



TAPPING INTO WASTEWATER THERMAL ENERGY

Jim McQuarrie, Metro Wastewater Reclamation District
Barb Frommell, City and County of Denver
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IDEA 2019 | Pittsburgh
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METRO WASTEWATER RECLAMATION DISTRICT

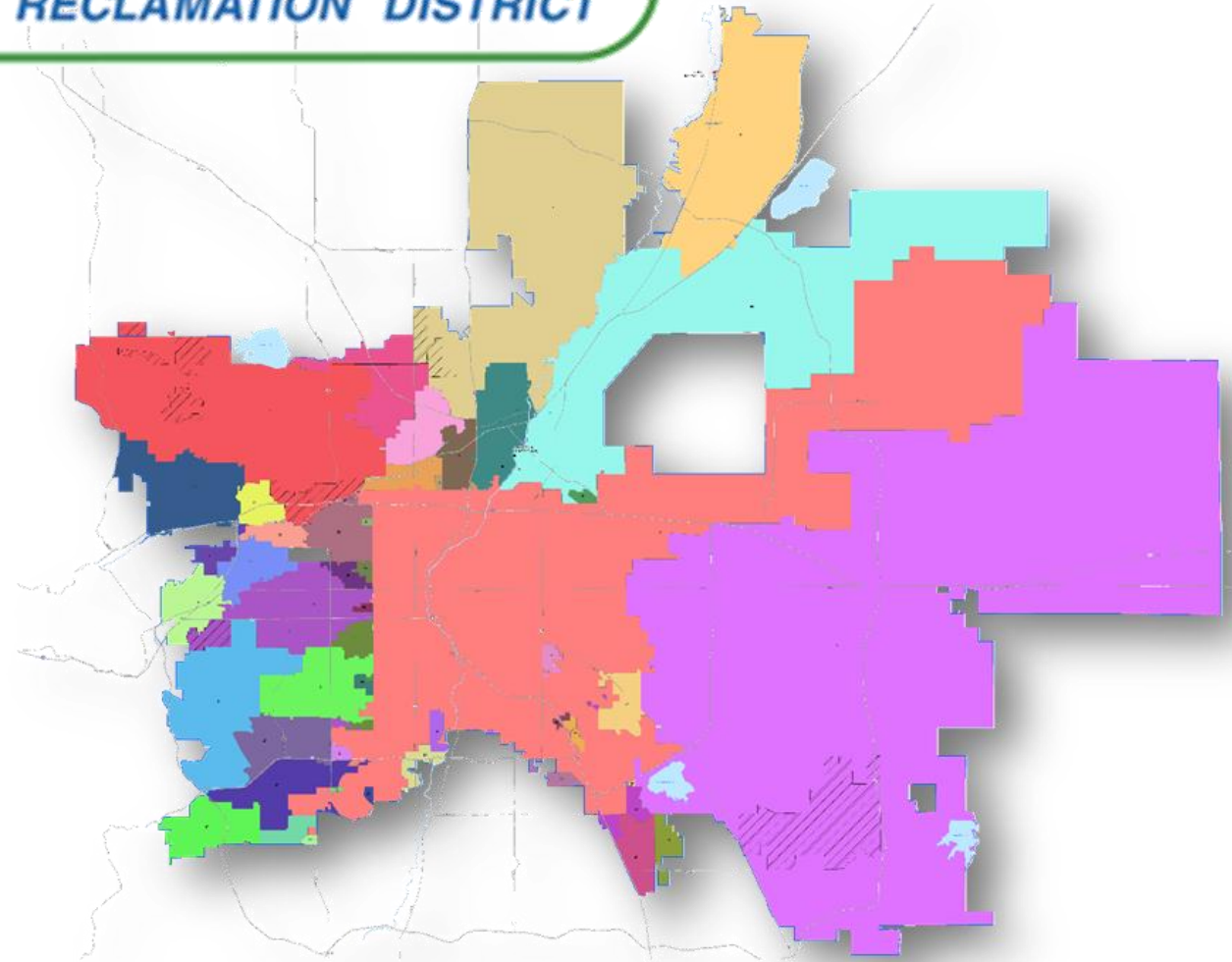
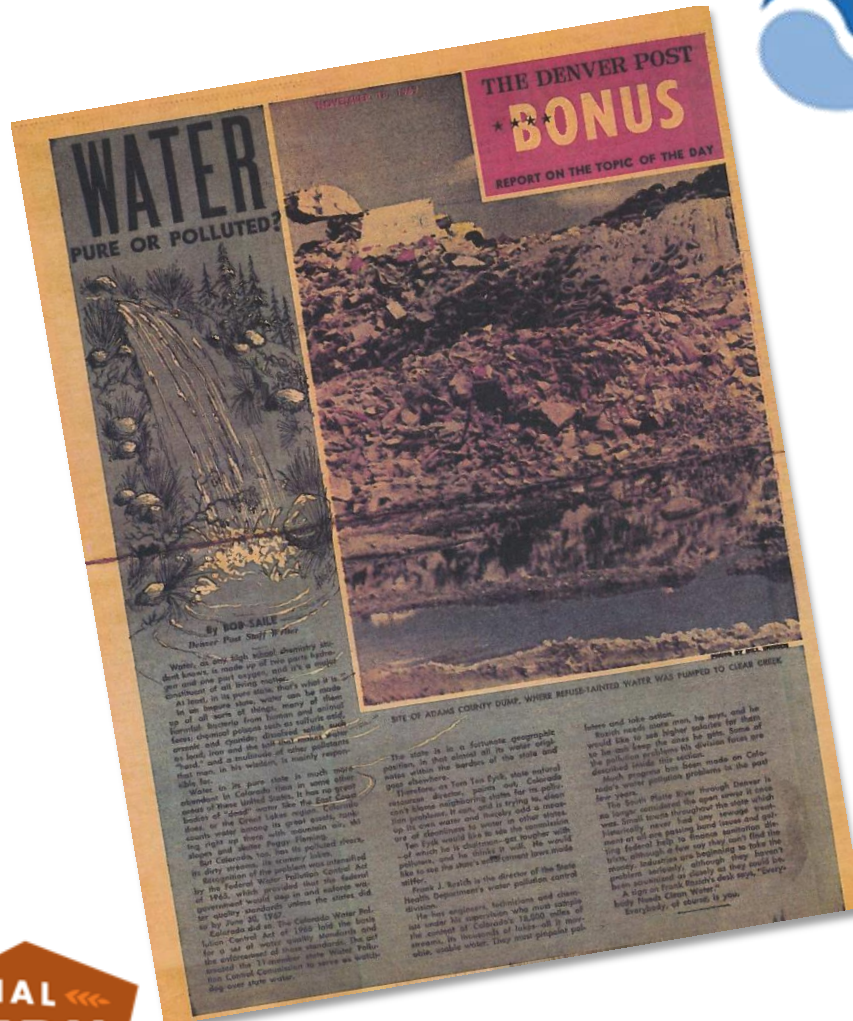
Jim McQuarrie
Chief Innovation Officer



METRO WASTEWATER RECLAMATION DISTRICT



METRO WASTEWATER
RECLAMATION DISTRICT



750 SQUARE-MILE SERVICE AREA

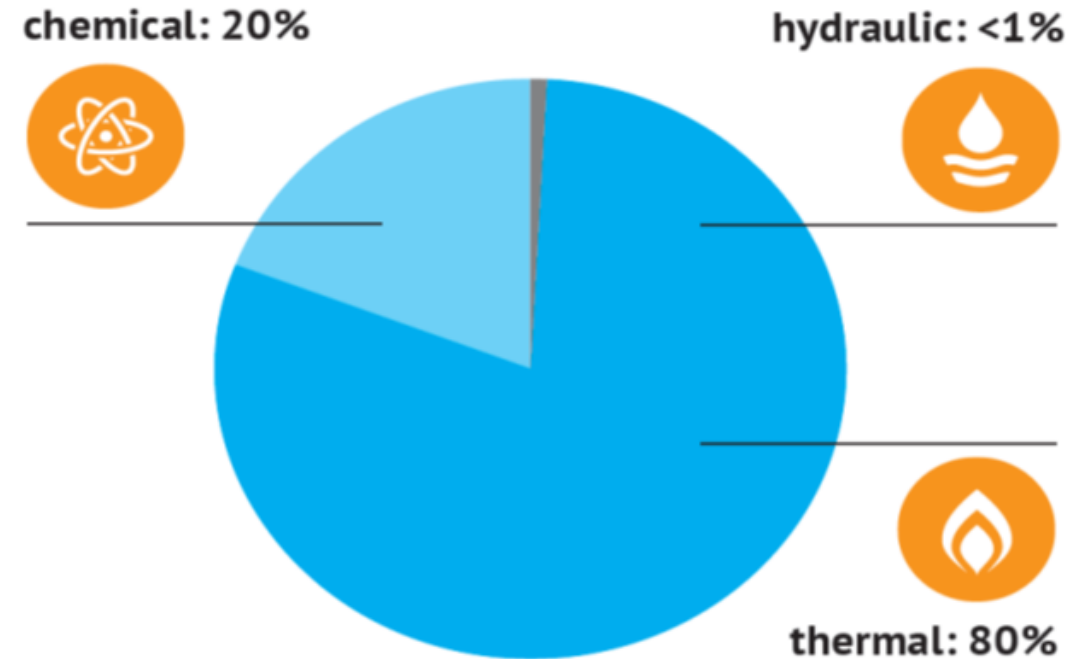


FROM POLLUTION CONTROL TO RESOURCE RECOVERY

UTILITY OF THE FUTURE

- Wastewater contains nearly five times the amount of energy needed to treat it
- 100 Largest Energy Neutral WRRFs = 2,200,000 homes

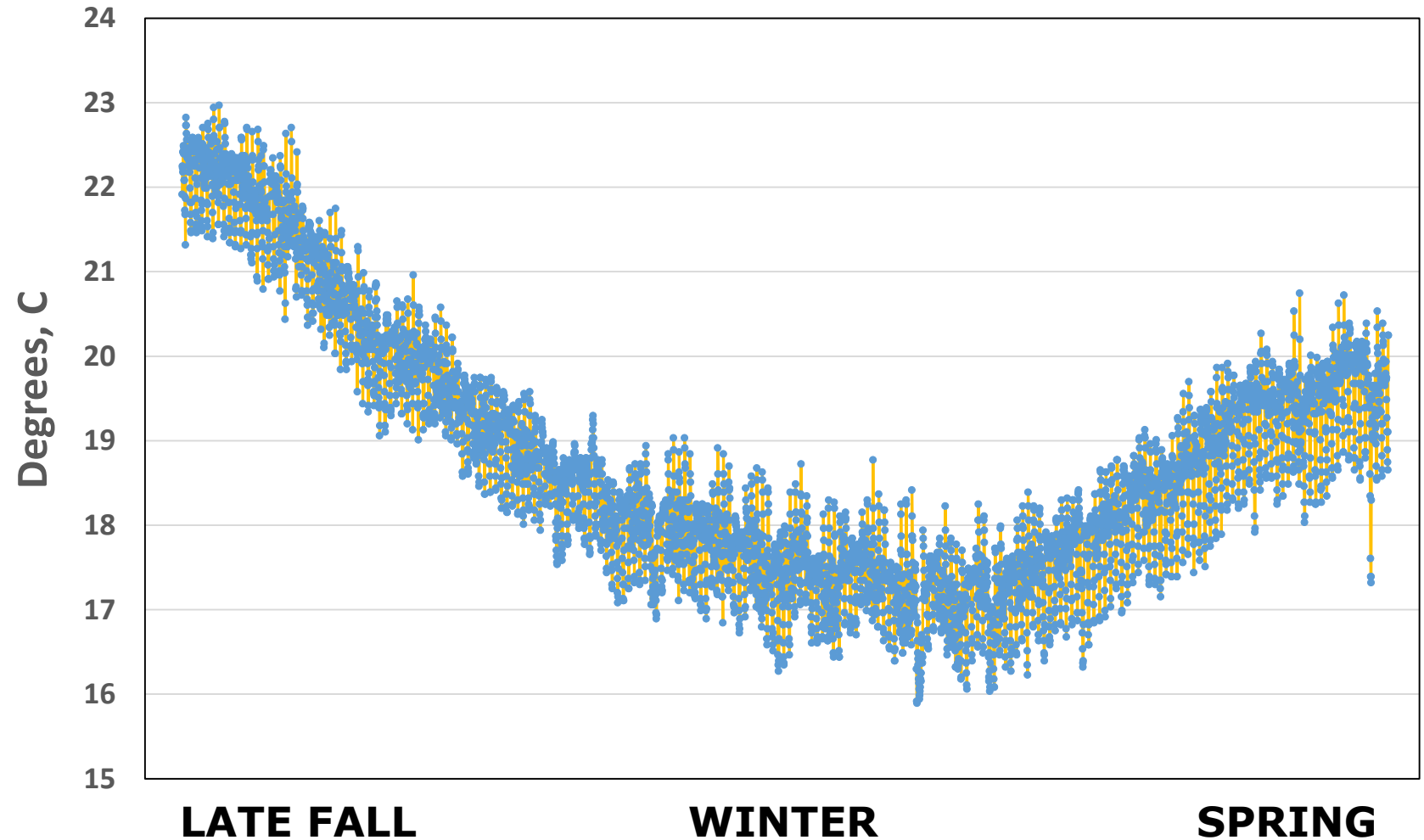
Energy Embedded in Wastewater



WASTEWATER IS WARM...

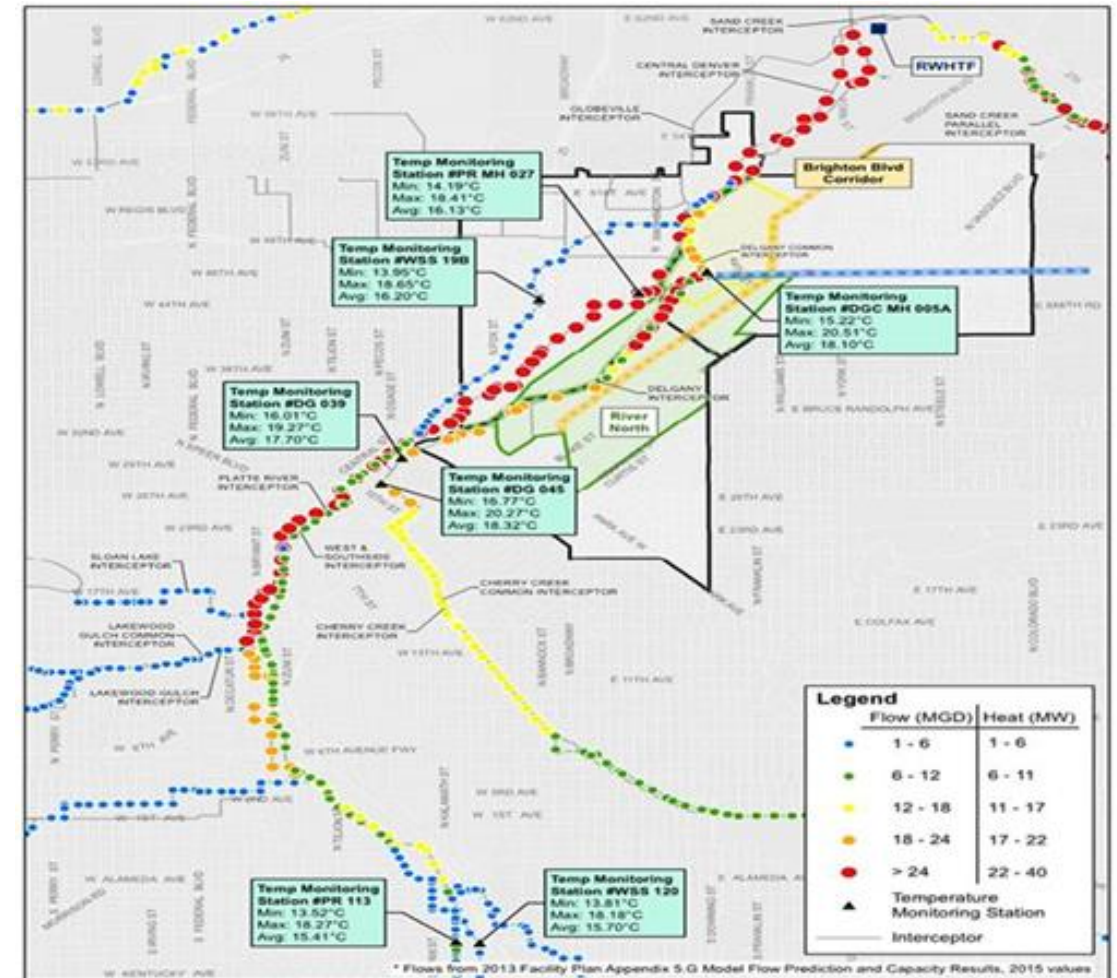


DELGANY INTERCEPTOR



DISTRICT ENERGY – SEWER HEAT – CENTRAL DENVER

- High density redevelopment
- Access
- Heat load ~ heat available
- Climate Goals
- Partnerships





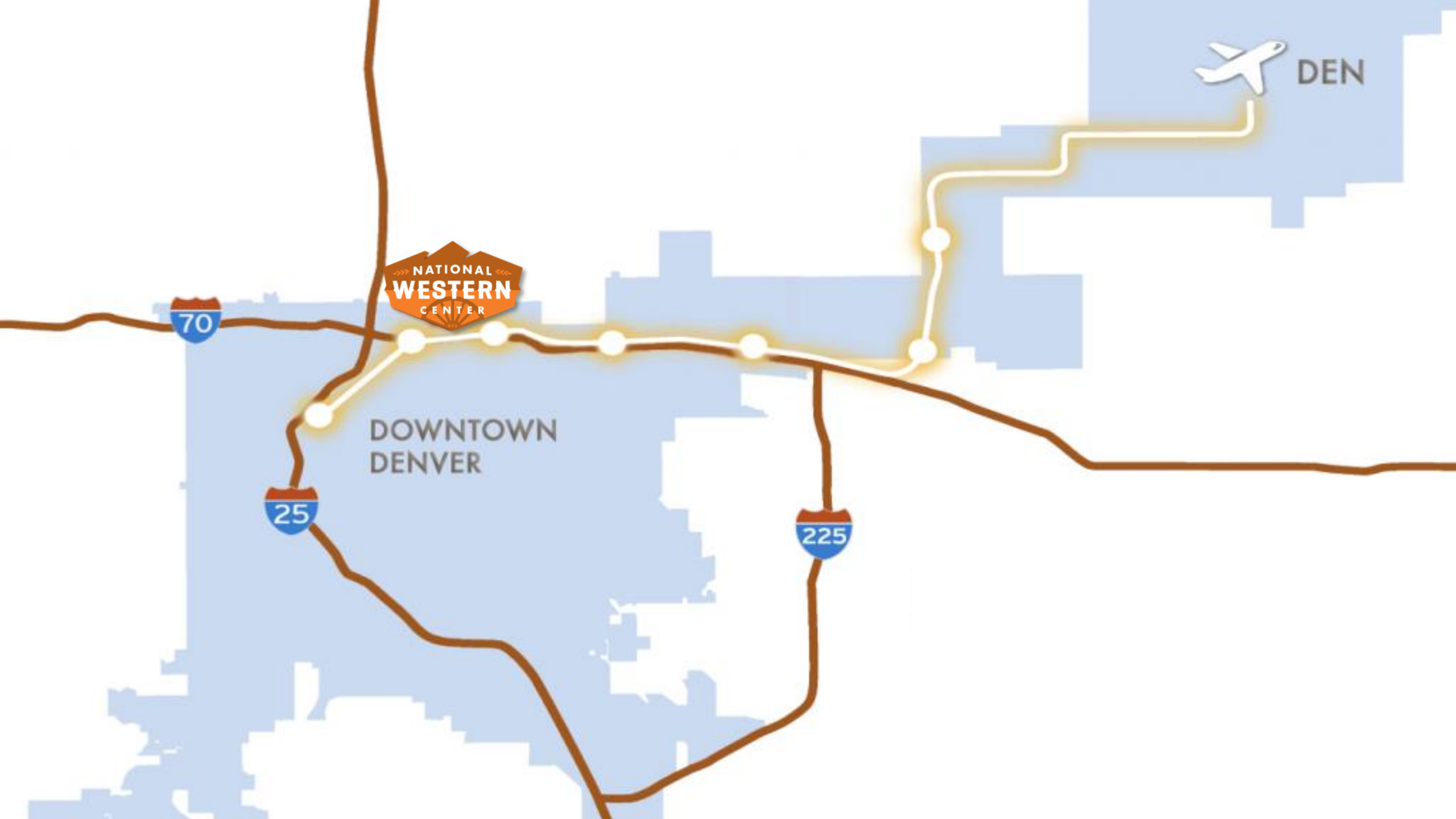
MAYOR'S OFFICE OF THE NATIONAL WESTERN CENTER

Barb Frommell

Strategic Partnerships Director



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DEN



DOWNTOWN
DENVER



"THE TRIANGLE"
60 Acres

PHASES 1&2
190 Acres





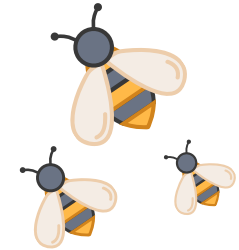
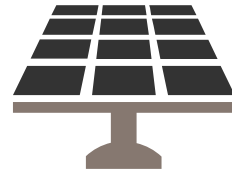


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100 YEAR REGENERATION JOURNEY

NWC –
Capital Build
2017 - 2023



Planning

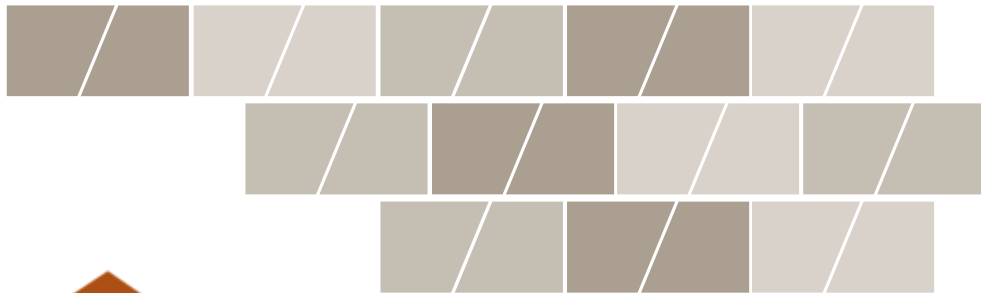
Design

Build

Handover

Operations and Maintenance (O&M) , Programming

FOUNDATION FOR... A REGENERATIVE CAMPUS



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A LOW CARBON, RESILIENT CAMPUS

1. Energy Efficient Buildings

Prioritizing energy efficiency to achieve LEED Gold or above.

2. District Thermal using Wastewater Heat Recovery

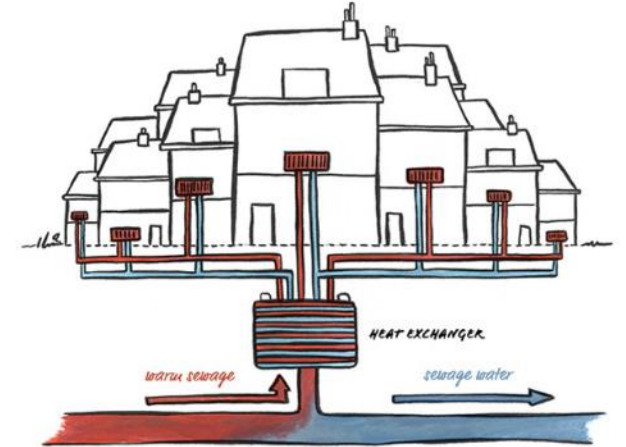
Utilizing wastewater thermal energy to heat and cool campus buildings efficiently.

3. Renewable Energy

100% renewable electric using a combination of on- and off-site sources

4. Community Resiliency

Ensuring critical facilities have power, heating and cooling, even during extreme events.



METRO WASTEWATER IGA

IGA: Intergovernmental Agreement

1. Relocate and bury the Delgany Interceptor
2. Provide access to wastewater thermal energy
3. Mitigate odors from the Delgany via a new biofilter

Metro Board and City Council approved, January 2019



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NWC CAMPUS ENERGY: PROCESS & PARTNERS





EAS DISTRICT ENERGY PROJECT

Catherine Thorn

EAS Energy Partners, Enwave



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DISTRICT ENERGY GOALS

Use **holistic thinking** rooted in creativity & first principles to challenge convention & **create value**



Catalyst for innovation, economic growth



A new model for sustainable development



Engage and educate the community



Opportunities for M/WBE and SBE businesses



Better outcomes than business as usual

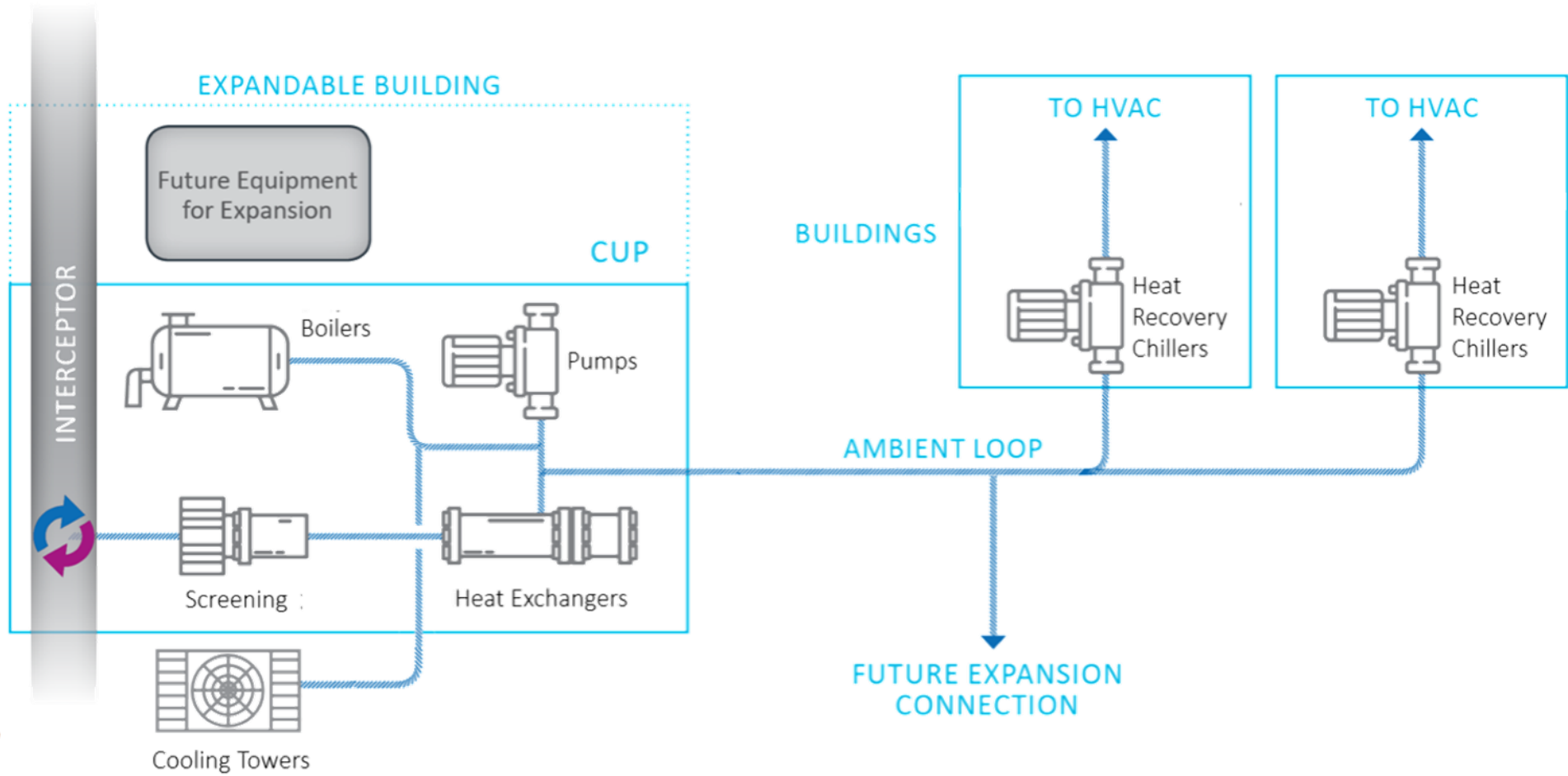


Reduce GHG emissions



Superior energy performance

THE AMBIENT HEAT RECOVERY SYSTEM



DECIDING ON AMBIENT DISTRIBUTION

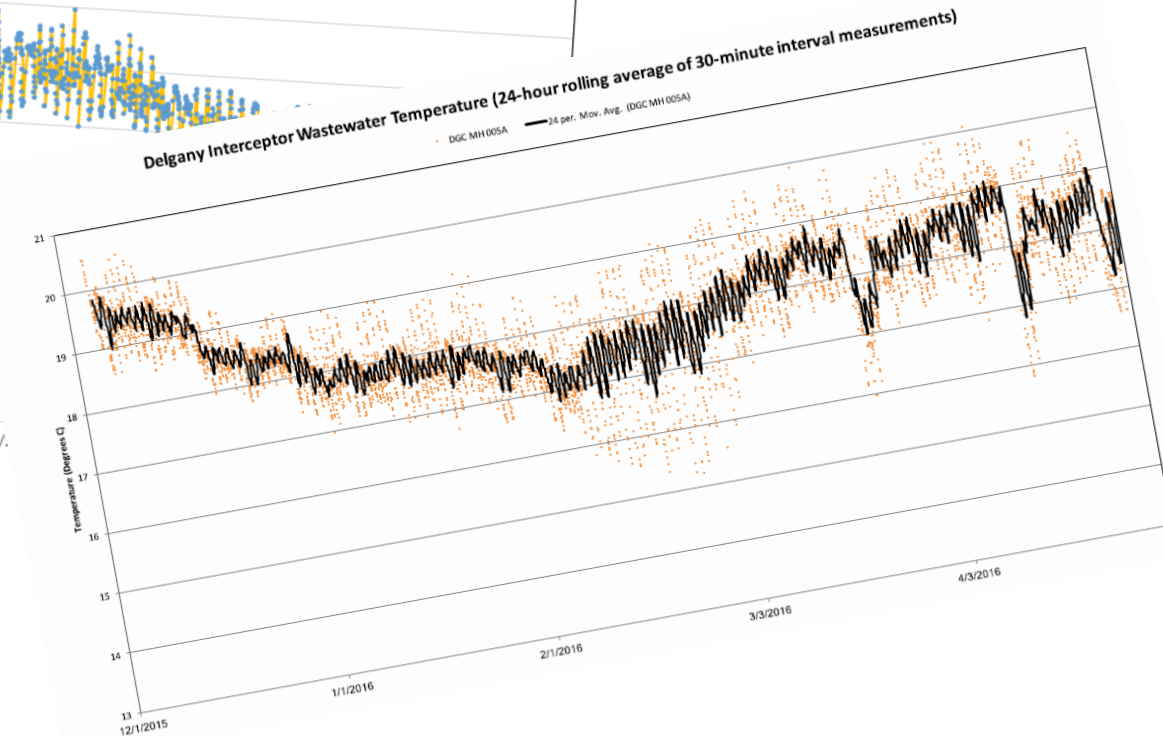
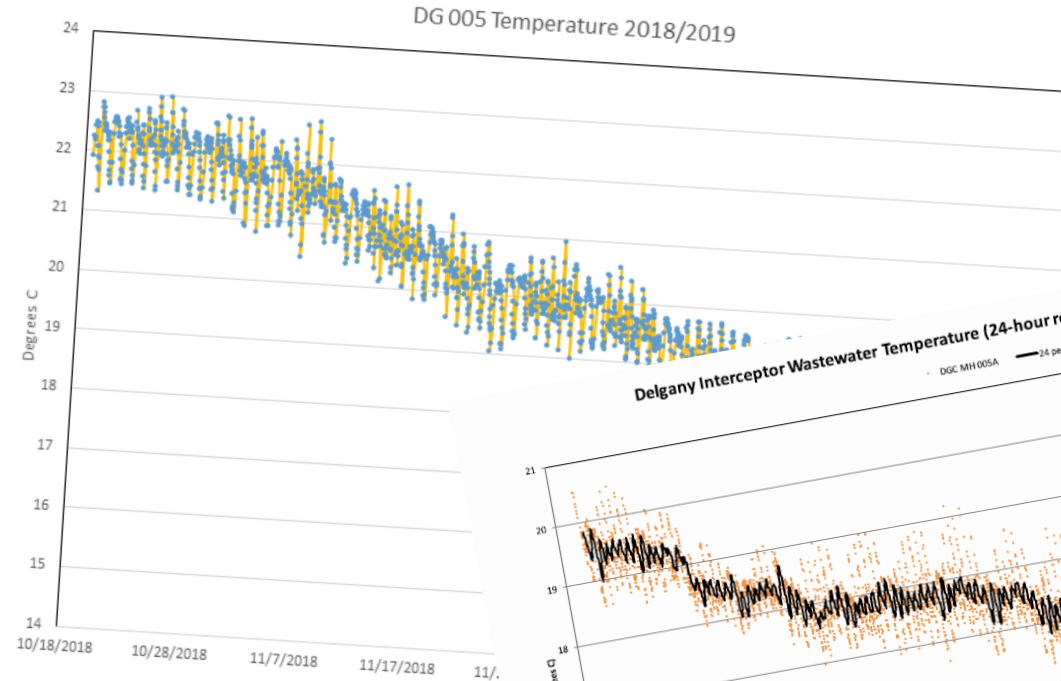
- Load density
- Available utility corridor
- Mechanical room space



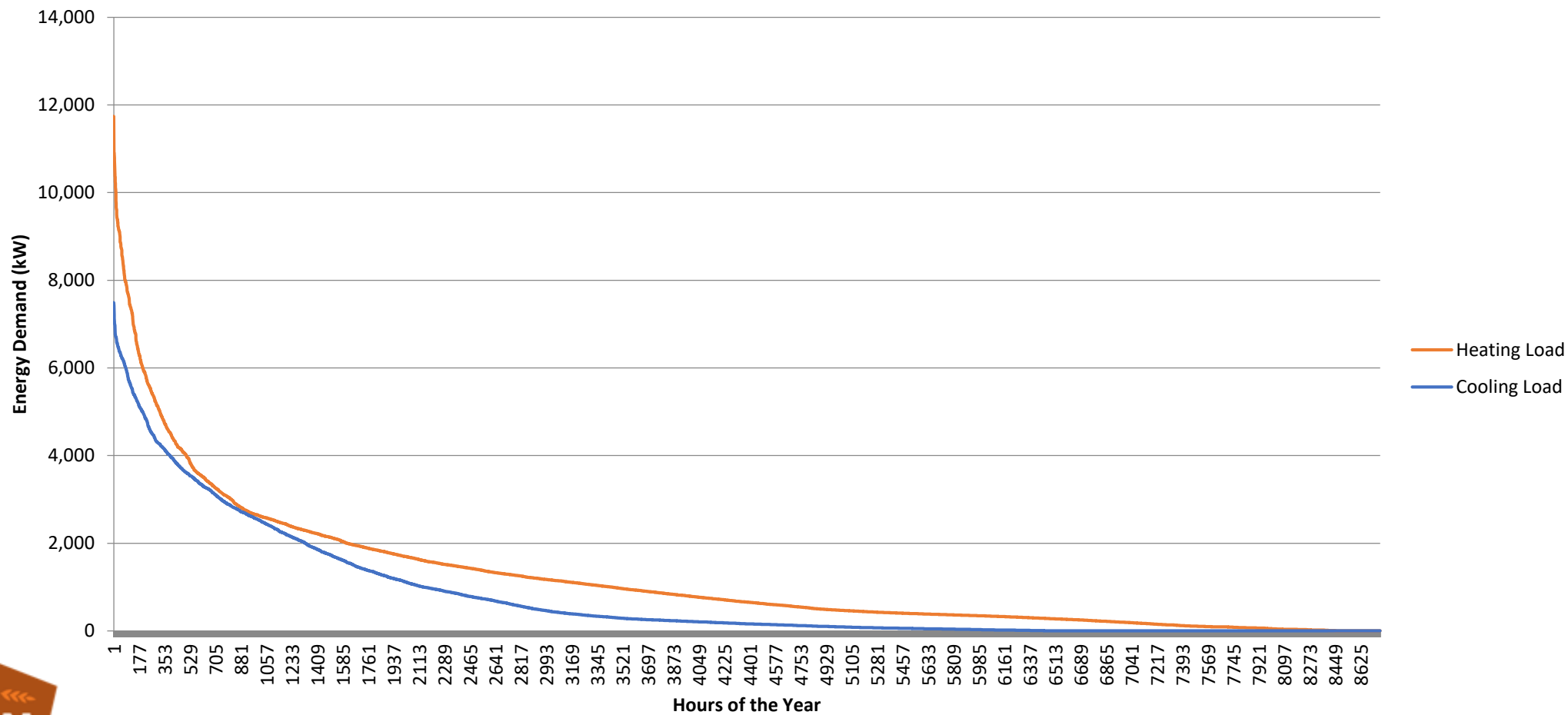
- Development schedule
- Lifecycle cost
- Operations strategy
- Future flexibility

HEAT RECOVERY POTENTIAL

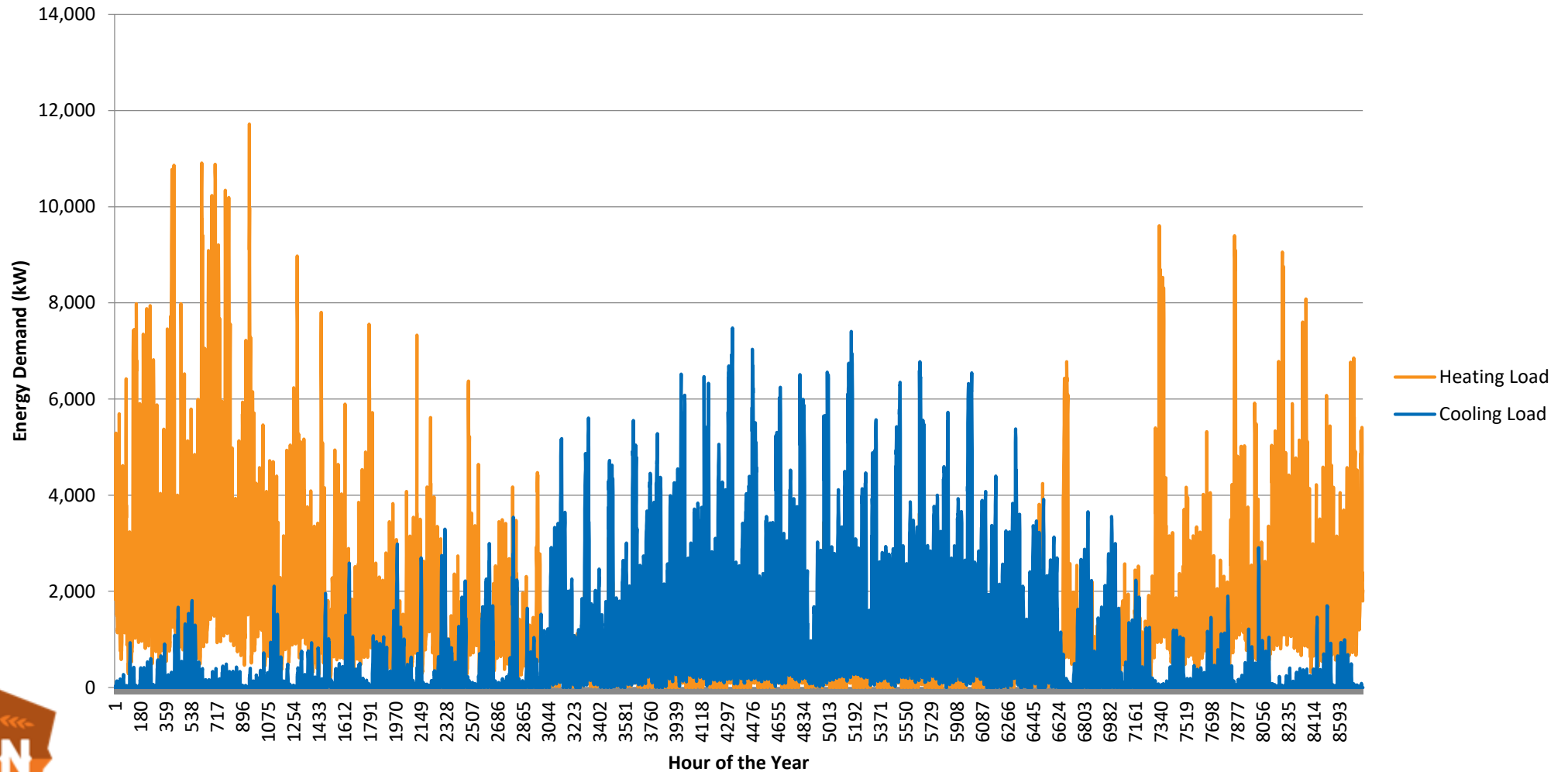
The heat available is **more than twice** the capacity required to supply the **entire campus**.



LOAD DISTRIBUTION CURVES



MODELLED HOURLY DEMAND

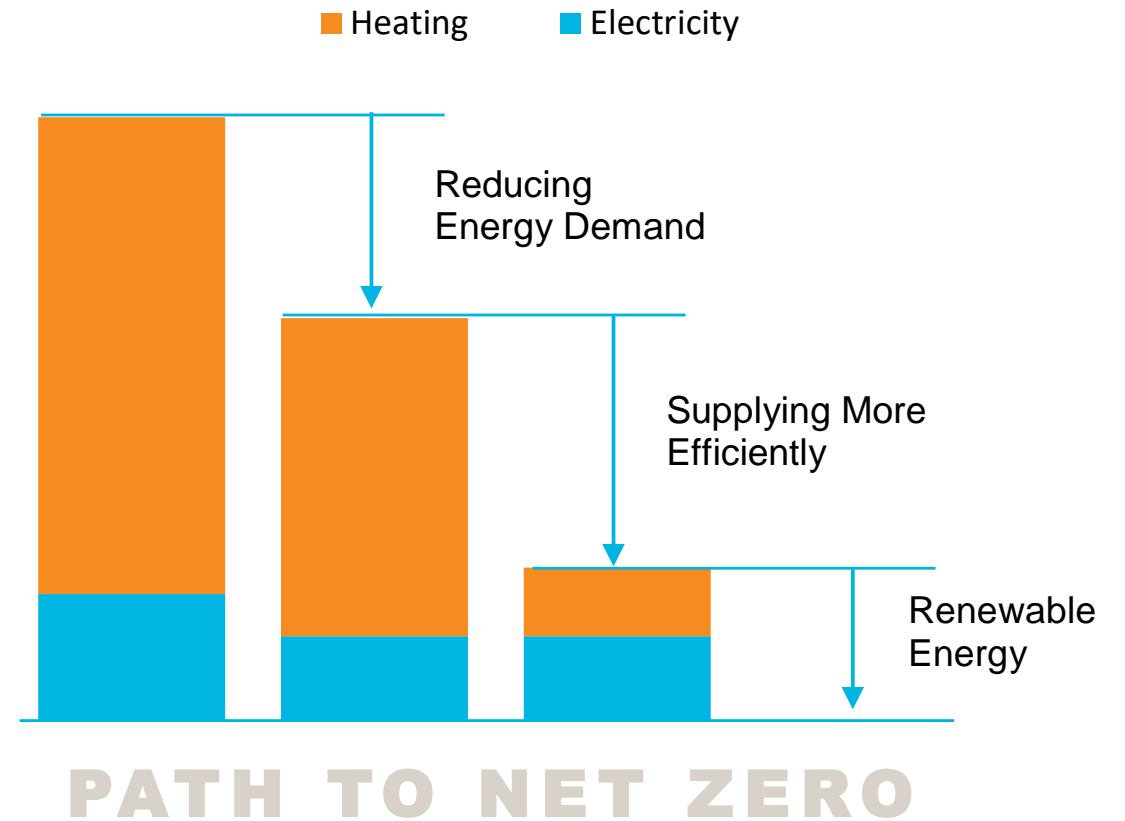


HOLISTIC OPTIMIZATION

Optimizing Building Design

- Envelope design
- Building loop temperatures
- Temperature setbacks

COP ↑ 25%

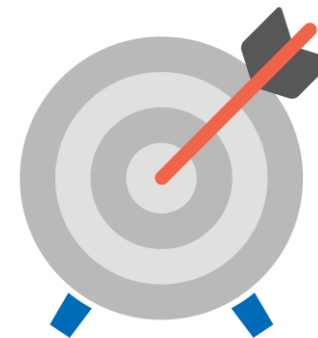
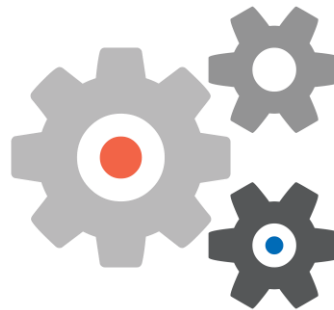


COMMUNITY ENGAGEMENT



ADDED VALUE OF DISTRICT ENERGY

- ✓ Reliability, Resiliency, and Efficiency
- ✓ Lays the Ground Work for Net Zero
- ✓ Benefits Metro Wastewater
- ✓ Economic Growth
- ✓ Supports City Sustainability Goals
- ✓ More Useable Rooftop
- ✓ More Useable Space
- ✓ Regulatory Future Proofing
- ✓ Operational Excellence





THANK YOU



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