

Data Centers as Community Energy Providers:

The Minnesota Heat Recovery Opportunity

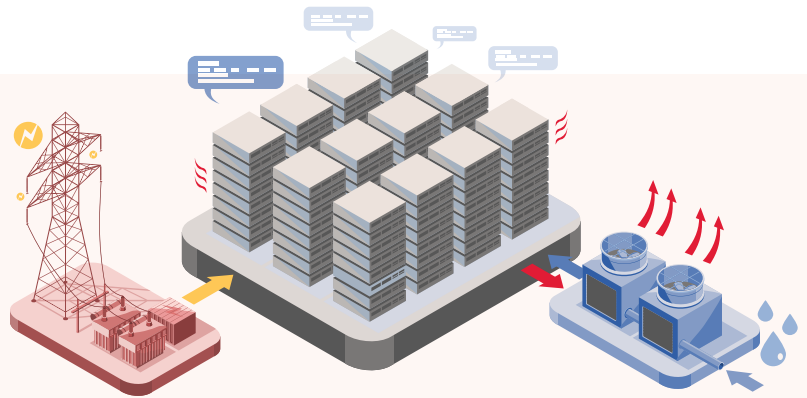
Data center infrastructure sits at the nexus of electricity, water, and thermal energy, creating both opportunities and challenges for communities working to unlock its economic value.

Minnesota is attracting data center developers due to its abundant water resources for equipment cooling, land availability, access to clean power, and capable workforce. By connecting data centers to heat users, waste heat recovery presents an innovative opportunity for Minnesota to lower its energy demand while lowering costs and meeting climate targets.

PROBLEM

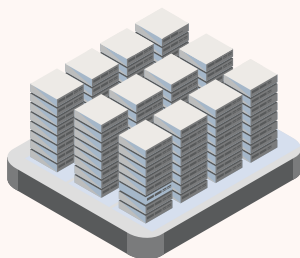
The Data Center Energy Dilemma

Data centers need constant electricity supply for servers and cooling systems, with demand projected to keep increasing.



New data centers could significantly strain the area's electric grid, and building additional grid infrastructure to support this new demand may increase utility bills for customers.^{1,2}

Data centers vary widely in size, with electric power ratings in the kilowatts (kW) to well over 100 Megawatts (MW).



100 MW ≈

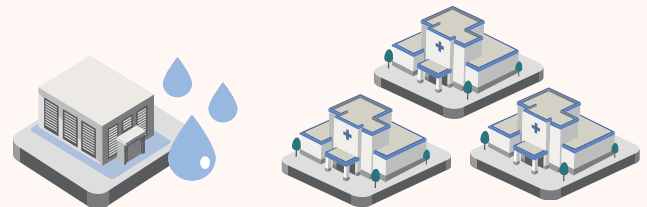


electricity for
80,000
U.S. households

Minnesota is set to power data center projects exceeding 100 MW with more in the pipeline.



Nearly 100% of the electricity required to operate data centers is turned into heat, requiring extensive cooling traditionally done with water-intensive processes.



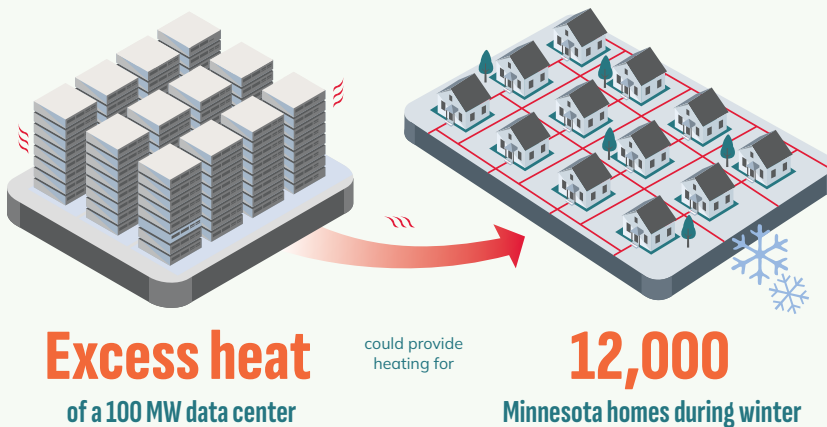
one
15 MW ≈ **3 average-sized hospitals**
data center

Closed loop cooling is starting to become more prevalent in modern designs, reducing direct water use but at the cost of higher electricity draw. Reusing waste heat can address this dilemma, improving total system energy efficiency while lowering both emissions and water use.

SOLUTION

Capture Thermal Energy for Heating Buildings

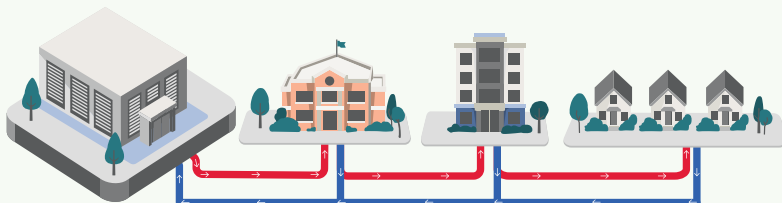
Minnesota is uniquely positioned to convert data centers from isolated energy consumers to community-serving energy generators by capturing their waste heat.



If captured and reused, the waste heat from a single 100-MW data center could provide heating for an estimated 12,000 Minnesota homes during the winter months when paired with heat pump technology and a district energy system, also called a thermal energy network (TEN).⁴

District Energy Systems & Thermal Energy Networks (TENs)

Co-locating data centers near campuses and communities provides opportunity for integrating data center heat via district heating or TENs, turning a heat byproduct into a valuable energy resource. Beyond the useful thermal energy, this type of integration can also reduce data center water consumption and the strain on the electric grid as more buildings move toward electricity for heating needs.



These systems distribute thermal energy through underground piping networks to heat and cool multiple buildings. They are proven technology throughout Minnesota—think District Energy St. Paul—and can adapt as technology evolves.

However, data center heat recovery has not yet been proposed or implemented in the state. There are a few examples from the U.S., and the technology is widely used in Europe.

Data Center Heat Recovery Benefits

- ✓ **Maximizes energy efficiency**
Reduces data center power usage by up to 30%
- ✓ **Reduces water consumption**
Waste heat no longer needs to be expelled, reducing water consumption by up to 70% by requiring a closed-loop system
- ✓ **Reduces heating emissions**
Heat offtakers replace the heat required for their operations with zero- or low-carbon heating, reducing air pollutants and greenhouse gases detrimental to public health
- ✓ **Enables cost savings on transmission lines**
Every electron saved through energy efficient TENs is an electron generated for other sectors amidst growing load growth from AI, electric vehicles, and electrified heating.
- ✓ **Creates local heat resource and economic benefits**
Data center waste heat is entirely local and a cost-competitive source of heat for communities, and it reduces exposure to fuel price volatility, natural gas curtailments, and supply chain issues
- ✓ **Strengthens social license**
Provides tangible community benefit that improves community relations and approval processes.

1. Basic, A. Can Data Centers Heat Our Buildings? Using Thermal Energy Networks to Reuse Data Center Waste Heat. Building Decarbonization Coalition, July 2025. <https://buildingdecarb.org/data-center-brief>
2. Plante, A. Gov. Kotek signs POWER Act to shield Oregonians from Big Tech utility bills, July 2025. <https://www.koin.com/news/politics/gov-kotek-sign-power-act-shield-oregonians-big-tech-utility-bills-06172025/>
3. Marohn, K. Water-guzzling data centers spark worries for Minnesota's groundwater. MPR News, February 2025. <https://www.mprnews.org/story/2025/02/11/water-guzzling-data-centers-spark-worries-for-minnesotas-groundwater>
4. Author's estimate based on winter energy reuse factor. (From Fortum's 2022 article "Fortum datacentre project spearheads energy efficiency.") Assuming average Minnesota residential heating load (From 2020 RECS Survey Data, U.S. Energy Information Administration).