

## IDEA

## PHASE 3 TECHNOLOGY DEMONSTRATION HIGHLIGHT

### COMPANY

Fisonic Energy Solutions

### TECHNOLOGY

FisonicMax Hot Water System

### DEMONSTRATION SITE(S)

DOHMH Public Health Lab,  
455 1st Avenue, New York, NY

### DEMONSTRATION PERIOD

December 2016 – November 2017



SYSTEM(S) INVOLVED

**DOMESTIC HOT WATER**



TYPE OF SAVINGS  
GENERATED

**STEAM, POTABLE WATER**

VENDOR'S POTENTIAL  
FOR SAVINGS

**16-55% STEAM**

SAVINGS ACHIEVED  
IN THIS DEMONSTRATION

**21% STEAM**



### Technology Description

The FisonicMax system is a patented heat exchanger technology that provides higher efficiency than a typical instantaneous steam-to-water heat exchanger. The FisonicMax system mixes steam and water in a unique nozzle to create a two-phase flow that does not cause banging or knocking. This nozzle also increases the pressure of the downstream flow, which can either replace some or all of the pumps needed in non-potable hot water circulation systems or be used as a heat-to-power system.

The FisonicMax system fully condenses steam to liquid water (condensate), and extracts additional energy from the hot condensate while bringing the condensate temperature below 150°F. In New York City, condensate must be below 150°F to be discharged to the sewer, which is typically done by adding potable “quench” water. The FisonicMax negates the need for this step, which reduces potable water use and may allow the building owner to apply for a reduced municipal wastewater charges. In New York City, a building owner would apply for an “Exception to Standard Allowances” with the NYC DEP.

### Optimum Facility Characteristics

The FisonicMax can be used to make hot water, power, or both, in buildings that have one or more of the following attributes:

- District or site-generated steam is used to make potable or non-potable hot water.
- Hot condensate is being discharged to the city sewer system.
- There is a large domestic hot water load (e.g. medical facility, laundry, food service).
- There is approximately 50 square feet of clear space for the FisonicMax equipment in the proximity of the steam and domestic hot water systems.
- Fines or legal action are taking place for steam condensate discharge above 150oF (in NYC) into sewers.

### Demonstration Results

The FisonicMax system was installed in parallel with a new instantaneous steam-to-water heat exchanger (Armstrong Flo-Rite Temp 665) to generate domestic hot water for the DOHMH laboratory facility. During short-term “flip-flop” testing, the FisonicMax system was approximately 21% more efficient than the instantaneous DHW system. During long-term tests, the average measured condensate discharge temperature for the FisonicMax was

approximately 71°F, which eliminated the need for quench water during the test period. During the demonstration care was taken to closely isolate the systems to create the same operational conditions to accurately measure and compare their efficiencies. It can be difficult to create the same conditions in an occupied building during the test to be able to compare systems.

### Recommendations for Implementation

FisonicMax system is connected to the internet through a PLC based standalone controller which provides monitoring, setpoint adjustments, remote diagnostics and technical application support for building engineers to make decisions, and is cable of integration to a BMS. The Fisonic nozzle has no moving parts. All of the control devices such as temperature sensors and actuators can be validated remotely or by simple site inspections. Below is a list of typical operator tasks that can be done on site:

- Visually check the system and its surroundings for any evidence of malfunction.
- Verify temperature sensors operation.
- Inspect for leaks.
- Review performance graphs over time for deviations.
- Setpoint adjustment.

Energy