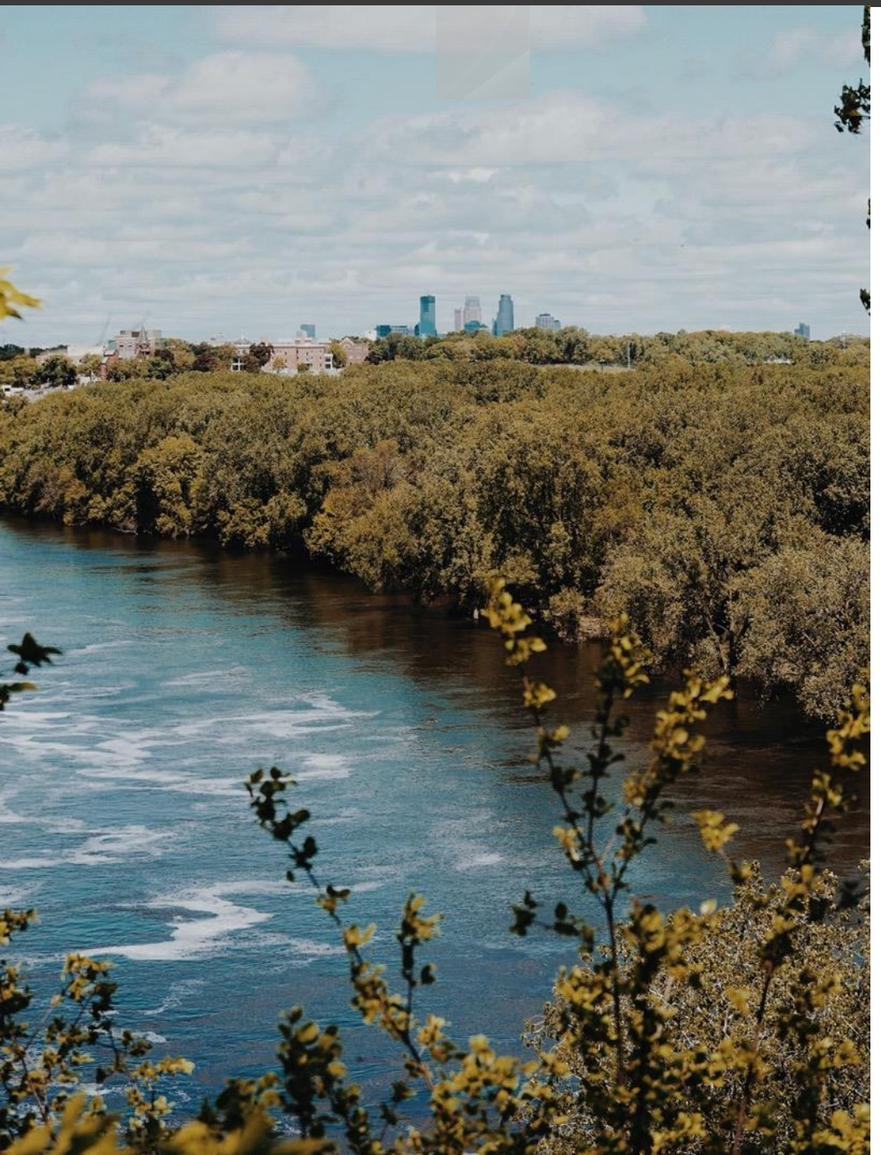
Informational Item: Waste Heat Recovery Project

METROPOLITAN COUNCIL

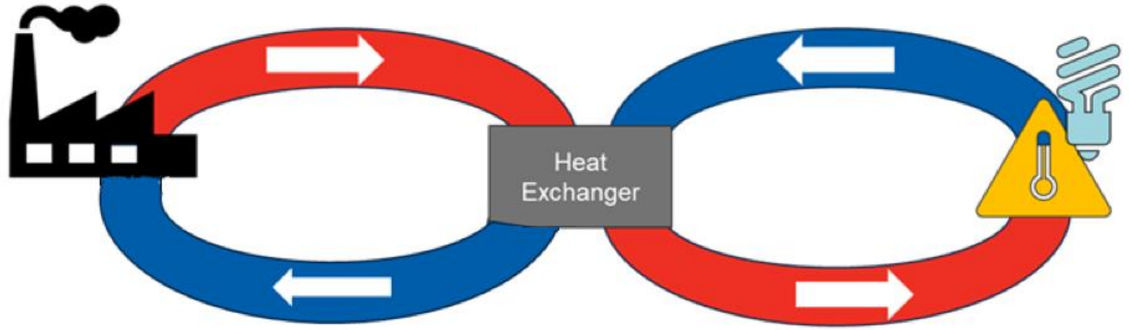
February 27, 2024

Sam Paske and Jen Kostrzewski

What is a waste heat recovery system?



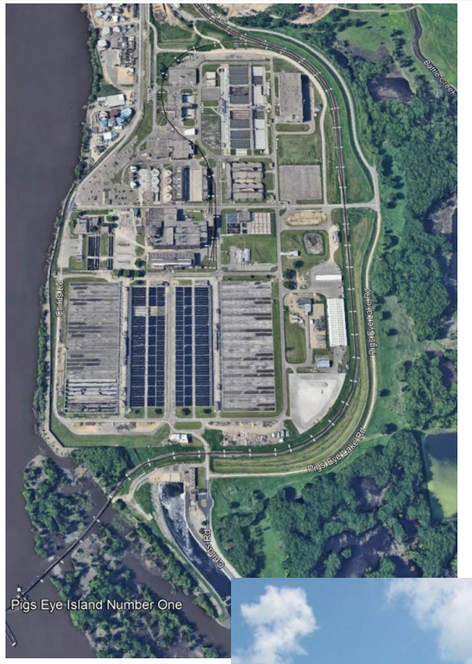
- A waste heat recovery unit is an energy recovery heat exchanger that transfers heat from process outputs at high temperature to another part of the process for some purpose, usually increased efficiency.
- Waste heat may be extracted from sources such as hot flue gases from a diesel generator, steam from cooling towers, or even wastewater.



Project Overview

Waste effluent heat recovery

- This project would be accomplished by a partnership with the Metropolitan Council, City of Saint Paul, and District Energy, the heat provider for the city's downtown area.
- Saint Paul is home to the Metro Plant, Minnesota's largest Wastewater Treatment Plant (WWTP), and District Energy St. Paul, the nation's largest hot water district heating system.
- A 60-megawatt heat recovery system that pulls thermal energy from Metro's effluent prior to discharging in the Mississippi River.
- Estimated cost of $100 million.



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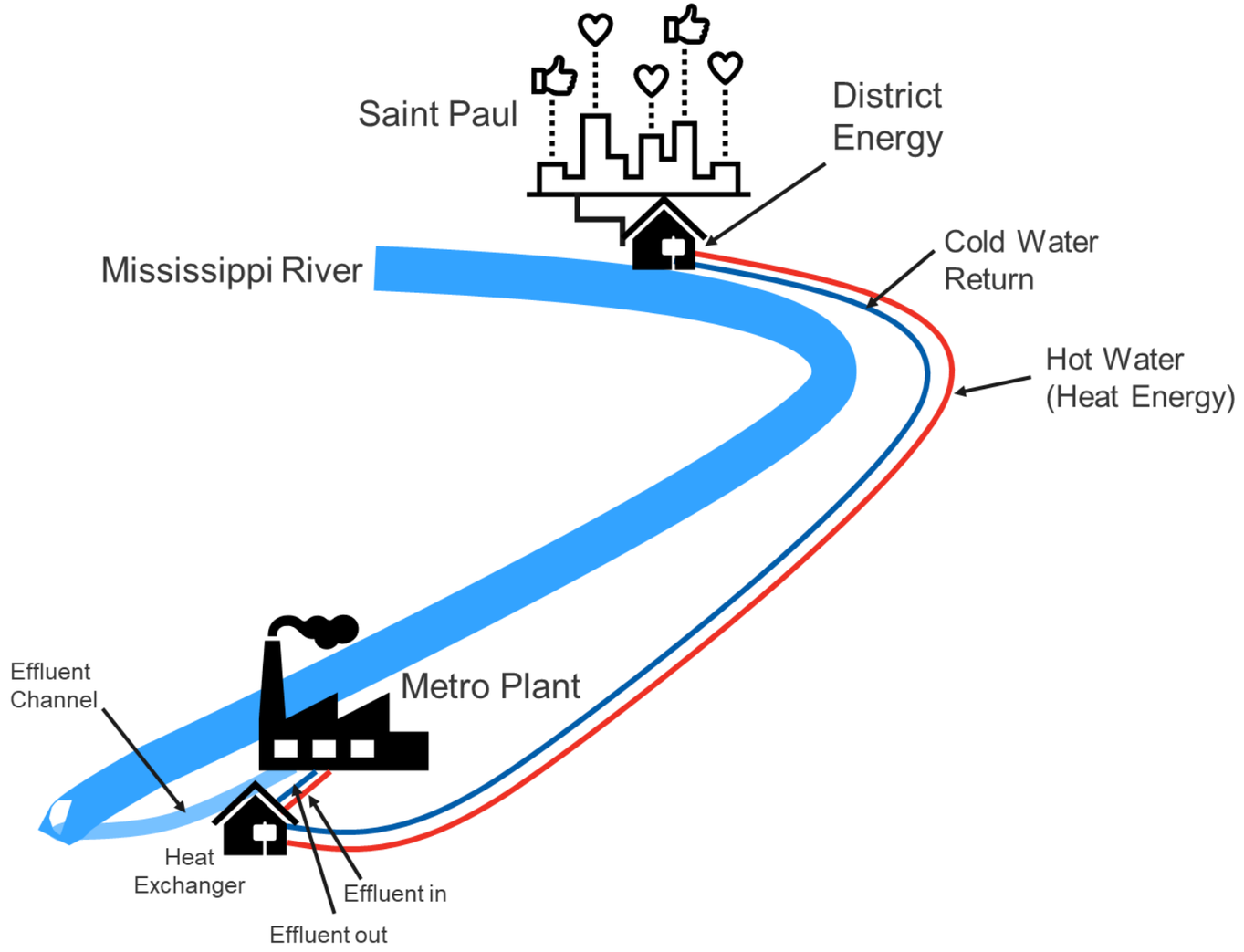
Project Idea Visualization

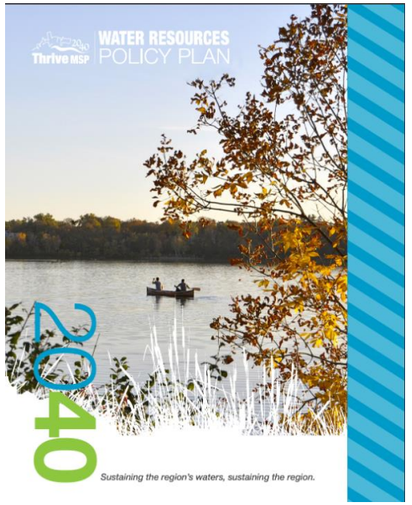


Project Benefits

- First application in North America
- Offset the approximately 50% of District Energy's annual heating load currently provided by fossil fuels.
- Reduces co-pollutant emissions improving local air quality.
- Causes minimal impact to Metro Plant operations
- Generate revenue for the Council.
- Position the City of Saint Paul, District Energy, and the Metropolitan Council as an innovative leaders in climate solutions and heat energy recovery.

Policy Alignment

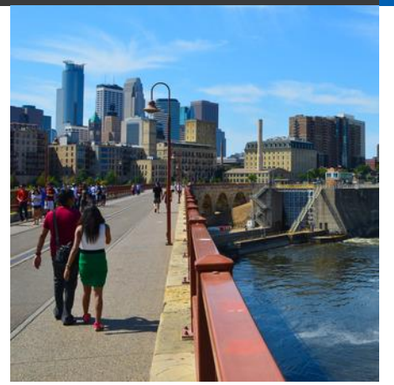
- 2040 Water Resources Policy Plan
- Climate Action Work Plan
- Minnesota Climate Action Framework
  - Goal 3 (Resilient communities)
  - Goal 4 (Clean energy and efficient buildings)
  - Goal 6 (Clean economy).

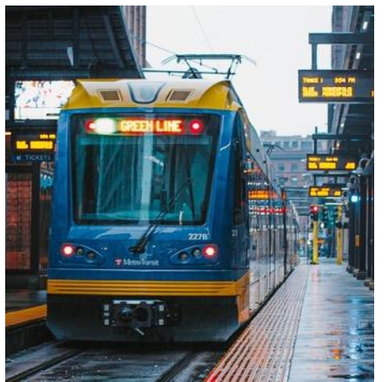


Funding Source

Climate Pollution Reduction Grant

- Approximately $4.3 billion dollars under the Environmental Protection Agency to fund initiatives that reduce emissions of greenhouse gases (GHGs) and create community benefits.
- The grants fund GHG reduction initiatives for states, agencies, and tribes.
- This grant fund does not require any matching amount from the applicant.
- The application deadline is April 01, 2024.
- Funding will be awarded in October 2024.





Roles and Responsibilities

City of Saint Paul

- Grant management
- Provides access to install system
- Community engagement & outreach
- Add new workforce opportunities to residents

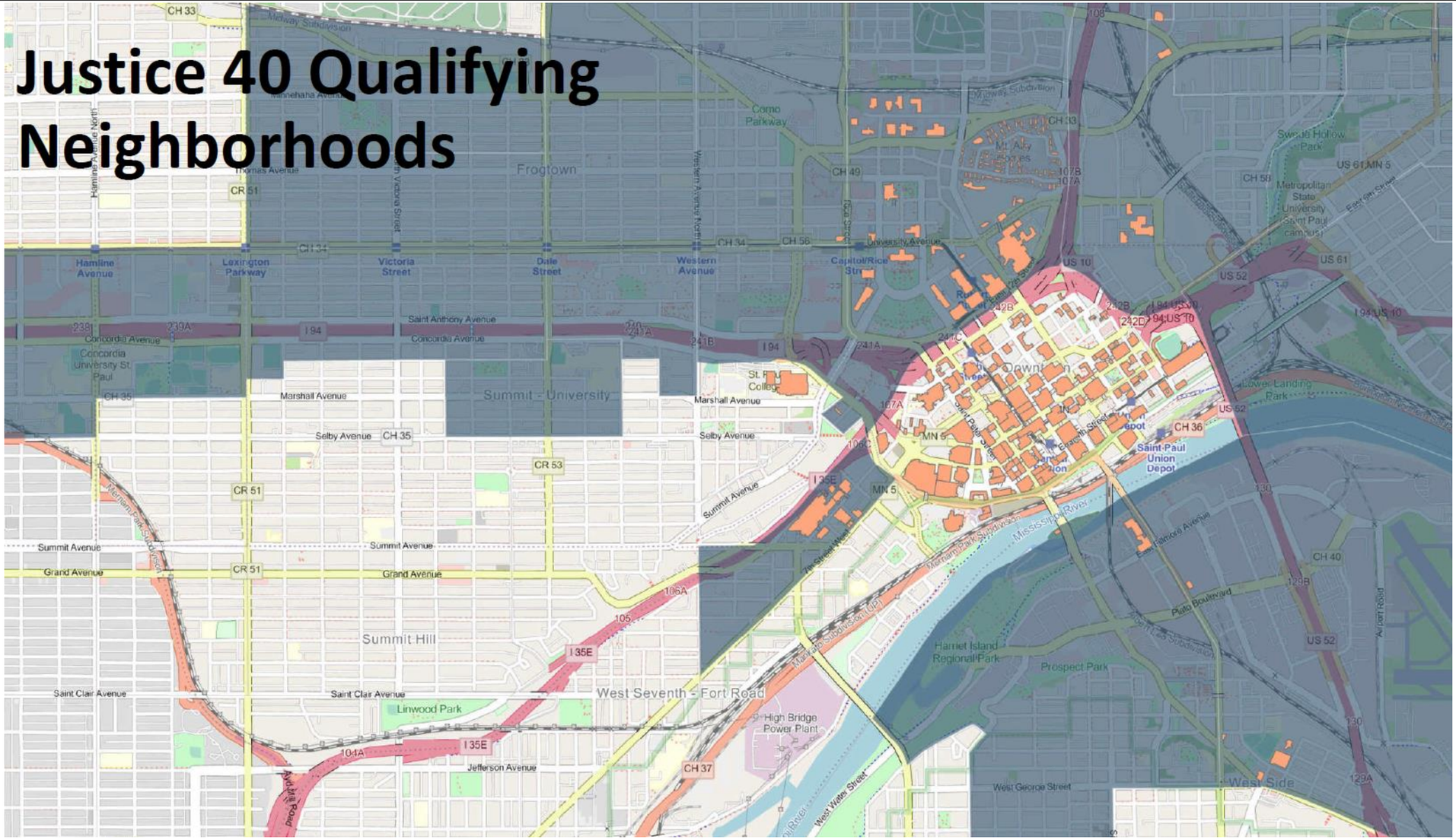
District Energy

- Builds, operates, and maintains infrastructure
- Provides carbon-free heating to downtown Saint Paul and surrounding area buildings

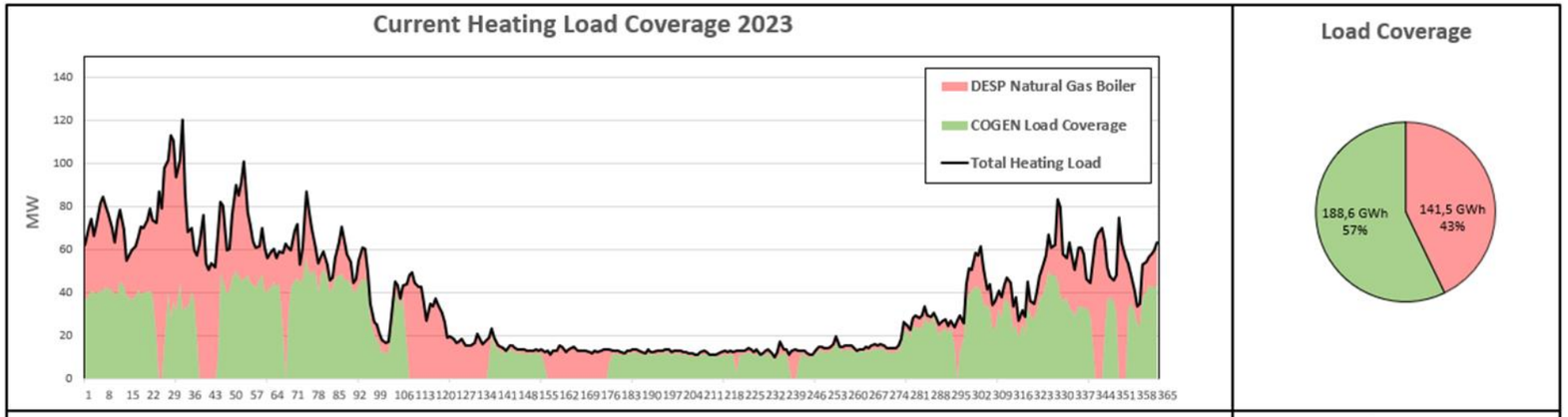
Metropolitan Council

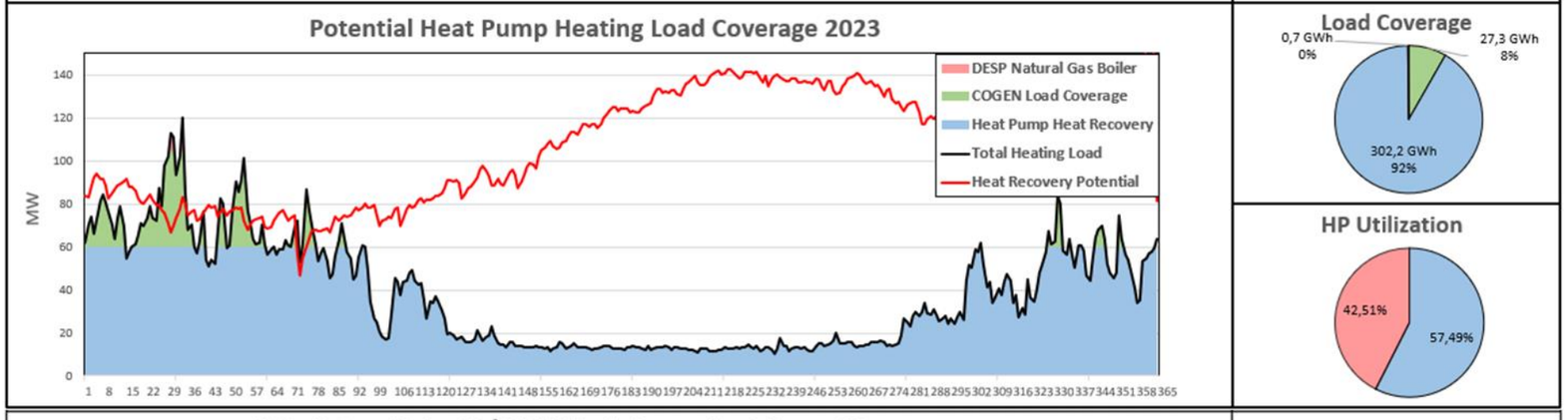
- Supports connections with small or disadvantaged businesses
- Host heat recovery system
- Provides waste heat from wastewater effluent

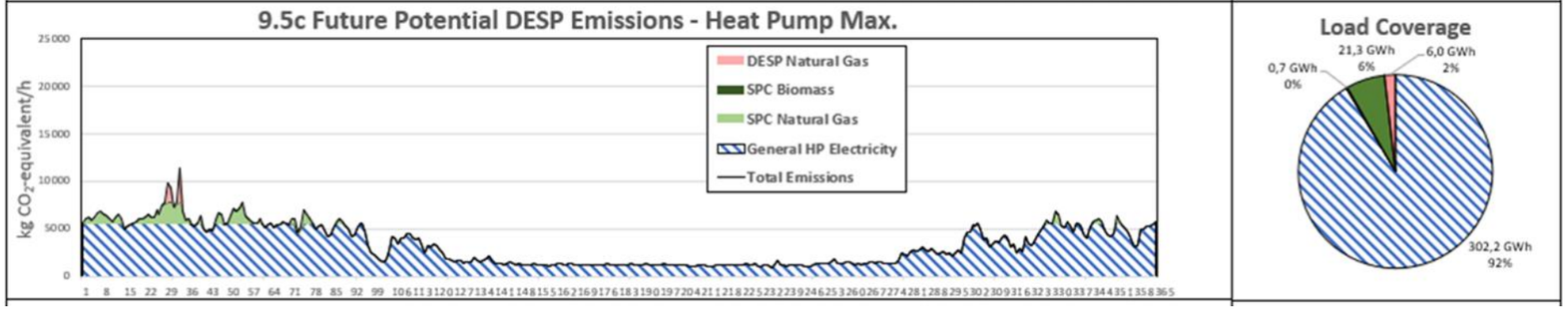
District Energy Service Area



Emissions Reduction Modeling

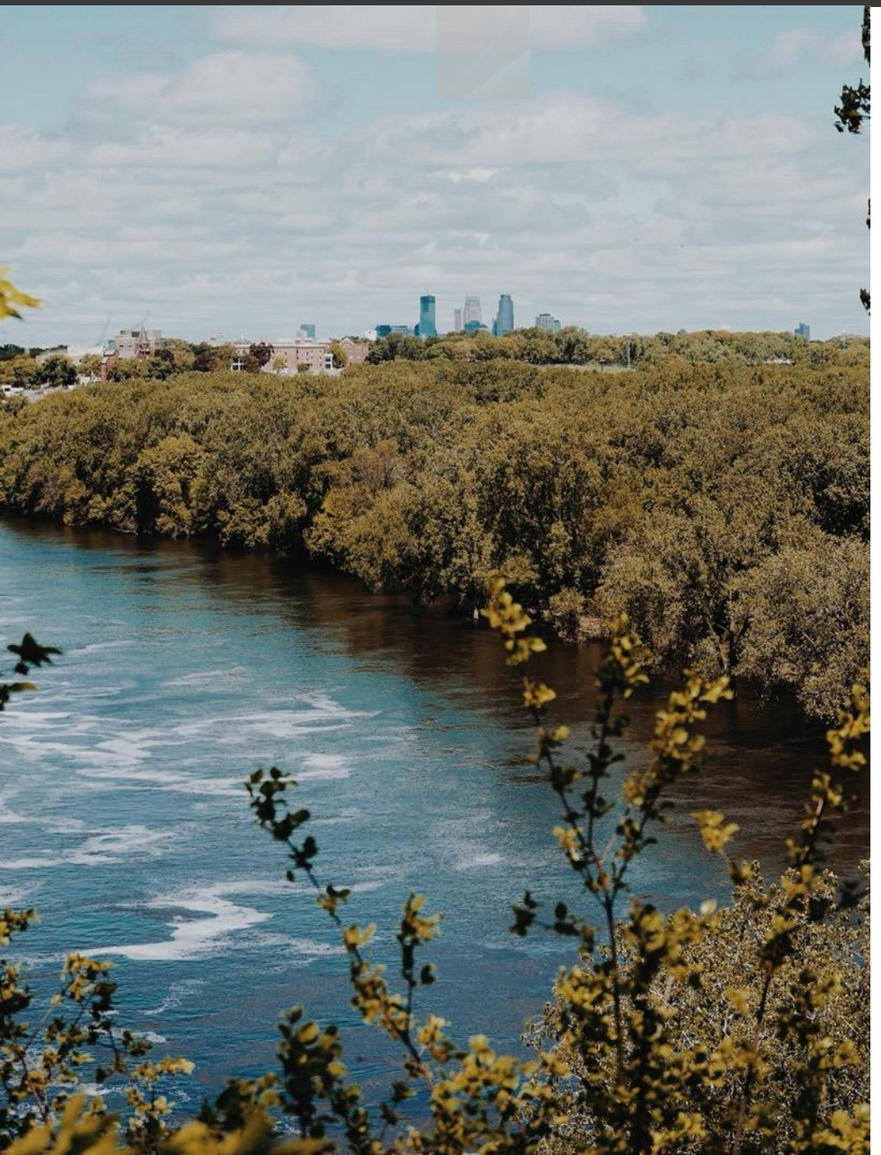






Modeling shows that waste heat from effluent could potentially provide up to 300 GWh of thermal energy to District Energy, or as much as 92% of its annual heat energy needs. And reduce GHG emissions up to 30,000 tons per year if the heat recovery system is powered by carbon free electricity.

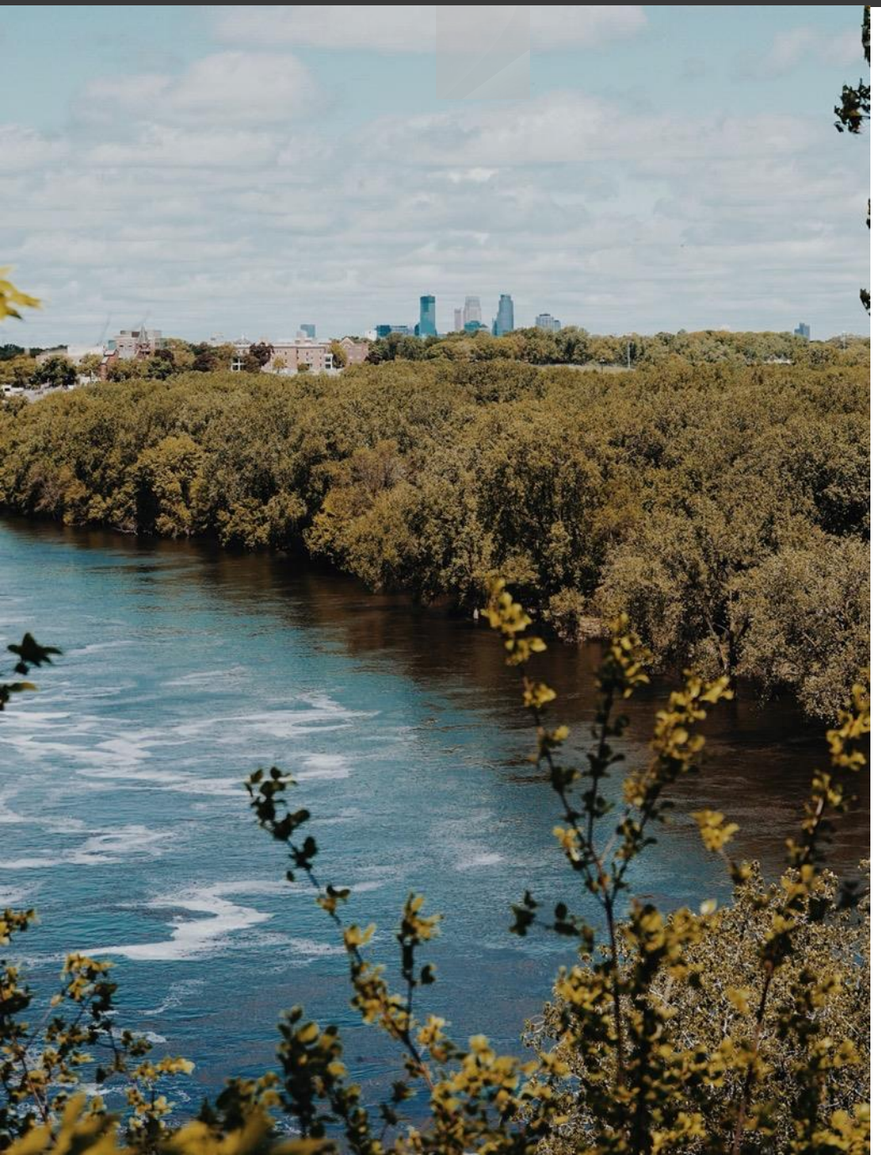
Future Applications



Demonstration Opportunity for Minnesota and Beyond

- Enormous volume of embedded thermal energy in wastewater that can be tapped by applying circular thinking, sector coupling and available technologies
- > 800 municipal wastewater treatment plants in Minnesota
- > 1,600 public and private wastewater treatment plants in Minnesota
- >16,000 municipal wastewater treatment plants in the U.S.
- No similar examples currently exist in North America

Next Steps



- Continue to work with District Energy and the City of Saint Paul to establish a system design and contractual agreements.
- Support the City of Saint Paul and District Energy in their application for the Climate Pollution Reduction Grant application.
- Funding decisions will come back from the Environmental Protection Agency in July 2024.
- We will come back to share progress with Council Members.
- Decarbonize a large portion of Saint Paul!

Questions

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