Hot Water Forum

From Grid-Responsive to Grid-Interactive:
The Control Provider’s Perspective

Presenter: Daniel Flohr, CEO
What We Do

- Smart Grid Projects for utilities and providers
- Grid Interactive Thermal Energy Storage & Demand Response
- Frequency Regulation Services, Wind Firming, PV Voltage Regulation and other Ancillary Services
- Projects with our new 3-Element/Variable Capacity Water Heater underway in 6 states and 2 Canada Provinces
SEQUENTRIC’s Variable-Capacity Grid Interactive Water Heater

Utility Controlled Pre-Heating

Complete control the timing of 100% of the energy used: no cold showers

Internal thermostats limit temperature and provide “fail-safe”

Without communication, defaults to a standard water heater

- Safe
- Reliable
- Extraordinarily Capable

Currently Manufactured by:

US Patents 8,121,742 8,571,692 many others pending in the US Canada & PTC Countries
24/7 Control of ALL Energy Input

Steady-State Wattage Calculated From Historical Data
Implemented By Duty Cycling the Heating Elements

Short Duration "Topping-Off"
~375 Watts
Precisely Regulated Temperature of Hot Water Delivered to Customer
Varying Energy Buffered and Stored By Pre-Heating
100% Controlled By Servers for Grid Benefit
A Network of Water Heater “Grid Batteries”

- Variable Capacity Grid Battery Water Heaters
- Real-Time Feedback and Control
- IP Networks
- Analytic and Dispatching Servers at System Operations Center
- Electric Grid
  - Frequency Regulation
  - Virtual Storage
  - Neutralizing Variability
  - Ancillary Services
  - Energy Cost Arbitrage

Real-Time Grid, Forecast and Market Data plus AGC Signal
Free Running “Load-Shape” of Fleet
24/7 Duty Cycling of Fleet
Water Heater Fleet Control Following “AGC”
THANK YOU

www.sequentric.com