



**HUBER**  
TECHNOLOGY  
WASTE WATER Solutions

**+ Noventa<sup>®</sup>**  
INNOVATING TO DECARBONIZE OUR FUTURE™

# Wastewater Energy Transfer™ [WET™]

December 8, 2023

**MassDEP Wastewater  
Energy Recovery Summit**



# WHO WE ARE

**Noventa Energy**, a global renewable energy company providing innovative ways of decarbonizing buildings, is HUBER's **exclusive North American distributor** and **energy partner** for the **ThermWin®** series of equipment.

**HUBER Technology**, a global leader in wastewater management, providing **wastewater solutions** and equipment for over 180 years, is the manufacturer of **ThermWin®** equipment for wastewater heat recovery.





## What We Do

- Reduce carbon emissions and energy consumption
- Reduce annual utility costs
- Improve **reliability** and **resiliency** of heating and cooling systems
- Reduce HVAC **capital costs** for new or replacement projects
- Reduce **maintenance costs** and **extend equipment life**
- **Finance projects**, freeing up capital dollars







## Technology Partners

**HUBER**  
TECHNOLOGY  
WASTE WATER Solutions



## Investment Partners

**ANCALA**

**CIB**  **BIC** | Canada  
Infrastructure  
Bank

**Vancity** Community  
Investment Bank™



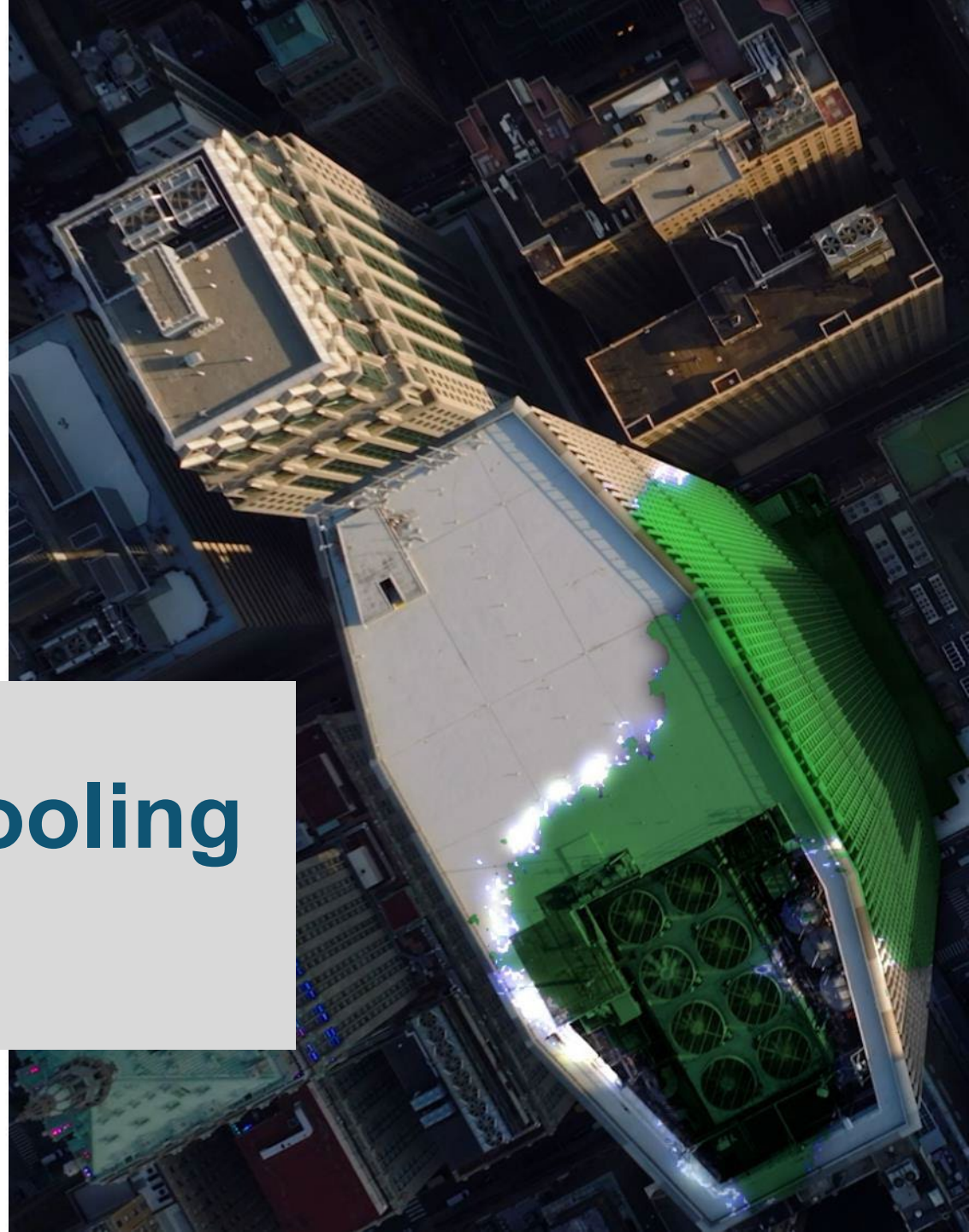
## **The Noventa Advantage**

- Reduced Energy Consumption
- Reduced GHG Emissions
- Reduced Water Use
- Lower Operating Costs
- Improved System Reliability & Resiliency
- Reduced Capital Costs



# Reimagining Heating & Cooling

The Opportunity



# WET™ Potential in North America

Wastewater – An Untapped, Low-cost, Renewable Energy Source



## Sanitary Sewers

- Predictable flow profiles
- Consistent temperatures year-round: 10°C to 25°C

145 billion litres

...of wastewater transported  
by sewers each day

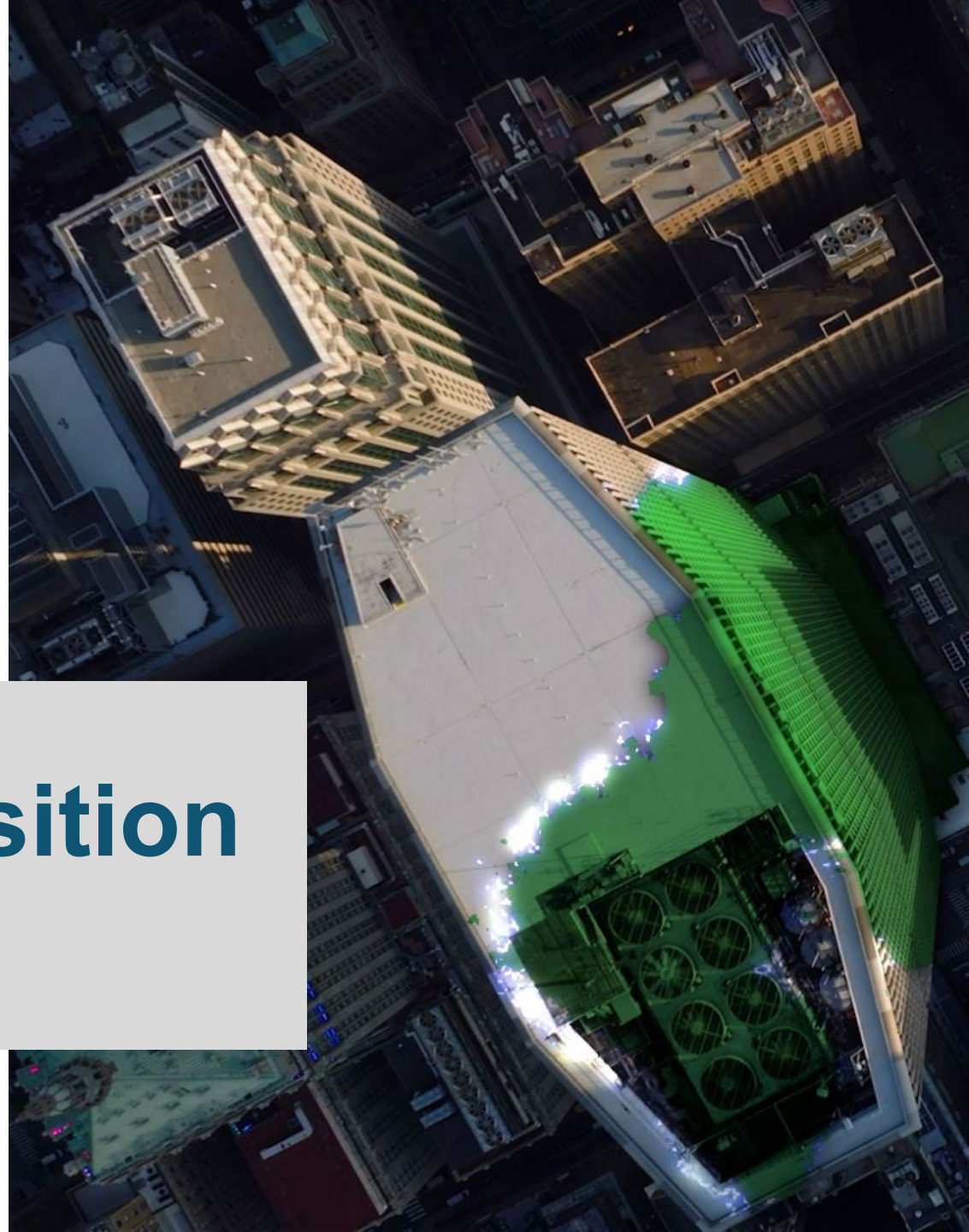


60 billion kWh available annually  
for every  $\pm 1^\circ\text{C}$  returned to sewer



# Noventa's Value Proposition

Low Carbon Heating & Cooling





# Conventional Cooling Systems

Diminished Efficiency and Performance When Needed Most



Heat is removed from a building and rejected **outside** via cooling towers

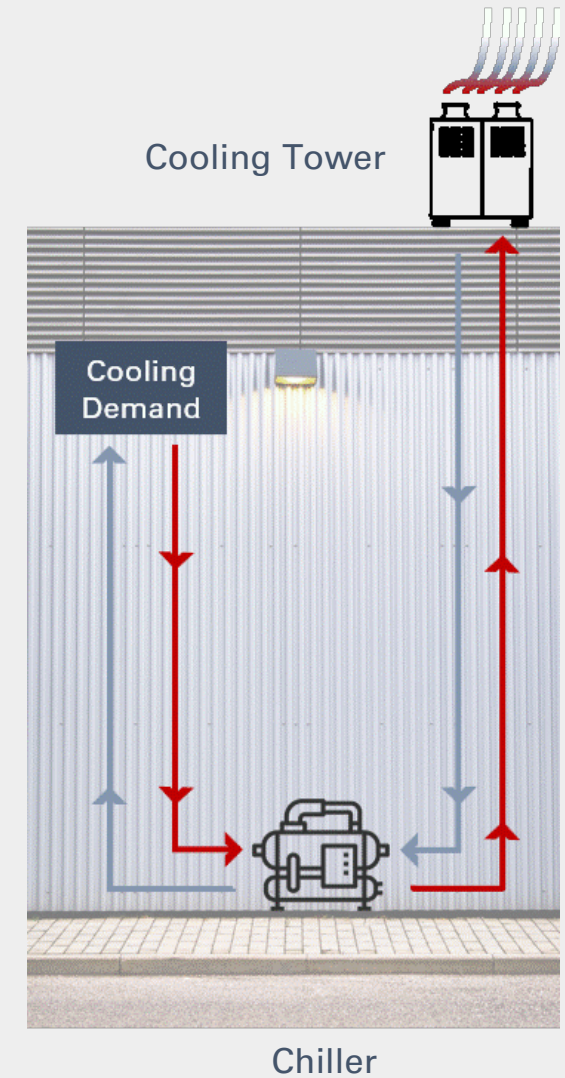


In ideal conditions, today's chillers can achieve a **COP of 5.0 – 6.0**

**HOWEVER**



Hot and humid conditions can reduce **COP to 3.8 – 4.2**





# Noventa WET™ System for Cooling

Efficient Cooling with Reduced Scope 2 GHG Emissions



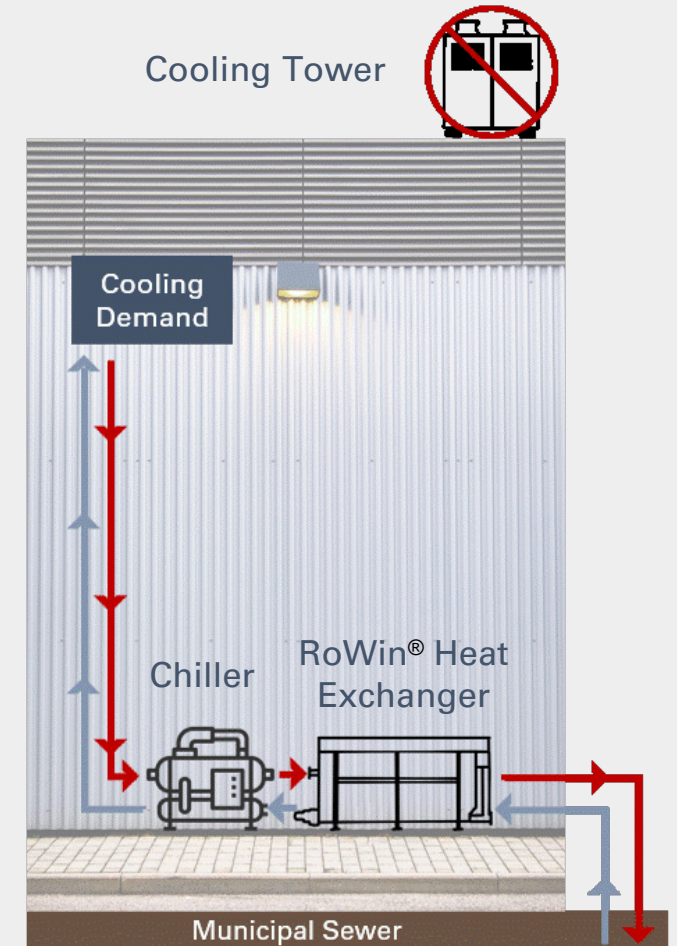
**Heat** is removed from a building and rejected to **wastewater** via the Huber ThermWin® system



Overall **COP of 6.5 (or higher)** as a result of heat rejection to wastewater rather than cooling towers, with minimal impact from weather conditions



Significant **water savings** realized from decreased or eliminated use of cooling towers





# Conventional Heating Systems

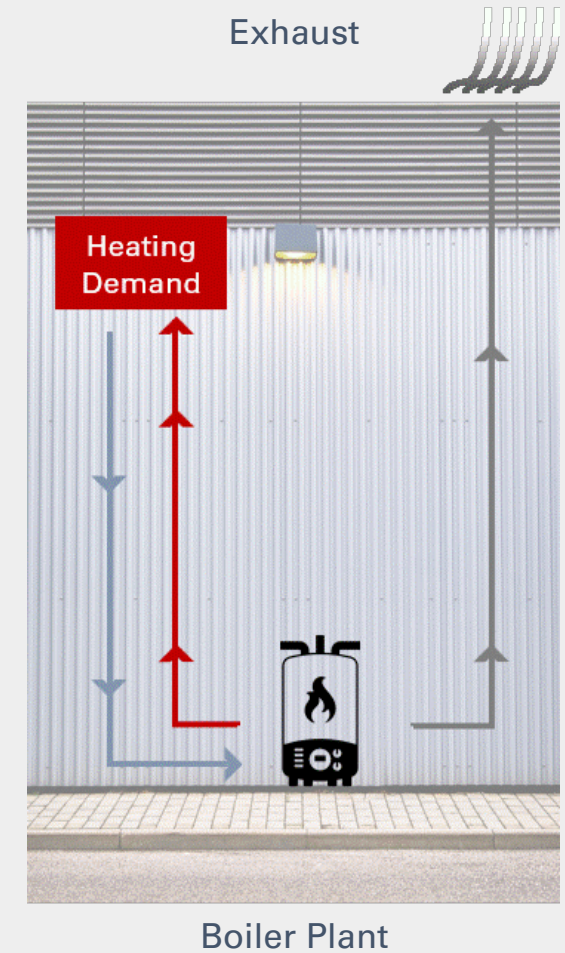
## Fossil Fuel Combustion and GHG Emissions



**Natural gas** is burned in boiler plants to produce **hot water** or **steam** (75 – 80% efficiency)



In ideal conditions, a boiler plant can achieve ***COP of 0.8***





# Noventa WET™ System for Heating

## Low Carbon Heating Solution



Heat is extracted from **wastewater** via the HUBER ThermWin® system



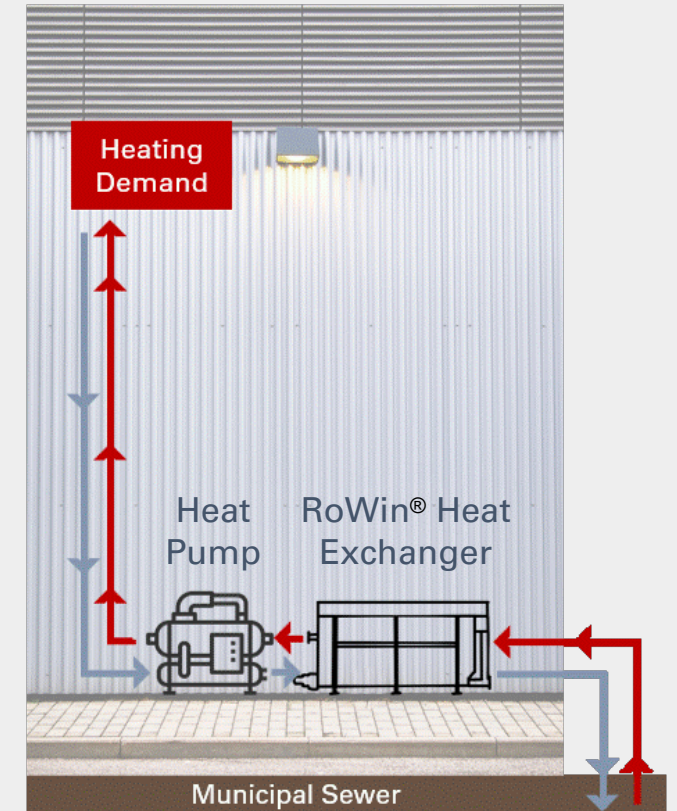
Heat pumps are used to produce hot water or steam at the required temperature(s)



Elimination or significant reduction in natural gas consumption from eliminated or decreased boiler plant use

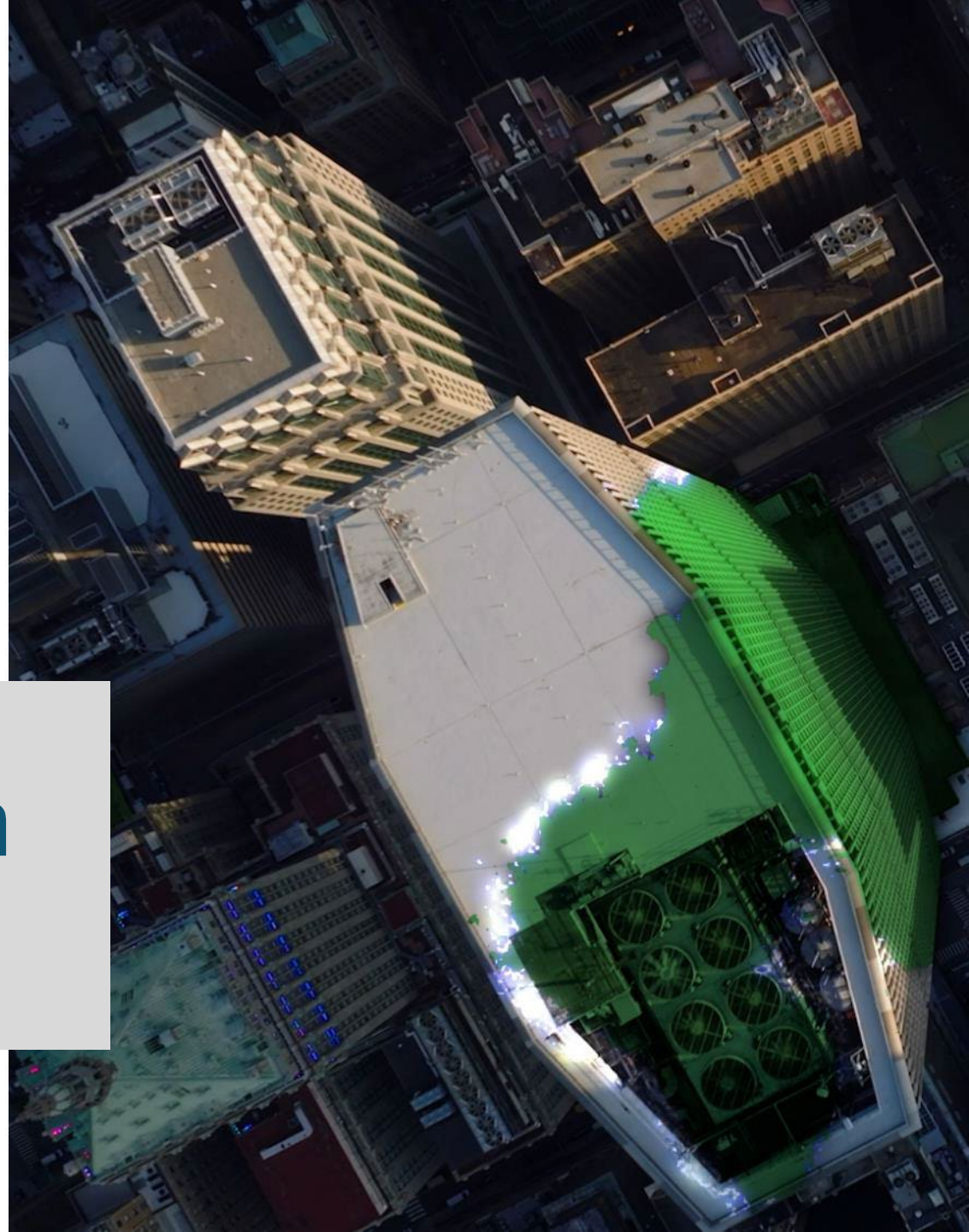


Overall **COP of 4.5 (or higher)** as a result of less natural gas usage



# Noventa WET™ System

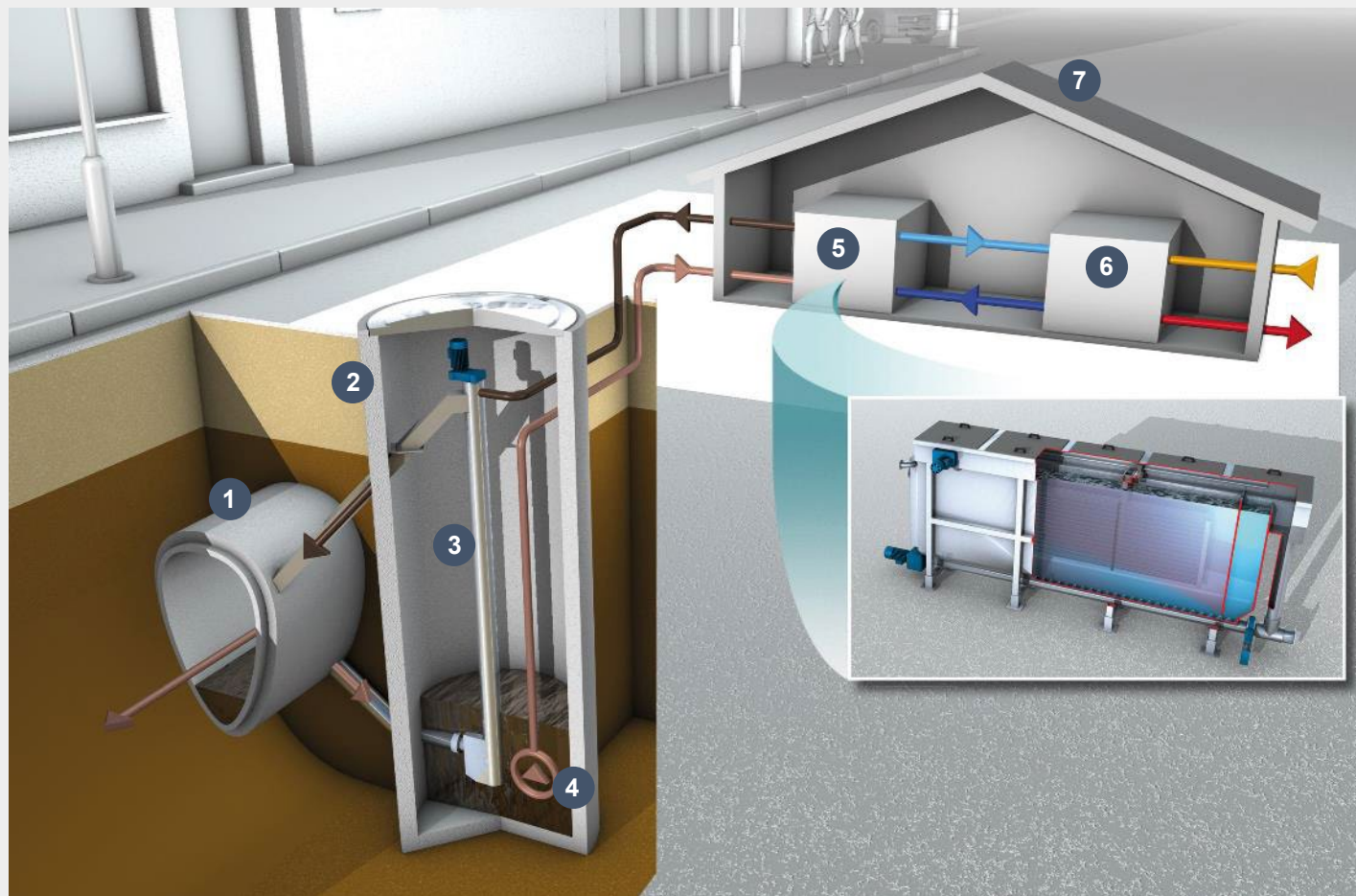
Innovative Decarbonization





# Noventa WET™ System Design

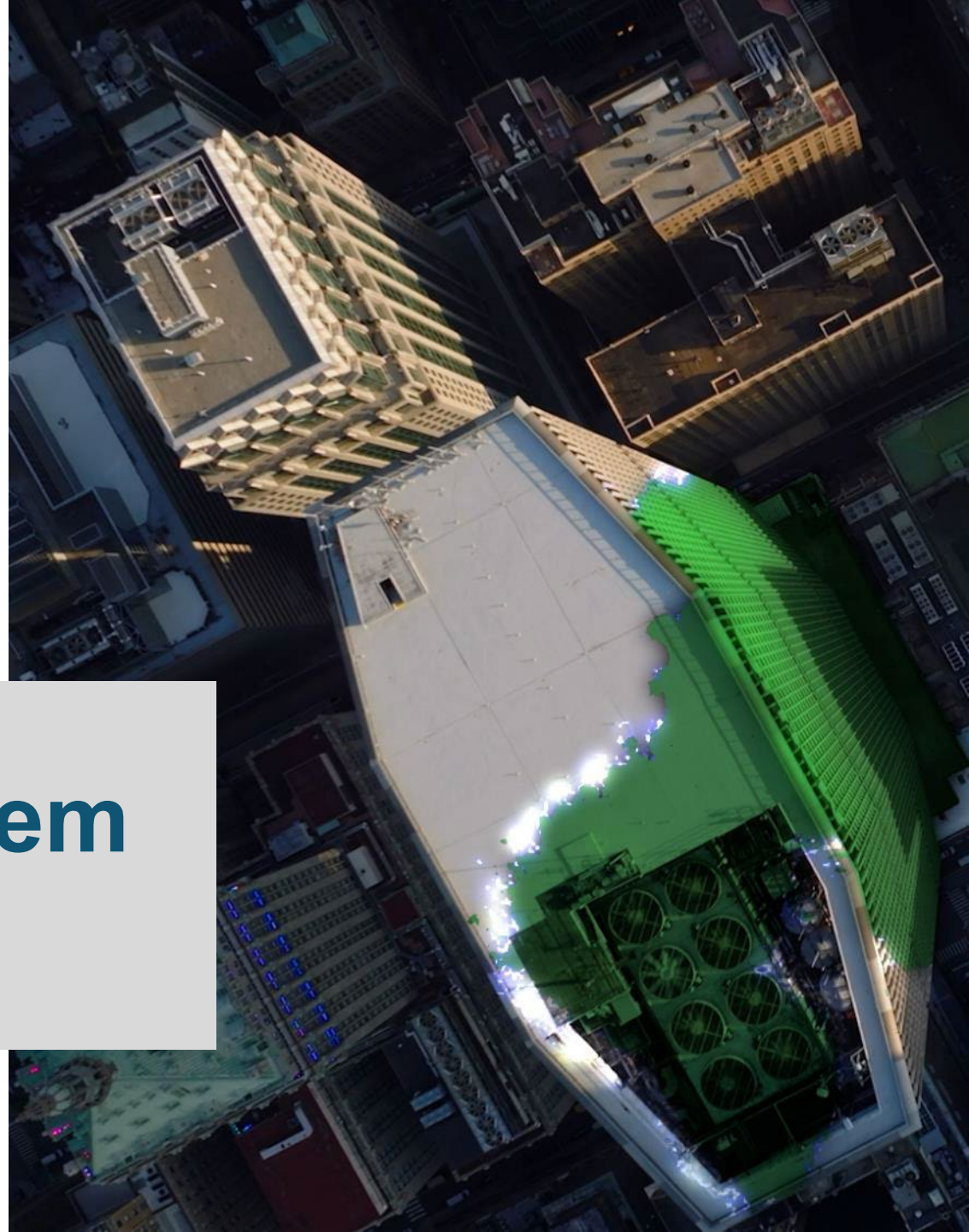
Typical Design Using HUBER ThermWin® Technology



- 1 | Sewer
- 2 | Wetwell
- 3 | ROTAMAT® RoK4 Wastewater Screen
- 4 | Wastewater Pump
- 5 | RoWin® Heat Exchanger
- 6 | Heat Pump
- 7 | Energy Transfer Station

# HUBER ThermWin® System

Our Wastewater Solution





# HUBER Technology

## Leader in Wastewater Solutions

- A **189-year-old**, 5 generations owned, supplier of wastewater solutions to the municipal & industrial markets
- HUBER has over **45,000** products **installed worldwide** in 61 countries – including 50 ThermWin® systems operating since 2008
- HUBER provides full engineering, design, and services support for all product lines
- HUBER is an ISO 9001 & 14001 Certified Manufacturer

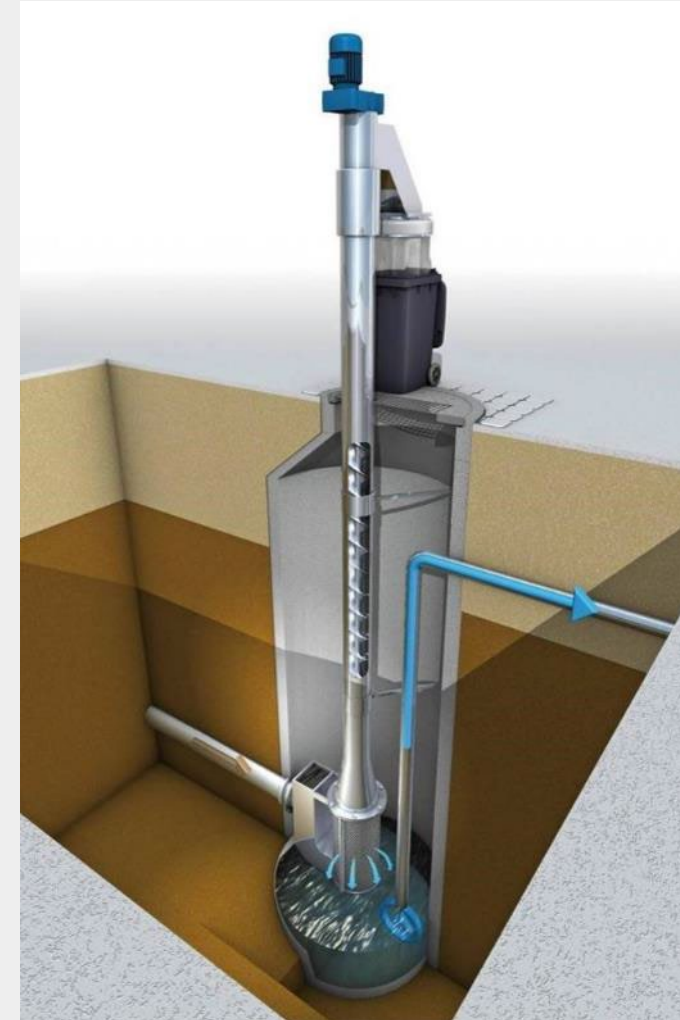


# HUBER ROTAMAT® RoK4 Wastewater Screen

## The ThermWin® Solution

- Large sewers tend to transport larger pieces of debris and have high total dissolved solids
- Sump pumps are **costly to maintain**, even when equipped with grinders
- Subject to **replacement** every **3 – 5 years**<sup>1</sup> when pumping unscreened wastewater

**The Noventa Advantage:** HUBER's self-cleaning ROTAMAT® RoK4 wastewater screen



<sup>1</sup> City of Toronto Water

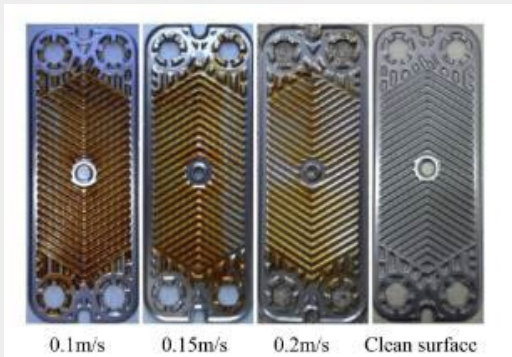


# Managing Biofouling & Sedimentary Flows

## Efficient Transfer of Energy

- **1 mm** thick biofilm **reduces effectiveness** of energy transfer by **over 45%**
- **Conventional** heat exchangers must be **chemically cleaned** and disassembled frequently to restore performance
- **Sediment** and **particulate** found in wastewater further reduces energy transfer; decreased flows and capacity

**The Noventa Advantage:** HUBER's self-cleaning RoWin heat exchanger



# HUBER RoWin<sup>®</sup> Heat Exchanger

Patented Self-Cleaning Technology – Eliminates Fouling

## Self-Cleaning Technology

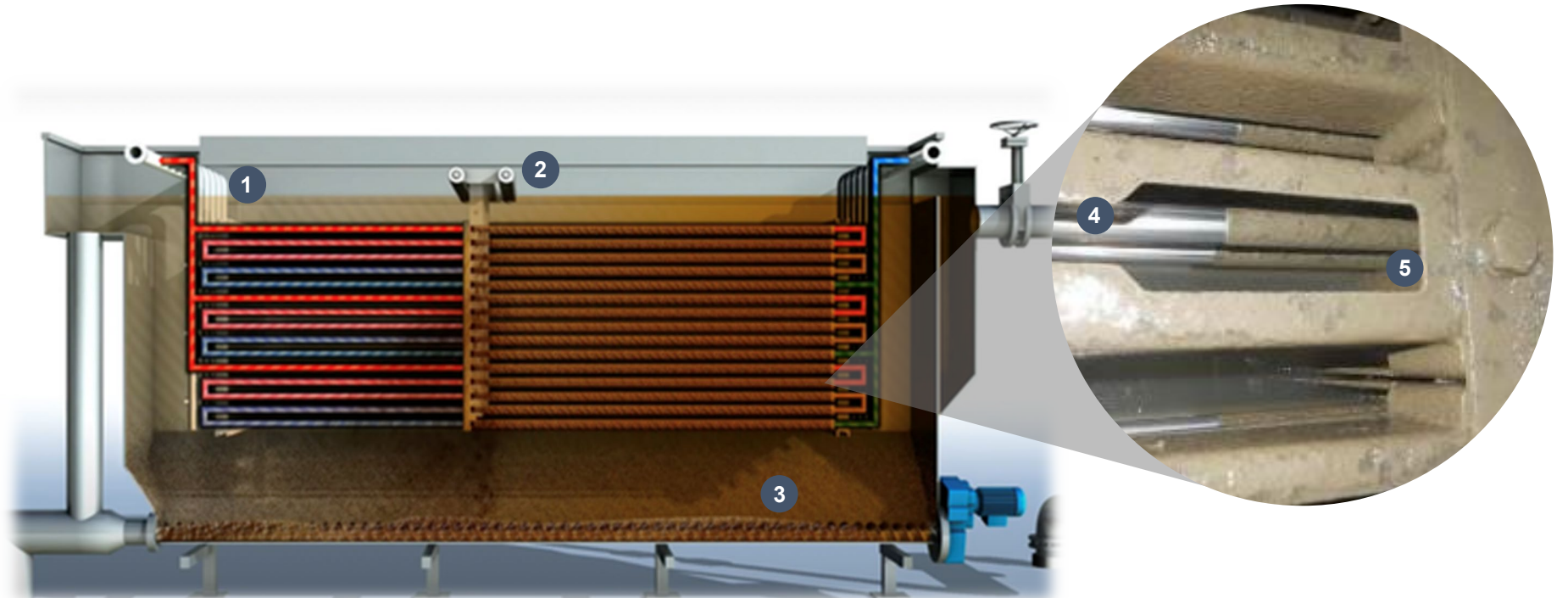
1 | Clean water flows within the tubes, while wastewater or salty aquifer water flows around the tubes

2 | A conveyor system with a series of O-rings slides across the tubes scrapping off any calcification or build-up

3 | An auger then pushes out any sediment that may have settled at the bottom of the heat exchanger

4 | Clean heat exchanger tube surface

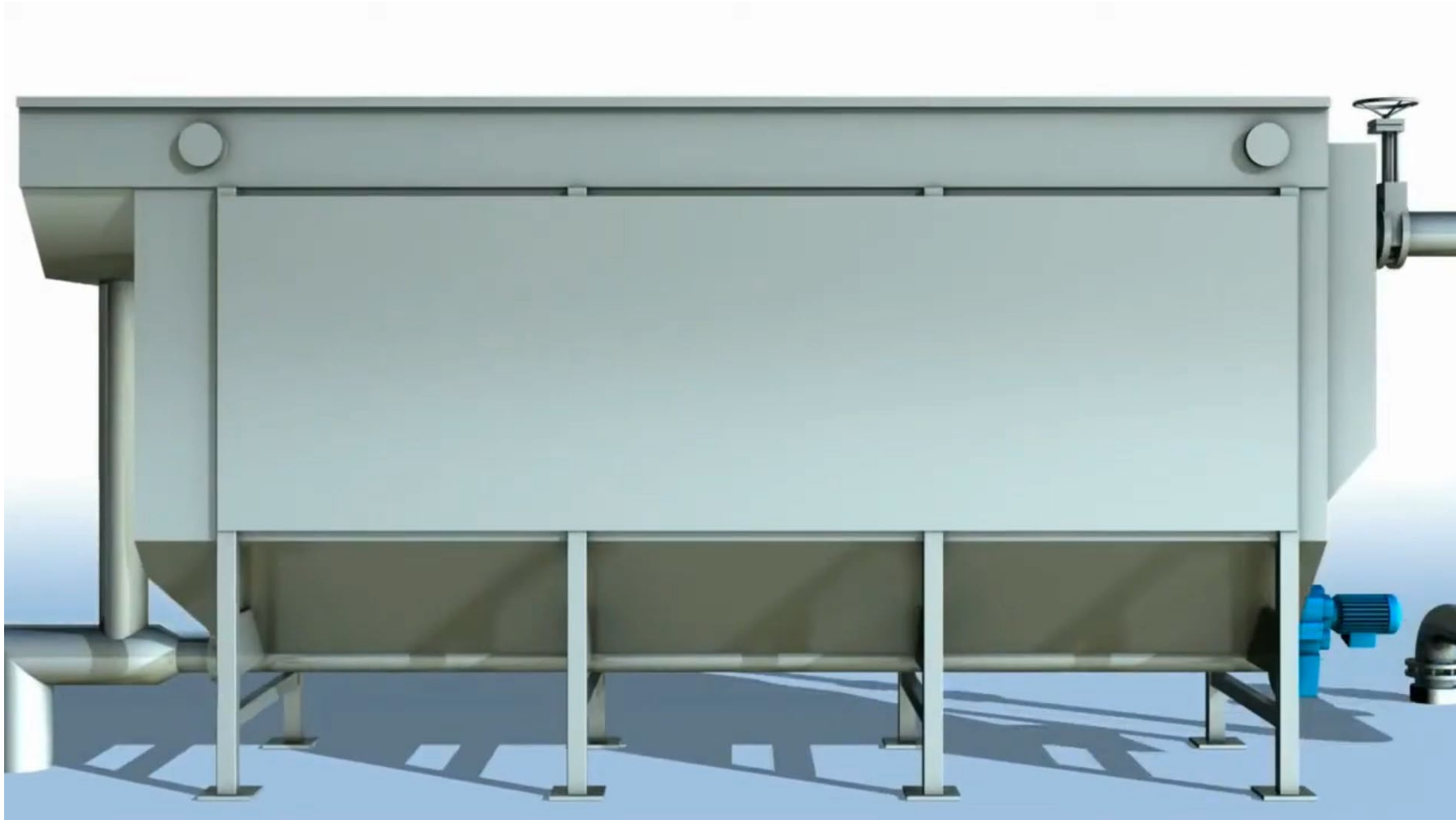
5 | Fouling at the ends of the heat exchanger tubes





# RoWin® Cleaning Mechanism

Video Demonstration



# The RoWin<sup>®</sup> Advantage

Superior to Conventional Plate & Frame Heat Exchangers



Patented **self-cleaning** mechanism & sediment removal screw



**Odor-tight** for sensitive spaces



Consistent **heat transfer**



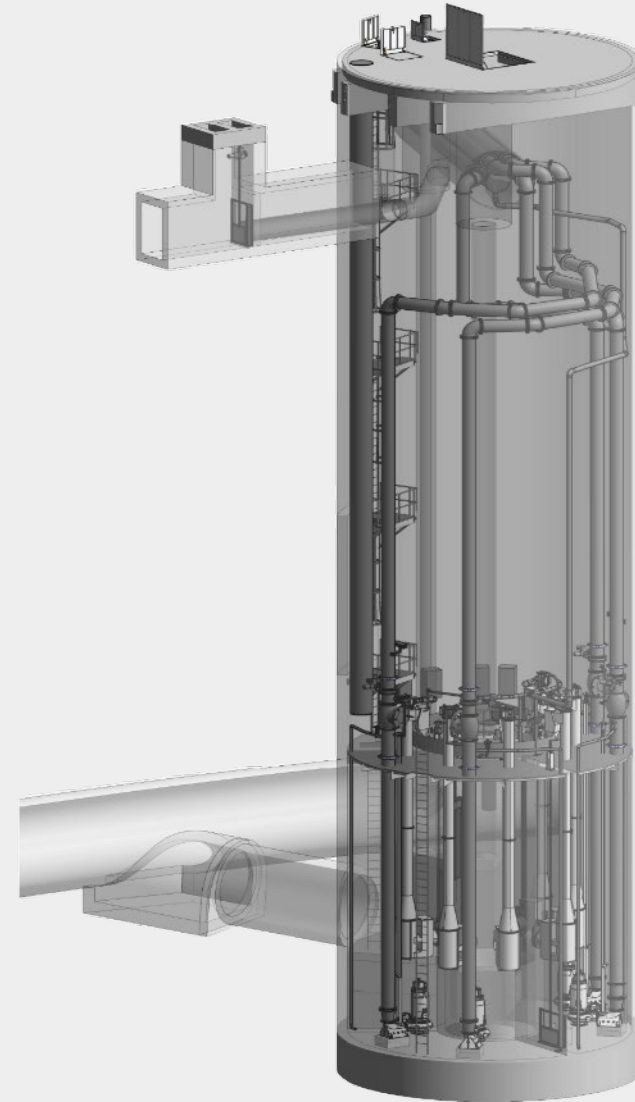
**Stainless steel** with patented corrosion-proof coating



# Noventa WET™ System

Flexible, Scalable, Efficient

- **WET™ Equipment:**
  - Available in a range of sizes and capacities
  - Allows for modular design and parallel installation
  - Ro9 Integrated Screen and ThermWin-Mini ideal for small scale installations
- **Wide Range of Applications:**
  - Small behind the meter installations (e.g. small residential buildings)
  - Low-carbon district energy systems: designed, built, operated and maintained by Noventa



# Noventa WET™ System

Flexible, Scalable, Efficient

- Design Flexibility:

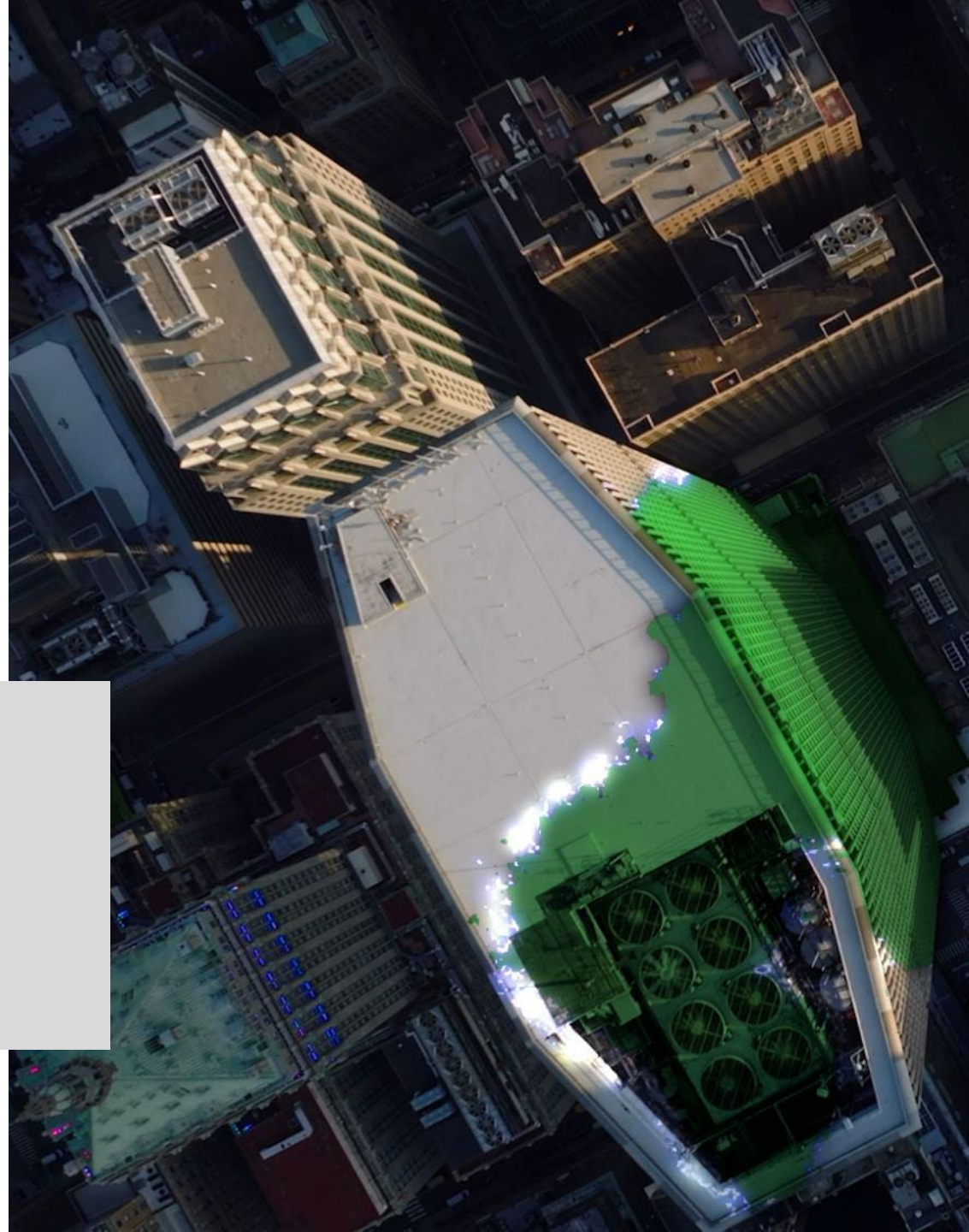
- Able to recover **as little as 100kW** thermal energy
- Maximum recovery rates only limited by wastewater flow
- Energy recovery viable with wastewater flows of **0.6 L/s [10 GPM]** up to **56 L/s [900 GPM]** **per RoWin®** heat exchanger
- Able to provide up to 100% of heating and cooling needs, including steam
- No limit on distance between sewer and buildings serviced
- Wetwell design allows access to wastewater anywhere along sewer at any depth





# Case Studies

Noventa Innovation and Capability



# Toronto Western Hospital

Toronto, ON [Canada]

- Hospital: 140,000 sq. m. [1,500,000 sq. ft.]
- Boiler Capacity: 120,000+ MBH
- Chiller Capacity: 6,800+ tons

## Impact

- Low-temperature hot water loop integration while maintaining existing steam infrastructure
- Annual space heating & cooling demand provided: **90%+**
- From wastewater: **10MW+** of *heating* and **9MW+** of *cooling*

## Savings

- Energy Savings: \$685,000/year approximately
- GHG emission reduction: 8,400+ tonnes CO<sub>2e</sub>/year
- Water Savings: 11.8+ million gallons of water per year





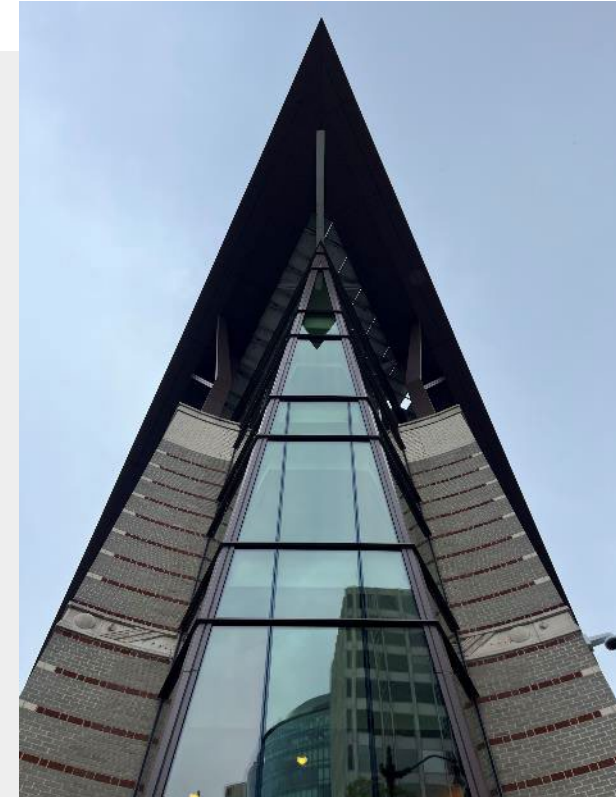
# American Geophysical Union

Washington, D.C. [United States]

- Office: 5,800 sq. m. [62,000 sq. ft.]
- 7-storey refurbished structure
- Certified Net-Zero Energy building by the U.S. Green Building Council

## Impact

- Sewer Flow Rate: 404 L/s [6,400 GPM]
- RoK4-700 fine screen pumping station
  - Inserted in a shaft beside the sewer next to building
- Heat Exchanger: 1 RoWin® BG8 installed
- System Provided: 480kW of heating & 840kW of cooling
- Coefficient of Performance (COP): 6+



# Residential Apartment Complex

**Straubing** [Germany]

- Residential: low-rise apartment complex
- 11 buildings & 102 units

## Impact

- Partial flow of wastewater: 20 L/s [317 GPM]
  - Flow taken from main sewer running outside apartment buildings
- Heat Exchanger: 2 RoWin® BG4S installed
  - Extracts up to 210 kW thermal energy from wastewater
- Heating Output: approximately 260 kW with heat pump
- COP: 6+

## Savings

- Energy Savings: approximately 386,000 kWh/year





# The Noventa Advantage

## Benefits of the WET™ System



Reduced  
Energy  
Consumption



Reduced  
GHG  
Emissions



Reduced  
Water Use



Lower  
Operating  
Costs



Improved  
System  
Reliability &  
Resiliency



Reduced  
Capital Costs



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