Staff Subcommittee on Gas

Sunday, February 9, 2020
Benefits of AMI

- Gas
- Water
- Electric
Valve Monitor Control
• Communicating Smart Infrastructure Solution sensors

Pressure Monitor
• Provide real-time insight into pipeline integrity

Smart Grid Sensor
• Enables proactive monitoring and actionable intelligence

Software
• Unified AMI, consumer engagement, implementation services and analytics software architecture supports combination utility opportunities

Zonescan
• Pinpoint water loss within a distribution system, reclaiming lost water revenue and avoiding high-cost catastrophic pipe failure

Valve Monitor Control
• Communicating Smart Infrastructure Solution sensors

Distribution Automation
• Communication infrastructure to support monitoring and control applications for distribution utilities

Cellular (Metrum)
• Metrum branded cellular communications for meters, monitoring and control devices primarily for the C&I market

Data Collector Unit (“DCU”)
• Communication network infrastructure supports PLC and RF solutions

Load Control
• Control load, curb demand and safeguard against under-voltage and frequency conditions

Meter Transmission Unit (“MTU”)
• Electric (RF, PLC), water (RF) and gas (RF) meter agnostic communications

Meter
• Residential and C&I electric meters and edge sensing devices for ANSI and IEC markets

Installation Services
• End-to-end installation services provider, leveraging industry leading installation, asset management and maintenance software

Electric

Water

Gas
Advanced Meter Infrastructure (AMI) Benefits

Move from monthly reads (12/yr) to hourly reads (8760/yr)

Hard Savings

- Meter reads
- Billing
- Field service
- Customer conservation

Soft Savings

- Safety
- Environmental
ADVANCED SOLUTIONS ENABLED

METHANE DETECTION

GAS PRESSURE MONITORING

OTHER GAS SENSORS

• Cathodic protection
• Valve state monitor
• Fiber optic intrusion
Questions
Thermal Heat Pumps – RD&D Overview

Dan LeFevres - Director, State and Consumer Programs

Natural Gas Subcommittee
NARUC Winter meeting 2-20
THPs - Motivation

> 84% of gas in buildings for heating and service hot water (SHW)
  • 76 billion therms, 25% of national NG consumption
  • Responsible for ~10% of US CO2 emissions

> Of the ~57% of U.S. homes with gas-fired heating/DHW:
  • For 85% of those with central furnaces, less than half have 90% AFUE or better
  • Only 5% of 4MM gas storage water heaters are 0.67 UEF or better (EnergyStar)

Potential: Cut emissions/energy consumption by 40% or greater with retrofit, potential for peak load management in winter/summer

Fraction of Housing Units Heated with NG/Propane

THPs - Motivation

Small-scale THPs, available overseas, have many advantages:

> Best-in-class operating efficiency (primary basis)
> Good part-load performance and in cold climates
> Typically do not require backup heating and can continue operation during defrost
> Opportunities for peak load management
> Commonly use natural refrigerants/working fluids with low/no GWP/ODP

> NOx and GHG emissions are decreased by half or greater and combustion ‘sealed’ or occurs outdoors (IAQ & venting)
Reducing full fuel cycle natural gas methane emissions

- **Near-Term (25-50+%):**
  - Expanded use of high-efficiency gas equipment
  - Hybrid natural gas furnace/boilers and electric heat pump systems
  - Building envelope improvements

- **Next-Gen (40-60+%):**
  - Natural gas heat pumps for space & water heating
  - Micro CHP systems
  - Deep building retrofits

- **Renewables (Added 10-30%):**
  - Renewable natural gas blends (bio-methane)
  - Solar thermal/natural gas space & water heating systems
  - Lower Methane Emissions (5-10%)

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* Numbers indicate nominal GHG reduction potential
THPs – Overview

• Summary of GTI THP Activities
  – Deployment of Gas Engine-driven HPs
  – Commercialization of Low-cost Gas Absorption HPs
  – Development of Next Generation THPs

Three Major THP Types
Vapor Compression
Sorption
Thermal Compression

GEHP operating in Boise, ID
Gas HPWH operating in Los Angeles, CA
Hot HX Development for Next Generation GHP
THPs – Demos & Deployment

- 100+ Res. GHPWHs (2020)
- Add'l THP Combis (2019-20)
- Adv. THP Combis (2020)

THPs – Industry Roadmap

• Special-Purpose Collaborative est. 2018
• Led by team of GTI + Brio Consulting
• 15 sponsors
• Technology and Market Assessment of:
  – Available or market-viable GHP products for space and water heating:
  – Residential and/or commercial applications
  – North American markets
  – Sold through standard supply chains
  – In two timeframes:
    • Near-term (<5 years)
    • Long-term (>5 years)
THPs – Industry Roadmap

THP Roadmap Overview:

Technical Assessment
• Technology/Theory Review
• GHP RD&D Catalogue, History
• Performance Comparison & SWOT by THP-type
• Barriers to Adoption

Market Assessment
• Overview of Market Participants →
• Defining Market Barriers, Risks, & Opportunities
• Review of LDC Collaboration Models

Issued 2019*

EE/Industry Partners

THP Developers

Manufacturers Interviewed to Gauge THP Interest

*Public materials available upon request