



# Renewable Resource Recovery Corp.

## @Source-Energy Pipe

### @Source-Energy Pipe:

- is a sustainable green energy system providing clean, safe, dependable heating and cooling of buildings,
- is a patented (pending) systems that extracts or rejects heat to concrete storm and sanitary sewer pipes and the ground in contact with and adjacent to the sewer pipes,
- uses the principles of geothermal energy and is connected to a heat pump or heat pumps located in the building which provide heating or cooling energy to the building,
- provides safe, renewable reliable, low cost energy that is not subject to cost fluctuations, and
- is a new technology based on sound engineering principles.

### Green Technology

The @Source-Energy Pipe system is a sustainable energy system that does not emit greenhouse gases, air pollutants or toxic emissions. It is a low cost, safe, dependable, renewable energy source that is not subjected to fluctuating costs.



The illustration above shows the installation of the @Source-Energy Pipes in a new subdivision in Sudbury, Ontario in 2009.

### Sewer Heat Recovery

An enormous amount of thermal energy (heat) is lost when wastewater flows into the sanitary or storm sewer pipes. The @Source-Energy Pipe system extracts that heat energy and returns it to heat residential, institutional, commercial and industrial buildings.

### Sewer Heat Recovery Technology

@Source-Energy Pipes function as standard concrete sewer pipes while extracting energy from the effluent in the pipes and from the adjacent ground. The minimum recommended diameter of pipe is 400 mm.

A heat pump in the building operates and controls the energy system, transferring heat in and out of the building to the @Source-Energy Pipe system. The heat pump provides year round comfort in the building - heating in the winter and cooling and conditioning the building in the summer.

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- The @Source-Energy Pipe system provides heating and cooling for buildings, with an energy efficiency ranging from 400 to 500%.
- @Source-Energy Pipes are manufactured from reinforced precast concrete functioning as a standard sewer pipe and as a heat recovery system providing heating and cooling to the building.
- Precast concrete pipes are custom engineered products with superior strength and flexibility. The @Source-Energy Pipes exceed the structural strength requirements of the CSA standard 3-edge bearing test.
- Precast concrete pipes provide sustainability through a low carbon footprint, durability and demonstrated long service life.

### Energy Recovery

Conductivity tests by an independent geothermal testing consultant\* determined a conductivity for @Source-Energy Pipe of 1.72 BTU/(hr-ft-F<sup>o</sup>). Based on a ΔT of 20°F and an 8 inch (200 mm) diameter @Source-Energy Pipe 100 ft long has the capacity to remove 37,000 BTU/hr/100 ft. from the effluent in the @Source-Energy Pipe.

Heat is also recovered from adjacent ground. Site tests indicate a recovery of up to 24,000 BTU/h/100 ft. for a 400 mm O.D. @Source-Energy Pipe.

During warm periods @Source-Energy Pipes store heat recovered from the building, which is recovered in cool periods

\* Conductivity tests by Ewbank and Associates



Renewable Resource Recovery Corp.  
2477 Maley Drive  
Sudbury, ON P3A 4R7, Canada  
www.r3c.info  
Telephone: 1-705-566-9993, or  
toll free 1-866-224-7944  
Email: hood.johnd@gmail.com



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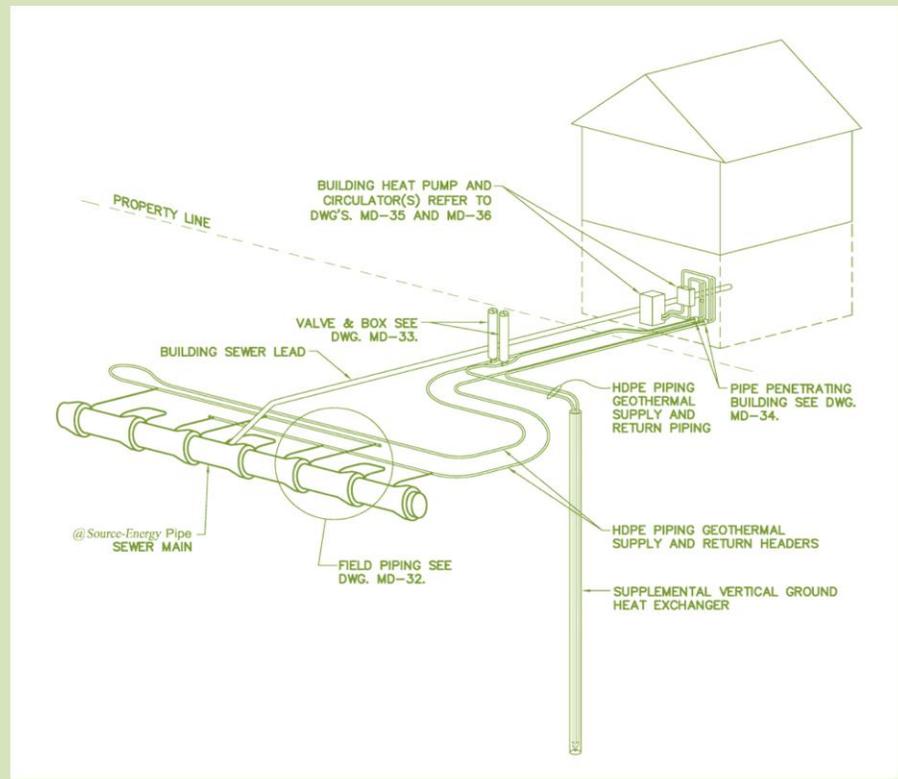
## @Source-Energy Pipe

### @Source-Energy Pipe:

- Composed of precast reinforced concrete pipes incorporating a heat extraction system.
- Heat is captured from effluent in sanitary and storm sewer pipes, and from adjacent ground.
- The @Source-Energy Pipe System is controlled by a heat pump in the building.
- The heat pump transfers heat into and out of the building to the @Source-Energy Pipe System, heating the building in cold weather and cooling the building in hot weather.
- Homeowners, businesses and industries connect to the @Source-Energy System at the lot line, similar to standard connections for water and natural gas.
- For larger buildings with higher energy demands, supplementary heat can be provided by a vertical heat exchanger.



### @Source-Energy System



Winner of 2009 OCA Specialty Concrete Products Award



Renewable Resource Recovery Corp.  
2477 Maley Drive  
Sudbury, ON P3A 4R7  
Canada

Web: [www.r3c.info](http://www.r3c.info)  
Telephone: 1-705-566-9993 or toll free 1-866-224-7944  
Email: [hood.johnd@gmail.com](mailto:hood.johnd@gmail.com)

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