Nicor Gas Emerging Technology Program Webinar

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Nicor Gas ETP Webinar – Agenda

> Role Call
> Background (GTI, GTI North American ETP)
> Nicor Gas Emerging Technology Program
  - Overview
  - How it Works
    - Ready, Set, Go!
  - Status
  - Highlighted projects
> Next Steps
> Questions, Discussion
GTI Overview

> Not-for-profit (501c3) RD&D organization with 70 year history

> Facilities
- 18 acre campus near Chicago
- 200,000 ft², 28 specialized labs
- Other sites in California, D.C., Texas, Alabama, Massachusetts

> Staff
- Approximately 250
- 170 engineers, scientists covering all fields
Natural Gas Industry Collaboration
Emerging Technology Program

> Gas Technology Institute led, utility supported, North American collaborative targeting residential, commercial and industrial solutions

> ETP’s principle goal is to accelerate the market acceptance of emerging gas technologies

2013 Members Listed Above
ETP Scope & Direction

ETP Mission

Accelerate the market acceptance of energy efficient gas technologies

ETP Activities

Identify and demonstrate technologies to (1) collect and analyze enabling program and technical data while (2) developing marketplace through consumer awareness and infrastructure improvement.

ETP Results

As gas programs, regulations, and markets mature, low hanging fruit disappears. ETP helps deliver a pipeline of new technologies and program solutions enabling utilities to meet tomorrow’s energy efficiency goals with less risk and more certainty.

Examples: Existing and New ET Program Activities

- California- Roughly 2.5% of total IOU EE and DSM budgets under 2010-2012 Portfolios
- New York- (NYSERDA) Roughly 5% of total program budget
- Pacific Northwest (NEEA)- 10% of total budget 2010-2014
- Illinois- 3% of Gas EE and DSM Program Revenue
- Canadian ETIC
National Collaborative Concept

> **Significant scale** makes the *program attractive to commercial partners* as a vehicle to expedite the market introduction and acceptance of new efficient products

> **Funders drive agenda** and influence product/process deployments and evaluations to address the needs of their company, rate payers, and the industry

> **Leverages collective funding, intelligence, and experience** of program members to efficiently resolve technical and market barriers through (1) collaborative projects and (2) coordinated efforts

> **Provides opportunity for field demonstrations within member’s service territory**, enabling a better understanding by utility personnel, customers, channel partners, trade allies and regulators

> Accelerates measure availability and **energy efficiency program savings**

> Positions members to **drive new technologies into the market**
2012 Deliverables

ETP Technology Snapshots: 2012

Residential Technologies

Description
Energy use is largely invisible to most consumers — they may notice when lights are on, but they are far less likely to be aware of how much natural gas their water heater is consuming at any given time. Energy monitoring devices are able to transform the invisible to the visible by providing consumers with a more comprehensive and nuanced understanding of their usage patterns. This information can help consumers make more informed choices and long-term decisions about their energy use.

Market Situation
Baseline - Residential consumers use a significant amount of energy, and there is a potential for significant energy savings through residential energy efficiency.

Opportunity
- Energy efficiency, natural gas, electricity, and water heating
- Smart grid integration
- Smart energy management systems

Segment
- Residential
- New construction
- Existing houses

Status
- Preliminary research
- Performance testing

Next Steps
- Further research and demonstration projects

Figure 1: Enhanced Billing, Smart Thermostats, & Advanced Ventilation

ETP Active Projects: 2012

Combined Space and Water

Water temperature throughout the range of common flow rates and use patterns, consistent with national operation, can be achieved using conformance due to equipment design and energy consumption, and the ability of solar energy.

Beyond the technical benefits, the market adoption is expected to be impacted by both contractors and home owners of these types of systems. GTI is currently pursuing both residential heating and demonstration projects to more thoroughly evaluate system performance and consumer satisfaction in field.

Building America Lab Work
Major water heater manufacturers are now designing and are currently marketing pre-engineered whole home insulated water heaters. These emerging water heater technologies offered the opportunity to conduct meaningful field implemented demonstrations, then commercialized the performance of the various packaged equipment configurations being offered.

Standardization testing for the system requires the system to be tested against space heating load and the water heater tested separately against water heating load. The test systems conducted by GTI for the project included a combination of design changes to the space heating and water heater components to reduce the amount of space and demand for hot water. The results highlight the benefits of these technologies that use traditional storage water heaters and tankless water heaters as their thermal engines. Some important differences were observed including:

- Energy savings of 30-40% average daily efficiency.
- 10 minutes to 125°F.
- 20 minutes to 120°F.
- 30 minutes to 120°F.
- 40 minutes to 120°F.
- Tankless water heaters are not comparable to standard water heaters.

The tankless water system that was tested consistently achieved better daily efficiencies (i.e., 30-40%) than the storage water system (i.e., 20-25%) when the water heater was tested separately against water heating load. The test systems conducted by GTI for the project included a combination of design changes to the space heating and water heater components to reduce the amount of space and demand for hot water. The results highlight the benefits of these technologies that use traditional storage water heaters and tankless water heaters as their thermal engines. Some important differences were observed including:

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Nicor Gas ETP: The Basics

> GTI is implementation contractor (IC) for Nicor Gas ETP

> The goal of ETP is to accelerate the arrival of the latest energy efficient technologies and practices to the Nicor Gas EEP. This could be enhancements for existing programs or new programs or measures

> Key activities include determining whether new products or practices are reliable, serviceable, and provide cost-effective energy savings compared to alternatives

> Key outcomes include data (energy savings, installed costs) and program design metrics and guidelines for program and regulatory stakeholders

> Close collaboration with key stakeholders is an essential part of process (e.g. implementation contractors, manufacturers).
One of the key principles behind the Nicor Gas ETP is to foster an open, transparent process for soliciting new measures and program concepts…
> Designed to identify the most promising technologies and program concepts, *Ready, Set, Go!* uses three increasingly rigorous evaluation stages to ensure only the applications with the most likelihood of success and impact become ETP projects.
Ready, Set, Go! Stages

**READY (SCREENING)**
- Qualitative Web Based Checklist Inputs

**SET (SCORING)**
- BASIC Quantitative Data Inputs from Web Based Form

**GO (SELECTION)**
- ROBUST Quantitative Data Input & ETP Project Action Plan

**ETP Project**
- Pilot Assessment Activities in Businesses and Homes

- Team approach:
  - GTI (or other PI)
  - Nicor/WECC
  - Cognizant EEP IC
  - Equipment manufacturers
  - Contractors
  - End users

- Custom response to applicant in weeks 2-4
- ETP staff & applicant interactions on data to meet project criteria
- 25% to Go stage per preliminary score/rank

- Custom response to applicant in weeks 8-12
- ETP staff make project recommendations to:
  - Technical Review Committee, with Ad Hoc Tech Support (Trade Ally)

- Yes/no queries with immediate response
- Establish minimal qualifications, such as market availability
Application Scoring

> Seven key criteria evaluated at Set and Go stages:
  1. Cost-effectiveness
  2. Gas savings potential
  3. Value to Nicor Gas portfolio
  4. Non-energy benefits
  5. Support/distribution in Nicor Gas service territory
  6. Technological maturity
  7. Ease of implementation/market adoption

> Criteria are scored on a scale of 0-5
> Different weights are applied to each criterion
> Scores are totaled out of a possible 100 points
> Once confirmed by the Nicor Gas Technical Review Committee, ETP will begin to implement the Action Plan for the pilot assessment.

> Pilot assessments are designed to validate gas savings potential and provide critical information for Work Paper development by other ICs as well as develop critical experience with new measures to ensure they are right for rate payers and can be successfully delivered through an existing or new EEP.
Application/Project Status

> 45 applications received
  ─ Mix of residential, commercial, and industrial sector

> 9 ETP projects underway, each project is different because each technology/program concept has its own set of barriers to EEP entry
  ─ Data Barriers
    > Moving from custom to prescriptive (ozone laundry, air barriers)
    > What about gas? (behavior programs, EcoFactor)
  ─ Market Barriers
    > Identifying and addressing the impacts of ‘disruptive’ technologies (condensing HE RTUs, combined space and water heat systems)
    > Awareness and education (boiler heat recovery workshop)
A few ETP applications…
Boiler Controls – Greffen M2G

MARKET SITUATION

Baseline
- Conventional closed loop hot water boilers

Opportunity
- Natural gas savings
- Electricity savings

Segment
- Commercial
- Multi-family
- New construction and retrofits

Status
- Technology is mature, and readily available off the shelf

Next Steps
- Further data on cost savings in a variety of markets

Technology
- The M2G is an advanced intelligent boiler control that optimizes the heating efficiency of hot water boilers and significantly reduces energy consumption through elimination of wasteful burner firing and effectively spreading the system loading demand over the number of installed boilers.

Savings Potential
- 10-20% gas savings

ETP Activity
- Nicor Gas ETP is coordinating with GTI's North American ETP and the Partnership for Advanced Residential Retrofit to better understand the gas savings and cost-effectiveness of the Greffen M2G Controller technology on typical applications
EcoFactor Home Energy Management

**MARKET SITUATION**

**Baseline**
- Conventional and programmable thermostat
- Home Energy Management (HEM)

**Opportunity**
- Natural gas savings
- Electricity savings

**Segment**
- Residential (single and multi-family)
- Commercial
- New construction and retrofits

**Status**
- Technology is mature, and readily available through certain programs

**Next Steps**
- Program metrics needed
- Large-scale pilot activity underway to better understand delivery channel approach, energy savings, costs (first, ongoing)

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**Technology**
- EcoFactor EMS pairs a wireless, programmable thermostat with internet-based software to make continual small adjustments to control the HVAC operation based on weather data and other information, including home occupancy status to reduce energy use while maintaining comfort

**Savings Potential**
- **Significant** HVAC energy savings are possible from combination of savings from automated energy efficiency and personalized schedules
- Gas savings not yet tested

**ETP Activity**
- The Nicor Gas Emerging Technology Program is partnering with EcoFactor to install and monitor **100 systems**
Status of Host Site Recruitment

> Multiple recruitment avenues being pursued:
  - EEP Friends and Family recruiting began 1/25
  - Eblast to 1,900+ past EEP participants released on 2/1
  - Tile on NicorGas.com went live 2/14
  - Employee recruitment email pending

> First batch of applications passed 3-stage QA/QC process and have been moved to EcoFactor to schedule installations.

> Second batch of applications have been received and are currently moving through QA/QC.
It is estimated that 25% of steam traps fail every year, half of them open.

Industries using medium and high pressure steam see the highest losses.

Steam trap monitors alert the user to trap failure immediately.
Cypress Steam Trap Monitor—Project Approach

> Identify a single site using medium to high pressure steam – 80 psi and up
  > Locate a branch line, wing, etc. with approximately 200 traps
  > Site needs routine trap maintenance plan to confirm monitor operation and to repair faulty traps promptly

> Utilize past years gas consumption as baseline

> Coordinate through GTI ETP with SoCal
ETP National Pilot Residential HE Combo Systems

- 94 EF condensing tankless water heater + hydronic air handler (Rheem pictured)
  - Improves utility/customer value proposition for water heating by piggy-backing on larger space heating load
- Multi-unit demonstrations/pilots in IL, NY, CA
  - At least 20 residencies with full data acquisition systems
- Measured field performance, energy savings, cost analysis, and customer reaction
- Contractor technical/sales training, consumer messaging, rebate program pilot

Rinnai PARR Southern California Gas Company UTD Nicor/GTI

Homeowner Contractor Manufacturer Distributor

$125* post-install rebate $350 post-install incentive ~10% equivalent post-install rebate Equipment resale discount ~25% equivalent equipment discount

Administered under ETP Participation Agreements
*Monitored homes = $350, Non-monitored homes = $125
Marketing Tools and Training
Field Assessment
High Efficiency Gas PACs- RTUs

- Collaboration with NREL, DOE, manufacturers, national accounts, and utilities
- Large-scale monitoring shows diverse runtimes for RTUs and more therm use than energy models suggested
- Dedicated outside air systems (DOAS) provide high efficiency market entry point application
  - “big box” retail accounts with established DOAS vendors
  - high heating degree day (HDD)/heating load locations
  - 24/7 retail stores
- Retail partner projected $4,400 premium, = 4.1 years ROI @ 90%TE
- Northern climates see up to 3,000 therms/saved per year per unit!
Nicor Gas ETP Walmart Pilot Project

> 3 step condensing heating module retrofit process over late September through mid-October

1. Installation of condensate piping with neutralizer
2. Replacement of non-condensing heating modules
3. Completion of data acquisition system
Walmart Pilot Project - results to date

> Therm savings to date can be projected with statistical confidence to a full heating season
  - AHU 1 – 2453 therms saved per year
  - AHU 2 – 2276 therms saved per year
Field Assessment
Multi-family Demand DHW Controls

- Demand pump for central domestic hot water systems
- System operates only when there is demand, energy savings from reduced thermal loses in recirculation loop (generally 1 - 3 years ROI)
- Nicor Gas supporting two demos in Chicago area with complete monitoring, collaborative demos in DTE territory, ETIC territory
- Project goal is to develop qualitative and quantitative data to support prescriptive program
- Nicor Gas, DTE, ETIC, and existing empirical data will contribute significantly to reliable savings numbers for cold weather DSM programs
Next Steps

> Now that we know each other, let’s find ways to collaborate

- Work with Gary Cushman (Nicor Gas), Douglas Kosar (GTI), and Merry Tondro (GTI) on existing or new opportunities within existing EEP cycle

- Continue discussion with Jim Jerozal and Ryan Kerr on opportunities for PY4-6 cycle, there are several compelling reasons to find ways to work together!
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