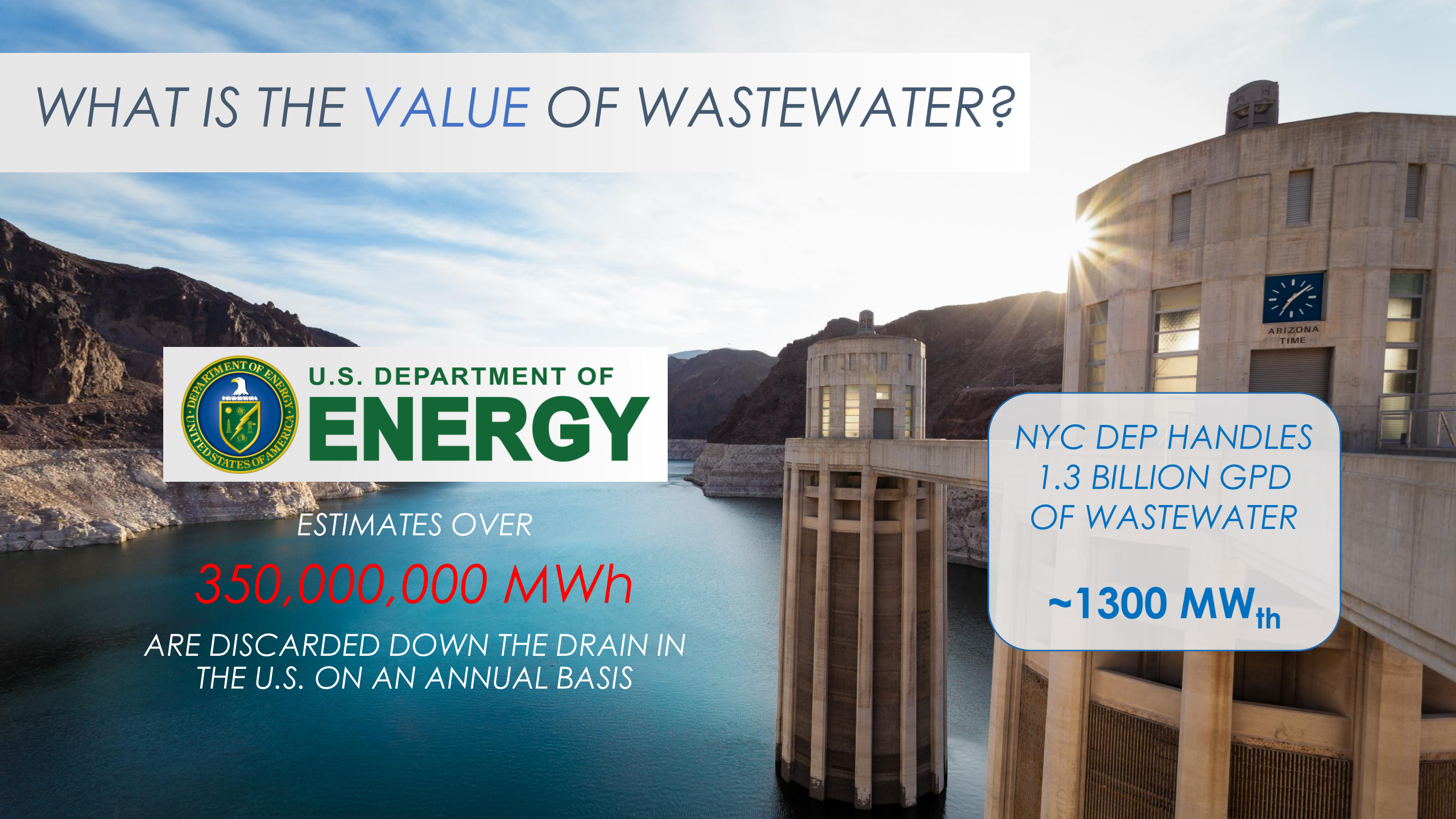
Enhancing Multi Family, Community & District Energy Geothermal Systems with Wastewater Energy Transfer (WET) Technology

SHARC ENERGY

WHAT IS THE VALUE OF WASTEWATER?



U.S. DEPARTMENT OF ENERGY

ESTIMATES OVER

350,000,000 MWh

ARE DISCARDED DOWN THE DRAIN IN THE U.S. ON AN ANNUAL BASIS

NYC DEP HANDLES 1.3 BILLION GPD OF WASTEWATER

~1300 MW_{th}

The Average Person Uses 30 Gallons of Hot Water per Day at 120°F*

- Producing an estimated **60 gallons/day** of wastewater
- Average Residential Wastewater Temperature is **70°F**
- Commercial, Industrial, & Healthcare Wastewater Temperature can reach **140°F** or Higher

Wastewater sources:

- Black and Grey Water Within Buildings
- Sanitary Sewers
- Lift Stations/Treatment Centres

* Hot-Water Demand and Use Guidelines for Apartment Buildings, Medium Average Daily - Table 7. ASHRAE Heating, Ventilating & Air-Conditioning Applications, Chapter 50 - Service Water Heating

PIRANHA.sharcenergy.com

SHARC.sharcenergy.com

Wastewater Energy Transfer (WET) Market Applications

PIRANHA SERIES

- Wastewater-source heat pump
- 140°F potable hot water
- No filtration needed
- **Small footprint**
- **No odor**

SHARC SERIES

- High capacity
- High volume filtration
- Wastewater heat exchanger
- **Small footprint**
- **No odor**

Residential

- Multi-Family Housing
  - ➢ PIRANHA (35–350 Units)
  - ➢ SHARC (350+ Units)
- Student Housing
- Senior Living
- Community Housing
- Corrections

Commercial

- Hospitals
- Micro-Breweries
- Hospitality & Water Parks
- Commercial Laundry & Car Wash
- Geothermal Loop Offset & Conditioning

Industrial

- Commercial Food Production
- Pulp and Paper
- Textiles
- Wastewater Treatment Plants
- **District Energy**

Repeatable × Scalable × Circular

PIRANHA HC

The PIRANHA is a self-contained heat pump that uses a specifically designed direct expansion heat exchanger to recover thermal energy from a building's wastewater for domestic hot water heating

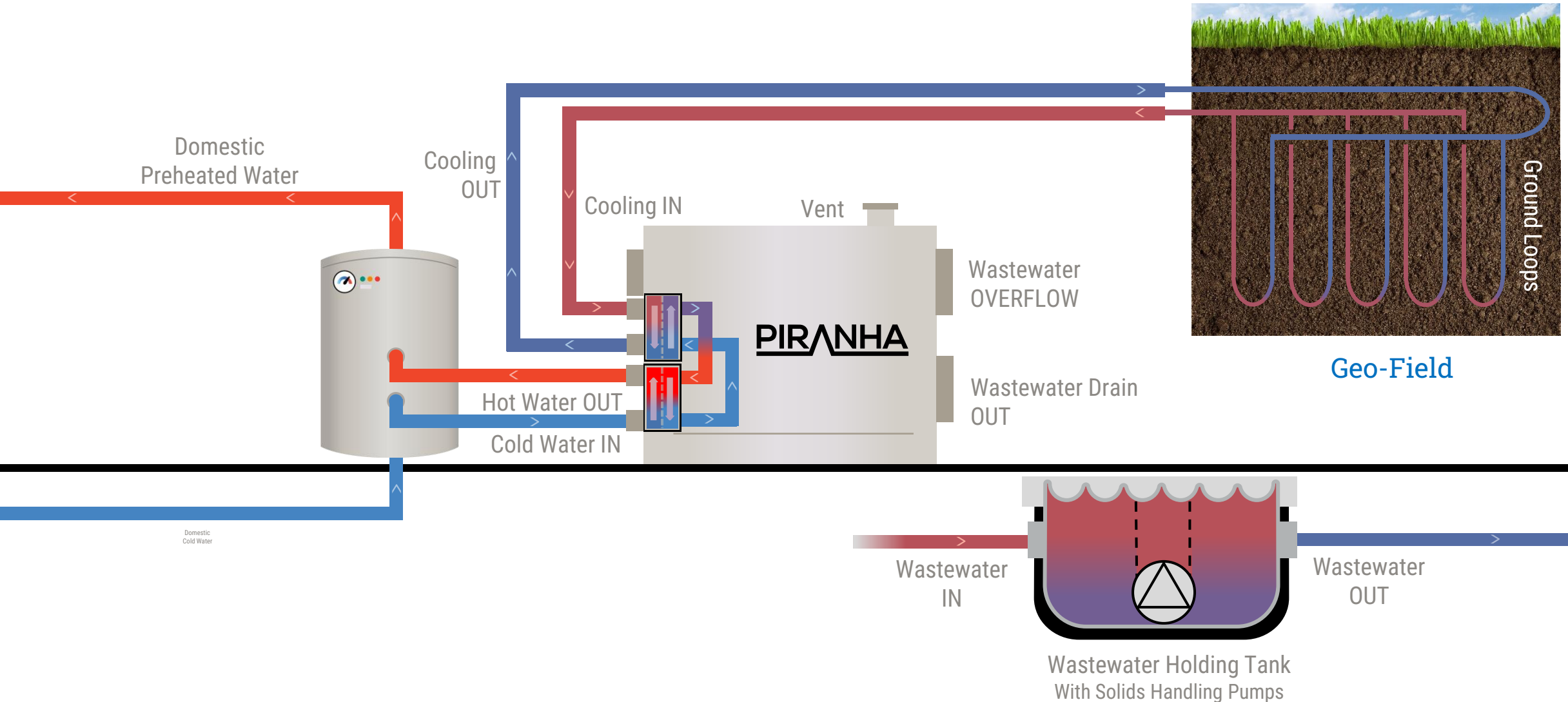
PIRANHA HC Combines Wastewater Energy Recovery with Space Conditioning

- **Models: T5 HC/T10 HC/T15 HC**
  - *Design Heat Output*
    - **60/120/180 MBH**
  - *Design Cooling Capacity*
    - **48/96/144 MBH**
    - *Increase output scalable with multiple units*
  - *Designed to fit through standard double door*
- *Average combined COP up to 7**
- *DHW production while Cooling Spaces*
- **NSF-372 rated BPHE**
  - *Double-wall, leak detection*
- *R-513a*
  - *56% Lower GWP than R-134a (573 vs. 1,430)*
  - *Same performance*

**Average COP across a range of source temperatures, output temperatures and application types.*

PIRANHA paired with Geothermal

Simultaneous Heating + Cooling



SHARC

SYSTEM

- *SHARC Filter Unit*
- *Support Frames/Skids*
- *Control Panel*
- *Macerator/Grinder*
- *Piping/Valve Assembly*
- *Plate & Frame Heat Exchanger*
  - *Wide Gap*

Not shown

- *Wastewater Holding Tank & Solids Handling Lift Pumps*

  Existing Tank can be used
- *Heat Pump*
  - *May not be needed in ambient/low temp systems*

**Sourced Separately*

Alafia- Vital Brooklyn Initiative

Brooklyn, NY

THE WALL STREET JOURNAL.

- $373M project delivering 2,400 affordable apartments & medical facilities.

- Phase 1A includes:
  - **(1x) SHARC 660 serving 2 buildings**
  - **(2x) PIRANHA T15HC serving 1 building**

- Closed loop geothermal systems support water-source heat pumps (WSHP) to provide heating, cooling and domestic hot water.
- SHARC allowed for a reduction in the number of boreholes required
- Final campus to be interconnected with an Ambient Temperature Loop (ATL)

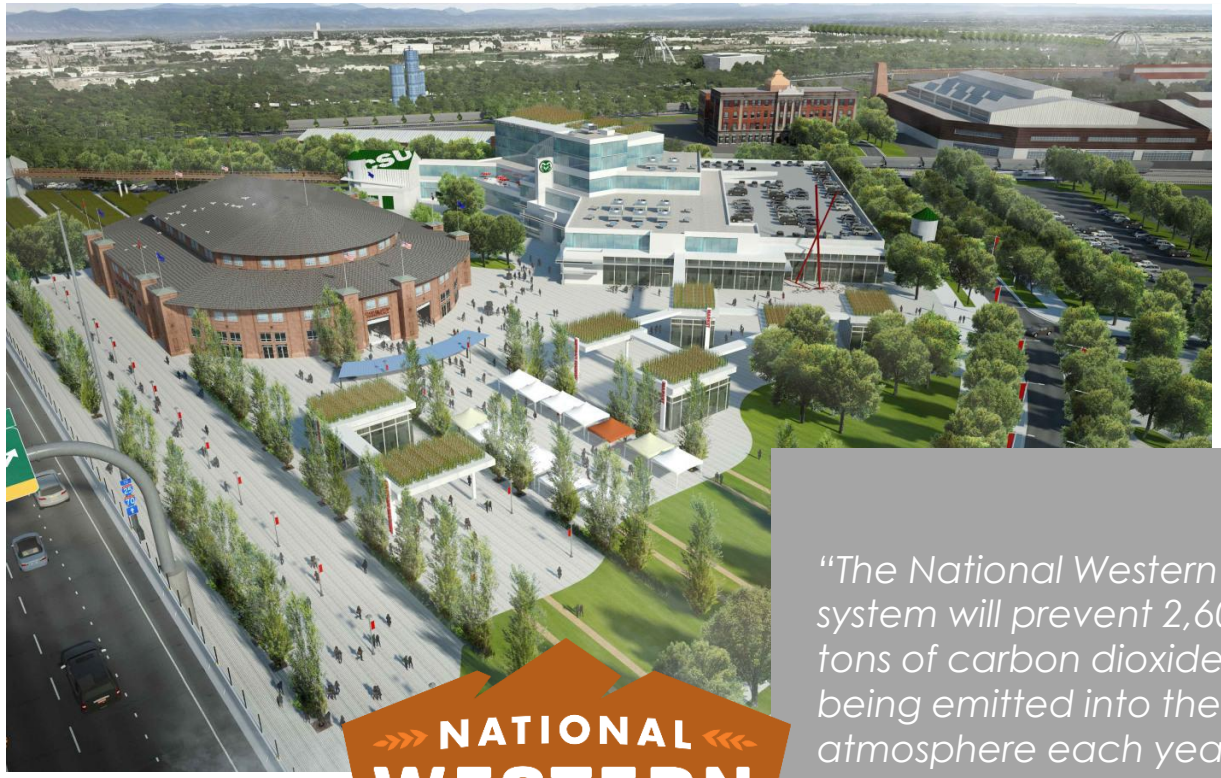
National Western Center

Denver, CO

SHARC

CASE STUDY

- *North America's largest District Energy wastewater recovery system*
- *3.8 MW district energy system*
- *Two SHARC 880 units provide an average 3,000 GPM filtration of raw, untreated wastewater which is then used as a direct source for the onsite heat pump*
- *Hailed as showing leadership & commitment to Denver's Climate Action Plan*
- *Commissioned in January 2022*



"The National Western Center system will prevent 2,600 metric tons of carbon dioxide from being emitted into the atmosphere each year by circumventing the need to burn fossil fuels."

THE DENVER POST

Lincoln King Community & Health Center
Racine, WI

SHARC
CASE STUDY

- *Holistic Health Center combines medical, behavioral, mental health & dental care*
- *Community Center increases access to recreational, fitness & social offerings*
- *One PIRANHA T10 HC Heat Recovery Unit*
- *Targeting LEED Platinum Certification*
- *Racine's FIRST Net Zero Building*
- *Sustainable design components:*
  - *Geo-exchange HVAC system with passive design strategies to minimize heating and cooling demands*
  - *Domestic Hot Water WET Heat Pump*
  - *Rainwater Reclamation System*
  - *Onsite Photovoltaics*