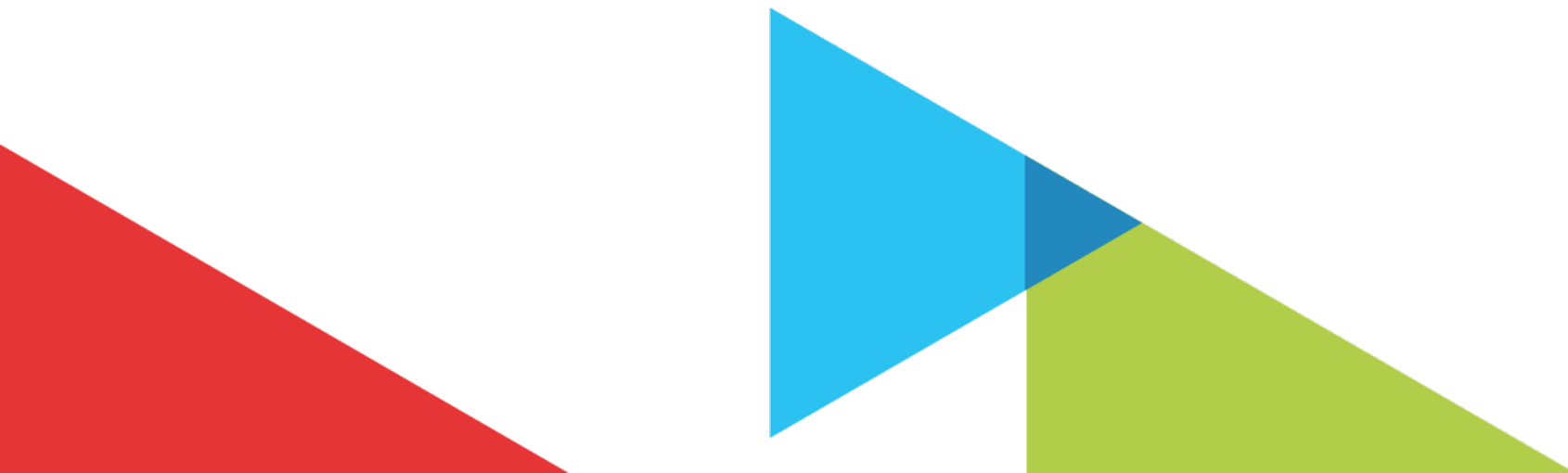


Ambiguity to Action – Nicor’s Roadmap to Research Success

Presented by Gary Cushman

February 28, 2020



The Promise

Vendor Claimed Savings



- What Vendors claim in energy savings
 - 10%
 - 15%
 - 20%
 - 25%
 - 30%

Challenge

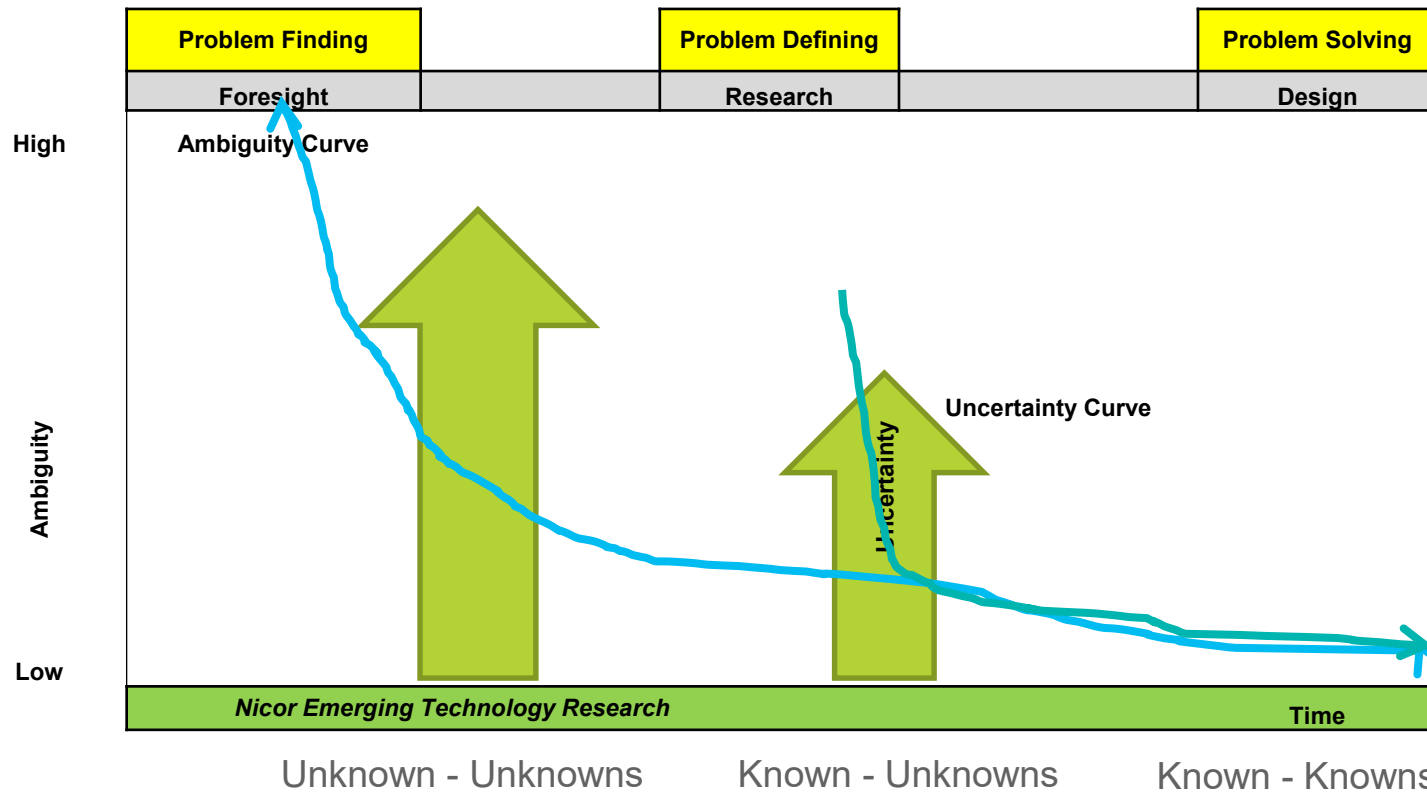


-
- Discover:
 - Products that claim to save therms
 - Prove:
 - Therm savings can be tested, verified and documented

Unproven Technology Challenges



- Ambiguity, Uncertainty – Action



Sources of Technologies



- Multiple Inputs

Source of products

- Referrals
- Applications
- Press releases
- Trade shows
- Internal research

Our goal: save therms

- Products
- Processes

What is Emerging Technology?

- Name is a misnomer
- Not exactly accurate

The Process

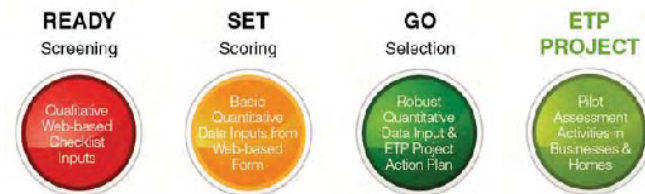
The background of the slide is composed of several overlapping geometric shapes in various shades of blue and teal. These shapes include triangles, quadrilaterals, and polygons that create a dynamic, layered effect. The colors range from a light, bright blue to a darker, more muted teal. The overall composition is modern and minimalist.



Idea Generation & Application Process

- Web Based Submission Form
 - Go to:
www.NicorGasRebates.com
 - Resources > Emerging Technology
 - General Questionnaire
 - Product Specific Questionnaire
- Stage Gate Process
 - Product is Scored
 - Evaluated
- Weighted Scale & Scoring
 - Score of 60+
 - Action Plan to Pilot

4S- A Ready, Set, Go Stage and Gate Process



Criteria	Score	Weighting	Final Score
Cost-Effectiveness	0 to 5	5	0 to 25
Gas Savings Potential (Net Energy Savings)	0 to 5	4	0 to 20
Value to EEP Portfolio	0 to 5	3	0 to 15
Non-Energy Benefits	0 to 5	2	0 to 10
Regional Support and Distribution	0 to 5	2	0 to 10
Technological Maturity	0 to 5	2	0 to 10
Ease of Implementation/Market Adoption	0 to 5	2	0 to 10
TOTAL	-	-	0 to 100

10



Becomes a Formal Pilot



- Pilot can take several forms
 - Onsite Pilot
 - GTI Laboratory
 - Engineering Paper
 - Combination of above

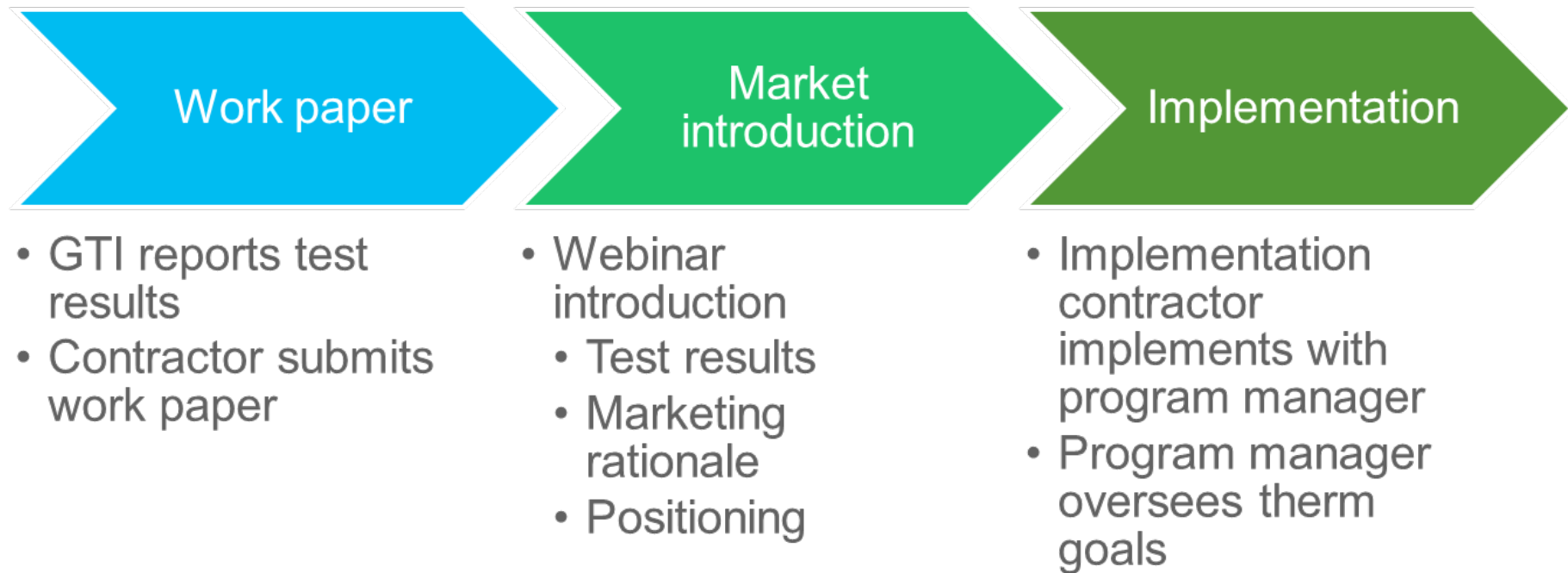
ETP Pilot Example



- Condensing Roof Top Unit



The ETP Process



Current Pilots

Venturi Steam Traps



- Joint Nicor Gas/SoCal Pilot
- Phase 1 - Laboratory **test completed**
- Evolved from fixed orifice technology
- Benefits
 - No moving parts
 - Reduced failure rates
 - Long Measure Life
 - Can be installed horizontally and vertically
- Results: Functions on par with mechanical Steam traps
- Manufacturer resistance
- **Phase 2 - Field Pilot is in progress**



Unit Ventilator Room Air Diffuser



- Sits on top of unit ventilators
 - Can easily self install
 - Several screws attach to the Univent
- Improves air distribution in rooms
- Reduces boiler runtime

Benefits

- 45 vs. 120 minute morning room warm up time
- Increased comfort by eliminating cold & hot spots
- Easy user installation
- Eliminates blocked vents from stacking
- Passive, no electricity consumed
- 16.9% Average Therm Savings
- Downers Grove School Pilot – 12 classrooms
- TRMv8 Workpaper being developed



Boiler Descaling Chemical



- Dissolves water scale, lime mud and rust deposits into solution

Benefits:

- Increases efficiency
- Reduces energy costs
- Increases useful life
- Non-toxic, Non-injurious, Non-flammable, Non-corrosive
- Non-hazardous
- Biodegradable

Market: all water based boilers

Fuel Cost Increase

1/16 inch buildup = 11% increase

1/2 inch buildup = 60% increase

**Downer Grove School -
Baseline Monitoring for Pilot**

Phase 2 now in progress

- Weather issues



Low E Storm Windows



- Description: Cost efficient alternative to single pane window replacement
- Benefits:
 - Saves Gas and Electric
 - Reduces drafts
 - Doubles R value
- Target market
 - Residential
 - Single family
 - Multi family

Joint Nicor Gas & ComEd pilot

Oak Park Preschool & Little Friend MF Building

Current status:

- On site test mode.



Boiler Array



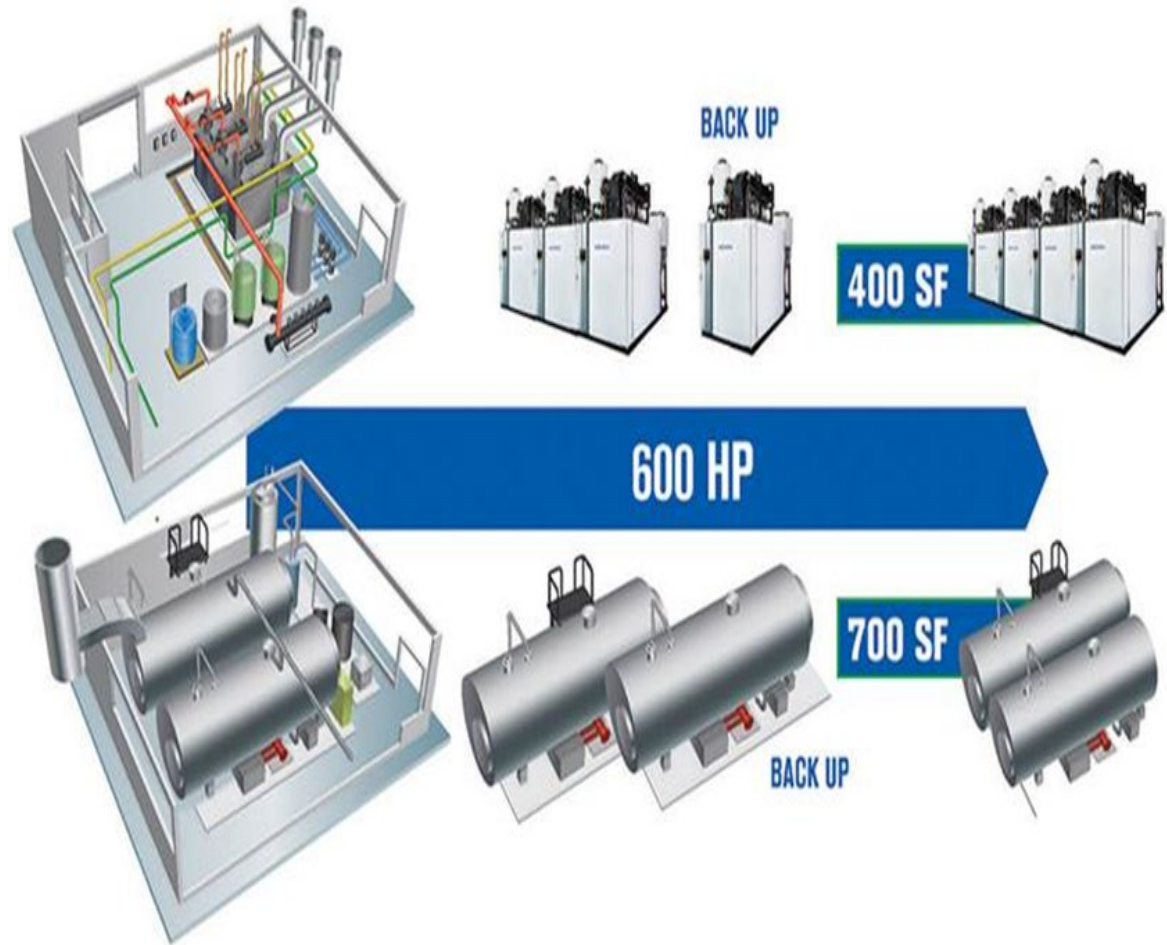
- Modular technology –
- Demand Response Heating
- Modules from 50 HP to 300 HP

Benefits:

- Reduced gas consumption
- Reduced start up costs
- Reduced standby losses
- Demand response in 5 minutes

Matches demand

Potential early replacement



Commercial On Demand Hot Water



- **On Demand Hot Water Array**

Description: Instantaneous water heaters
Heat water directly without using storage tanks

- **Benefits:**
 - Constant supply
 - Reduces standby losses
 - Saves natural gas
 - Scalable with array
 - Handles varying loads
 - Size based on need
 - Improved reliability
- **Target Markets** – Highrise building, most commercial applications, prisons, colleges & food service
- **Currently performing base monitoring at several customer sites**
- **Chicago high rise example**



Overhead Door Hinge



- **Target Market**
 - Heated garage space
 - Limited Residential
 - Small to Medium Size Commercial
- Creates tight seal on overhead garage doors
- Eliminates up to 1/4" gap
- Spring loaded – 12 gauge steel
- Workpaper completed



Smart Radiator Valves



Description: controls radiator heating

- Hot water radiators
- Steam radiators

Target Markets:

- Residential
- Large public sector
- K12 schools
- Government buildings
- Multi-family buildings
- Single family homes

Pilot Sites

- Single Family (Hinkley, IL)
- Downers Grove School

Nicor target market?

- Older established towns



Older Radiator Chemical Flushing



- Chemical Radiator Descaling

- Industrial
- Commercial
- Public Sector
- Hospitality
- Health Care
- Higher Education
- Local Government
- Low Income
- Multifamily

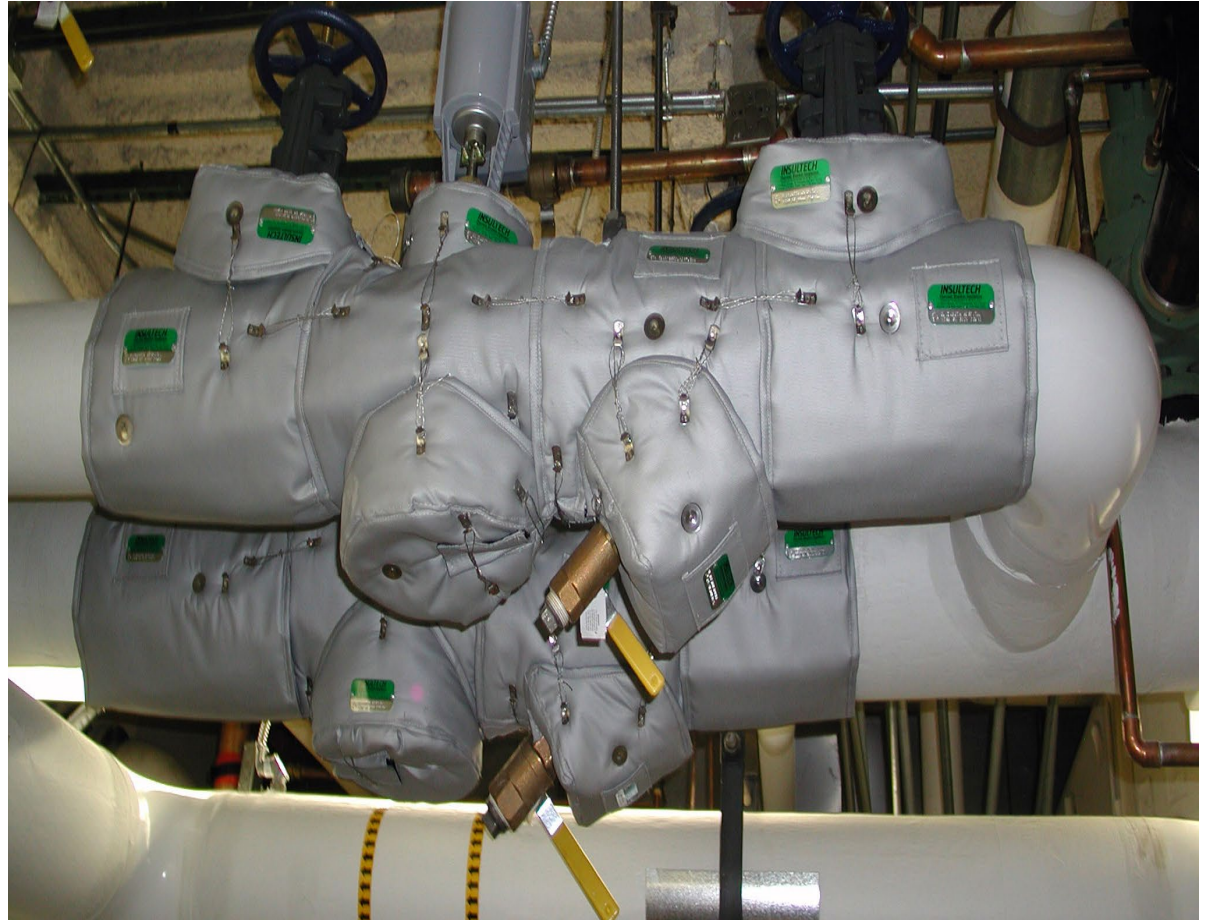
- Flushing ineffective
- Justifies new purchase



Pipe Insulation – On Line Calculator



- Product, Process or Service
 - Industrial
 - Commercial
 - Public Sector
 - Hospitality
 - Health Care
 - Higher Education
 - Local Government
- Missed therm savings
- Hight # variables
- Difficult to calculate



Pipe Insulation



- Variables – Inside 483,075 & Outside 483,075

Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	1.8	28	5271.561031	436.853176	4834.707855	8760	876	0	8760	8760	8760	56.8789159	56.87891594	56.87891594	56.87891594	56.87891594
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	2.8	28	5271.561031	372.444868	4899.116163	8760	876	0	8760	8760	8760	57.6366607	57.63666074	57.63666074	57.63666074	57.63666074
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	2.8	28	5271.561031	329.189912	4942.371119	8760	876	0	8760	8760	8760	58.1455426	58.14554258	58.14554258	58.14554258	58.14554258
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	3.8	28	5271.561031	294.542181	4977.01885	8760	876	0	8760	8760	8760	58.5531629	58.55316294	58.55316294	58.55316294	58.55316294
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	3.8	28	5271.561031	271.565265	4999.995766	8760	876	0	8760	8760	8760	58.8234796	58.8234796	58.8234796	58.8234796	58.8234796
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	4.8	28	5271.561031	253.40256	5018.158471	8760	876	0	8760	8760	8760	59.0371585	59.03715848	59.03715848	59.03715848	59.03715848
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	0.8	28	5891.573052	1142.28097	4749.292081	8760	876	0	8760	8760	8760	55.8740245	55.87402449	55.87402449	55.87402449	55.87402449
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	1.8	28	5891.573052	693.17344	5198.399612	8760	876	0	8760	8760	8760	61.1576425	61.1576425	61.1576425	61.1576425	61.1576425
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	1.8	28	5891.573052	527.447873	5364.125178	8760	876	0	8760	8760	8760	63.107355	63.10735504	63.10735504	63.10735504	63.10735504
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	2.8	28	5891.573052	436.12375	5455.449302	8760	876	0	8760	8760	8760	64.1817565	64.18175649	64.18175649	64.18175649	64.18175649
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	2.8	28	5891.573052	377.915562	5513.657489	8760	876	0	8760	8760	8760	64.8665587	64.8665587	64.8665587	64.8665587	64.8665587
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	3.8	28	5891.573052	332.837041	5558.736011	8760	876	0	8760	8760	8760	65.3968942	65.39689424	65.39689424	65.39689424	65.39689424
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	3.8	28	5891.573052	303.80589	5587.767162	8760	876	0	8760	8760	8760	65.7384372	65.7384372	65.7384372	65.7384372	65.7384372
Steel	Indoor	40 psi Steam - Recirculation year round	Healthcare Clinic	4	4.8	28	5891.573052	281.26663	5610.306422	8760	876	0	8760	8760	8760	66.003605	66.00360497	66.00360497	66.00360497	66.00360497
483075	483075	483075	483075	#	#	#	483075	483075	483075	483075	###	5E+05	5E+05	483075	483075	483075	483075	483075	483075	483075

Pipe Insulation Calculator



- 13 point data entry

1	Pipe Material	Copper
2	Application	Hot Water space heating with outdoor reset - Non recirculation
3	Building Type	Assembly
4	Pipe Size (inches)	3.5
5	Insulation Size (inches)	0.5
6	Hot Water/Steam Boiler Efficiency (%)	75
7	DHW Water Heater Efficiency (%)	73
8	Zone	Belleville
	Therm Savings/ft	1.401571609
9	Length of Installed Pipe (ft.)	100
10	Elbows	Yes
11	Tees	Yes
12	Flanges	Yes
13	Valves	Yes
	Equivalent Length of Elbows (ft)	1.01
	# of Elbows	1
	Equivalent Length of Tees (ft)	0.84
	# of Tees	1
	Equivalent Length of Flanges (ft)	3.67
	# of Flanges	
	Equivalent Length of Valves (ft)	1.16
	# of Valves	
	Total Savings (therms)	142.7500683

Legend

Filled by User	
Internal Vlookups	
Total Savings	

Program Results

ETP Program Metrics



Energy
Efficiency
Program

Emerging Technologies Program

Updated
2/13/2020

Evaluated Applications

125

Completed Pilots

27

22%
% Evaluated Applications

Active Pilots

11

9%
% Evaluated Applications

Rebates Launched

10

37%
% Completed Pilots

By Sector



Active Pilots	Current Pilot Tasks	Finish	% Complete
Boiler Chemical Descaling	Site # 2 Post Descaling Data	02/14/20	20%
Pipe Insulation	Prepare Software	03/06/20	85%
Steam Boiler Array	Field Service Agreement	03/13/20	30%
Low-E Interior Storm Windows	Retrofit Monitoring (Heating Data)	03/19/20	5%
Smart Radiator Valves	Retrofit Monitoring (Heating Data)	03/19/20	15%
Commercial Tankless Domestic Hot Water Array	Field Service Agreement	03/27/20	30%
Venturi Steam Traps Phase 2 (Field Test)	Sign Field Test Agreement (FTA)	03/27/20	50%
Air Deflector for Unit Ventilator (ADUV)	Data Collection of 16 UVs	05/07/20	5%
Residential Thermal Heat Pump	Field Testing	10/30/20	25%
Gas Heat Pump Water Heater (GHPWH)	Field Testing	02/05/21	25%



Energy
Efficiency
Program

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