equipment to ASHPs with electric resistance backup heat, peak demand on our electric system would increase by roughly 2.5 times what we have today. Figure shows the breakdown of that demand by end use, on NSP's system in Minnesota.

How We're Doing This

Utility Thermal Energy Networks are one option we're investigating

- Next generation district energy system
- No centralized heating/cooling plants (may require small plant for supplemental thermal needs depending upon loop design and location)
- Delivers temperate water-based solution to each customer for use in a water source heat pump
- Boreholes keep the fluid temperature close to ground temperature



UTENs are the Next Generation of District Energy

Traditional District Energy Systems		UTEN
Require large heating or cooling plants	→	Does not require heating/cooling plants. Can be designed with supplemental heating or cooling. Only requires electricity for pumping
Distribute hot/cold fluid	→	Distributes temperate fluid (water + glycol) close to ground temperature Uses boreholes to absorb/exude energy from/to the ground
Customers don't require heating/cooling equipment	→	Customers require a heat pump to extract energy from the fluid to heat or cool their facility
Centralized and built in one fell swoop	→	Not centralized and can be expanded in small, incremental pieces
Not very efficient. Loses energy to the ground. The larger it becomes, the less efficient it becomes.	→	Ultra efficient. Gains energy from the ground and enables energy sharing between customers. The larger it becomes, the more efficient it becomes.

UTENs are the Most Efficient Heating and Cooling System Currently Available

Heating from the ground instead of air	Is roughly 2.4x more efficient on a peak cold day.
Enormous potential for recovering waste heat	Natively recovers heat from low temperature sources. In urban districts the amount of waste heat can reach 50–120% of the total annual heat demand.
Diversification of building types leads to load flattening	Greater size and diversity yields greater performance. In one real-world example peak demand was mitigated by 45%.
Saves space	Reduces footprint compared to drilling individual boreholes/bore-fields for each building.
Enables seasonal energy storage	Can utilize boreholes or aquifers as a thermal storage medium.
Access to opportunistic resources	Such as industrial heat processes, municipal wastewater systems, or surface water bodies.

Legislation Driving Projects

Active Projects

- File a demonstration project in CO
- Must contain either a Disproportionally Impacted Community, a mountain community, or a region of gas capacity constraint
- No cost cap

CO HB23-1252
Thermal Energy Services

- Identifies communities interested in piloting gas alternatives projects
- Utility and local government jointly file a neighborhood-scale alternatives project

CO HB24-1370
Reduce Cost of Use of Natural Gas

Active Projects

- Allow natural gas utilities to meet Minnesota's greenhouse gas reduction and renewable energy goals through innovative resources
- ~10M cost cap on district energy projects for XE

MN 23-518
Natural Gas Innovation Act

- PUC to establish a Thermal Energy Network Deployment Work Group to examine (1) the potential regulatory opportunities for thermal energy networks and (2) the potential barriers to development

MN 24-275

UTEN Project Timeline - CO

Q1 - Q3 2024

Community outreach

Site selection

Q4 2024 – Q2 2025

Phase 1 filing submitted August 2024

Approved June 2025

Frisco and Ruby Hill neighborhood in Denver selected

Q2 2025 – Q4 2026

Design and Engineering

Final cost estimates

Enrolled customers

Phase 2 filing submitted by 12/11/2026

2027 – 2028

Demonstration projects implementation