

Next Generation of Gas Savings: Program Strategies and Emerging Technologies

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Web conference



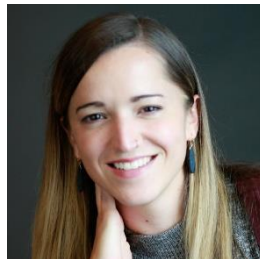
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Today's presenters



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Agenda

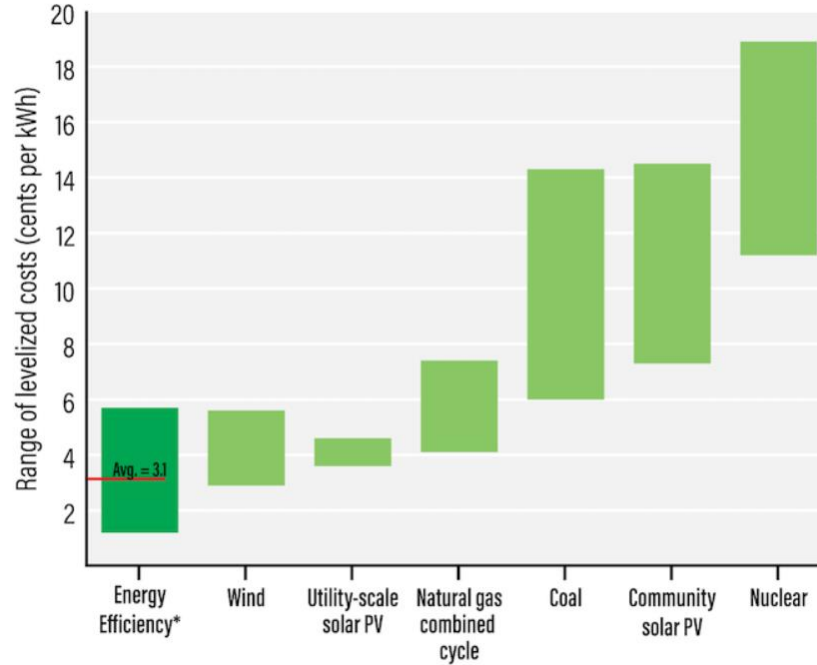
- Overview of research project
- Next-generation gas demand-side management (DSM) program strategies
- Next-generation gas DSM measures
- Get plugged into E Source's gas DSM research

A person is seen from behind, sitting at a desk and using a laptop. The laptop screen displays a social media profile page with a header 'People', a profile picture, and a 'My Status' section. The text on the screen is partially obscured by a large white text box. The background is a solid blue color.

Overview of research project

Energy costs are low and decreasing

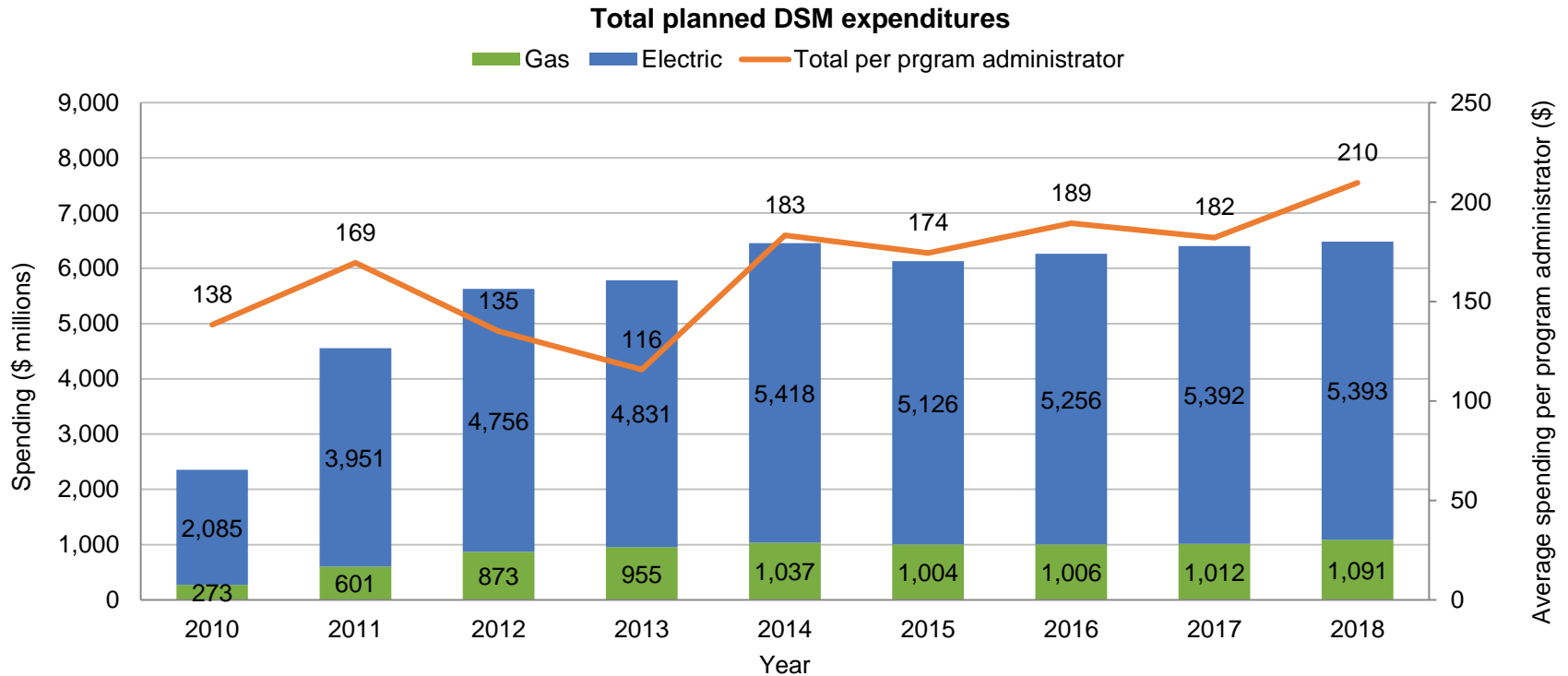
Levelized Cost of Electricity Resources



*Notes: Energy efficiency program portfolio data from Molina and Reif 2018. Represents costs to utilities or program administrators only, including shareholder performance incentives if applicable. All other data from Lazard 2018 Unsubsidized Levelized Cost of Energy Comparison.

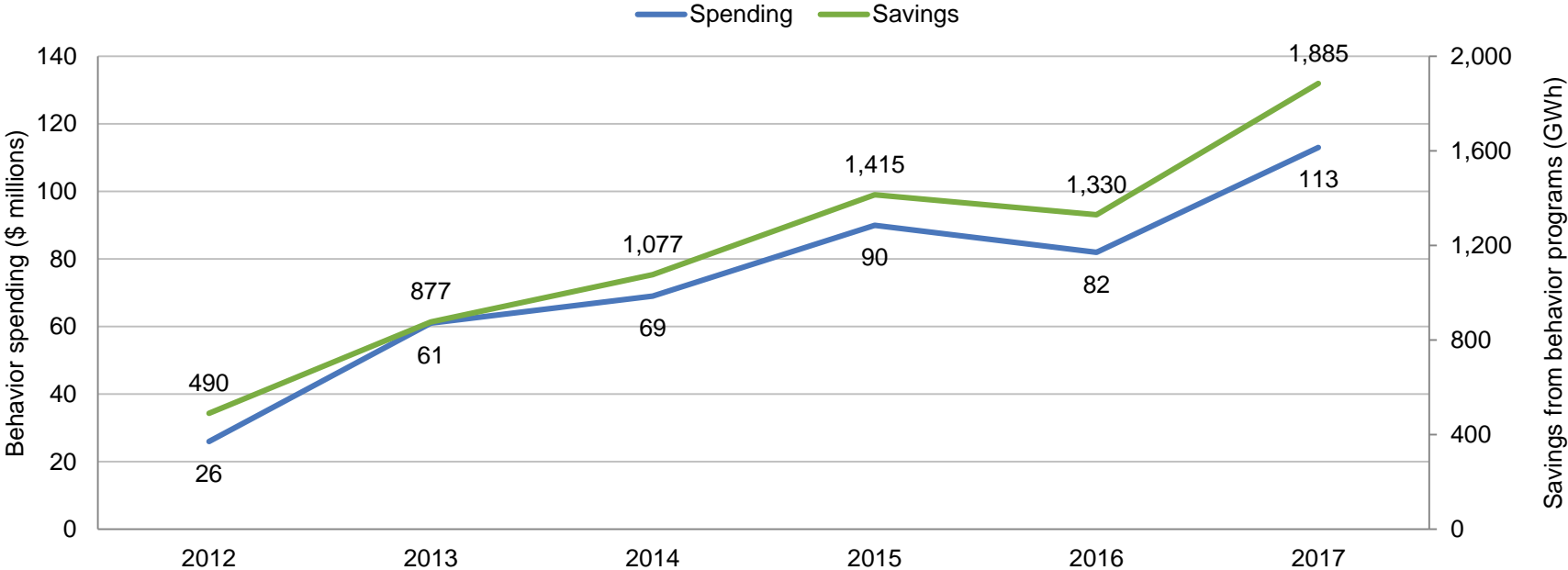
Source: ACEEE

Targets are still going up



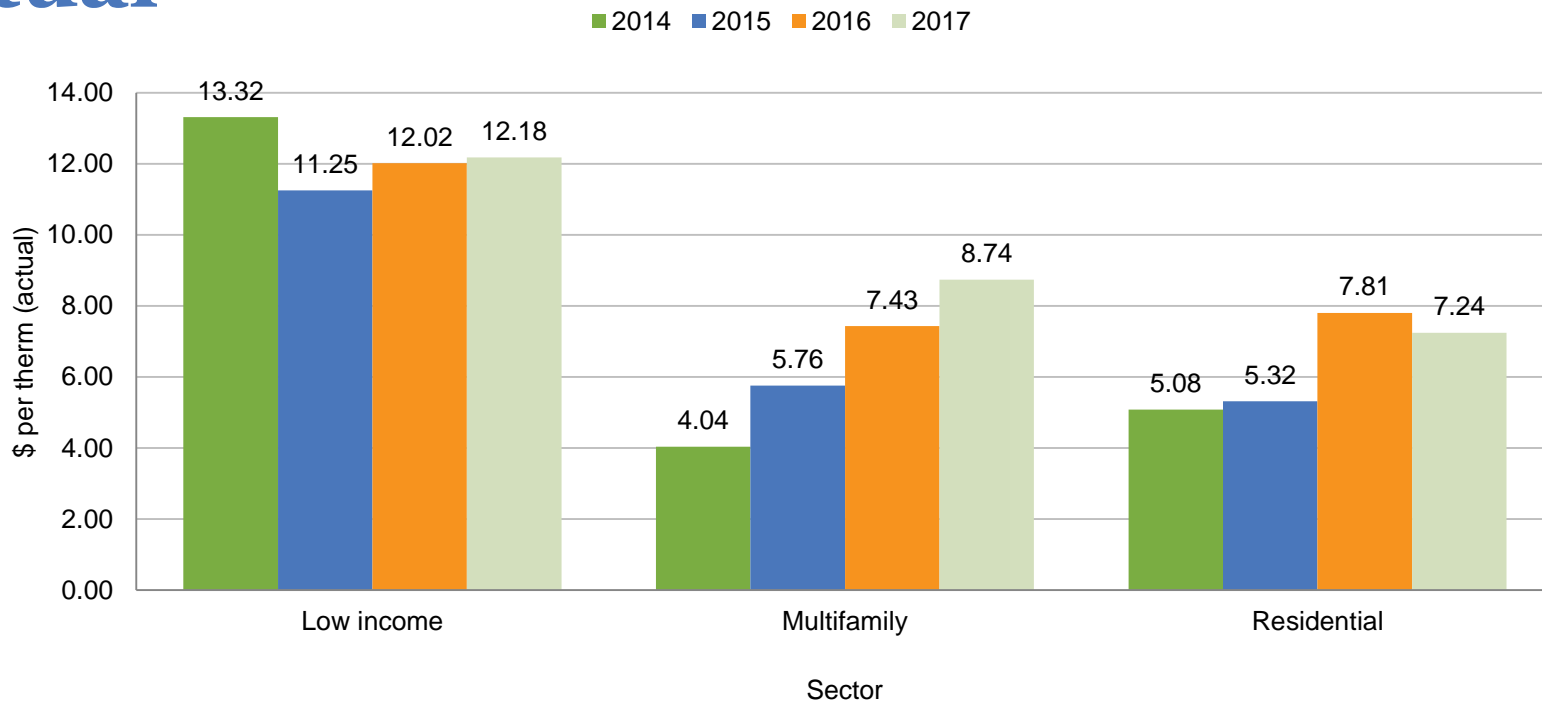
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Spending and savings are on the rise



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Residential sector \$ per therm trends— actual

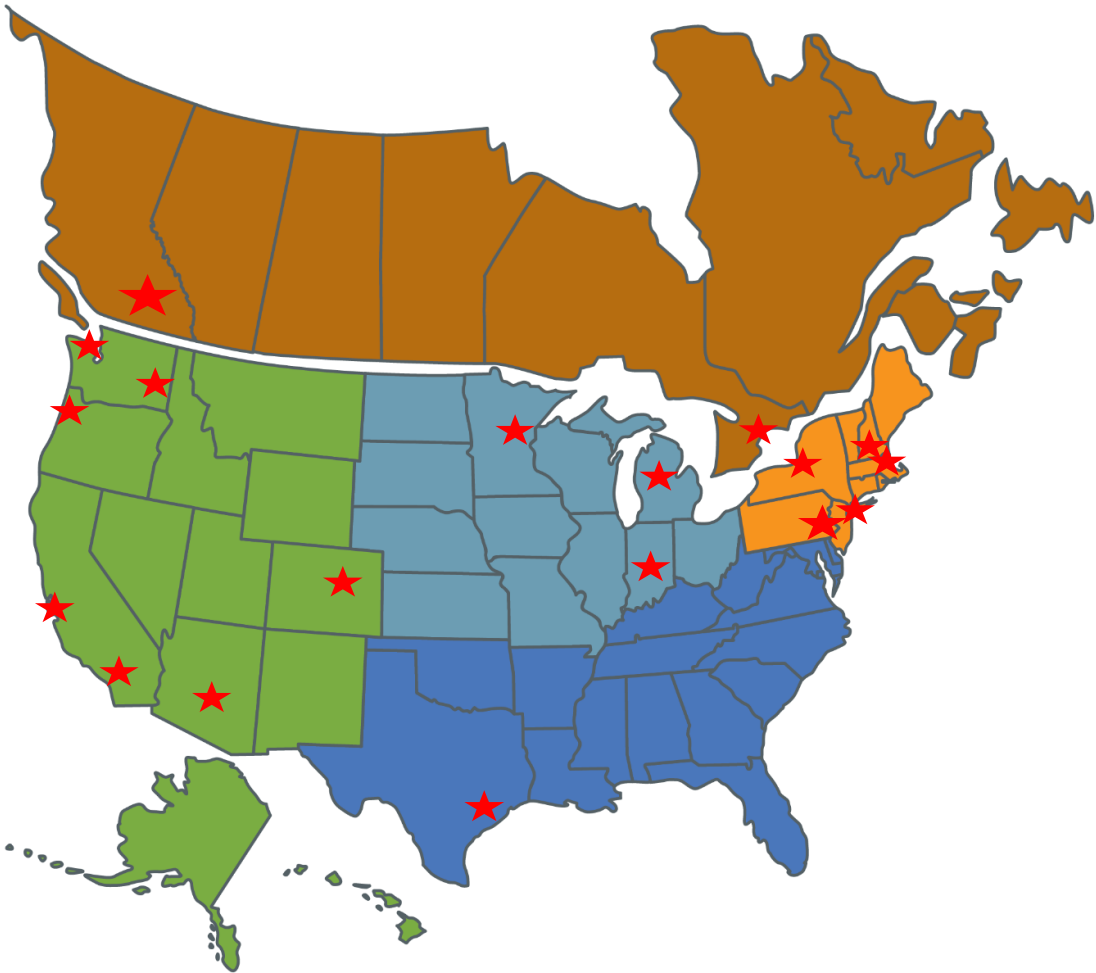


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We looked at utilities all over the US

In-depth review of leading gas utilities' plans

Follow-up interviews



Companion reports to this web conference

- [Next-Generation Gas DSM Strategies](#)
- Emerging Gas Technologies to Fill Your DSM Pipeline

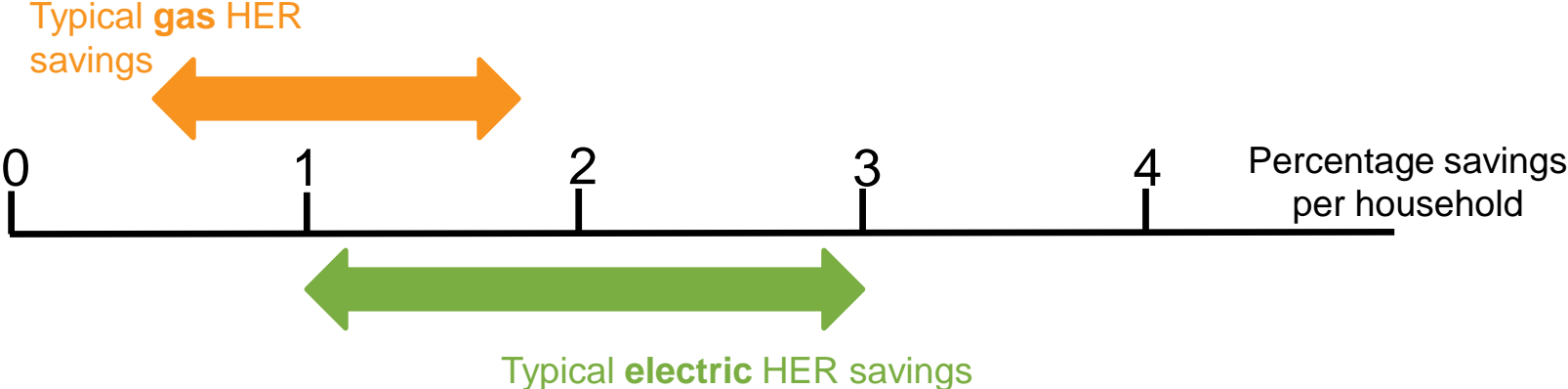


Next-generation gas DSM program strategies

Next-generation gas program strategies

- Gas home energy reports (HERs)
- Furnace quality installation
- Midstream gas efficiency

Gas HERs



Variation in cost-effectiveness of gas HERs

Utility	\$ per therm
Liberty Utilities	19.12
Average	3.62
Median	0.74
MidAmerican Energy	0.32

© E Source (DSM Insights)

Energize Connecticut's gas HERs



Year 1: 0.6% savings
Year 2: 0.81% savings

Atmos Energy's gas HERs



25% of gas rebate program customers came directly from HER program



Best practices for maximizing savings from your gas HERs program

- Read our [Natural Gas Savings from HERs](#) report
- Check out our updated report in 2020



Natural Gas Savings from Home Energy Reports

Alexandra Behringer
SEPTEMBER 5, 2013



View published New draft Manage Schedules Moderate Clone this deliverable

Contents

[Dual-Fuel Versus Gas-Only HER Deployments](#)
[Evaluated Savings](#)
[Customer Actions in Response to HERS](#)
[Persistence of Savings After Report Suspension](#)
[Resources](#)
[Notes](#)

In recent years, home energy reports (HERs) have become the mainstay of residential behavior-based energy efficiency programs. HERs provide residential customers with information on their energy usage and compare this information to neighbors with homes that have similar characteristics, such as square footage, location, and type of HVAC units in the home. The reports also provide information on steps customers can take to reduce household energy use.

Although a large proportion of these programs focus on electricity savings, increasingly both gas utilities and dual-fuel utilities are targeting gas savings through HERs. We sought to learn more about these programs, including the gas savings they generate and the persistence of these savings after reports are discontinued. We found that:

- Efficiency program administrators (PAs) are realizing gas savings from HER programs. However, due to variations in program design and evaluation methodologies, we can't draw conclusions about average savings ranges.
- Savings vary by fuel type, though gas savings tend to be somewhat lower than electric savings as a percentage of annual consumption.
- Gas savings from gas-only HER programs tend to be higher—sometimes almost twice as much—as gas savings from dual-fuel HER programs (which target both gas and electricity savings). According to Opower, gas savings tend to make up between 1.2 and 1.6 percent of annual consumption for gas-only HER programs and between 0.7 and 1.0 percent of annual consumption for dual-fuel HER programs.
- Evaluations suggest that savings persist while customers continue to receive reports. However, it's too soon to draw conclusions about savings persistence when reports are discontinued.

Furnace quality installation

Rising measure baselines



Furnace quality installation

Rising measure baselines



6% energy savings



Fortis BC's furnace quality installation

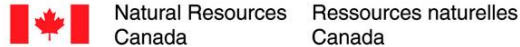


Natural Resources
Canada

Ressources naturelles
Canada

Canada

Fortis BC's furnace quality installation



- ~12 participating contractors
- \$100 incentive per project
- \$200 bonus incentive
- 200 pilot installations
- Billing analysis

Fortis BC's furnace quality installation

- Priming the market
 - Five-year roadmapping process
 - [Fortis BC's High-Efficiency Furnace Installation Guide for Existing Houses](#)
 - Customer awareness [YouTube video](#)
 - Customer-friendly [reference sheet](#)
 - Quarterly webinars on contractor quality installation best practices

Midstream gas efficiency



- Commercial food service
- HVAC equipment
- Water heaters
- Contractor spiffs (incentives)

DTE's midstream gas efficiency



DTE's midstream gas efficiency



- Added gas measures in 2017
- **670%** increase in gas savings
- \$25–\$100 spiffs for distributors
- Summer gas bonus for distributors and customers

E Source's midstream series

- [Sending your DSM Measures Upstream: Popular Measures and Best Practices for Midstream and Upstream Programs](#)
- Coming soon
 - Strategies to Overcome Upstream Program Evaluation Challenges
 - Strategies to Overcome Upstream Program Data Collection Challenges
 - Strategies for Designing Effective Midstream Incentives

INSERT POLL in ReadyTalk

- What gas programs and strategies are you investing in to buoy the cost-effectiveness and maintain savings within your gas DSM portfolio?



Next-generation gas DSM measures



Heat pumps get gassed up

The times they are a-changin’

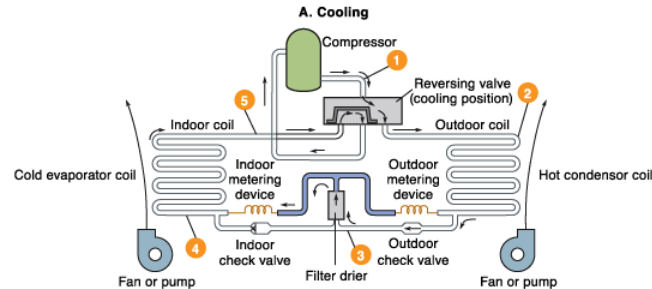
- Natural gas has long dominated thermal markets (space and water heating) in the US
- That domination faces pressure from ideology, public policy, and advances in electric heat pump technology



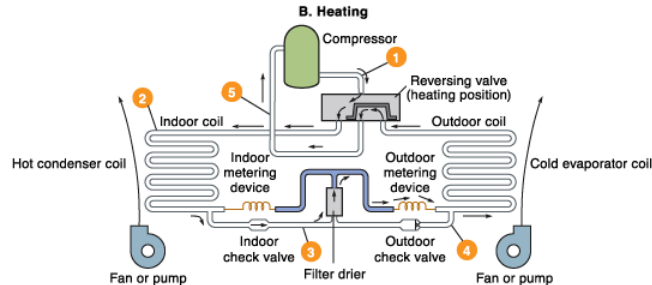
Source: Wikimedia Commons

Just what are gas heat pumps?

- Move energy from cold to hot
- Use energy from natural gas to drive process
- May serve space cooling, space heating, or water heating



- 1 High-pressure, high-temperature vapor
- 2 Refrigerant releases heat to outside air and returns to a liquid state
- 3 High-pressure, medium-temperature liquid
- 4 Low-pressure, low-temperature liquid/vapor mixture refrigerant absorbs heat from air and the liquid refrigerant boils to vapor
- 5 Low-pressure, low-temperature vapor



- 1 High-pressure, high-temperature vapor
- 2 Refrigerant releases heat to air and returns to a liquid state
- 3 High-pressure, medium-temperature liquid
- 4 Low-pressure, low-temperature, liquid/vapor mixture refrigerant absorbs heat from air and the liquid refrigerant boils to vapor
- 5 Low-pressure, low-temperature vapor

© E Source

They enable gas companies to ...

- Compete for thermal markets
- Drive down carbon dioxide emissions
- Participate in decarbonization public policies

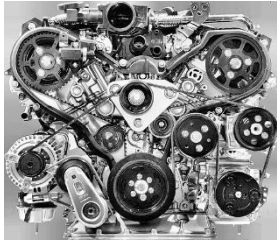


Short-term markets

- Avoided electrical upgrades
- Propane fueled
- Remote applications

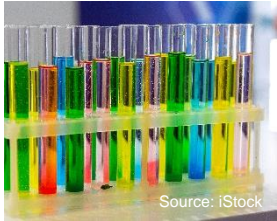


Three different mechanisms



Source: Wikimedia Commons

Engine



Source: iStock

Chemical



Source: Thermolift

Thermal compression

Tecogen (trade name: Ilios)

- Mechanism: engine
- Load: water heating
- Size: 400–600 kBtuh
- Coefficient of performance (COP): 2.2
- Availability: commercially available



Source: Tecogen

Blue Mountain Energy

- Mechanism: engine
- Loads: space cooling and heating
- Size: 8–15 tons
- Availability: commercially available



Source: Blue Mountain Energy

Yanmar

- Mechanism: engine
- Loads: space heating and cooling
- Size: 8.5 tons
- Availability: commercially available



Source: Yanmar

Robur

- Mechanism: chemical
- Loads: water heating, space heating and cooling
- Size: 4–5 tons (modular units up to 30 tons)
- COP: 1.3
- Availability: commercially available



Source: Robur

Stone Mountain Technologies

- Mechanism: chemical
- Loads: water heating and space heating
- Size: 10 and 140 kBtuh
- COP: 1.4
- Availability: under development



Source: SMTI

SaltX and Rheem

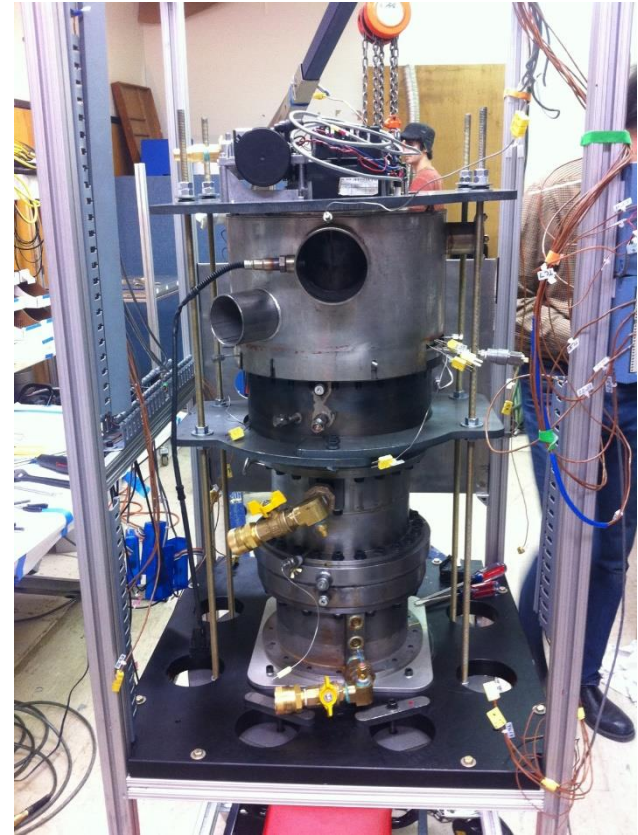
- Mechanism: chemical
- Load: water heating and space heating
- COP: 1.4
- Availability: under development



Source: US Department of Energy

Thermolift

- Mechanism: thermal compression
- Loads: water heating, space heating and cooling
- COP: 1.5
- Availability: under development



Source: Thermolift

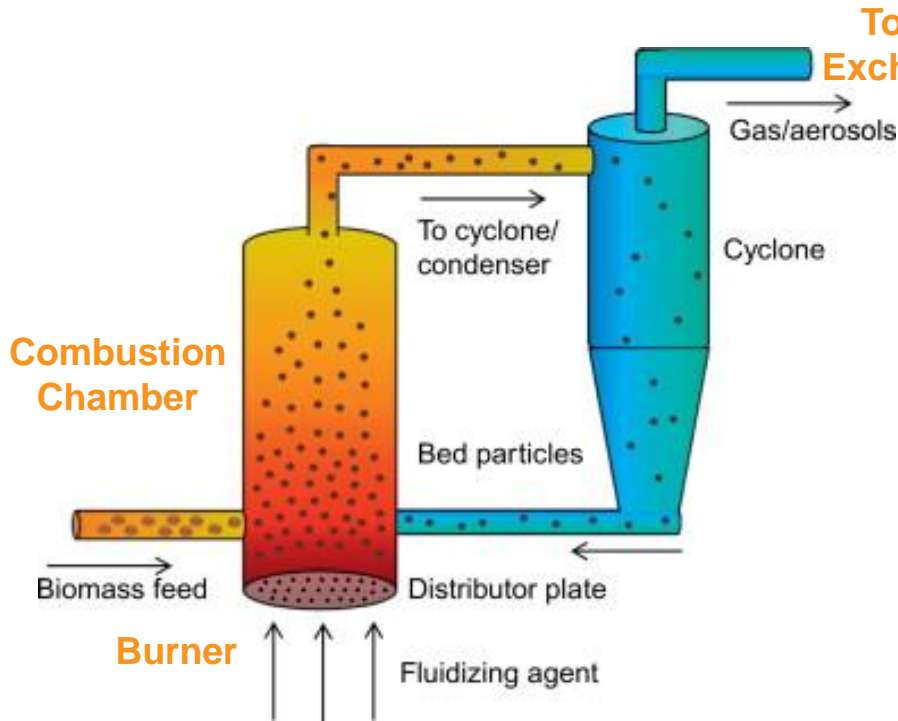
Long-term challenge





Circulating fluidized bed boilers

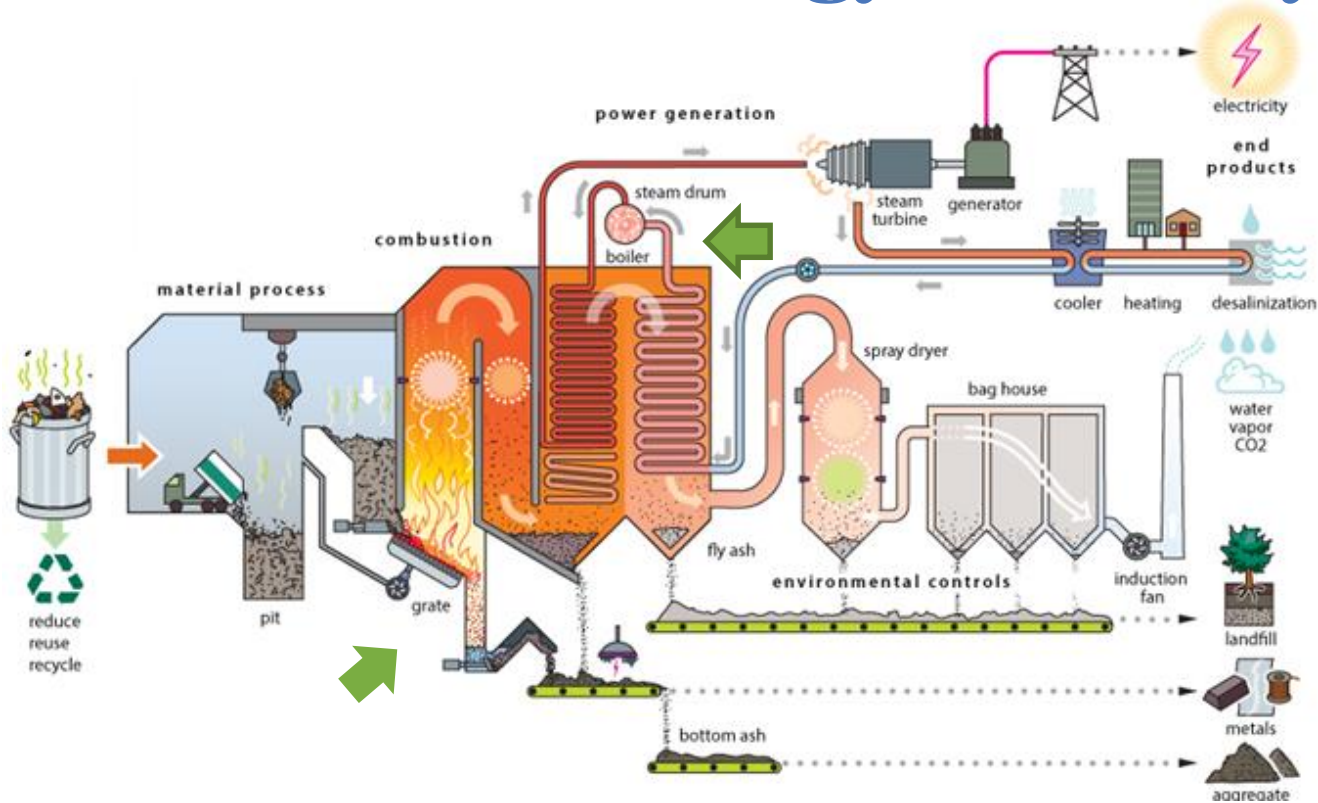
How circulating fluidized beds work



- Fuel is fed into the combustion chamber
- Fuel is rapidly mixed with the “fluidizing agents” (e.g. limestone and/or sand)
- Particles and particulates are captured in a condenser and recirculated
- Gas is exhausted from the condenser
- It is a two-phase (solid-gas) open system

Source: [Reactor and Process Design in Sustainable Energy Technology](#) (2014)

A typical waste-to-energy (WTE) system



Source: US Energy Information Administration

In 2018: A case study from Ontario



Source: Recycling Today

Paper sludge was being landfilled.

The sludge-to-energy system:

- Processes 100,000 tons/year
- Reduces waste disposal costs
- Reduces natural gas costs
- Is deemed economically viable

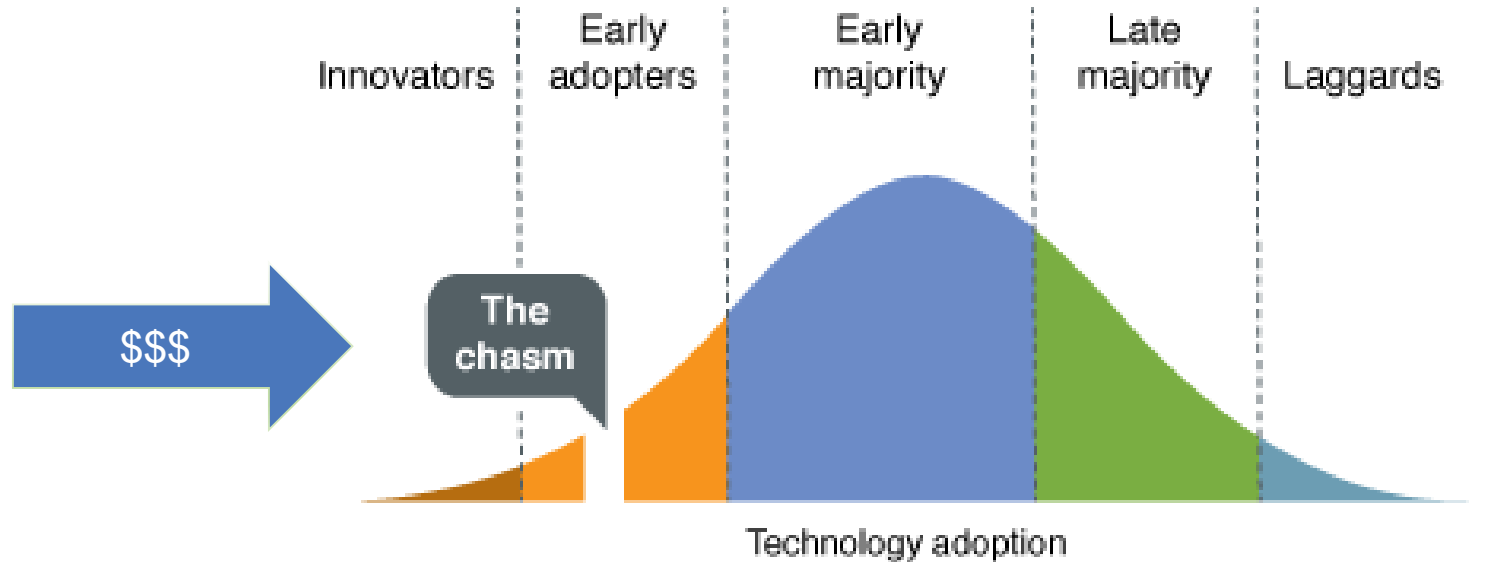
More savings opportunities exist

- Other customers who could benefit
 - Breweries
 - Wastewater facilities
 - Forest managers
 - Campus district heating, cogeneration
- Continuous flow of waste materials
- Pay a tipping fee to landfill waste
- Large power or steam demand



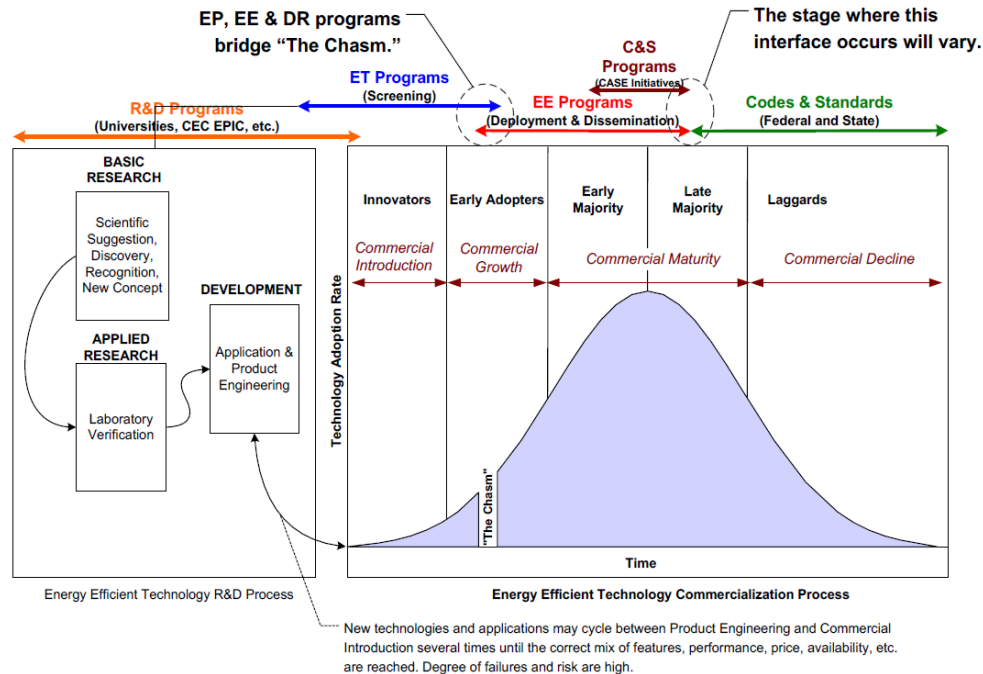
Source: iStock

The classic market-adoption model



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The emerging technology framework in California



Note: C&S = codes and standards; CEC = California Energy Commission; DR = demand response; EE = energy efficiency; EP= engineered projects; EPIC = Electric Program Incentive Charge; ET = emerging technology; R&D = research and development.

Courtesy: Southern California Edison

A tech-transfer framework we use

Understanding the context

Customer market research and insights

Market analysis

Best practices and utility benchmarking

Utility and regulatory considerations



Identifying goals

Customer-related goals

Operational goals

Planning and resource management goals

Financial goals

Societal goals



Conducting the analysis

Customer segmentation and propensity analysis

Measure / portfolio benchmarking and best practices

Time value analysis

Measure level load shape analysis



Prioritizing portfolio changes

Target program use cases

Rank current and new measures

Measure selection

Program/portfolio design



Implementing and refining new portfolio

Rates

Regulatory

Program implementation

Target marketing

Evaluation and customer experience improvement

INSERT POLL: What new measures are you looking towards to support your DSM goals?


A person is shown from behind, sitting at a desk and using a laptop. The laptop screen displays a social media profile page with a profile picture, a name, and various menu options like 'My Status', 'My Posts', 'My Friends', 'My Photos', 'My Videos', and 'My Groups'. The background is a solid blue color.

Get plugged into E Source's gas DSM research

E Source membership options

 Customer Energy Solutions	 Customer Experience	 Marketing & Communications	 Utility Strategy
<ul style="list-style-type: none"> ✓ Demand-Side Management 	<ul style="list-style-type: none"> Customer Experience Strategy 	<ul style="list-style-type: none"> Residential Marketing 	<ul style="list-style-type: none"> ✓ E Design 2020
<ul style="list-style-type: none"> Distributed Energy Resource Strategy 	<ul style="list-style-type: none"> Customer Care 	<ul style="list-style-type: none"> Business Marketing 	<ul style="list-style-type: none"> E2 Strategic Partners Program
<ul style="list-style-type: none"> ✓ Technology Assessment 	<ul style="list-style-type: none"> E-Channel 	<ul style="list-style-type: none"> Corporate Communications 	
<ul style="list-style-type: none"> DSM Insights  	<ul style="list-style-type: none"> Account Management 	<ul style="list-style-type: none"> Business Energy Advisor  	
<ul style="list-style-type: none"> Measure Insights  	<ul style="list-style-type: none"> JourneyHub  		

 Current member inclusions

 Tools and databases

Companion reports to this web conference

- [Next-Generation Gas DSM Strategies](#)
- Emerging Gas Technologies to Fill Your DSM Pipeline

Get plugged into more gas DSM and technology content in 2020

Gas DSM working groups

Best-in-class gas DSM programs

Serving low- and moderate-income customers

Serving gas small and midsize customers

Gas Technologies and Programs Resource Center

NOVEMBER 21, 2019



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Gas utilities have unique challenges requiring innovative solutions. We created this resource center to help our members quickly find content that highlights gas technologies and programs.

Please note that some reports are available only to members of specific E Source services. For more information, or to learn which services your utility subscribes to, please check your [home page](#) to see your memberships.



Gas technology trends and evaluations

Tech Roundup recordings

All of our Tech Roundups feature gas technologies. Here is a list our seven most recent roundups and the gas technologies they included:

Unlimited inquiries on your gas DSM questions

“ What is the best approach to measure avoided cost of gas?

“ Who offers incentives for commercial destratification fans? What savings can we expect?

“ How do you set up a joint gas/electric offering?

“ Are there effective strategies to establish a gas DR offering?

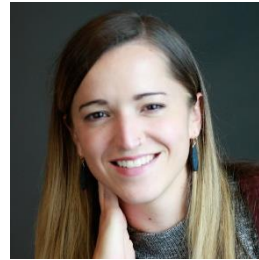
“ What are emerging measures for gas SMB customers?



For more information on gas DSM research



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