

# Waste Heat Energy Recovery Technologies



**Today's sponsor**



# Panelists

- Brock Trimble, **SHARC Energy Systems**
- Stephen Condie, **Noventa Energy Partners**
- Patrick Lach, **Maxi-Therm**
- Karl Neubert, **Renewable Resource Recovery Corp.**
- Christian von Drachenfels, **UHRIG**

## Panelists will cover:

1. Technology Overview
2. Ideal Market
3. Value Proposition and Benefits of Technology





# SHARC Energy Systems

Brock Trimble  
Director, Technical Sales



## The SHARC System

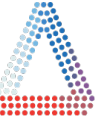


- High capacity wastewater filtration and energy transfer
- Multiple sizes for scalable options
- Custom heat exchanger for project specific design
- Heat recovery and heat rejection – heating and cooling
- **Small footprint, no odor**

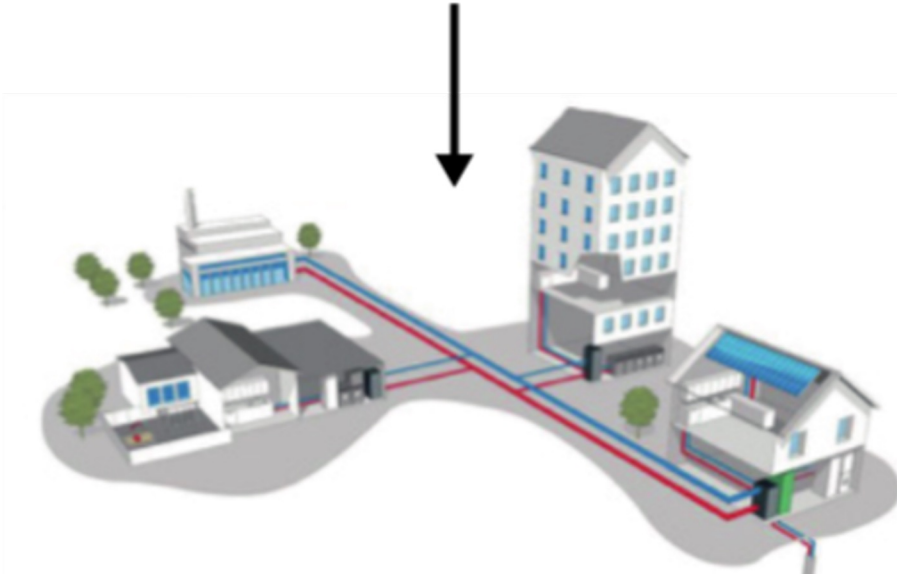
## The PIRANHA



- Wastewater-source heat pump
- Multiple sizes for scalable options
- Active energy recovery
- Deliver hot water at setpoint
- **Small footprint, no odor**



# SHARC System



- MEDIUM-LARGE MULTI-FAMILY RESIDENTIAL
- MEDIUM-LARGE COMMERCIAL & INDUSTRIAL
- **DISTRICT HEATING AND COOLING NETWORKS**

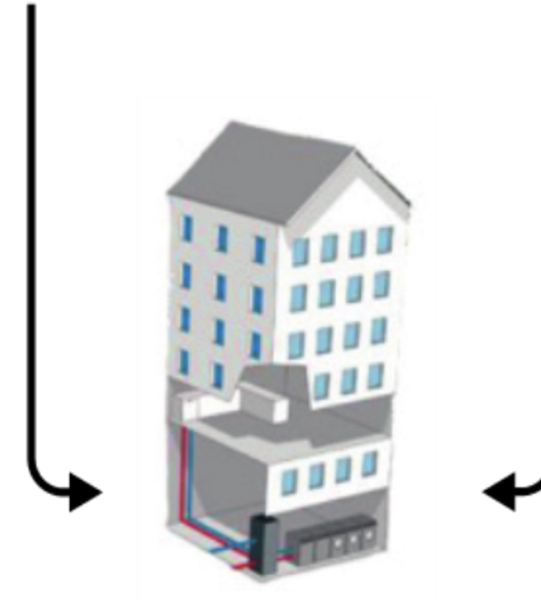
## Examples

*Wall Center Central Park – 700+ Unit MFR Vancouver, BC*

*DC Water HQ – Office Space Washington, D.C.*

*False Creek NEU – District Energy Vancouver, BC*

# PIRANHA



- INDIVIDUAL BUILDING
- SMALL-MEDIUM MULTI-FAMILY RESIDENTIAL
- SMALL-MEDIUM COMMERCIAL & INDUSTRIAL

## Examples

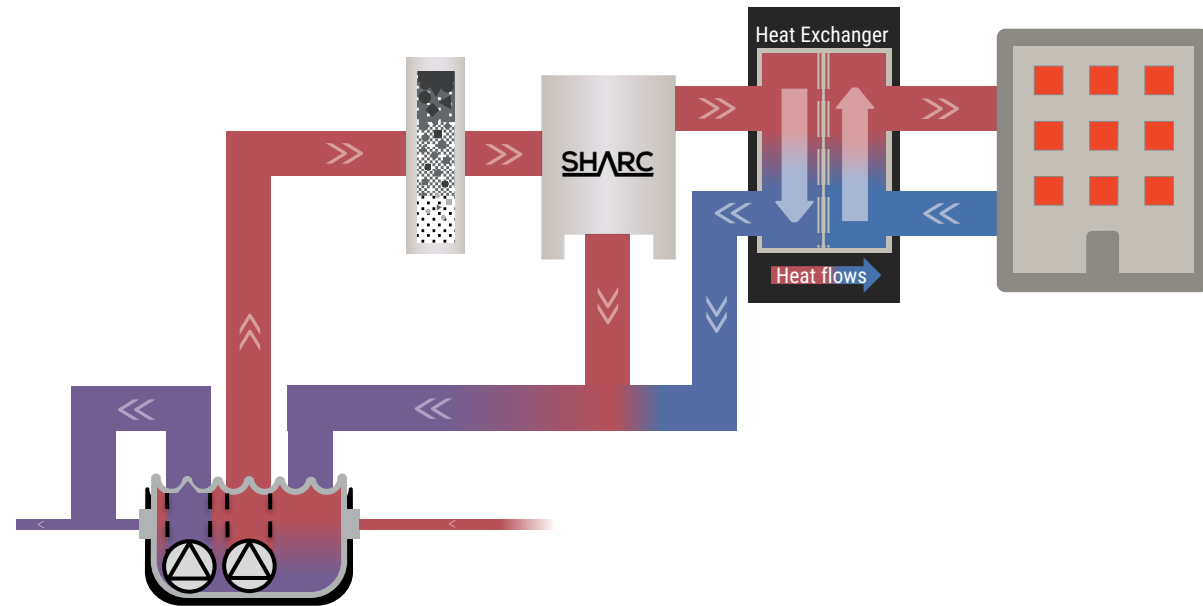
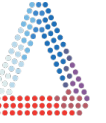
*3200 Bluff – 37-Unit MFR Boulder, Colorado*

*Lake Louise Inn – Hotel Laundry Lake Louise, Alberta*



## Why Wastewater?

Recoverable/Renewable Energy  
Consistent Temperatures Year-Round  
Limitless Source Material

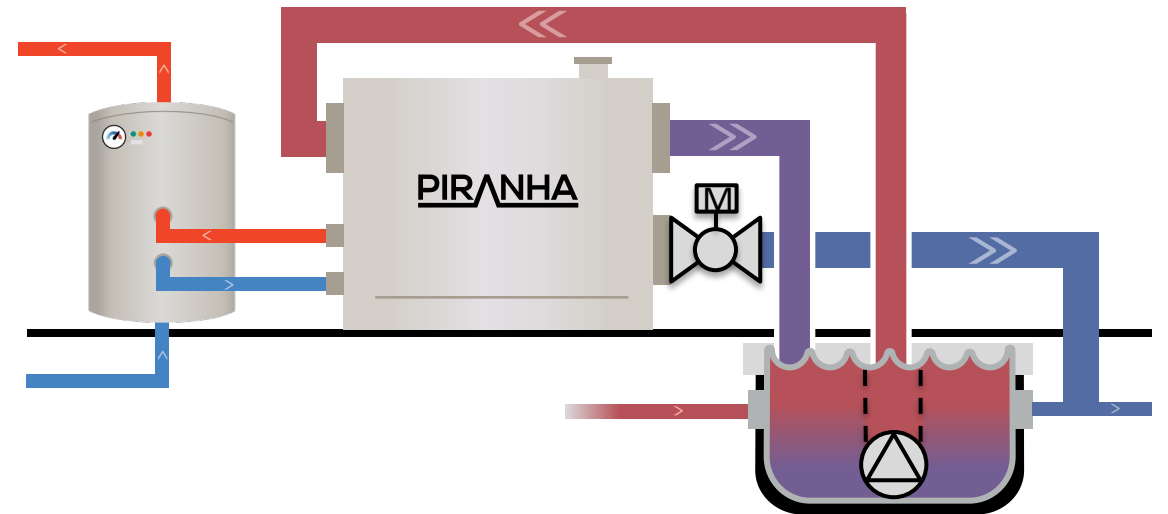


### Reductions

Energy Losses from Buildings  
Energy Use & Operational Costs  
GHG Emissions

### Regional Support

Local Legislation – LL97  
State & Federal Funds  
Utility Incentives



### Market Demand

High Efficiency Electrification  
*Clean Heat Programs*  
*Heat Pumps*  
*Low GWP Refrigerants*





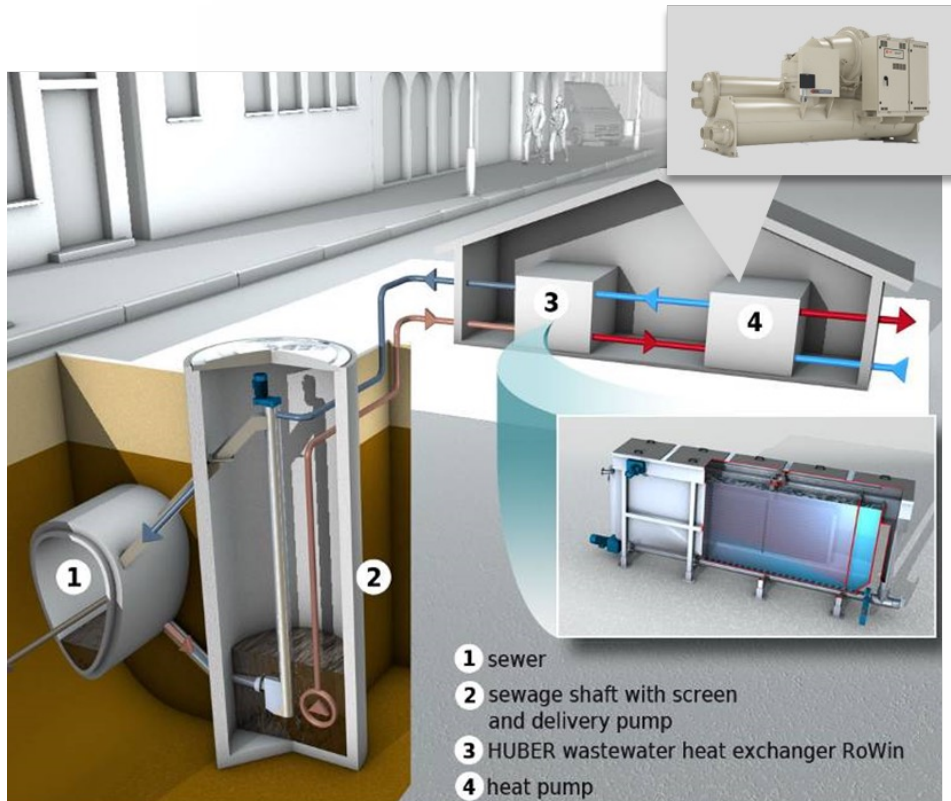
# Noventa

Stephen Condie  
Chief Technology Officer & Head of  
Operations



# The WET™ system – How it works

## System overview



## Distinguishers

### Designed for wastewater

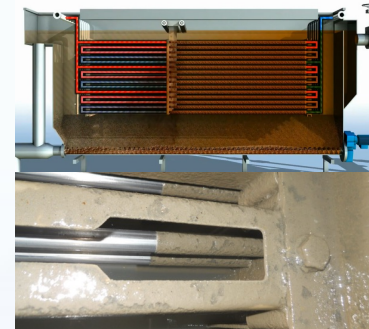
#### RoK4

- Enables access to deep sewers
- Filters out solids instead of processing sewage

#### RoWin®

- Purpose-designed stainless steel

### Self-cleaning



### Proven Technology

#### RoK4

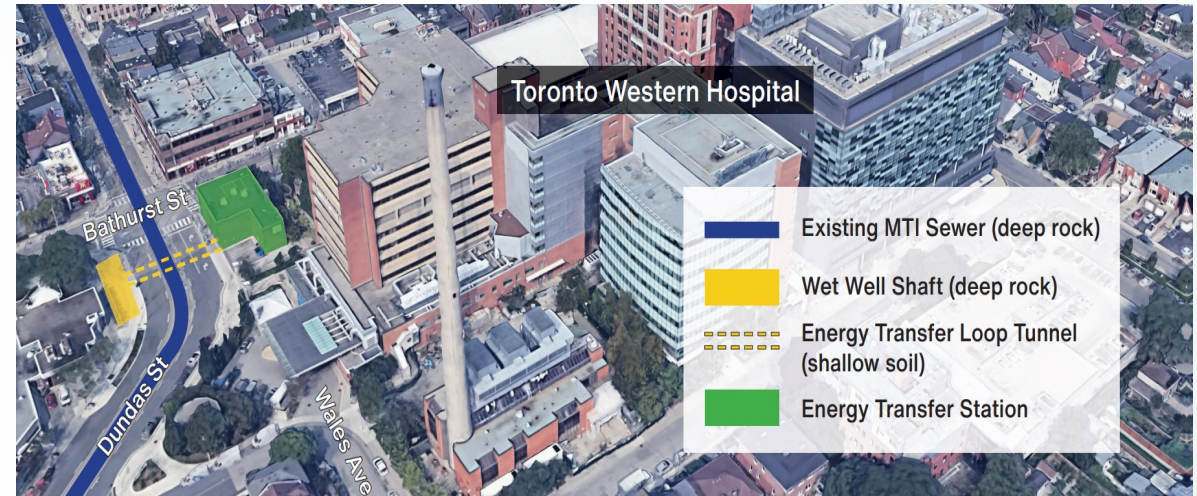
- Over 1,200 installations

#### RoWin®

- Over 40 installations

# Target applications for Noventa's WET™ projects are buildings with high energy demand

- Hospitals
- Datacenters
- Hotels
- Universities
- Office Towers
- Residential









Topic	Details
<b>GHG Reduction</b>	— Over 8,400 tCO <sub>2</sub> e/year
<b>Water Saving</b>	— Over 43,000 m <sup>3</sup> /year
<b>WET™ Project Details</b>	— Largest Raw Wastewater Energy project in the world at 19MW of Thermal Energy
	— \$43 million Capex
	— 60% of peak Demand/ 90% of total
	— Wetwell dimensions – 35 ft wide, 165 ft deep
	— Over 2,400 tons of cooling
	— Over 33,000 MBTU of heating



# Noventa offers end-to-end services to develop WET™ projects that reduce emissions and save costs



Customer Benefit		Explanation
	<b>No upfront Cost</b>	– <b>No upfront costs</b> for project Capex and due diligence through Noventa's Energy-as-a-Service business model
	<b>Energy &amp; Water Savings</b>	– Improved efficiency of HVAC operations, <b>reducing utility costs</b>
	<b>Permitting &amp; Approvals</b>	– <b>No need to deal with permitting &amp; approvals</b> , as Noventa executes approval process with authorities
	<b>Improved Reliability</b>	– Improved reliability of HVAC system, as Noventa's WET™ system is <b>designed to desired redundancy</b>
	<b>Extended Life</b>	– Reduced wear and tear on the HVAC systems, <b>prolonging useful life and allowing for future expansion</b>
	<b>Reduced Carbon Emissions</b>	– <b>Up to 100% reduction of Scope 1 GHG emissions</b> from eliminating fossil fuel combustion from HVAC operations





# Maxi-Therm

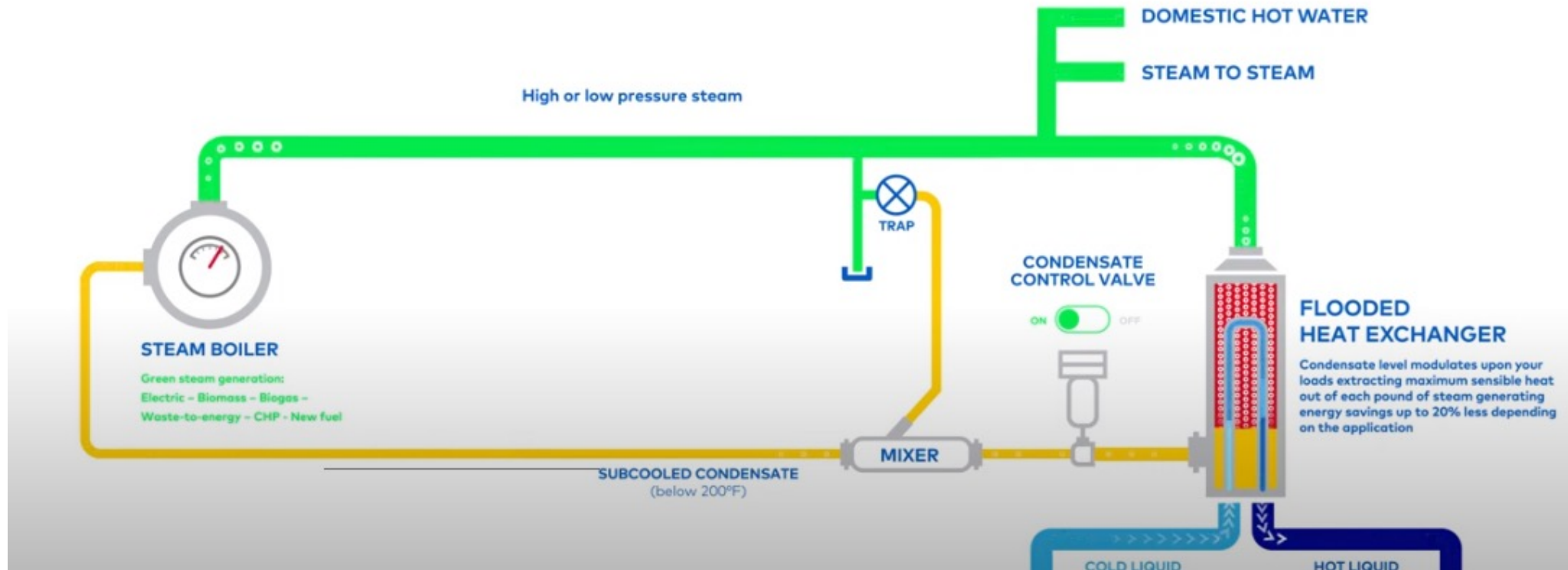
Patrick Lach  
Vice President, Sales & Business  
Development



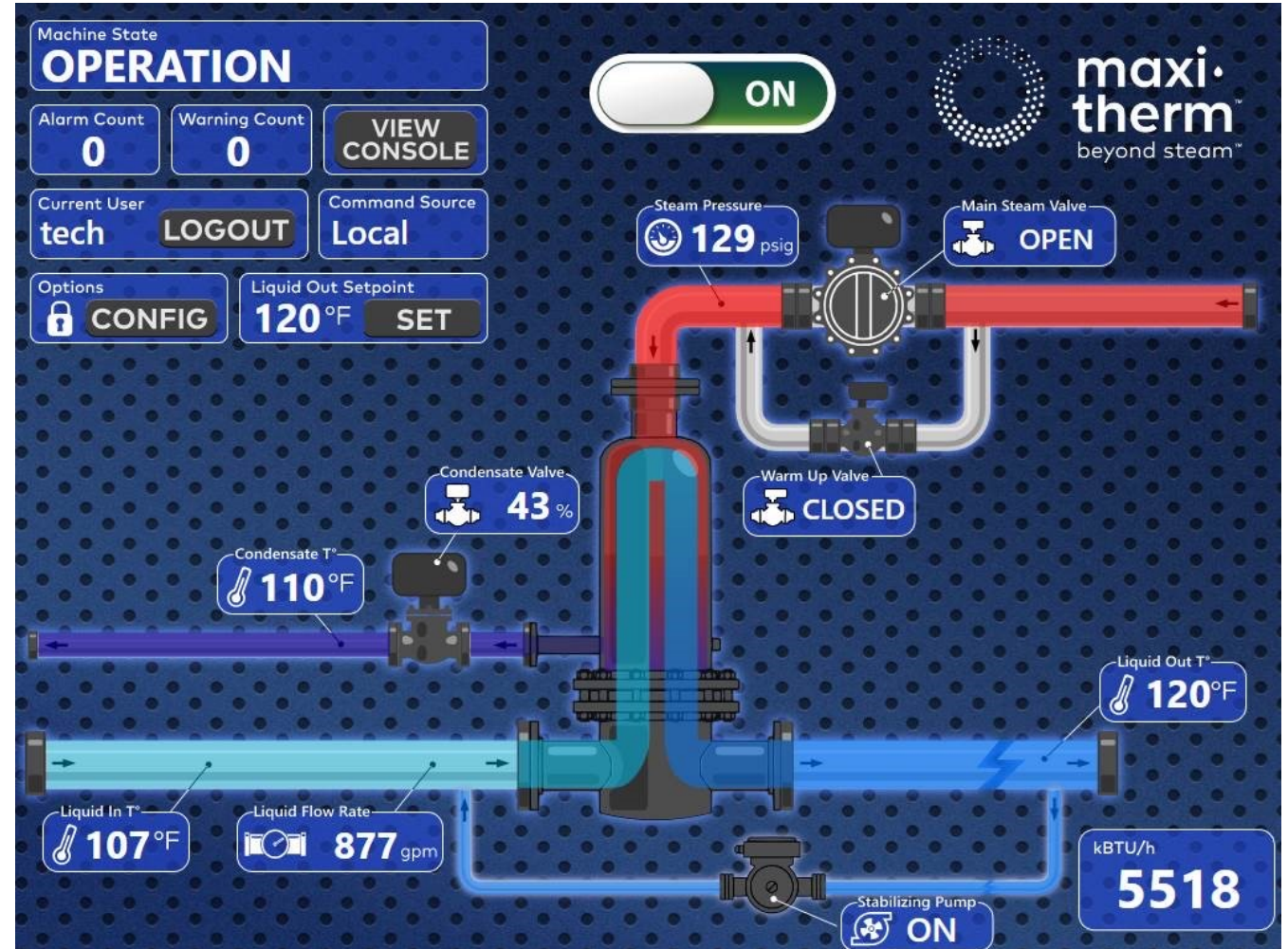


**maxi·  
therm**<sup>™</sup>  
beyond steam<sup>™</sup>

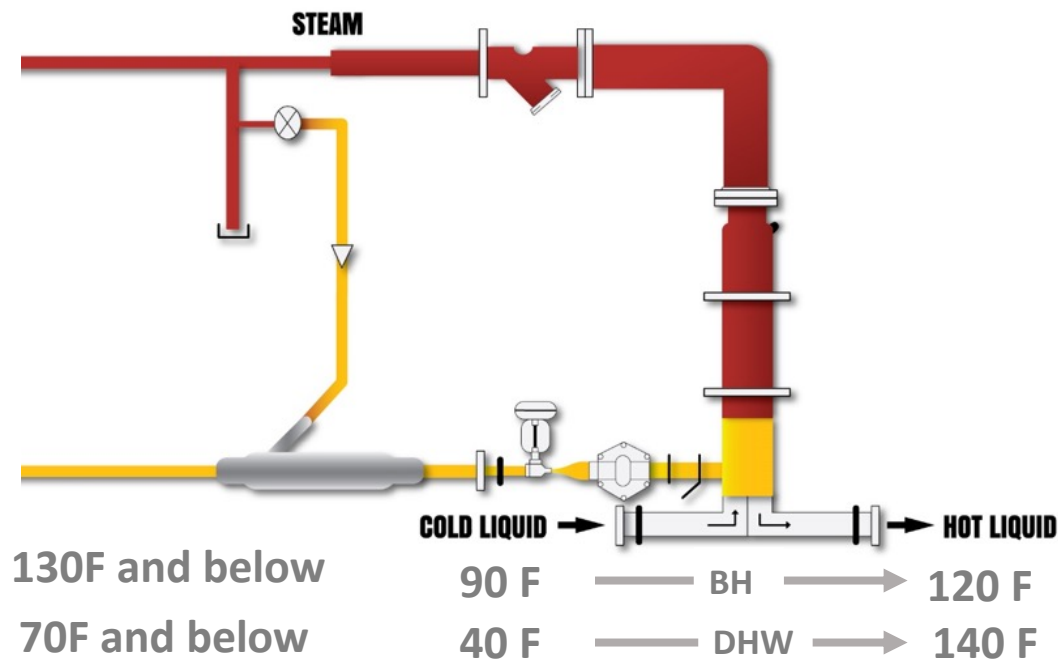
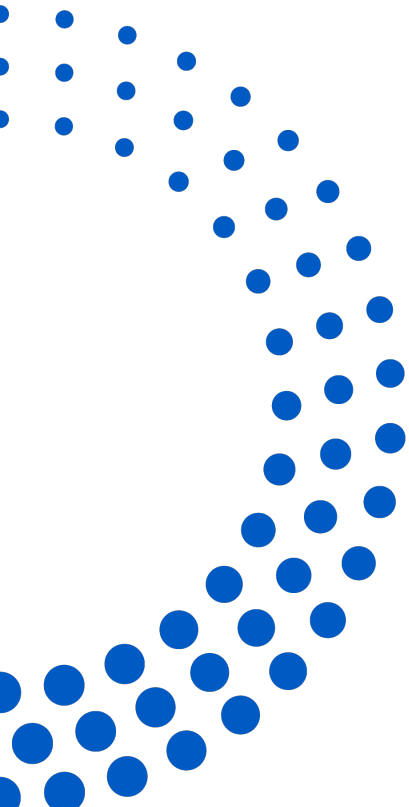
When steam district energy is used,  
chimney and vents are not required.  
Zero on site combustion



## 2 Liberty Place in Philadelphia







### Other benefits

- No quencher is needed upon hot water temperature set point
- No vents to the roof or wall
- No on site combustion using steam district energy
- Steam is safe and reliable
- Very quiet operation
- No over heat generated with pressure reducing valves
- One moving part, very low maintenance costs
- Low footprint
- Full automatic control system
- User friendly touch screen panel with BTU energy reading
- Remote access for fast technical support



#### Conventional @ 6 psig

4,000,000 BTU/h / 959 BTU/lb = 4,171 lbs/h

### Building heat hot water loop

#### Flooded @ 175 psig w/ 130F condensate outlet

847 BTU/lb (latent) +  
247 BTU/lb (sensible) = 1,094 BTU/lb total heat

4,000,000 BTU/h / 1,094 BTU/lb = 3,656 lbs/h

**12.34% savings**

### Domestic hot water

#### Flooded @ 175 psig w/ 70F condensate outlet

847 BTU/lb (latent) +  
307 BTU/lb (sensible) = 1,154 BTU/lb total heat

4,000,000 BTU/h / 1,154 BTU/lb = 3,466 lbs/h

**16.90% savings**



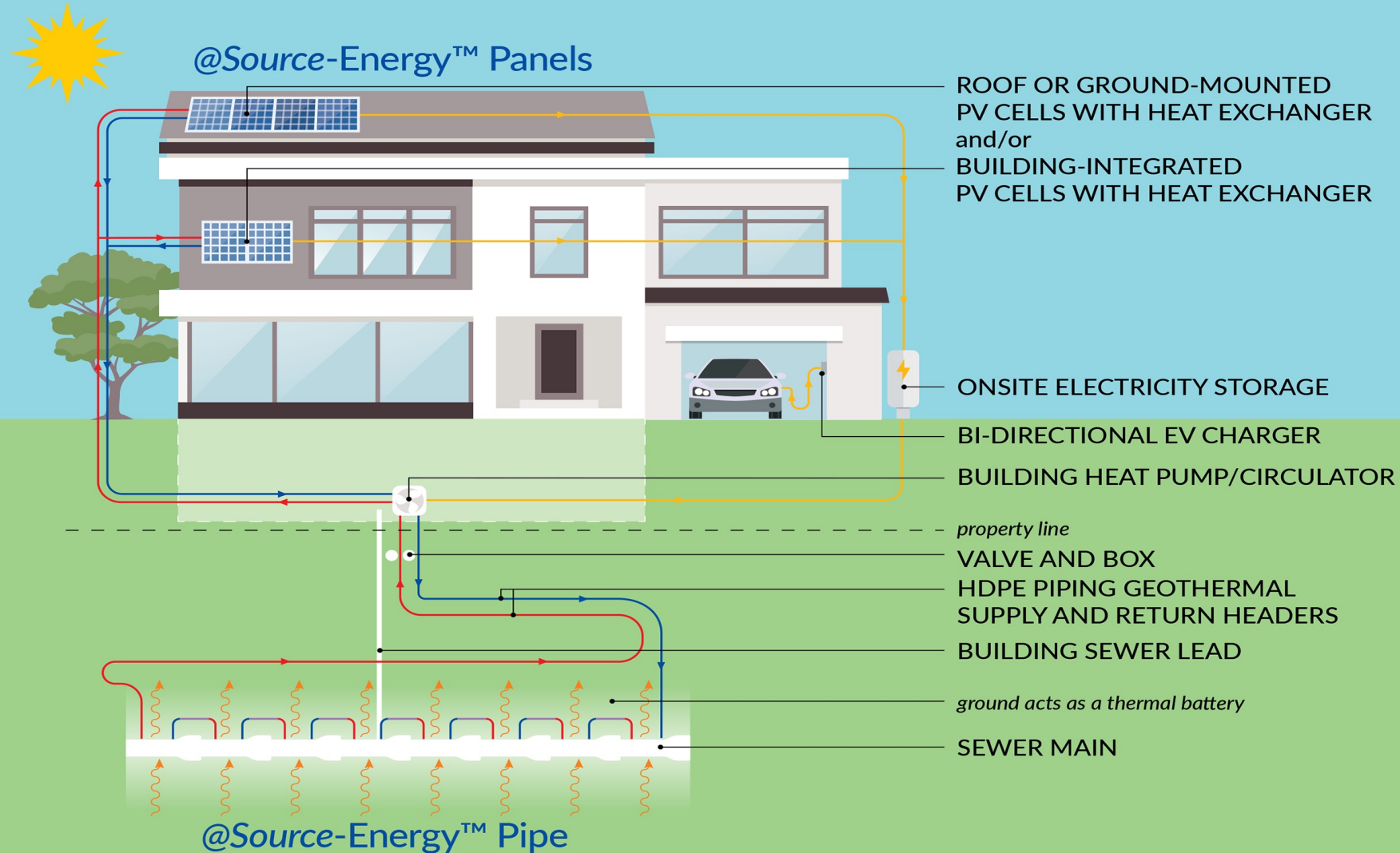


# Renewable Resource Recovery Corporation

Karl Neubert  
Director and VP Marketing



# @Source-Energy™ System



# Market and @Source-Energy™ System Installations



@Source-Energy™ Pipe and Panel  
Gold LEED certified  
Cambrian College  
Sudbury, Ontario, Canada



@Source-Energy™ Pipe and @Source-Energy™ Panel  
55 Units, 56,000 ft<sup>2</sup>  
Net Zero Carbon target – under construction  
Sheena Sharp - Coolearth Architects Inc.  
Sudbury, Ontario Canada



@Source-Energy™ Pipe  
Subdivision installation  
Sudbury, Ontario, Canada



# Benefits of the @Source-Energy™ Technology

- Wastewater infrastructure is dual purposed as a thermal energy sink while it continues its liquid waste conveyance function. The heat exchanger does not come in contact with sewage and does not impede the liquid flow. Maintenance-free over the lifespan of the pipes.
- Waste water pipes will be used regardless; using them to store and recover heat can pay for new or replacement wastewater infrastructure. Reduces or eliminates the need for geothermal wells.
- For 1 unit of electricity a hybrid PV panel produces over 2 units of thermal energy equivalents with the same footprint. Hybrid PV panels can be roof or ground mounted or building integrated. Removing heat from panels increases PV electrical generating efficiency on average by 5% per year.





# UHRIG Group

Christian von Drachenfels  
Head of Business Development



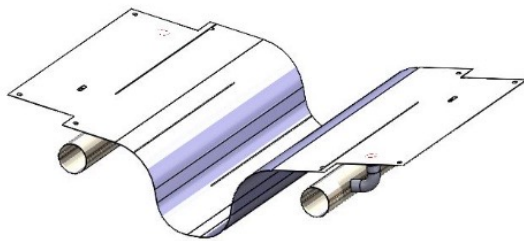
## General idea

- ▶ Recover energy only from the public sewer system
- ▶ Use energy for demand in close proximity
- ▶ No maintenance required for the system

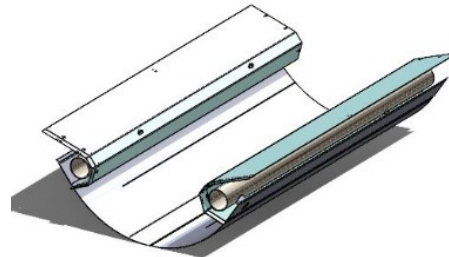
## Solution: Therm-Liner system

- ▶ Plant is installed directly in the sewer
- ▶ System is passive
- ▶ System can be adapted to any sewer shape

Therm-Liner Module Type A



Therm-Liner Module Type B



## Focus demand side

- ▶ Buildings (20+residential units) or heat networks
- ▶ Residential and commercial
- ▶ Preferably low temperatures in the heating system

## Client offering

- ▶ Heat exchanger system turnkey
- ▶ Heat supply contract (together with partner)

## Track record

- ▶ 120+ plants in operation
- ▶ [References » Heat from wastewater» UHRIG \(uhrig-bau.eu\)](#)





### USP Therm-Liner

- ▶ Internal solution
- ▶ No external space requirement
- ▶ Passive system with low maintenance
- ▶ Material is recycled and reused
- ▶ Patented and certified

### Why UHRIG?

- ▶ 120+ plants in operation
- ▶ Successful in a highly competitive environment
- ▶ Serial production running entirely on PV
- ▶ 55+ years active in the wastewater sector



**Contact: UHRIG Headquarters Germany**

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Head of Global Business Unit Energy from Wastewater

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# Upcoming Events

Financing Energy Upgrades 101  
February 28 | 10:00-11:30 a.m. ET (Free!)

Spring Member Reception  
March 15 | 6-8 p.m. ET

Register at [urbangreencouncil.org/events](http://urbangreencouncil.org/events)



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