

# Duluth Energy Plan Commission Recommendation

January 23, 2025

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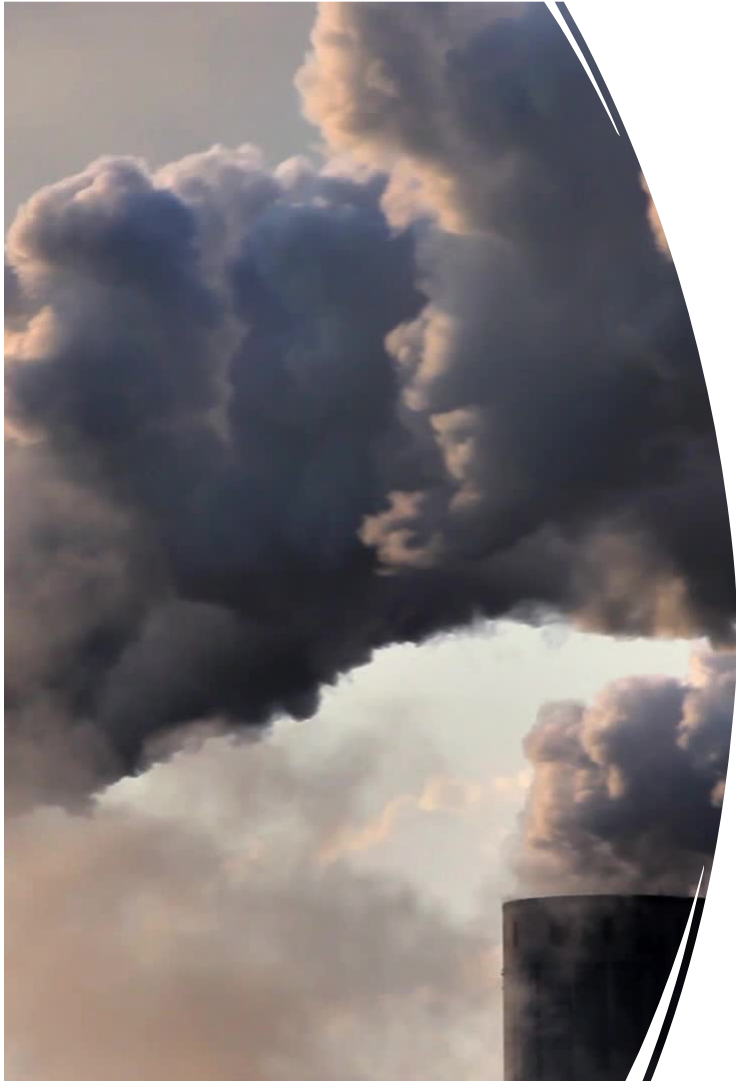
“The purpose of the commission is to advise the administration and city council on ways to achieve the goal of reducing the city’s greenhouse gas emissions by 80 percent by 2050”

From Duluth City Ordinance  
Chapter 2 Article XXV



# 1. The Goal: Greenhouse Gas (GHG) Reduction

- Duluth
  - 80% by 2050 from 2008 levels (EPC's charge by City Council on 3-13-2019)
  - 100% by 2050 (Mayor Larson statement 2022)
- State of Minnesota
    - 50% by 2030 from 2005 levels
    - 100% by 2050 from 2005 levels
    - 100% carbon free electricity by 2040, 55% from renewable sources
  - Reference: MN Action Framework 2022



## 2. The Cause: Burning of Fossil Fuels

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### **Fossil fuels**

- The burning of coal, oil, and natural gas for electricity and heat is the largest source of greenhouse gas emissions. Fossil fuels account for over 75% of global greenhouse gas emissions.

Reference: US Environmental Protection Agency (EPA)

- Greenhouse gases trap the sun's heat in the Earth's atmosphere, causing climate change.

Reference: United Nation Climate Action

## 2. The Cause: Greenhouse Gas (GHG) Emissions per Fuel

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Pounds of CO<sub>2</sub> emitted per million British thermal units (Btu) of energy for various fuels:

- Coal (anthracite) 228.6
- Coal (bituminous) 205.7
- Coal (lignite) 215.4
- Coal (subbituminous) 214.3
- Diesel fuel and heating oil 161.3
- Gasoline (without ethanol) 157.2
- Propane 139.0
- Natural gas (aka methane gas) 117.0

- Reference: American Geosciences Institute



### 3. The Trends: City Owned Facilities and Vehicles

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- 2008 – 39,006 metric tons CO<sub>2</sub>e
- 2023 – 14,301 metric tons CO<sub>2</sub>e
- 63% reduction

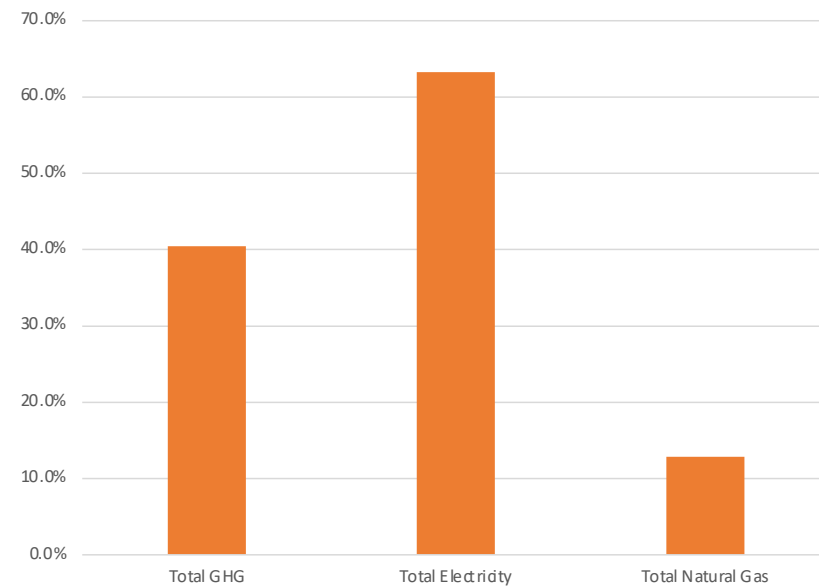


### 3. The Trends: Duluth Community GHG Reductions - 2013 to 2020

- Total community GHG: 40% reduction  
(from 1,444,482 to 680,780 tons CO<sub>2</sub>e)
- Total electricity GHG: 63% reduction  
(from 724,677 to 266,341 tons CO<sub>2</sub>e)
- Total natural gas GHG: 13% reduction  
(from 401,037 to 349,668 tons CO<sub>2</sub>e)

Reference: Regional Indicators Initiative  
Minnesota

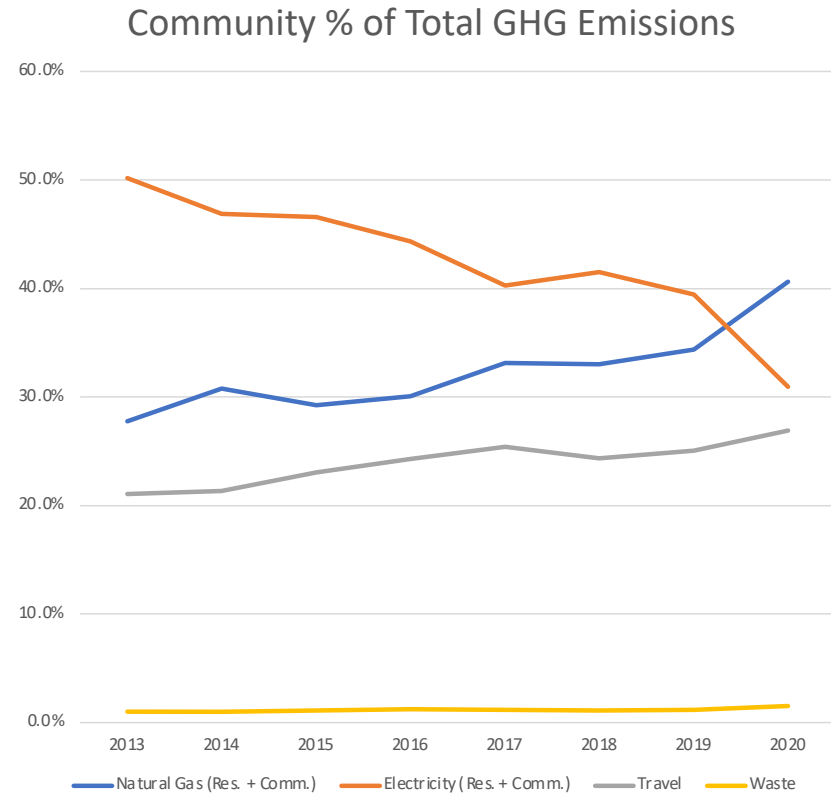
Cumulative GHG Emissions Reductions -  
2013 to 2020



### 3. The Trends: Duluth Community GHG 2013 to 2020

- Percent of Duluth's GHG from electricity  
Decreased from 50.2% in 2013 to 30.9% in 2020
- Percent of Duluth's GHG from natural gas  
Increased from 27.8% in 2013 to 40.6% in 2020


Reference: Regional Indicators Initiative  
Minnesota






## 4. The Problem:

Thermal energy is being primarily provided by the burning of fossil fuels.



- While the GHG from electricity usage has decreased significantly, this is not true for natural gas.
  - Electricity - Minnesota Power, has reduced its GHG by switching to renewable energy systems, currently 50% of its energy is from renewables.
  - Electricity – There have been many improvements in major electrical equipment over the past 20-30 years.
  - Electricity - Minnesota law requires Minnesota electric utilities to be 100% carbon free by 2040.
  - Natural gas – There is a limit to GHG reductions because the energy source is fossil fuel.
- 



5. The  
solution:  
Zero GHG  
Thermal Energy

Demand Side

Supply Side

Hybrid of Demand and Supply  
Side – Thermal Energy Network

## 5. The Solutions: Demand Side Actions

- Demand side – reducing the energy needed to operate a building (ECO – Energy Conservation and Optimization programs)
  1. Improve building envelopes
  2. Use passive solar design principles
  3. Use more energy efficient equipment
- Demand side measures can potentially reduce energy needs by up to 38%
- This is a very important aspect for Comfort System mission and activities



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## 5. The Solutions: Supply Side Actions

- Supply side – change to clean energy sources
  1. Passive solar design
  2. Electrification from clean electricity
  3. Heat pumps – air and ground source
  4. Geothermal energy
  5. Thermal energy networks

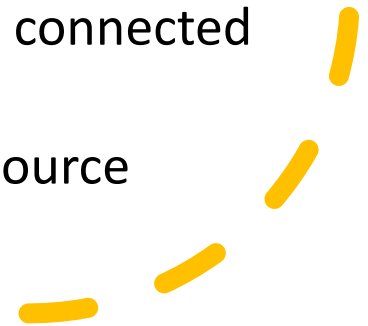


5. The  
Solution:  
UMD's Bagley  
Outdoor  
Classroom



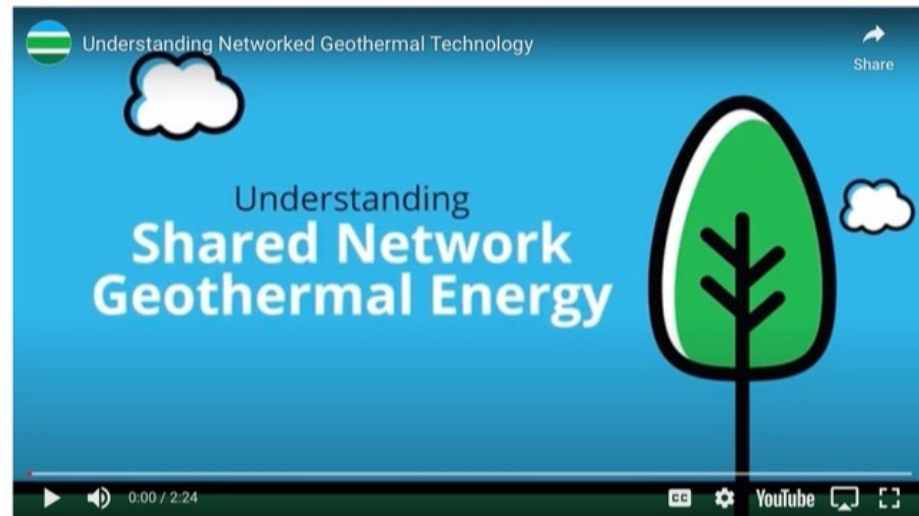
## 5. The Solutions: Thermal energy networks

- Thermal energy network can be thought of as many ground source heat pumps connected together
- Provide both heating and cooling
- Provide consistent heating when outside temperatures are very low
- Provide up to six units of thermal energy for every one unit of input energy (COP)
- They are expandable and can be connected to other thermal networks
- Are a local and resilient energy source



# Quick Intro to Thermal Energy Networks

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## 6. The EPC Recommendation

We need to act now to start transitioning Comfort Systems to a more sustainable model for their own longevity and the benefit of their customers. The Energy Plan Commission recommends that the Duluth City Council and the Duluth Administration:

1. Create a position or task force focused on developing a plan for Duluth Comfort Systems to meet the City's goal of zero greenhouse gas (GHG) emissions by 2050.
2. Provide secure funding to support energy transition planning for Comfort Systems.





## 6. Recommendation: Background

- 1. The City of Duluth has a stated goal of reducing GHG emissions 50% by 2030 and reaching carbon neutrality by 2050.
- 2. GHG emissions from methane gas consumption within the City of Duluth has been reduced by 12.8% (2013 to 2020). This compares to GHG emissions from electricity consumption within the City of Duluth which has been reduced by 63.2% over the same time frame. (Source - Regional Indicators Initiative)
- 3. Community wide GHG emissions from methane gas as a percent of the total community emissions has increased from 27.7% in 2013 to 41.6% in 2020. In contrast, community wide GHG emissions from electricity as a percentage of the total emissions have decreased from 50.1% in 2013 to 30.9% in 2020. (Source - Regional Indicators Initiative)
- 4. These emissions can be reduced significantly by energy conservation measures.
- 5. The remaining thermal energy can be totally produced by clean energy sources that are currently available and beneficial to both the utility and its customers.
- 6. With city-wide updates to utility infrastructure come additional opportunities for resiliency planning such as burying electricity lines to reduce potential power outages.
- 7. As customers of Comfort Systems convert to electric alternatives for their thermal energy needs, the cost of natural gas will rise for those left on the system. Since electrification often requires substantial upfront costs, this increase in cost will be borne by customers who are least able to afford these increases.
- 8. Planning for the decarbonization of Comfort Systems should include a study of their current operations, a revision of their business model and a transition to clean energy sources which will include replacement of existing natural gas equipment.
- 9. This transition may also include changes in City policy. This could include, for example, a policy of working with developers and builders of new or substantially renovated buildings to encourage electrification.
- 10. A number of Cities around the country have established similar long-term funding for their sustainability needs through taxes, mill rate increases, etc.



# 6. Recommendation: Background

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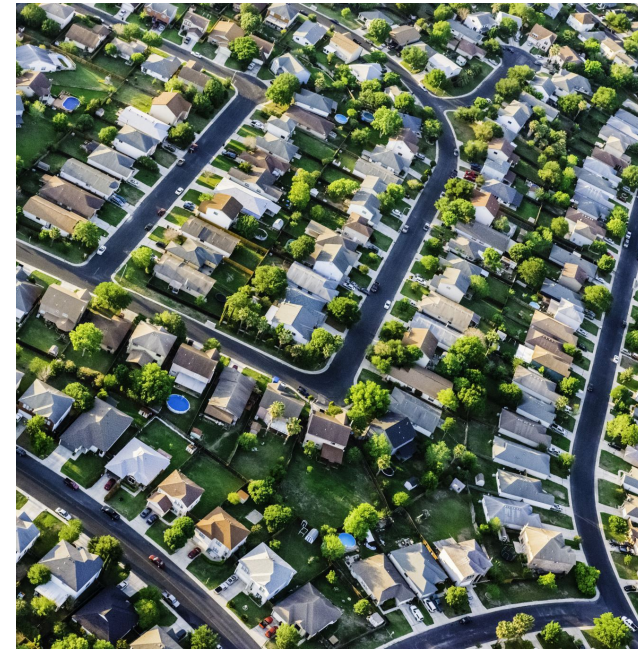
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## 7. Examples: How other communities have funded sustainability goals

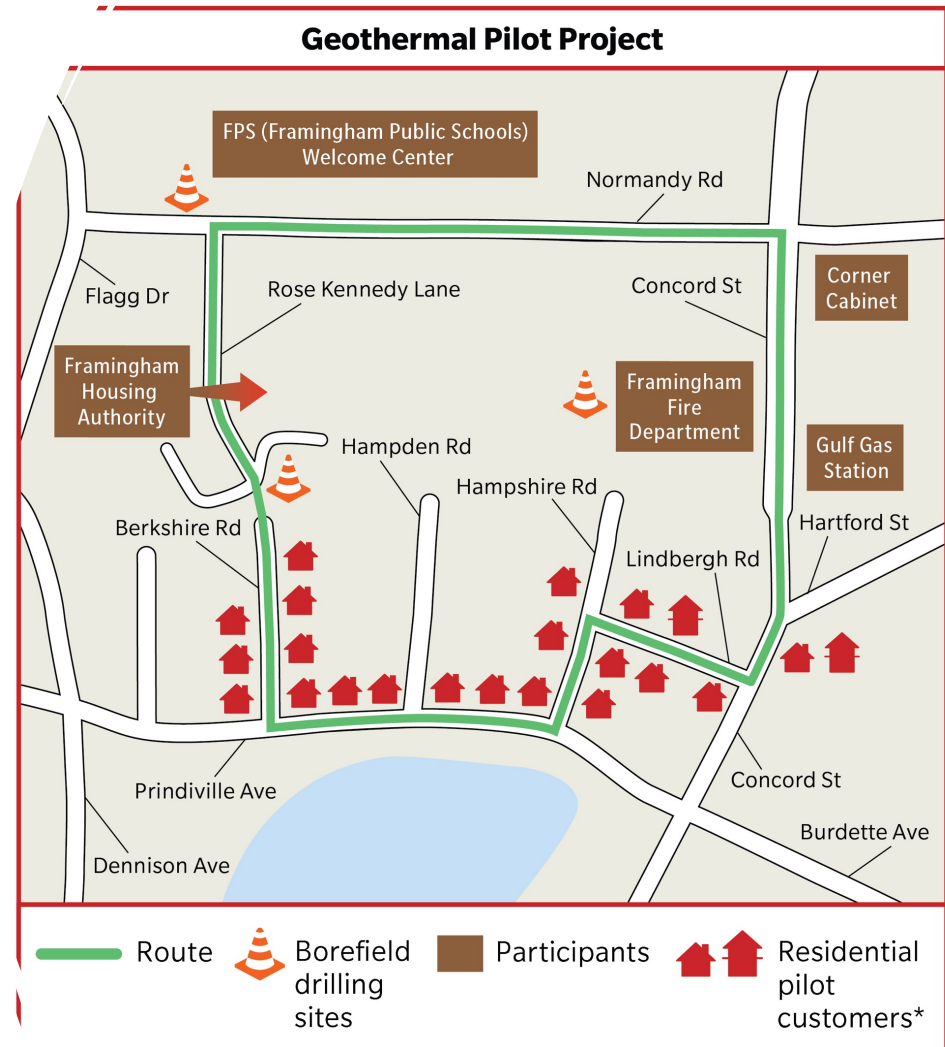
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- Ann Arbor, MI - 20-year mill levy passed – provides \$6.8 million per year – 18 person staff
- Denver, CO – 0.25% sales and use tax - raises \$40 million annually for sustainability efforts
- Athens, OH - \$0.002/kWh charged on electric bills
- Boulder, CO – Climate tax of about \$50 per year per residential customer (higher amounts for commercial and industrial) - raises \$6.5 million for climate efforts
- Orange County, NC – property tax increase of \$0.0025 per \$100



# 7. Examples: Technologies

- HEET & Eversource Energy: Thermal Energy Network Pilot in Framingham, MA
- Vermont Gas Systems
- MN Natural Gas and Innovation Act (NGIA) - CentrePoint Energy and XCEL Energy PUC filings



## 7. Examples: Geo-Thermal Energy Networks in Minnesota

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- Rochester City Hall
- Woodbury Central Park
- Metro Transit's North Loop Garage
- Carleton College
- The Heights Redevelopment Project – East Saint Paul
- Winona Public Schools

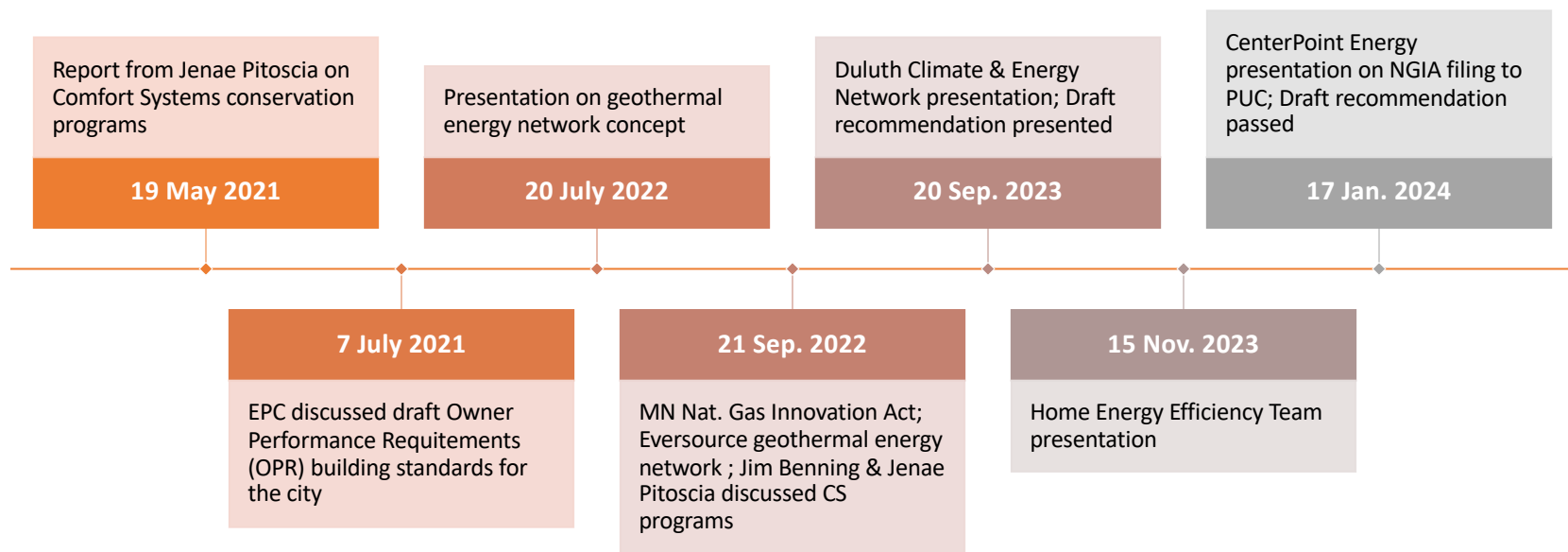


# Questions, Comments

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# EPC Meetings related to Comfort Systems



## Geothermal Pilot Project



## Eversource – Framingham Mass. Geothermal Pilot Project

- <https://www.youtube.com/watch?v=Hu3IOLfgMiM&t=1s>

## Link to Regional Indicators Initiative

- <https://www.regionalindicatorsmn.com>