The New Leaders of the Pack: ACEEE's Fourth National Review of Exemplary Energy Efficiency Programs

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Executive Summary

BACKGROUND

ACEEE has reviewed utility-funded energy efficiency programs nationwide every five years since 2003 to identify trends and present effective approaches. Throughout this period, the energy efficiency industry has been evolving, adapting program designs and strategies in response to policy changes and technology advances.

Utility-sector energy efficiency programs are more important than ever. Energy efficiency continues to be one of the cleanest and lowest-cost utility system resources.[1]
This fourth ACEEE national review of exemplary energy efficiency programs has two objectives: (1) to identify and promulgate successful approaches that might help others improve their program designs and (2) to provide recognition to utilities and other administrators that are funding and delivering excellent programs.

We do not claim that the examples included in this report are absolutely the nation's best programs. It would not be feasible to assess all the programs in the United States, nor would that be necessary to meet our purposes in this project. The intent is to identify noteworthy programs that we feel to be exemplary and worthy of emulation.

METHODOLOGY

The methodology we used was similar to the first three national reviews. We issued a broad call for nominations of exemplary programs from people and organizations across the industry, reviewed the pool of nominations with the help of an expert panel, and selected the final set of exemplary programs based on program performance and expert opinions. Additional detail on the selection process is provided in the body of the report.

For a program to be eligible for nomination, we required that it be located in the United States or Canada; funded, at least in part, through utility rates, public benefits charges, or similar utility revenue mechanisms; and administered by a utility, government agency, third-party independent administrator, or a combination.

EXEMPLARY PROGRAMS

The most effective high-performance programs focus on various customer sectors, industries, and end uses. With this in mind, we present profiles of successful models in 14 program categories.

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[1] I. Hoffman, G. Leventis, and C. Goldman, *Trends in the Program Administrator Cost of Saving Electricity for Utility Customer-Funded Energy Efficiency Programs* (Berkeley: LBNL, 2017). eta-publications.lbl.gov/sites/default/files/lbnl-1007009.pdf. Lazard, *Lazard's Levelized Cost of Energy Analysis: Version 11.0.*, 2017. lazard.com/media/450337/lazard-levelized-cost-of-energy-version-110.pdf.

Small Commercial

Commonwealth Edison, ComEd Energy Efficiency Program Small Business Offering, Illinois. Trade-ally-driven, prescriptive incentive approach for private businesses with less than 100 kW peak demand.

Consumers Energy, Small Business Energy Efficiency Solutions, Michigan. Multifaceted program including trade-ally-driven installations, walk-through assessments, and direct measure installation at little or no cost to small business and nonprofit customers.

New Jersey Board of Public Utilities, Office of Clean Energy, Direct Install Program, New Jersey. Technical assistance, education, and incentives up to 70% of the project cost for replacing lighting, HVAC, refrigeration, and other equipment with energy-efficient alternatives.

Xcel Energy, One-Stop Efficiency Shop, Minnesota. No-cost audit, below-market-rate financing, and rebates for lighting and RTU upgrades open to Xcel Energy commercial accounts in Minnesota with a demand of 400 kW or less.

Medium and Large Commercial and Industrial

Bonneville Power Administration, Energy Smart Industrial. Custom projects, strategic energy management (SEM), small industrial (SI), and lighting energy efficiency for 117 enrolled utilities and their industrial customers in seven Northwest states.

Focus on Energy, Large Energy Users Program, Wisconsin. Technical assistance, prescriptive and custom project incentives, study incentives, application assistance, SEM, and energy team facilitation for customers with more than 1 MW peak demand or 100,000 therms of gas use per month and more than $60,000 of monthly energy expenses.

Strategic Energy Management

AEP Ohio, Continuous Energy Improvement (CEI), Ohio. Training, start-up grants, performance-based financial incentives, and no-cost building walkthroughs for up to three customer facilities to establish continuous improvement practices by customers with high energy use facilities.

Puget Sound Energy, Commercial Strategic Energy Management (CSEM), Washington. Technical assistance, peer teaching and reinforcement, energy modeling, and a per-kWh savings incentive for commercial and industrial customers.

Residential Comprehensive Retrofit

Eversource, Home Energy Services (HES) Program, Massachusetts. In-home energy assessments, base load, thermal boundary, and mechanical measures, financial incentives, and 0% financing for homeowners and renters in one- to four-unit homes.

Southwestern Electric Power Company (SWEPCO), Home Performance with ENERGY STAR (HPwES), Arkansas. No-cost Home Performance with ENERGY STAR (HPwES), with participation eligibility based on the inefficiency of the home.

New Hampshire Utilities, NHSaves Home Performance with ENERGY STAR (HPwES) Program, New Hampshire. Low-cost energy audits, incentives, and low-interest financing support a whole-home approach delivered through a network of 20 local weatherization contractors.

Oklahoma Gas and Electric (OG&E) and Arkansas Oklahoma Gas Corporation (AOG), Joint Weatherization Program, Arkansas. Energy audits and incentives for residential gas and electric efficiency measures, prioritized by cost effectiveness.

Residential Miscellaneous

Efficiency Vermont, Heat Pump Water Heaters, Vermont. Retail and online prescriptive rebates for customers, combined with midstream incentives for wholesalers and distributors, for certified advanced and high-efficiency water heaters.

Entergy Arkansas, Energy Solutions for Manufactured Homes, Arkansas. Audits and direct-install measures for manufactured homeowners and residents.

CenterPoint Energy and Xcel Energy, Home Energy Squad (HES), Minnesota. Energy audits, direct-install measures, and coordination with insulation contractors for residential customers.

Multifamily

BayREN, Bay Area Multifamily Building Enhancements (BAMBE), California. Whole-building retrofit program offering no-cost energy consulting and cash rebates to multifamily customers in the San Francisco Bay Area.

Eversource, Multifamily Initiative, Connecticut. Energy assessment, technical assistance, incentives, and financing for energy efficiency upgrades to multifamily buildings.

Puget Sound Energy, Multifamily Retrofit and New Construction for Market Rate and Low Income, Washington. Free walk-through site assessment, no-cost direct-install measures, portfolio benchmarking, trade ally network, and prescriptive and calculated incentives for electric and gas measures.

PSE&G, Residential Multifamily Housing Program, New Jersey. Multifamily housing retrofits including upfront engineering and construction funding, incentives, and on-bill financing.

Low-Income: Statewide Comprehensive

Efficiency Vermont, Low-Income Electric Efficiency Program (LEEP), Vermont. Contracts with the state's Weatherization Assistance Program (WAP) agencies to install electrical efficiency measures in income-eligible single- and multifamily homes; Targeted High Use Program provides no-cost energy coaching, energy assessment, and efficient product and HVAC upgrades.

New York State Energy Research and Development Authority (NYSERDA), EmPower New York, New York. Comprehensive energy efficiency program providing no-cost electric reduction and home performance measures to low-income households.

Massachusetts Utilities, Low-Income Energy Affordability Network (LEAN), Massachusetts. No-cost comprehensive weatherization, appliance efficiency, and heating system measures and services to eligible low-income households for all fuels (electricity, gas, oil, propane).

NHSaves, Home Energy Assistance Program (HEA), New Hampshire. Whole-house approach from energy audit through installation and inspection, implemented with Community Action Agencies (CAAs) and additional collaboration with state and federal WAP.

Low-Income: Natural Gas Utilities

Columbia Gas of Ohio, WarmChoice, Ohio. No-cost energy efficiency services to income-qualified households targeting high natural gas usage households and those with high arrearages.

Oklahoma Natural Gas, Low-Income Energy Efficiency Assistance Program, Oklahoma. No-cost attic insulation, air sealing, and duct sealing, including evaluation and installation, available to all income-qualified residential customers.

Low-Income: Targeted/Social Equity

Maryland Energy Administration (MEA), EmPOWER Clean Energy Communities Low-to--Moderate-Income (LMI) Grant Program, Maryland. Grants to nonprofits and local governments for whole-building, new construction, and individual measure energy efficiency upgrades that benefit low- to moderate-income Marylanders.

Xcel Energy, Low-Income, Colorado. Single-family weatherization through WAP and Colorado Affordable Residential Energy (CARE), income-qualified multifamily, and the Nonprofit Energy Efficiency Program (NEEP) for nonprofit organizations serving income-qualified communities.

New Construction

AEP Ohio, EfficiencyCrafted Homes, Ohio. Above-code energy performance through technical standards, training, and cost-effective incentives for builders, combined with consumer education and marketing, and a pay-for-performance incentive structure.

Energy Trust of Oregon, EPS New Construction, Oregon. New home construction program uses EPS, an energy performance scoring system providing performance-based scaled incentives to builders and third-party raters for installing energy improvements beyond state energy codes.

Xcel Energy, Energy Design Assistance, Colorado. Helps building design teams include energy savings before construction begins by using computer simulation modeling to forecast the planned building's energy performance, and then suggests energy-saving strategies and projects energy-cost savings.

New Construction: Path to Net Zero

Efficiency Vermont, High-Performance Homes Program, Vermont. Net zero ready, prescriptive-incentive program for residential new construction customers seeking stick-built homes; Zero Energy Modular (ZEM) Homes pathway for LMI customers; technical assistance from planning phase through construction at no cost to the customer.

Energy Trust of Oregon, New Buildings: Path to Net Zero, Oregon. Design-based initiative using energy use intensity (EUI) targets to set 70% energy reduction compared to typical building goals.

Heating, Ventilating, and Air-Conditioning (HVAC)

Efficiency Maine Trust, Ductless Heat Pump Initiative of the Home Energy Savings Program (HESP), Maine. Drives market toward high-efficiency ductless heat pumps through fixed-price rebates and loans, quality assurance, customer education, and marketing through qualified contract network.

Oncor Electric Delivery, Multifamily HVAC, Texas. Replacement of electric resistance heating systems with high-efficiency heat pumps using marketing targeted to property management companies, HVAC companies, and multifamily contractors.

Toronto Hydro-Electric System Ltd., PUMPsaver Local Program, Ontario. Direct installation of variable frequency drives on hydronic distribution systems for multiunit residential building facilities and customers in other sectors.

Lighting

Commonwealth Edison, LED Street Lighting, Illinois. Retrofits of municipal- and/or utility-owned high-intensity discharge (HID) streetlights to LED.

Consumers Energy, Advanced Lighting Controls (ALC), Large Business, Michigan. Technical training and tiered per-kWh incentives for fully networked lighting systems that leverage multiple control strategies for business and institutional customers.

Focus on Energy, Retail Lighting and Appliance, Wisconsin. Upstream incentives for ENERGY-STAR-certified LED lightbulbs at retail locations, smart thermostat rebate, online appliance marketplace for consumer research, and participation in the ENERGY STAR® Retail Products Platform (ESRPP) pilot.

Pacific Gas and Electric (PG&E), LED Accelerator Program (LEDA), California. Custom retrofits and new construction, tiered incentives for retail, downstream, and pay-for-performance for best-in-class LEDs and networked lighting controls (NLCs).

On-Bill Lending

Ouachita Electric Cooperative, HELP PAYS®, Arkansas. Tariffed on-bill (TOB) financing program that reduces the upfront costs of energy efficiency upgrades for residential, municipal, and nonprofit member-owners of the co-op.

AVANGRID, Small Business Energy Advantage, Connecticut. Turnkey energy efficiency services and financial incentives for small commercial customers, combined with 0% financing and on-bill repayment to provide positive cash flow.

Agriculture

Entergy Arkansas, Agricultural Energy Solutions, Arkansas. Farm audits, prescriptive and custom incentives, and education for farmers, agribusiness, and agricultural equipment suppliers.

Consumers Energy, Agriculture Energy Efficiency, Michigan. Prescriptive rebates for 43 electric and gas technology measures, custom projects, and rebates for US Department of Agriculture (USDA) Tier 2 audits.

Utility Partnerships

PG&E, California Youth Energy Services, California. Training and employment of local young adults to provide free energy efficiency and water conservation services including home assessment, installations, education and behavior change, and referrals.

Los Angeles Department of Water and Power and SoCalGas, Master Inter-Utility Agreement, California. Partnership structure for the coordination and integration of multiple inter-utility efficiency programs.

Irvine Ranch Water District (IRWD), Southern California Edison (SCE), and SoCalGas, One-Stop Shop for Water and Energy Efficiency, California. A water–energy nexus direct-install program for mutual customers in the IRWD service area.

Xcel Energy, Partners in Energy, Colorado and Minnesota. Collaboration and utility support to develop community-driven energy action plans and implementation support including marketing, project management, tracking, reporting, funding for incremental staffing or events, online webinars, office hours, and in-person education and networking forums.

Niche

CenterPoint Energy, Foodservice, Minnesota. Provides energy efficiency rebates and the company's Foodservice Learning Center to commercial, large-volume cooking customers, and foodservice trade allies.

Eversource, Franchise Customer Initiative, Massachusetts. Technical services at the retail site including studies of energy cost and savings impacts, implementation guidance, and project-level incentives for franchise businesses.

MassSave, C&I Natural Gas Water Heater Initiative, Massachusetts. Upstream rebates and cash incentives to distributors for the sale of high-efficiency water heater equipment to commercial- or industrial-rate natural gas customers.

NV Energy, Residential Demand Response, Nevada. Free smart thermostats, energy efficiency service subscriptions, and annual rebates for residential customers who agree to participate in demand response events.

PSE&G, Hospital Energy Efficiency Program, New Jersey. Incentives, upfront payments, and on-bill financing of energy conservation measures at hospitals and healthcare facilities operating 24/7.

Commonwealth Edison, ComEd Energy Efficiency Program Retro-Commissioning (RCx) Offering, Illinois. Four RCx program options that include no-cost engineering studies to identify no- and low-cost operational improvements for existing energy-using systems in businesses and public facilities.

Background

ACEEE has reviewed utility-funded energy efficiency programs nationwide every five years since 2003 to identify trends and present effective approaches. The authors of the first review recognized the extent to which programs had evolved since the 1970s and seized the opportunity to document the state of practice for successful programs. By presenting models of excellence in multiple customer sectors and business segments, the 2003 report addressed a previously unmet need (York and Kushler 2003).

The industry responded favorably to that first review, leading ACEEE to repeat and refresh the process with *Compendium of Champions: Chronicling Exemplary Energy Efficiency Programs from across the U.S.* (York, Kushler, and Witte 2008). That report profiled 90 programs selected as models for other utilities to learn from. ACEEE followed up again five years later, releasing *Leaders of the Pack: ACEEE's Third National Review of Exemplary Energy Efficiency Programs* (Nowak et al. 2013).

Utility-sector energy efficiency programs are more important than ever. Energy efficiency continues to be one of the cleanest and lowest-cost utility system resources (Lazard 2017; Hoffman, Leventis, and Goldman 2017). Utilities have expanded their energy efficiency portfolios, generating increasing cumulative energy savings impacts. Figure 1 shows the increase in total electric savings from ratepayer-funded electric programs.

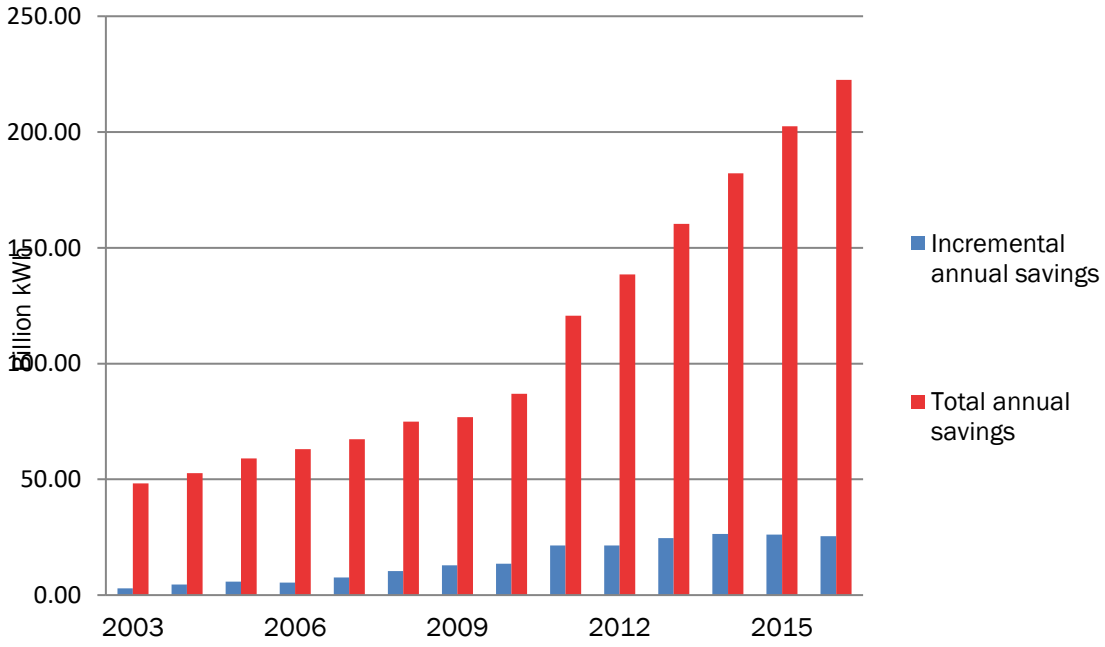

Figure 1. Total annual electricity savings from utility ratepayer-funded programs, 2003–2016. Total annual savings numbers reflect savings for previously installed measures that continue to deliver savings in the year shown. *Source:* Berg et al. 2017.

When ACEEE published its first national review of exemplary programs in 2003, US gas and electric utilities were spending $1.4 billion per year on energy efficiency. As figure 2 shows, utilities now invest more than five times that amount, over $7 billion annually, and have maintained that level every year since 2014 (Berg et al. 2017).

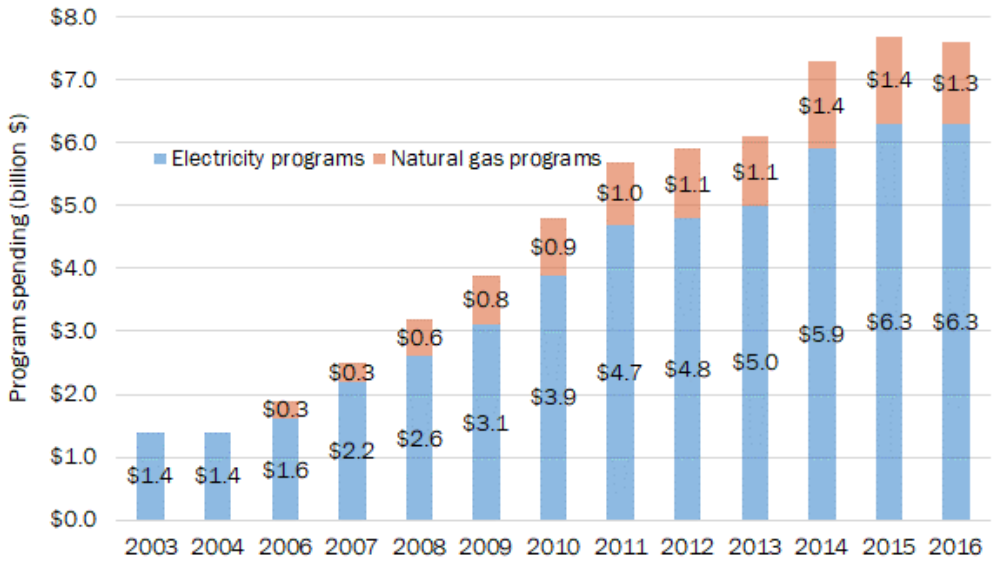

Figure 2. Annual electric and natural gas energy efficiency program spending. Natural gas spending is not available for 2003 and 2004. *Source:* Berg et al. 2017.

While the need for innovation and adaptation has remained constant across the ACEEE reviews timeframe, program administrators face a constantly evolving set of challenges to administering successful energy efficiency programs. Recent developments include the tightening of many building codes and lighting and appliance standards, concern that utilities have already harvested much of the low-hanging fruit, and the widespread adoption of technological advancements such as advanced metering and smart technologies.[2] Those factors all contributed to our decision to conduct a new exemplary programs review in 2018.

Report Purpose

In this fourth ACEEE national review of exemplary energy efficiency programs, we present profiles of 53 high-performing programs in 14 customer sector and end-use categories. This review serves two objectives: to identify and promulgate successful approaches that might help others improve their program designs, and to recognize utilities and other administrators that are funding and delivering excellent programs.

We examine leading efforts in residential, commercial, and industrial customer sectors to facilitate the borrowing and adapting of strategies across sectors, end uses, and

[2] We would note that in the energy efficiency context, there is not a fixed or static amount of low-hanging fruit. Due to continuing improvements in technology and reductions in cost, new forms of low-hanging fruit tend to appear over time. Nevertheless, there is some concern in the industry that program administrators may have harvested the easiest-to-capture efficiency improvements first.

technologies.[3] Disseminating examples of effective designs is increasingly important in today's industry environment. The need for improvement is growing, driven by factors such as regulatory requirements to meet aggressive energy savings targets in the context of increasingly fast-changing markets—both as codes and standards are adopted for existing technology and as new technology and new market opportunities emerge. This report facilitates peer learning to meet that demand.

The exemplary awards also give well-earned credit to the people and organizations who contribute to the industry year after year. ACEEE exemplary program reports have been prominent and popular, and the 2013 *Leaders of the Pack* was among the most-downloaded ACEEE research reports that year. These reports offer a set of models or prototypes for illustrative purposes only; we do not claim that these are the nation's best programs. No doubt other excellent programs exist that were not part of our review and selection process. Attempting to assess all US programs would be neither feasible nor necessary to meet our project's purpose, which is to identify exemplary programs worthy of emulation.

Methodology

The methodology we used for this *Fourth National Review* is consistent with predecessor reports. We issued a broad call for nominations of exemplary programs from people and organizations across the industry, reviewed the pool of nominations with the help of an expert panel, and selected the winners by considering program features and performance as well as expert opinions. Unlike the open nomination process of previous years, ACEEE required that this year's nominations be within predetermined program categories as described below.

SCOPE

Consistent with past practice, to be eligible for consideration, we required nominated programs to be

- Located in the United States or Canada
- Funded, at least in part, through utility rates, public benefits charges, or similar utility revenue mechanisms
- Administered by utilities, government agencies, or third-party independent administrators
- Electric, natural gas, or dual-fuel, or a combination
- One of no more than three nominations submitted from their own portfolio by a utility or program administrator from a particular state

SELECTION CRITERIA

When deciding whether to recognize a nominated program as exemplary, we considered the following factors:

[3] ACEEE also performs extensive research on exemplary programs and best practices in specific program categories. These focused research reports go into more depth on market transformation and on multifamily, low-income, small business, smart building, and other programs.

- *Direct energy savings*. Does the program deliver substantial immediate and long-term kWh (and/or therm) savings from energy efficiency?
- *Cost effectiveness*. Does the program yield significant energy savings and related benefits relative to its costs?
- *Market impacts*. Does the program produce desirable and lasting improvements in the energy efficiency characteristics and performance of the targeted market?
- *Customer service*. Does the program provide high-quality service and achieve high levels of customer satisfaction?
- *Innovation*. Does the program incorporate particularly innovative measures, program designs, and/or implementation techniques that have achieved positive near-term results and promise significant future impacts?
- *Transferability, replicability, and expansion potential*. Is the program design easily replicable in other, similar settings?

INITIAL PROGRAM CATEGORIES

For this 2018 effort, we limited nominations to a predetermined set of categories. To highlight an array of successful approaches, we invited nominations in 15 areas. These represented widely diverse programs that varied by fuel, customer sector, industry segment, end use, technology, and other characteristics. We selected a category based on multiple characteristics, including the area's growth potential, whether it historically accounted for deep and lasting energy savings, and whether it represented new or different institutional arrangements. We also added categories to capture exemplary programs worthy of emulation that did not fit elsewhere, including residential miscellaneous, and medium and large commercial and industrial programs. We did not include behavior programs among the categories, since over the past few years ACEEE has dedicated several reports to recognizing exemplary programs of this type (Sussman and Chikumbo 2016; Grossberg et al. 2015; Mazur-Stommen and Farley 2013).

The initial program categories were

- Small commercial (could include targeted small business subsectors, e.g., restaurants and convenience stores)
- Medium and large commercial or industrial
- Strategic energy management (SEM) (any sector)
- Residential comprehensive retrofit
- Residential miscellaneous (other than lighting, HVAC, or shell; could include water heating, plug loads, or appliances)
- Multifamily
- Residential low income or income eligible
- Ultra-low energy new construction homes and buildings (any sector)
- Residential or commercial HVAC (heating and/or cooling)
- Lighting (any sector; must demonstrate past performance and have potential for the future)
- On-bill lending (any sector)

- Agriculture (programs or initiatives targeted and designed for agriculture sector customer energy efficiency needs and end uses)
- Utility–city partnerships or community strategies (any sector)
- Combined energy efficiency and demand response; integrated demand side management (DSM) (must have a strong energy efficiency component)
- Geotargeted energy efficiency programs (any sector)

SOLICITATION OF PROGRAM NOMINATIONS

We designed the exemplary review methodology to attract program nominations from people in the industry. We did not begin the process with data collection on all utility energy efficiency programs; instead, we limited the pool of nominations to those submitted by people who were aware of the process and who invested the time to complete nomination forms. This made it important to publicize the review widely. To do so, we leveraged the extensive ACEEE database and network of energy efficiency contacts. We primarily relied on a series of mass email messages and reminders targeted to reach program administrators, implementation contractors, regional energy efficiency organizations, and regulators. We also solicited nominations through the ACEEE website, staff members' professional contacts, and social media. Regional energy efficiency organizations placed notifications on their websites and featured the call for nominations in online newsletters.

Representatives from across the industry responded resoundingly to the call, nominating a diverse collection of 112 gas and electric energy efficiency programs representing every eligible category.

The pool of nominations represented every type of program administrator, including federal power authorities, municipal utilities, investor-owned utilities, state agencies, nonprofit organizations, regional energy efficiency organizations, third-party program administrators, and rural electric cooperatives. The set of nominated programs was more geographically diverse than in the past, representing 39 states and 3 Canadian provinces, compared with 36 states in 2013, and 23 states in 2008.

We received an average of eight nominations per category, excluding geo-targeted programs, which had only one. We eliminated one category—combined energy efficiency and demand response (integrated DSM)—because the five nominations submitted were primarily smart thermostat programs that our staff and advisory panel did not select as exemplary models of integrated DSM.

PROCESS OF PROGRAM REVIEW AND SELECTION OF WINNERS

To review and assess the nominated programs, we relied on both the selection criteria and the knowledge and experience of internal and external experts.

Internally, at least four of us—including a subject matter expert for the program category—assessed each nominated program. We reviewed each program's design and strategy, examining the customer sectors, marketing, measures, services, incentives, and quantitative

performance data. We then looked at evaluation reports where available. We made notes and recorded overall ratings of every nominated program in a central database.

In parallel with our internal reviews, we convened a review panel of three outside energy efficiency experts, each of whom was tasked with reviewing a specific set of program categories. At least two of the experts reviewed each submission, assessing overall quality and taking into consideration the six primary selection criteria and other factors.

To select winners, we used a consensus-building process in discussions with the expert panel members. We first considered programs with the highest overall ratings in each program category as potential winners, using quantitative performance data and expert judgments and opinions to select a set for each category. However we did not select winners based on quantitative ranking alone; we often recognized programs because they were good examples of particular strategies or designs. Our objective was to identify a representative set of exemplary programs in each program category.

FINAL PROGRAM CATEGORIES

After reviewing the many high-quality submissions, we refined the program categories in two ways.

First, we added an additional category for exemplary niche programs. These demonstrate strong performance by tailoring energy efficiency offerings to specific targeted market niches such as specific industry sectors (foodservice and hospitals), type of businesses (franchise retailer), technology (smart thermostats), end use (commercial and industrial water heating), and building systems (retrocommissioning).

Second, we subdivided two of the initial categories to distinguish important characteristics. Of the 18 low-income program nominations, we recognized two administered by natural gas utilities and four comprehensive statewide programs. We also created a third group for innovative and noteworthy equity elements that could be adapted elsewhere, such as providing energy efficiency services to nonprofit organizations that serve low-income communities. For new construction, we distinguished between programs that aim at net zero buildings and other exemplary offerings.

We also eliminated two categories (combined energy efficiency and demand response/integrated DSM, and geotargeted programs) for which we received few strong nominations.

In the past, in addition to honoring Exemplary Programs, ACEEE conferred honorable mention awards to innovative programs that showed promise for the future but lacked a demonstrated performance history. This year we received multiple high-quality nominations in almost every category; in part because of this, we decided not to confer honorable mention recognition.

Results

As in prior years, we analyzed and selected programs to profile. This time we reduced the number of profiles and their length in order to make key attributes more accessible to

readers. After examining the pool of nominations by category, we selected 53 exemplary programs.

One should not generalize or draw conclusions about the utility energy industry as a whole by extrapolating from our selections. We have highlighted a few relevant and illustrative models in each program category. Utilities face various challenges depending on the program type, and they have developed a variety of models to meet those challenges. Successful strategies and approaches are often specific to end use, customer sector or subsector, or technology.

For example, lighting programs have evolved over the years, in part in response to the advance of federal standards that reduce the savings that utilities may claim from each measure. Although many relatively simple prescriptive rebate programs established years ago have continued, they have changed in many ways. The compact fluorescent lamp (CFL), for example, has declined as a program mainstay as light-emitting diodes (LEDs) have gained market share. The set we recognize here shows the diversity in the lighting area, including programs featuring LEDs, distribution channel, advanced controls, and streetlights.

Table 1 presents our roster of 53 exemplary programs serving 23 states and 1 Canadian province.

Table 1. Exemplary programs

Category	Program	Utility or program administrator	State
Small commercial	ComEd® Energy Efficiency Program Small Business Offering	Commonwealth Edison (ComEd)	IL
	Small Business Energy Efficiency Solutions	Consumers Energy	MI
	Direct Install	New Jersey Board of Public Utilities, Office of Clean Energy	NJ
	One-Stop Efficiency Shop	Xcel Energy	MN
	Small Business Energy Advantage[a]	AVANGRID	CT
Medium and large commercial and industrial	Energy Smart Industrial (ESI)	BPA	OR, WA, ID, MT, NV, CA, WY
	Large Energy Users Program	Focus on Energy/APTIM	WI
Strategic energy management	Continuous Energy Improvement (CEI)	AEP Ohio	OH
	Commercial Strategic Energy Management (CSEM)	Puget Sound Energy	WA

Category	Program	Utility or program administrator	State
Residential comprehensive retrofit	Home Energy Services (HES)	Eversource	MA
	Home Performance with ENERGY STAR® (HPwES)	Southwestern Electric Power Company (SWEPCO)	AR
	NHSaves Home Performance with ENERGY STAR (HPwES) Program	NH Utilities[b]	NH
	OG&E/AOG Joint Weatherization Program	Oklahoma Gas and Electric Co. (OG&E) and Arkansas Oklahoma Gas Corporation (AOG)	AR
Residential miscellaneous	Heat Pump Water Heaters	Efficiency Vermont	VT
	Energy Solutions Manufactured Homes Program	Entergy Arkansas	AR
	Home Energy Squad (HES)	CenterPoint Energy and Xcel Energy	MN
Multifamily	Bay Area Multifamily Building Enhancements (BAMBE)	BayREN	CA
	Multifamily Initiative	Eversource	CT
	Multifamily Retrofit and New Construction for Market Rate and Low Income	Puget Sound Energy	WA
	Residential Multifamily Housing Program	PSE&G	NJ
Low-income: statewide comprehensive	Low-income Electric Efficiency Program (LEEP)	Efficiency Vermont	VT
	EmPower New York	NYSERDA	NY
	Low-Income Energy Affordability Network	MA utilities	MA
	NHSaves Home Energy Assistance Program (HEA)	NH utilities and agencies	NH
Low-income: natural gas utilities	WarmChoice®	Columbia Gas of Ohio	OH
	Low-Income Energy Efficiency Assistance Program	Oklahoma Natural Gas	OK
Low-income: targeted/social equity	EmPOWER Clean Energy Communities Low-to-Moderate Income (LMI) Grant Program	Maryland Energy Administration (MEA)	MD
	Low-Income Program	Xcel Energy	CO
New construction	EfficiencyCrafted[SM] Homes	AEP Ohio	OH
	EPS New Construction (New Homes)	Energy Trust of Oregon	OR
	Energy Design Assistance	Xcel Energy	CO
New construction: path to net zero	High-Performance Homes	Efficiency Vermont	VT
	New Buildings: Path to Net Zero	Energy Trust of Oregon	OR

Category	Program	Utility or program administrator	State
HVAC	Ductless Heat Pump Initiative of the Home Energy Savings Program (HESP)	Efficiency Maine Trust	ME
	Multifamily HVAC Program	Oncor Electric Delivery	TX
	PUMPsaver Local Program	Toronto Hydro-Electric System Limited	ONT
Lighting	LED Street Lighting Program	Commonwealth Edison (ComEd)	IL
	Advanced Lighting Controls (ALC), Large Business	Consumers Energy	MI
	Retail Lighting and Appliance	Focus on Energy	WI
	LED Accelerator Program (LEDA)	Pacific Gas and Electric (PG&E)	CA
On-bill lending	HELP PAYS®	Ouachita Electric Co-op	AR
	Small Business Energy Advantage	AVANGRID	CT
	Residential Multifamily Housing Program[c]	PSE&G	NJ
Agriculture	Agricultural Energy Solutions	Entergy Arkansas	AR
	Agriculture Energy Efficiency	Consumers Energy	MI
Utility partnerships	California Youth Energy Services	PG&E	CA
	Master Inter-Utility Agreement	SoCalGas and LADWP	CA
	One-Stop Shop for Water and Energy Efficiency	IRWD, SCE, and SoCalGas	CA
	Partners in Energy	Xcel Energy	CO, MN
Niche programs	Foodservice	CenterPoint	MN
	Franchise Customer Initiative	Eversource	MA
	MassSave C&I Natural Gas Water Heater Initiative	MassSave and its program administrators	MA
	Residential Demand Response Program	NV Energy	NV
	Hospital Efficiency Program	PSE&G	NJ
	ComEd Energy Efficiency Program Retro-Commissioning (RCx) Offering	Commonwealth Edison (ComEd)	IL

[a] Profile is in Appendix A on-bill lending section. [b] Eversource (electric), Liberty Utilities (electric and natural gas), New Hampshire Electric Cooperative (electric), Unitil Energy Systems (electric), and Northern Utilities (natural gas). [c] Profile is in Appendix A multifamily section.

EXEMPLARY PROGRAM PROFILES

Appendix A presents short descriptions of each exemplary program. The categorization and order are the same as in table 1. Each profile is included in only one program category, although a few are cross-listed in the roster if they fit into more than one category.

Our intention is to provide only a brief overview, not a comprehensive or complete description. Each profile begins with a program-at-a-glance table that includes the name and contact information of the best person to contact for further information. We encourage you to reach out. Every representative listed is not only knowledgeable but also willing to collaborate for the good of the industry.

The profiles continue with a description of exemplary features and accomplishments, lessons learned that program managers or implementers have shared to benefit peers who are starting or running similar programs. Each profile concludes with a table of performance data for the three most recent program years.

While ACEEE provided the profile format, the program administrators wrote the actual text themselves, so writing styles and terminology vary across the profiles. If you have questions or need further information about a program, please contact the designated person identified in the profile's at-a-glance table.

Observations

The utility energy efficiency field is dynamic, with changes in policies and markets leading to advancements in program design and delivery. We noticed a number of themes and trends as we reviewed the exemplary programs. One influence has been the strengthening of federal lighting efficiency standards, which has reduced the amount of energy savings utilities may claim from lighting programs. As lighting's role in portfolios becomes smaller, programs are turning to other end uses, and savings from new technologies are growing.

Another important factor has been an increase in energy savings goals associated with state energy efficiency resource standards (EERSs). Programs are increasingly tailoring their offerings to comply with EERS policies. For example, they are deploying strategic energy management (SEM) to commercial and industrial customers; designing new construction programs to achieve deeper savings than ever before, up to and including net zero homes and buildings; and directing financial incentives upstream and midstream for greater impact on efficient water heating markets. As utilities develop emerging technologies from pilots into full-scale programs, they are offering products and equipment with higher energy efficiency in every industry and sector. One-size-fits-all programs are giving way to targeted designs that support every type of customer.

Our more specific observations include the following.

Strategic energy management (SEM) programs are demonstrating success in serving commercial and industrial customers. SEM establishes a commitment and internal structure within the customer's organization to identify and pursue energy efficiency improvements. AEP Ohio's Continuous Energy Improvement program and Puget Sound Energy's Commercial Strategic Energy Management program exemplify this approach.

Multifamily programs are proliferating and diversifying. ACEEE has previously documented the growth of multifamily programs, finding new ones in 22 of 51 metropolitan areas studied between 2011 and 2015 (Samarripas, York, and Ross 2017). Our report profiles several successful, cost-effective models providing both gas and electric measures, with services

including no-cost consulting, energy assessments, whole-building retrofits, direct-install measures, engineering and construction funding, and on-bill financing. Exemplary multifamily programs serve both market-rate and income-eligible customers.

Low-income programs reaching customers with high energy burdens are growing in importance. Energy burden is the percentage of household income that goes toward energy expenses (Drehobl and Ross 2016; Ross, Drehobl, and Stickles 2018). We received 19 low-income program nominations, more than in any other category, and, due to their strength, we recognized 8 of them. They include statewide comprehensive models, natural gas utility offerings, and programs that work with nonprofit organizations and local governments to serve low-income residents. Seven of the eight profiled programs have increased their spending over the past three years.

Lighting programs are deploying new designs and strategies. Traditional lighting programs that provide rebates to customers at the retail level are becoming less prominent. Programs are shifting to provide advanced lighting technologies through midstream and upstream delivery channels. They are also increasingly focusing on systems like networked lighting controls rather than on lamps and fixtures (King and Perry 2017). LED street lighting for municipal and utility customers is another noteworthy program category.

New construction programs are embarking on a path to net zero energy. A number of exemplary programs support the construction of ultra-low-energy buildings in both the commercial and residential sectors. Efficiency Vermont's High-Performance Homes program includes both net zero-ready options and a pathway to net zero modular homes for low- and moderate-income customers. Energy Trust of Oregon's Commercial New Buildings Path to Net Zero aims at reductions in energy use intensity of 70% relative to typical building goals.

Leading upstream- and midstream-focused programs leverage rebates in product distribution channels for greater market impact. For example, Efficiency Vermont's Heat Pump Water Heaters program provides rebates at retail, online, wholesale, and distributor levels, achieving market penetration of more than 29 times the national average on electric-to-electric conversions. The Mass Save C&I Natural Gas Water Heater Initiative provides financial incentives to distributors to maintain high-efficiency inventory, offer price discounts to customers, and educate the market. The initiative achieves more than 20 times the savings of equivalent customer mail-in rebate programs.

Utilities are partnering with a number of other entities. Collaborative program models include gas and electric utility partnerships, coordinated energy and water conservation, and work with local government entities and nonprofit organizations. Nonprofit Rising Sun Energy Center implements California Youth Energy Services (CYES) for PG&E. CYES engages with and is funded by cities, counties, water districts, nonprofit organizations, and a private foundation. In another program, SoCalGas and the Los Angeles Department of Water and Power have formed a partnership for rebate programs, direct install, outreach, and R&D coordination and delivery.

Programs increasingly target particular industry segments, customer subsectors, and technologies instead of relying on a one-size-fits-all design. We recognize a diverse set of six niche programs to illustrate programs tailored to specific market segments. For example, the PSE&G

Hospital Energy Efficiency program serves only a handful of large institutions a year with large capital-intensive projects that address the unique needs of healthcare facilities. The CenterPoint Energy Minnesota Foodservice program provides rebates and training each year to hundreds of trade allies and commercial, large-volume customers.

Conclusions

Electric and natural gas utility energy efficiency programs continue to deliver value in every customer segment year after year. Energy savings continue to grow, with resulting benefits for household and business cost savings, the environment, and the economy.

As policymakers increase energy savings targets and adopt more-stringent codes and standards over time, program developers and designers continue to innovate. Today's leading program implementers have been building on and incorporating utility industry lessons for more than 30 years. They have enhanced program approaches and marketing and introduced new generations of high-efficiency products and technologies while maintaining cost effectiveness and increasing savings.

This fourth national review of exemplary energy efficiency programs, like the first three, is an up-to-date resource for anyone interested in improving or expanding utility-sector energy efficiency programs. The exemplary programs profiled in this report include replicable models for success that can be adapted to suit most states and regions and various customer types and market sectors.

The professionals behind each of these exemplary programs have proven their commitment to serving customers, and their success shows in their performance results. We congratulate the individuals and organizations responsible for the programs selected, and we hope that the information here will be useful to others in the industry.

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Appendix A. Profiles of Exemplary Programs

SMALL COMMERCIAL

Commonwealth Edison (ComEd®), Energy Efficiency Program

PROGRAM AT A GLANCE

Implementation organization	Nexant, Inc.
State where offered	Illinois
Customer segment served	Commercial small business
Program start date / year established	2011
Annual energy savings (MWh net)	172,000 (2017)
Peak demand (summer) savings (MW net)	29
Budget	$46.3 million (2018), $44.0 million (2019)
Funding source	The ComEd Energy Efficiency Program is funded in compliance with state law
Website	www.comed.com/SmallBiz
Contact for program information	Lei Wang Program Manager Nexant, Inc. 630-480-8145 lwang@nexant.com Neal Latham Sr. Energy Efficiency Program Manager ComEd 630-437-2415 Neal.Latham@comed.com

The small business offering within the ComEd Energy Efficiency Program is a trade-ally-driven, prescriptive incentive approach for private businesses with less than 100 kW peak demand. Trade allies are responsible for finding customers interested in participating in the small business offering and performing free facility energy assessments to discover electric energy-saving opportunities eligible for incentives, including lighting, refrigeration, compressed air, HVAC, building envelope, and water-side measures. For each project, the trade ally provides the customer a report summarizing the findings of the assessment with incentives covering up to 75% of total labor and material cost.

Once the scope is agreed upon, the incentives are reserved and the trade ally installs the project. Incentive payments are delivered directly to the trade ally after the project is implemented and final paperwork is approved, and the customer is charged only the final cost (after incentives are applied). Incentive levels are strategically set and at times increased or decreased to achieve certain results, including increased savings, market penetration, or measure diversity.

Trade allies may partner with other companies both within and outside the network via subcontracting to ensure they are able to offer the customer a comprehensive project with the full suite of measures. Nexant project coordinators manage and support the trade ally

network by providing training and support, and answering both customer and trade ally questions as needed.

ComEd and Nexant support the trade allies through marketing campaigns, the creation of materials (including co-branded pieces), and continual guidance on proper promotion of the offering.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The small business offering has grown from a first-year savings goal in 2011 of 8,190 MWh to a 2018 goal of 172,006 MWh net savings per year. The small business offering has helped more than 32,000 customers complete more than 38,000 projects to achieve 738,010 MWh net savings since 2011, saving them over $70 million in first year energy costs alone. Customer and trade ally satisfaction scores are consistently at 90% or better.

Recent innovations:

- Developed a custom web-application to simplify project submissions for trade allies
- Piloted new technologies such as smart controls
- Streamlined business processing to achieve quicker rebate processing and payments
- Developed and launched a trade ally mentorship program to increase diverse participation
- Moved the market beyond lighting with 25% or more customer participation in non-lighting technologies
- Implemented numerous geo-targeted campaigns within underserved areas to increase customer participation
- Piloted a new online tool to connect small businesses with small business trade allies to schedule assessment appointments

LESSONS LEARNED

- Offer turnkey solutions to eliminate unnecessary burdens and obstacles for the customer, inform and enable trade allies, and scale to deliver significant impacts for the utility.
- Offer right-size incentives to ensure small businesses can afford to participate.
- Deliver incentive payments directly to the trade ally, avoiding higher upfront costs and simplifying the customer experience.
- Strive to develop strong partnerships with trade allies to help them grow and develop their offerings; ComEd's high level of service with its trade allies has contributed significantly to the offering's success. Trade allies are confident in the work they perform and the support they receive throughout the process.
- Drive market transformation through measure and customer segment focuses.
- Target outreach campaigns in under-participating communities.

PROGRAM PERFORMANCE

	2015 (PY7)	2016 (PY8)	2017 (PY9)*
Program spending	$44.9 million	$33.6 million	$67.4 million
Number of participants	9,800	5,124	9,024
Annual electric energy savings (MWh net)	173,705	153,724	256,465
Annual peak demand savings (MW)	29.37	23.68	35.55
Lifetime electric energy savings (MWh net)	2,084,460	1,844,688	3,104,892
Cost-effectiveness results, Total Resource Cost (TRC), electric	2.34	Under review	TBD
Most recent program evaluation www.ilsag.info/comed_eval_reports.html			

* PY9 was a 19-month program year.

Consumers Energy, Small Business Energy Efficiency Solutions

PROGRAM AT A GLANCE

Implementation organizations	DNV GL, Franklin Energy Services
State where offered	Michigan
Customer segment served	Small businesses and subsectors such as nonprofits and shelters with annual usage ≤ 400,000 kWh, 6,000 MCF
Program start date / year established	July 2009
Annual energy savings (MWh gross)	76,616
Peak demand (summer) savings (MW gross)	11.1
Other measures of program results	9.4 out of 10 customer satisfaction rating
Budget	$20 million (2017), $14 million (2018)
Funding source	Energy optimization fee in accordance with 2008 Public Act 295
Website	www.consumersenergy.com/business/energy-efficiency/small-business-solutions
Contact for program information	Chad Miller Small Business Energy Efficiency Program Manager Consumers Energy 517-513-1878 Chad.D.Miller@cmsenergy.com

The Consumers Energy Small Business Energy Efficiency Program serves a hard-to-reach market, helping to reduce the energy bills of businesses, nonprofits, and shelters with usage at or below 400,000 kWh and 6,000 MCF per year. The program consists of walk-through assessments, direct measure installation, and trade-ally-driven project participation at little or no cost to the customer. The program offers electric incentives for LED lighting, lighting controls, and refrigeration; and gas incentives for furnaces, water heaters, and boilers. The direct-install measures include programmable and smart thermostats, aerators, shower heads, pipe wraps, and vending misers.

DNV GL is the prime implementation contract holder, managing applications, trainings, pre-installation inspections, approval of applications, and post-inspection services. Franklin Energy provides field service support such as delivering onsite assessments and the direct installation of measures. In addition, they manage the trade ally networks to ensure execution and completion of the proposal delivery through project completion. EMI Consulting conducts third-party evaluation annually on process, impact, billing analysis, and customer satisfaction.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

This program serves as a replicable model with proven results of increased uptake of energy efficiency upgrades and high customer satisfaction in a difficult to reach market.

As a recipient of the 2017 Michigan Governor's Energy Excellence Award, the program has provided both high customer satisfaction (9.4 out of 10 per third-party EMI Consulting) and

energy savings for small businesses that normally do not have the opportunity to participate in energy efficiency programs.

In 2017, the program assisted 1,454 customers with $9.6 million of investment, saving them more than $4.4 million annually.

The program provides a holistic approach to energy efficiency for small business; participation is seamless from start to finish. Free assessments, direct-install measures, and education, as well as access to qualified trade ally contractors, make participation simple and enjoyable for participating small business owners and nonprofits.

LESSONS LEARNED

- Free energy assessments and direct installations provide the initial connection with the customer that provides increased education, current and future energy efficiency opportunities, and increase customer satisfaction with Consumers Energy.
- Updating outdated equipment and under-weatherized facilities provides substantial immediate and long-term energy savings that provide increased investment to their core business.
- Installing energy efficiency products also produces nonenergy benefits that businesses desire beyond energy savings, such as improved comfort in the workplace, increased employee efficiencies, enhanced aesthetics, and safety and security of occupants.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$14.4 million	$9.0 million	$19.8 million
Number of customers	7,179	15,665	20,018
Annual electric energy savings (MWh gross)	38,460	29,433	76,616
Annual peak demand savings (MW gross)	9.7	5.7	11.1
Annual gas energy savings (therms gross)	2,346,330	35,698	176,110
Lifetime electric energy savings (MWh net)	794,175	447,917	897,638
Lifetime gas energy savings (therms net)	19,000,440	286,160	2,152,453
Cost-effectiveness results, Utility Cost Test (UCT), electric	3.51	3.27	2.30
Cost-effectiveness results, UCT, gas	3.76	0.19	0.53
Most recent program evaluation	Contact Consumers Energy		

New Jersey Board of Public Utilities, Office of Clean Energy, Direct Install Program

PROGRAM AT A GLANCE

Implementation organization	TRC
State where offered	New Jersey
Customer segment served	Small to medium business (≤ 200 kW)
Program start date / year established	2009
Annual energy savings	30,000 MWH, 725,000 therms
Peak demand (summer) savings (MW)	6.35
Other measures of program results	> 40% of electric savings is non-lighting
Budget	$40 million (FY2018), $40 million (FY2019)
Funding source	Societal Benefits Charge
Website	www.njcleanenergy.com
Contact for program information	Kevin Rivera Program Manager TRC 732-855-2891 krivera@trcsolutions.com

Created specifically for existing small- to medium-sized facilities with demand of ≤ 200 kW, the Direct Install Program pays up to 70% of the project cost for replacing lighting, refrigeration, HVAC, and other outdated operational equipment with energy-efficient alternatives. In addition to small businesses, the program serves local government entities and nonprofit organizations.

The program provides turnkey services including technical assistance, financial incentives, and education to encourage the early replacement of existing equipment with high-efficiency alternatives. It strives to include a comprehensive package of cost-effective energy efficiency improvements in each customer's project. Some utilities have developed no-interest on-bill repayment financing options for the Direct Install Program and offer them to applicants in their service territories.

A variety of electric and natural gas systems are eligible for improvements including lighting and lighting controls, refrigeration, HVAC and HVAC controls, and variable speed drives and water conservation measures.

Direct Install participating contractors are assigned by county; customers can use their own contractor provided that they agree to the same terms as the participating contractors.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Unlike other direct-install programs, this program obtains more than 40% of the electric savings from non-lighting measures such as air-conditioning upgrades, refrigeration, and motors and VSDs. In addition, the program captures substantial gas savings through heating system upgrades, HVAC controls, and water heating improvements. The no-interest

on-bill repayment financing options offered by some of the utilities assist applicants with the program's out-of-pocket expenses.

LESSONS LEARNED

The program has evolved to allow more contractors to participate, which has reduced issues with contractors and expanded the reach of the program. To improve cost effectiveness, the program recently moved to a statewide procurement of equipment that has served to lower measure costs and allow for better $/kWh and $/therm saved values.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$25.7 million	$8.3 million	$19.5 million
Number of participants	714	345	552
Annual electric energy savings (MWh gross)	31,666	14,816	30,034
Annual peak demand savings (MW)	7.17	3.15	6.35
Annual gas energy savings (therms gross)	708,770	324,060	735,570
Lifetime electric energy savings (MWh gross)	464,360	222,758	449,131
Lifetime gas energy savings (MMtherms gross)	11.638	5.190	12.281
Cost-effectiveness results, Utility Cost Test (UCT), electric and gas combined	1.1	1.3	1.4
Most recent program evaluation www.njcleanenergy.com/files/file/Library/ERS Benchmark and Program Review_v3.pdf			

Xcel Energy, One-Stop Efficiency Shop® (One-Stop)

PROGRAM AT A GLANCE

Implementation organization	Center for Energy and Environment (CEE)
State where offered	Minnesota
Customer segment served	Xcel Energy Minnesota commercial accounts with demand ≤ 400 kW
Program start date / year established	2000
Annual energy savings (GWh)	669
Peak demand (summer) savings (MW)	149
Other measures of program results	19,308 participants $700 million lifetime savings (equipment lifetime 14 years) 96% participant satisfaction rate
Budget	$17.7 million (2017), $13 million (2018)
Funding source	MN Conservation Improvement Program/Xcel Energy
Website	www.mncee.org
Contact for program information	Kristen Funk Director of Commercial Programs Center for Energy and Environment 612-335-3487 kfunk@mncee.org

One-Stop is a full-service lighting and rooftop air-handling unit (RTU) upgrade program for the small business sector. Participants receive a free no-obligation audit, below-market-rate financing, and significant rebates. One-Stop serves Xcel Energy commercial accounts in Minnesota with a demand of 400 kW or less. Technical assistance and any required project oversight are available from program staff throughout the project.

Financing is available at below-market rate, including a 0% loan for nonprofits. Rebates are based on kW and kWh savings, which are calculated using actual operating hours and customer rates. Rebates are provided for up to 60% of the project cost. Historically, rebates were offered for lighting upgrades (electric). One-Stop recently added RTU upgrades (electric and gas) to its portfolio. They include RTU optimization, economizers, motors, RTU replacement, VFDs, and thermostats.

Xcel Energy sponsors One-Stop and the program is administered by CEE. In addition to providing general program oversight and coordination, Xcel Energy provides a qualified customer database, works with CEE staff to determine customer eligibility, and issues program rebate checks. CEE's responsibilities include providing audits and recommendations to business owners, serving as a liaison between business owners and their contractor, providing technical and program support to business owners and vendors, and generating all final paperwork and reporting.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

One-Stop is a full-service program offering small business owners start-to-finish oversight of their retrofit project. It includes

- Objective recommendations backed by the credibility of Xcel Energy
- Program software to design retrofits that are specifically tailored to meet the technical and financial needs of each individual customer
- Substantial incentives combined with convenient and attractive financing
- A simple, one-stop service that minimizes customer time requirements; education, financial, and program resources are brought directly to the customer
- Intensive marketing rooted in a sales mentality

Since the beginning of the program, One-Stop has completed 19,308 projects saving 149 MW and 669 GWh.

LESSONS LEARNED

Although accurate audits and incentives are a foundation of the program, marketing the program specifically to each customer is just as important. Staff does not assume that rebates and savings are enough to convince customers to participate. They work with the customer to identify their unique needs and explain how One-Stop can meet these needs.

Staff also build strong and lasting relationships with vendors. They are allies, but also program participants. Besides offering rebates, our goal is to serve as a technical and administrative resource so that vendors can provide their customers with a quality product and experience.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$13.5 million	$20.5 million	$17.7 million
Number of participants	1,970	2,618	2,549
Annual electric energy savings (MWh gross)	56,580	83,065	76,889
Annual peak demand savings (MW)	11	14.4	11.7
Lifetime electric energy savings (MWh gross)	1,244,760	1,204,448	1,142,570
Cost-effectiveness results, Utility Cost Test (UCT)	3.75	2.82	2.15
Most recent program evaluation www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={50677762-0000-CF1D-A3C1-7E905D7E3660}&documentTitle=20183-141546-01			

MEDIUM AND LARGE COMMERCIAL AND INDUSTRIAL

Bonneville Power Administration (BPA), Energy Smart Industrial

PROGRAM AT A GLANCE

Implementation organizations	Cascade Energy, Inc. (primary contractor), Evergreen Consulting (subcontractor)
States where offered	Washington, Oregon, Idaho, parts of Montana, Nevada, California, Wyoming
Customer segment served	Wholesale electric utilities (public power)
Program start date / year established	October 1, 2009
Annual energy savings (aMW)	17.9 (averaged October 2009 to September 2017)
Peak demand (summer) savings	N/A
Other measures of program results	117 of 124 BPA-served co-ops, municipalities, and public utility districts enrolled, representing over 99% of BPA-served industrial load Over 50 small/rural/residential (SRR) utilities have completed at least one ESI energy efficiency project In 2017, hosted 15 SEM peer group workshops throughout Pacific Northwest region Undergone one overall process evaluation, one CP impact evaluation, two SEM impact evaluations
Budget	$20.7 million (FY2017), $19.8 million (FY2018), $19.0 million (FY2019)*
Funding sources	BPA Energy Efficiency incentives, utility self-fund
Website	www.EnergySmartIndustrial.com
Contact for program information	Todd Amundson Acting Industrial Sector Lead Bonneville Power Administration 503-230-5491 tmamundson@bpa.gov

* BPA 2016–2021 Energy Efficiency Action Plan, figure 33, page 75.

The Bonneville Power Administration (BPA) Energy Smart Industrial (ESI) program supports 117 enrolled BPA electric retail utilities and their industrial customers, including water and wastewater municipalities. It offers incentives based on verified energy savings as well as prescriptive rebates.

ESI includes a broad portfolio of complementary program components targeted at diverse industrial end users, project types, sizes, and technologies. ESI's components include traditional "capital" or custom projects, SEM, small industrial (SI), and lighting. As BPA's contracted implementation program partners since 2009, Cascade Energy and Evergreen Consulting provide consistency to program participants. Implementers are supported by a regional pool of technical service providers.

ESI Custom Projects (CP) include 227 eligible efficiency measures, and individual projects feature BPA-approved measurement and verification (M&V) plans that provide a high-

degree of confidence in the reported savings. CP incentives pay up to $0.25 per kWh saved, with a cap of 70% of eligible project costs.

SEM provides a pathway for medium and large industries to achieve deeper savings through operations, maintenance, and behavior-based opportunities. SEM features two consecutive annual reporting periods, and verified savings are eligible for an annual incentive of $0.025/kWh.

SI and lighting components offer prescriptive rebates based on streamlined analysis tools.

In addition to rebates and incentives, ESI offers utilities and industries account planning, scoping studies, project assessments, M&V analysis, and SEM training. It also provides networking and marketing opportunities including quarterly utility focus group meetings, SEM cohort workshops, published case studies, and a Big Check Ceremony toolkit.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

ESI has achieved 1,399,000 MWh of verified energy savings, a 7.2% reduction in the region's industrial load. The 2015 impact evaluation identified a realization rate of 0.98, a benefit–cost ratio of 2.65, and 85% market penetration among BPA's top 100 industrial loads. Both utilities and industries have reported high levels of satisfaction, and the ESI program continues to improve M&V protocols while addressing safety, cost, and accuracy trade-offs. The program's Enhanced M&V Safety Policy and its *Monitoring, Targeting and Reporting Reference Guide* are available online.

LESSONS LEARNED

- It is important to maintain a proactive approach to improving program systems and processes. Many ESI program resources are publicly available and easily adaptable elsewhere.
- For data security, ESI deployed a SharePoint-based platform for secure document and data sharing and review.
- The water/wastewater and food processing industries require targeted support. ESI has dedicated sector specialists and a customized SEM training curriculum to serve them.
- Rural utilities need targeted offerings (e.g., SI and water/wastewater efforts) that address their needs.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$22 million	$23.0 million	$18.0 million
Number of participants	202	217	256
Annual electric energy savings (aMW/MWh gross)	16.61 / 145,490	20.61 / 180,569	18.73 / 164,106
Lifetime electric energy savings (aMW/MWh gross)	106.8 / 935,390	127.4 / 1,115,957	146.1 / 1,280,063
Cost-effectiveness results, Total Resource Cost (TRC)	5.3	6.8	7.0
Most recent program evaluation https://www.bpa.gov/EE/Utility/Evaluation/Evaluation/ESI_Process_Evaluation_2010-2011.pdf			

Focus on Energy/APTIM, Large Energy Users

PROGRAM AT A GLANCE

Implementation organizations	APTIM (program administration contractor), Leidos Engineering, LLC (program implementer), CleanTech Partners (program implementation subcontractor), Energy Performance Services (program implementation subcontractor)
State where offered	Wisconsin
Customer segment served	Commercial and industrial businesses that use more than 1 MW or 100,000 therms and more than $60,000 of energy in a typical month
Program start date / year established	April 1, 2012
Annual energy savings	138,432 MWh gross (2017), 8,449,980 therms gross (2017)
Peak demand (summer) savings (MW)	17.2 (2017)
Other measures of program results	Average TRC 5.48 (2015–2017), evaluated overall program satisfaction score 8.9 out of 10 in 2017
Budget	$18 million (2017), $18 million (2018)
Funding source	Eligible Wisconsin utility ratepayers
Website	focusonenergy.com/business/large-energy-users
Contact for program information	John Nicol Program Director Focus on Energy Leidos 608-819-9039 nicolj@leidos.com

Focus on Energy's Large Energy Users Program (LEUP) offers prescriptive and custom incentives for energy efficiency projects. It serves approximately 750 unique customers at 1,200 facilities. The customer base consists of manufacturers, healthcare networks, university campuses, and large commercial facilities. A customer is considered a *large energy user* if it has more than 1 MW peak demand or 100,000 therms of gas use per month and more than $60,000 of energy use in a typical month.

The program covers all gas and electric energy efficiency measures (standard and custom), including manufacturing processes, steam, compressed air, lighting, refrigeration, VFDs, process heat recovery, and a variety of industry-specific specialty measures. Custom incentive rates are $0.80/therm, $0.03/kWh ($0.02 for lighting), and $100/kW. Prescriptive incentive rates are organized by technology specific catalogs: Lighting, HVAC and Plumbing, Process Systems, Refrigeration, and Commercial Kitchen Equipment.

LEUP also provides technical assistance, study incentives, application assistance, and energy team facilitation. Special strategies—such as SEM, competitive incentive RFPs, or retrocommissioning incentives—are frequently used to meet evolving customer needs and expand on the base program offerings.

LEUP supports customer energy efficiency projects by deploying 14 customer-designated energy advisors and six subject matter experts. These field staff work directly with utility account managers and trade allies during implementation of customer projects. A centralized technical review team handles the detailed incentive processing and engineering review.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

LEUP has achieved high levels of participation, repeat year-to-year participation, customer satisfaction, and cost effectiveness. The inclusion of SEM as part of regular customer engagement provides unique value to LEUP customers by supporting their proactive energy management and the implementation of long-term operational and behavioral energy savings.

LESSONS LEARNED

Keep things simple for the customers. Minimizing barriers to participation through program design builds trust in a program. Two factors contribute to this overarching goal:

- One-on-one customer relationships with energy advisors. A designated EA serves as the customer's primary point of contact, eliminating confusion when navigating the various program offerings and providing unbiased energy efficiency and industry expertise.
- A well-integrated implementation team. Whether it be a single implementer or a highly communicative team, the ability to present a seamless and unified front to customers reduces confusion, delays, and builds trust during outreach activities.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$18.2 million	$16.5 million	$15.8 million
Number of customers	422	368	386
Annual electric energy savings (MWh gross)	159,969	130,760	138,432
Annual peak demand savings (MW)	21.1	15.0	17.2
Annual gas energy savings (therms gross)	14,718,783	13,896,333	8,449,980
Lifetime electric energy savings (MWh gross)	2,526,960	1,768,582	2,233,657
Lifetime gas energy savings (therms gross)	206,852,066	201,477,193	144,988,131
Cost-effectiveness results, Total Resource Cost (TRC)	5.14	4.54	6.76
Most recent program evaluation focusonenergy.com/evaluation-reports			

STRATEGIC ENERGY MANAGEMENT

AEP Ohio, Continuous Energy Improvement (CEI)

PROGRAM AT A GLANCE

Implementation organization	AEP Ohio
State where offered	Ohio
Customer segment served	Commercial and industrial
Program start date / year established	2013
Annual energy savings (MWh)	25,000 (2017)
Peak demand (summer) savings (kW)	3,400
Other measures of program results	25% increase in capital projects
Budget for most recent year	$2 million
Funding source	AEP Ohio EE/PDR rider
Website	www.aepohio.com/save/business/
Contact for program information	Michelle Cross Principal Engineer AEP Ohio 330-438-7028 mcross@aep.com

AEP Ohio offers the Continuous Energy Improvement (CEI) program to its commercial and industrial customers who use a minimum of 3 million kWh annually. These include manufacturing facilities, commercial facilities, distribution centers, data centers, colleges, hospitals, mining operations, and municipal waste and clean water processing facilities.

CEI offers technical assistance through audits and engineering calculations, as well as via workshops, peer teaching, and reinforcement. The program uses a customer-centered cohort model. A typical cohort of 10–15 companies meets quarterly in interactive workshops over a one-year period. Along with the incentives, these services support program participants in developing a company culture that emphasizes sustainable energy efficiency.

Resulting improvements include leak repair on compressor systems, turning equipment off during idle periods, scheduling optimization for operational equipment, temperature set-point reductions, motor control adjustments, sensor repairs, lighting reductions during unoccupied periods, and chiller optimization to tailor set points to seasonal requirements.

CEI offers an easy-to-use energy model and the reward of a per-kWh incentive. The energy model incorporates a linear regression formula that provides a direct comparison to a participant's two-year baseline. The company pays an incentive of $0.02 per kWh saved through no- and low-cost energy efficiency improvements relative to the baseline.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Program managers used new measurement and verification tools to claim nearly 3.4 MW in peak savings last year. The greatest asset of the program for the utility is the ability to improve the customer experience and establish AEP Ohio as the customers' trusted energy

advisor. Most customers opt to continue the program once they have completed their first year; some are now in their fourth year.

LESSONS LEARNED

As CEI has matured, new participants have lower baseline energy use and less internal engineering/energy expertise. Maintaining momentum among long-term participants has also been challenging as teams turn over. To meet these challenges, coaches now develop mature teams into mentors for newcomers, which reinforces efficiency culture in mature participants and better supports newcomers.

Peak demand has become an increasing priority at AEP Ohio, including in CEI. Dedicated workshops and tools have helped participants better understand their own loads, accelerating energy and demand savings.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$1.2 million	$2.9 million	$1.8 million
Number of customers	38	52	22
Annual electric energy savings, (GWh net)	14.7	55.9	25
Annual peak demand savings, kW	0	1,700	3,400
Cost-effectiveness results, Utility Cost Test (UCT)	1.8	2.1	2.3
Most recent program evaluation dis.puc.state.oh.us/TiffToPDf/A1001001A18E15B41223B03501.pdf			

Puget Sound Energy, Commercial Strategic Energy Management

PROGRAM AT A GLANCE

Implementation organization	Puget Sound Energy Building Performance Team
State where offered	Washington
Customer segment served	Commercial
Year established	2003
Annual energy savings	12,000 MWh, 500,000 therms
Budget for most recent year	$2 million
Funding source	Conservation rider
Website	pse.com/savingsandenergycenter/ForBusinesses/energy-management-programs/Pages/commercial-strategic-energy-management.aspx
Contact for program information	Jessica Raker Supervising Energy Management Engineer Business Energy Management 425-424-6840 Jessica.raker@pse.com

Through the Commercial Strategic Energy Management (CSEM) program, PSE works with customers to identify and address savings opportunities through whole-building energy analysis using utility bills and interval data, as well as careful documentation of conservation efforts. The program provides financial incentives to encourage these actions.

GOALS

- Identify operational and behavioral energy-saving opportunities for customers with high energy use facilities
- Establish SEM continuous improvement practices and initiatives
- Implement on-going operational and behavioral programs to reduce energy consumption
- Document energy savings from customer programs

SERVICES

- *Building walkthroughs* for up to three customer facilities at no cost to the customer
- S*tart-up grant*s to establish CSEM programs
- *Performance-based financial incentives* to reward achieved savings
- An *annual training allowance* to support on-going skill building in resource conservation management
- *Resource accounting software* to track energy consumption along with other resources such as water, sewer, and waste
- *Bimonthly training opportunities* on best practices hosted by PSE

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Over the past 15 years, PSE has worked with more than 75 customers through the CSEM program, analyzing the performance of more than 1,000 customer sites and saving more than 10,000 MWh every year. Customers are enthusiastic about the program; some have

participated for 10 years running. The program has evolved based on evaluator and customer feedback to include a pay-for-performance component; it has also developed an in-house software tool that is now available to all commercial customers for tracking energy consumption.

LESSONS LEARNED

Strong customer relationships are one of the benefits of the CSEM program and are essential to its success. Relationship-based approaches result in higher levels of engagement and savings than self-serve and data-focused options.

Providing an array of program benefits, including training opportunities, helps to make the business case for the program across a broader audience than would be possible with financial incentives alone.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$2.4 million	$1.6 million	$1.5 million
Number of participants	44	48	49
Annual electric energy savings (MWh net)	11,707	12,982	12,962
Annual gas energy savings (therms net)	777,294	861,734	676,636
Cumulative first year electric energy savings (MWh net since 2012)			74,952
Cumulative first year gas energy savings (MMtherms net since 2012)			5,261,520
Cost-effectiveness results, Utility Cost Test (UCT), electric	1.16	1.51	2.23
Cost-effectiveness results, UCT, gas	1.98	2.41	2.8
Most recent program evaluation conduitnw.org/pages/file.aspx?rid=4525			

RESIDENTIAL COMPREHENSIVE RETROFIT

Eversource, Home Energy Services

PROGRAM AT A GLANCE

Implementation organization	Eversource
State where offered	Massachusetts
Customer segment served	Residential
Program start date / year established	2010
Annual energy savings (2017)	38,204 (net MWh) 827,516 (net therms)
Peak demand (summer) savings	6 MW
Budget (gas and electric)	$69.9 million (2017), $73.8 million (2018)
Funding source	Energy efficiency charge on utility customer gas and electric bills through Mass Save program
Website	www.eversource.com/content/ema-c/residential
Contact for program information	Katelyn Mazuera Residential Supervisor Eversource Energy 781-441-3903 Katelyn.Mazuera@eversource.com

Eversource's Home Energy Services (HES) Program provides in-home energy assessments, turnkey weatherization solutions to residential market-rate customers occupying one- to four-family residences.[4] Taking a fuel-blind approach, the program offers energy-saving products and incentives to decrease plug load, address thermal boundary inefficiencies, and upgrade residential mechanical equipment. In addition to the standard services and incentives offered, HES includes enhanced incentives for renters and moderate-income customers as defined by customers falling within 60–80% of the state median income.

HES offers financial incentives and 0% financing to help homeowners and renters retrofit their existing homes with cost-effective energy-efficient measures. Executable work contracts are provided to customers during the in-home visit, and a participating contractor coordinates the installation of the work. HES also provides a quality-control visit after work installation to ensure that the installation meets program standards.

The program examines all end uses, regardless of heating fuel used. Efficiency measures include air sealing, insulation, duct sealing, duct insulation, boiler reset controls, heating and hot-water equipment, water-saving devices (including faucet aerators), and efficient showerheads, thermostats, LEDs, refrigerators, clothes washers, and advanced power strips; the measures also include incentives for certain pre-weatherization barrier mitigation.

Financial incentives include the no-cost energy assessment; no-cost installation of products such as LED bulbs, faucet aerators, and advanced power strips; instant insulation incentives

[4] HES is also available through other Massachusetts program administrators as part of Mass Save®.

of up to 75% of the project costs; no-cost air sealing; and rebates ranging from $150–3,250 for additional equipment and appliances.

The HES Program provides services through a competitively procured Lead Implementation Vendor delivery model. More than 100 contractors participate to provide home energy assessments, insulation installation services, or both to customers. The program works with a network of more than 500 HVAC trade allies.

The HES Program is marketed in several ways including radio, digital, social, direct mail, direct email, bill inserts, public relations and community events, and through partnerships with trade allies. The HES Program is promoted under the Mass Save® brand, which is an initiative sponsored by Eversource, Berkshire Gas, Blackstone Gas Company, Cape Light Compact, Columbia Gas of Massachusetts, Liberty Utilities, National Grid, and Unitil.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

By providing its customers with exemplary customer service, turnkey weatherization solutions, and new cost-effective, energy-saving technologies and delivery solutions, Eversource's HES program has

- Provided home energy assessments to more than 100,000 customers over the past four years
- Saved enough electricity in 2016 to power 5,955 homes for the year and enough gas to create greenhouse gas emissions reductions equivalent to taking 1,062 cars off the road for the year
- Produced 1.2 million MWh net lifetime electric savings and 52 million therm net lifetime gas savings between 2014 and 2016
- Produced cost-effective energy savings with a benefit–cost ratio of 4.70 in the electric program between 2014 and 2016 and 2.15 in the gas program between 2014 and 2016
- Produced air sealing participant spillover of 8% and non-participant spillover of 28%; insulation participant spillover of 20% and non-participant spillover of 28%.

LESSONS LEARNED

Eversource's HES Program adheres to rigid customer service standards that include quality-assurance and quality-control reviews. Eversource keeps open communication channels with participating contractors, tracks and reviews customer feedback, and analyzes data to determine trends and areas for program improvement. Data insights inform decisions and various hypotheses are tested with trials to learn the best strategies for implementation and to overcome potential barriers for large-scale rollout.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending, electric	$39 million	$34 million	$33 million
Program spending, gas	$12 million	$11 million	$12 million
Number of home energy assessments	30,209	23,243	22,326
Annual electric energy savings (MWh net)	51,629	42,997	38,204
Annual peak demand savings (MW)	7	6	6
Annual gas energy savings (therms net)	1,047,062	864,974	827,516
Lifetime electric energy savings (MWh net)	528,804	363,963	296,918
Lifetime gas energy savings (therms net)	18,983,173	16,691,741	15,244,712
Cost-effectiveness results, Total Resource Cost (TRC), electric	5.87	3.24	3.27
Cost-effectiveness results, TRC, gas	2.24	2.03	1.95
Most recent program evaluation ma-eeac.org/wordpress/wp-content/uploads/Home-Energy-Services-Impact-Evaluation-Report_Part-of-the-Massachusetts-2011-Residential-Retrofit-and-Low-Income-Program-Area-Evaluation.pdf			

Southwestern Electric Power Company, Home Performance with Energy Star

PROGRAM AT A GLANCE

Implementation organization	CLEAResult Consulting, Inc.
State where offered	Arkansas
Customer segment served	Residential
Program start date / year established	2012
Annual energy savings (MWh net)	5,908 (2017)
Peak demand (summer) savings (kW)	2,133 (2017)
Budget	$3 million (2018)
Funding source	Ratepayer funded by customers of Southwestern Electric Power Company per directive from Arkansas Public Service Commission
Website	www.swepcogridsmart.com/arkansas/home-performance-energy-star.html
Contact for program information	Kent Tomlinson Energy Efficiency Coordinator/Consumer Programs Southwestern Electric Power Company 479-973-2442 kbtomlinson@aep.com

The HPwES weatherization program focuses on residential energy efficiency. It offers a comprehensive energy assessment and report, attic and wall insulation, duct and air sealing, and direct-install measures. Customer eligibility depends on the inefficiency of the home. To qualify, the home must have been occupied for the previous 12 months and be at least 10 years old or have a monthly energy bill that exceeds 10 cents per square foot of conditioned space. While not focused on income eligibility, HPwES has evolved into a no-cost program. Many participants are senior citizens and customers in the LMI bracket.

With the help of its implementer, CLEAResult Consulting, Inc., SWEPCO partners with Black Hills Energy Arkansas (BHEA), a local gas utility, to provide these services using common contractors, a common online portal for contractor document uploads, and quality-assurance staff.

The program focuses on contractor training and customer education in addition to the technical processes. SWEPCO has used an integrated marketing campaign to increase awareness within its customer base.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The goals for SWEPCO's HPwES program have continually increased, with the 2017 energy goal reaching 6.1 GWh and a demand goal of 1,340 kilowatts (kW). The 2017 program budget was $2,950,000, which included incentives of $1,960,000. The program was able to upgrade 1,826 single-family homes in PY2017. The program achieved five-year cumulative savings of 15,377,609 kW and 6.7 MW and saw an increase in the TRC from 0.48 for PY2012 to 4.0 for PY2017. The EM&V customer satisfaction score for PY2017 was 95%.

The process was replicated into the multifamily market resulting in 1,318 apartments upgraded during PY2017.

LESSONS LEARNED

- Creating a customer experience where multiple utilities work seamlessly to reduce the number of visits to the home improves both customer and contractor satisfaction. This also results in increased profits to the contractor.
- The annual RFQ process, monthly contractors scorecard, territory allotments for contractors, common portal for document uploads, and joint training events provide a seamless contractor process. This has enhanced the customer experience by allowing a single contractor visit and a single quality-assurance visit to cover both utilities.
- Monthly contractor allotments aid in keeping contractors engaged year-round while providing a higher level of program consistency and availability for customers.
- Training and field mentoring of contractors help them to improve their processes. The resulting deeper savings not only add to the contractor incentive but increase customer satisfaction.
- A strong quality-assurance/quality-control process helps the program and the contractors, especially if conducted with contractors onsite.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$1.2 million	$2.9 million	$2.9 million
Number of participants	1,578	1,997	1,826
Annual electric energy savings (MWh net)	1,900	5,700	5,907
Annual peak demand savings (MW)	1.076	2.491	2.133
Lifetime electric energy savings (MWh net)	29,853	93,860	96,307
Cost-effectiveness results, Utility Cost Test (UCT)	2.10	2.53	2.93
Most recent program evaluation www.apscservices.info/EEInfo/EEReports/SWEPCO 2017.pdf			

New Hampshire Utilities: Eversource (Electric), Liberty Utilities (Electric and Natural Gas), New Hampshire Electric Cooperative (Electric), Unitil Energy Systems (Electric), Northern Utilities (Natural Gas), NHSaves Home Performance with Energy Star

PROGRAM AT A GLANCE

Implementation organizations	New Hampshire utilities
State where offered	New Hampshire
Customer segment served	Residential high use
Program start date / year established	2002
Annual energy savings, electric, natural gas, and fuel neutral combined (MMBtu)	20,418 (2017)
Budget	$2.4 million (2017), $4.3 million (2018)
Funding sources	Utility System Benefits Charge (electric), ISO-NE Forward Capacity Market (electric), Regional Greenhouse Gas Initiative Allowance proceeds (electric), Local Distribution Adjustment charge (natural gas)
Website	www.nhsaves.com
Contact for program information	Kate Peters Supervisor Eversource Energy 603-634-3112 katherine.peters@eversource.com

The HPwES program is a fuel-neutral weatherization program offered to both electric and natural gas customers. It serves existing single-family and multifamily housing customers. HPwES targets residences with high heating energy use per square foot. Using a whole-house approach, it helps residents move forward with comprehensive weatherization projects.

HPwES uses a streamlined whole-house approach from energy audit through installation and inspection. A low-cost energy audit results in comprehensive recommendations for cost-effective measures. Incentives and low-interest financing encourage and assist the resident to move forward. Measures include air sealing, insulation, high-efficiency lighting, low-flow showerheads, faucet aerators, programmable and/or Wi-Fi thermostats, hot-water pipe insulation, duct sealing, refrigerator replacements, hot-water temperature setback, a variety of health and safety measures, and end-of-life heating system replacement.

Participating customers can receive approximately 50% of the cost of weatherization services up to $4,000. Additional incentives beyond the $4,000 cap are available for high-efficiency oil, propane, and natural gas space and water heating if those customers are implementing weatherization. Interest rate buy-downs provide access to 2% loans from local lenders and revolving loan funds provide access to on-bill financing.

The NH Utilities are the program administrators and work directly with a network of more than 20 local weatherization contractors to implement the program. Participating contractors must be qualified. They must hold Building Performance Institute certification and undergo quality-assurance review.

Word-of-mouth referrals, customer service referrals, contractor-initiated marketing, community partnerships, and utility marketing are the main marketing channels to drive program awareness and customer leads.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

An easy-to-use home heating index tool identifies homes with high energy use per square foot. Meaningful incentives, streamlined contractor relationships, and access to low-interest financing contribute to high completion rates and significant energy savings. The fuel-neutral nature of the program means that customers save on all of their energy use, including oil, propane, and wood heating fuels. The program leverages limited funding to achieve high-impact, cost-effective energy efficiency projects.

LESSONS LEARNED

Two of the barriers faced by residential retrofit programs are closure rates for customers that move forward after getting an audit and achieving comprehensive jobs with limited funding. The HPwES program focus on high energy use homes helps to ensure program funds are focused on motivated customers that have potential for energy savings and are likely to move forward. The simple-to-understand rebate structure at a meaningful 50% of cost, combined with financing options, helps to encourage customers to move forward with a comprehensive project. The program delivery mechanism makes it easy for customers to participate because the contractor can provide all services from audit through implementation of the measures.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$3.9 million	$2.8 million	$2.4 million
Number of participants	3,077	1,423	654
Annual electric energy savings (MWh adjusted gross)	1,936	868	512
Annual gas energy savings (MMBtu adjusted gross)	19,779	14,960	4,512
Lifetime electric energy savings (MWh adjusted gross)	37,425	18,555	8,846
Lifetime gas energy savings (MMBtu adjusted gross)	423,070	333,435	97,043
Annual fuel-neutral savings (MMBtu adjusted gross)	19,517	16,313	14,164
Lifetime fuel-neutral savings (MMBtu adjusted gross)	400,966	344,267	282,242
Cost-effectiveness results, Total Resource Cost (TRC), electric	1.45–1.72	1.17–1.64	1.33–1.8
Cost-effectiveness results, TRC, gas	1.05–1.14	1.24–2.23	1.23–1.36
Most recent program evaluations www.puc.state.nh.us/Electric/Monitoring and Evaluation Reports/124 NH HPwES Impact Evaluation Report June 13 2011.pdf www.puc.state.nh.us/Electric/Monitoring and Evaluation Reports/124 NH HPwES Process Evaluation Report June 13 2011.pdf New evaluation in process during 2018			

Oklahoma Gas and Electric (OG&E), Arkansas Oklahoma Gas Corp. (AOG), OG&E, and AOG Joint Weatherization Program

PROGRAM AT A GLANCE

Implementation organizations	DK Construction, Williams Energy, Total Home Efficiency
State where offered	Arkansas
Customer segment served	Residential
Program start date / year established	2011
Annual energy savings (net)	4,593 MWh, 291,031 therms (2017)
Peak demand (summer) savings (MW net)	1.17 (2017)
Other measures of program results	Net Promoter Score 74.4
Budget	OG&E: $2.7 million (2017), $2.7 million (2018) AOG: $1.5 million (2017), $1.5 million (2018)
Funding source	Arkansas Public Service Commission approved bill rider
Websites	www.oge.com/, www.aogc.com/
Contact for program information	Dean Pollock Sr. Manager, Customer Programs & Support Oklahoma Gas and Electric Co. 405-553-3846 pollocbd@oge.com Fred Kirkwood Sr. Vice President of Customer Development Arkansas Oklahoma Gas Corp 479-783-3187 fkirkwood@aogc.com

The Joint Weatherization Program is designed for residential customers who own, rent, or lease their home. The program weatherizes single-family homes, duplexes, and town homes. It is a custom program with no upfront costs to the participant. The delivery approach is a home audit/inspection to determine the mix of cost-effective measures followed by implementation by contractors trained in home weatherization.

Services offered include improvement of thermal envelope, furnace tunes, and lighting upgrades. Electric and gas measures include but are not limited to attic and duct insulation, air infiltration, window sealing/caulking, low-flow showerheads, faucet aerators, and water heater tank and pipe insulation. Electric-only measures include lighting retrofits with LEDs. Gas-only measures include furnace tune-ups.

The contractors use EnerTrek, an online database and modeling tool supported by Frontier Associates. EnerTrek is used to record contractor measure inputs for each home and calculates actual kW and kWh savings by measure.

The program markets services through bill stuffers, mail outs, radio, and word of mouth.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

This program takes advantage of the service territory overlap of OG&E (electric) and AOG (natural gas). The joint program eliminates duplication of services, reduces marketing, implementation, and administrative costs, and results in simpler and less time-consuming scheduling for the customer. The program has consistently produced high customer satisfaction ratings with a four-year mean score of 9.4 on a scale of 1–10, with 10 being most satisfied.

LESSONS LEARNED

The collaboration between the companies has delivered better and cheaper home energy efficiency than could have been achieved with separate programs. Determining the right mix of measures and prioritizing them based on cost effectiveness using a savings to investment ratio have ensured the continued success of the program for both utilities. The use of a single software program is essential for transparent scheduling, measure calculation, and payment processing. Contractor training is key to consistent service and implementation.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending			
OG&E	$2.2 million	$2.4 million	$2.7 million
AOG	$1.6 million	$1.5 million	$1.5 million
Number of households			
OG&E	1,325	1,578	1,662
AOG	1,005	1,049	1,149
Annual electric energy savings, OG&E (MWh net)	3,058	3,962	4,593
Annual peak demand savings, OG&E (MW net)	0.95	1.05	1.17
Annual gas energy savings, AOG (therms net)	218,078	196,409	291,031
Lifetime electric energy savings, OG&E (MWh net)	45,393	57,847	76,496
Lifetime gas energy savings, AOG (MMtherms net)	3.48	3.21	4.97
Cost-effectiveness results, OG&E, Total Resource Cost (TRC), electric	1.70	2.72	3.29
Cost-effectiveness results, AOG, TRC, gas	1.88	2.06	2.26
Most recent program evaluations OG&E: www.apscservices.info/EEInfo/EEReports/OG&E 2017.pdf AOG: www.apscservices.info/EEInfo/EEReports/AOG 2017.pdf			

RESIDENTIAL MISCELLANEOUS

Efficiency Vermont, Heat Pump Water Heaters

PROGRAM AT A GLANCE

Implementation organizations	VEIC, implementing Efficiency Vermont; Burlington Electric Department
State where offered	Vermont
Customer segment served	All Vermont customer-ratepayers (except those replacing natural gas water heaters), new construction, existing homes
Program start date / year established	November 1, 2013
Annual energy savings (MWh gross)	2,257 (2017)
Peak demand (summer) savings (MW gross)	0.357 (2017)
Other measures of program results	Supported installation of 7,800 heat pump water heaters since fall 2013, nearly 60% market penetration on electric-to-electric conversions (more than 2,900% above the national average), $10 million lifetime total resource benefits (water, electricity, and fuel savings)
Budget	$1.5 million (2017), $1.9 million (2018)
Funding source	Energy Efficiency Charge, a system benefits charge on utility bills (supports electric energy efficiency) Revenue from market participation as a demand resources provider to ISO New England's Forward Capacity Market (supports heating and process fuels efficiency) Revenue from Vermont's share of the cap-and-invest program, the Regional Greenhouse Gas Initiative (supports heating and process fuels efficiency)
Website	www.efficiencyvermont.com/rebates/list/heat-pump-water-heaters
Contact for program information	Jake Marin Program Manager Efficiency Vermont 802-540-7700 JMarin@efficiencyvermont.com

The Heat Pump Water Heater (HPWH) Program is open to Vermont customer-ratepayers who wish to replace an existing water heater (other than natural gas) with an electric heat pump water heater. Equipment must be ENERGY-STAR-certified and meet the Northwest Energy Efficiency Alliance's Advanced Water Heater Specification (AWHS). The program covers new construction and existing homes.

HPWH has three elements: retail and online prescriptive rebates, instant rebate incentives for wholesalers/distributors (with a 100% pass-through requirement to customers for units sold), and an administrative payment to wholesalers/distributors collecting basic customer data. Incentives are $300 for an HPWH that meets AWHS Tier 1 or Tier 2 and $500 for an HPWH that meets AWHS Tier 3. Payments of $50 are made to wholesalers/distributors who collect customer information for midstream instant rebates.

Efficiency Vermont and Burlington Electric Department, the state's two energy efficiency utilities, implement the program. Efficiency Vermont has longstanding relationships with retailers and wholesalers/distributors. A sponsored HPWH contractor trade group (new in 2018) helps contractor-members of the Efficiency Excellence Network (EEN) of trade allies.

For marketing, HPWH uses the EEN and distribute point-of-sale collateral at retailers, and it also uses

- Digital content marketing via social media, e-newsletters, and blogs that offer education, benefits, and customer stories
- Acquisition and cross-sell direct-response campaigns that target customers via energy use data, demographic data, propensity scoring, and post-purchase cross promotion of other programs
- Digital advertising that targets "moments that matter" (e.g., water heater failure)
- Workshops, events, and campaigns that engage the community

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Features

- AWHS exceeds ENERGY STAR standards
- High performance in cold climates
- Instant midstream rebate reduces customer costs
- Immediate, durable energy savings
- Energy storage capability (grid resource)

Accomplishments

- 7,800 installed HPWHs since 2013; Vermont now has one of the highest uptake rates of HPWH technology, as a percentage of total water heater volume, in North America.
- Nearly 60% market penetration on electric-to-electric conversions, which is upward of 2,900% above national average.
- Energy Trust of Oregon, NEEA's Hot Water Solutions, AEP-Ohio, Puget Sound Energy, and NYSERDA have adopted the model.

Innovation

1. AWHS tiers help utilities align incentives with evolving technology.
2. Distributor bonuses for collecting customer data eliminates retail-level rebate challenges.

LESSONS LEARNED

- Midstream point-of-purchase discounts reduce up-front barriers
- Supplier relationships inform successful approaches to other midstream actors:
    - Increased HPWH inventory, historically dominated by emergency replacements
    - Decreased suppliers' HPWH inventory investment by increasing market demand

    - Rapid reimbursement of incentives to distributors solidified trust
- Post-installation follow-up with customers ensured contractor accountability on passed-through incentives and ratepayer understanding of Efficiency Vermont's role
- Optimizing data collection requirements on distributors enhanced participation

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$1.3 million	$1.1 million	$1.2 million
Number of participants	2,135	2,106	1,707
Annual electric energy savings (MWh gross)	2,359	2,310	2,257
Annual peak demand savings (MW)	0.349	0.355	0.357
Annual gas energy savings (therms gross)	6,600	7,266	6,428
Lifetime electric energy savings (MWh gross)	30,586	29,977	29,338
Lifetime gas energy savings (MMtherms gross)	85,801	94,456	83,568
Cost-effectiveness results, Societal Cost Test (SCT) for 3-year portfolio, electric		1.15	
Cost-effectiveness results, SCT for 3-year portfolio, gas		8.02	
Most recent program evaluation www.efficiencyvermont.com/Media/Default/docs/plans-reports-highlights/2017/efficiency-vermont-savings-claim-summary-2017.pdf			

Entergy Arkansas, Entergy Solutions Manufactured Homes Program

PROGRAM AT A GLANCE

Implementation organization	ICF
State where offered	Arkansas
Customer segment served	Residents of manufactured homes, owners/managers of manufactured home parks
Program start date / year established	2012
Annual energy savings (MWh net)	4.690 (2017)
Peak demand (summer) savings (MW net)	1.08 (2017)
Budget	$1.1 million (2017), $1.1 million (2018), $1.1 million (2019)
Funding source	Entergy Arkansas Energy Efficiency Recovery rider
Website	www.entergy-arkansas.com/your_home/save_money/EE/manufactured.aspx
Contact for program information	Heather Hendrickson Project Manager, Energy Efficiency Entergy Arkansas 501-377-3551 hheath@entergy.com

From light bulbs to duct sealing, the Entergy Solutions for Manufactured Homes Program installs energy-saving products for manufactured homeowners and residents. It is targeted to all residential customers in manufactured homes within the Entergy Arkansas service territory. There are no income guidelines required for participation.

Beginning in 2012, the program offered level 1 audits and no-direct-cost installation of energy efficiency measures to residents living in manufactured housing. The energy efficiency measures included CFLs, high-efficiency showerheads, aerators, and advanced power strips. The program expanded in 2015 to incorporate more comprehensive weatherization measures such as duct sealing, air sealing, and A/C tune-ups. (Duct sealing for manufactured homes achieves greater savings, given that the duct work is outside of the conditioned space.) With this expansion, the program became trade ally driven. For duct sealing and air sealing, incentives are paid to trade allies based upon the kWh saved, not a flat amount.

For customers requesting direct-install measures, ICF staff conducts a level 1 audit to provide information on recommended energy efficiency upgrades, and weatherization measures installed for little or no direct costs to participants.

Many customers in the manufactured home segment speak Spanish, so program marketing collateral is printed in both English and Spanish. Radio talk show time on Hispanic stations is purchased to inform and engage customers. A Refer-A-Friend campaign for every qualified referral increases customer participation.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The program delivers both immediate and long-term kWh savings. It achieves significant participation in a hard-to-reach customer segment, providing immediate energy and cost benefits to customers. An Entergy study showed that 37% of the 2017 program participants were low-income.

In 2016, 100% of tenants and property owners who participated reported either very high or extremely high satisfaction with the program.

The program has expanded from achieving 625,613 kWh in 2013 to 4,690,095 in 2017. When comprehensive weatherization measures were implemented, the cost effectiveness increased from 0.42 TRC in 2013 to 8.56 in 2017. Program costs decreased from $0.202/kWh in 2014 to $0.01/kWh in 2017.

By employing bilingual ICF account managers and utilizing marketing that appeals to Hispanic residents of manufactured homes in Entergy territory, the program successfully overcomes a major barrier.

Program measures are constantly reviewed, and new measures are incorporated when deemed cost effective.

LESSONS LEARNED

Employment of bilingual managers and materials printed in both Spanish and English are needed to implement the program because a majority of potential participants speak only Spanish.

The program incentive and payment structure help to overcome the initial cost and split-incentives barriers. Payments to duct-sealing and air-sealing trade allies based on kWh savings encourage weatherization on the most challenging homes.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$872,388	$810,080	$1.0 million
Number of participants	687	174	641
Annual electric energy savings (MWh net)	685	1,621	4,690
Annual peak demand savings (MW)	0.084	0.192	1.083
Lifetime electric energy savings (MWh net)	6,495	27,218	74,732
Cost-effectiveness results, Total Resource Cost (TRC)	0.32	2.83	8.56
Most recent program evaluation www.apscservices.info/(X(1)S(efktp35gbzi4e1xlb4jvtrge))/eeAnnualReports.aspx?AspxAutoDetectCookieSupport=1			

CenterPoint Energy (CPE), Xcel Energy (XE), Home Energy Squad (HES)

PROGRAM AT A GLANCE

Implementation organization	Center for Energy and Environment
State where offered	Minnesota (Xcel Energy also offers HES in Colorado)
Customer segment served	Residential
Program start date / year established	2010
Annual energy savings	CPE gas: 127,580 gross therms (2017) XE gas: 86,000 gross therms (2017) XE electric: 4,822,301 net gen kWh (2017)
Peak demand (summer) savings (MW)	0.623
Other measures of program results	Societal Score (2017): 2.36 XE electric, 1.64 XE gas, 0.44 CPE gas
Budget	XE electric: $863,079 (2017) XE gas: $1.3 million (2017) CPE: $2 million (2017) XE electric: $867,850 (2018) XE gas: $1.3 million (2018) CPE: $2 million (2018)
Funding source	Minnesota ratepayers
Website	www.HomeEnergySquad.Net
Contact for program information	Emma Ingebretsen Energy Efficiency Program Administrator CenterPoint Energy 612-321-4417 emma.ingebretsen@centerpointenergy.com

Home Energy Squad (HES) is a comprehensive energy efficiency program for residential customers of CenterPoint Energy and Xcel Energy. HES provides a suite of home-visit options such as energy audits (including blower door test and infrared scan), direct installation of energy-efficient measures, and additional engagement services designed to help participants move forward with energy efficiency opportunities identified in the audit. During a home visit, participants can choose the set of services that best fit their needs.

The home visit is offered to the customer for a small copay: $100 for the direct install + energy audit (Home Energy Squad—Enhanced) or $70 for the direct-install services only. HES has established relationships with 13 partner cities that further buy-down the cost of the visits for the customer. All of the home visit options are available to low-income customers at no cost.

For the direct-install component of HES, the program focuses on measures that create energy savings and are quick to install. Measures include LED bulbs, exterior door and attic hatch weather stripping, high-efficiency showerheads and faucet aerators, water heater blankets, water heater temperature correction, and programmable thermostats.

If insulation work is recommended for the home, an estimate is provided at the visit for a partnering insulation contractor to perform upgrade work, and the program provides additional supporting follow-up services encouraging implementation of the upgrades.

The program works closely with insulation contractors who have agreed to offer air sealing and insulation at standardized prices to program participants, which makes it easier for customers to move forward with those projects.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

HES is a successful example of a utility collaboration to achieve whole-house gas and electric energy savings for a wide range of customers and income levels. The program generates immediate savings through direct-install services and drives additional savings by providing an easy channel for customers to have home insulation upgrades and other related services. The program provides instant estimates and scheduling services during the visit, as well as additional follow-up to encourage customers to take action. This customer support, engagement, and convenience in a one-stop design has cost effectively increased implementation of recommended upgrades.

LESSONS LEARNED

On-site energy efficiency evaluations and additional support services drive higher conversion rates to additional upgrades, which results in more savings per home than participants who do not receive the additional services. Receiving the bid makes the process of completing upgrade work more tangible, whereas a recommendation on its own requires follow-up work by the homeowner. In a recent survey of HES participants, 86% of respondents said they were more comfortable getting recommendations from someone other than a contractor, 93% felt that recommendations were in their best interest, and 88% stated they would look for utility rebates with future home improvements.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending			
CPE gas	$849,391	$784,520	$1.7 million
XE gas	$649,538	$568,235	$572,052
XE electric	$1.3 million	$1.3 million	$761,044
Number of participants			
CPE gas	2,647	2,464	2,666
XE gas	2,096	2,313	1,269
XE electric	4,580	4,680	3,316
Annual electric energy savings (MWh net gen)	3,845	4,095	4,822
Annual peak demand savings (MW)	2.031	2.047	0.623
Annual gas energy savings (gross therms)			
CPE	218,520	234,450	127,580
XE	243,850	254,090	86,000
Lifetime electric energy savings (MWh net gen)	44,834	48,824	35,029

	2015	2016	2017
Lifetime gas energy savings (gross therms)			
CPE GAS	1,574,620	1,642,290	1,206,037
XE GAS	2,038,190	2,119,620	833,480
Cost-effectiveness results, Utility Cost Test (UCT), electric	2.74	3.22	1.87
Cost-effectiveness results, Utility Cost Test (UCT), gas			
CPE	1.17	1.26	0.38
XE	1.19	1.98	0.69
No evaluation of the currently filed program has been conducted			

MULTIFAMILY

Bay Area Regional Energy Network (BayREN), Bay Area Multifamily Building Enhancements (BAMBE)

PROGRAM AT A GLANCE

Implementation organizations	Association for Energy Affordability (nonprofit implementer and technical assistance provider), Frontier Energy (reporting and contract management implementer), San Francisco Department of the Environment (government agency technical assistance provider), local government agencies representing the nine Bay Area counties.
State where offered	California
Customer segment served	Multifamily
Program start date / year established	July 2013
Annual energy savings (gross 2017)	2,200 MWh, 139,099 therms
Peak demand (summer) savings (MW)	1.65 MW
Other measures of program results	26,091 households, 383 properties served
Budget for most recent year and next budget cycle	$6.5 million, $6.5 million
Funding source	California Public Utilities Commission utility ratepayer funds
Website	bayareamultifamily.org
Contact for program information	Candis Mary-Dauphin Program Manager StopWaste 510-891-6553 cmary-dauphin@stopwaste.org

The BayREN Bay Area Multifamily Building Enhancements (BAMBE) program is a whole-building energy efficiency retrofit program offering no-cost energy consulting and cash rebates for multifamily properties. It serves multifamily buildings with five or more attached dwelling units in the nine-county San Francisco Bay Area (Alameda, Contra Costa, Marin, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma counties).

The program supports the planning and implementation of energy efficiency improvements designed to save 15% or more of a building's energy and water usage. It provides a $750 per unit rebate to help pay for the upgrades. The BAMBE program's no-cost consulting includes onsite energy audits, scope development, project cash-flow analysis, procurement and construction oversight, post-construction verification, and referrals to other relevant incentive and financing programs.

BAMBE provides building owners with a single point of contact and one-stop-shop service throughout the upgrade process. The program's energy experts work with property owners and property management staff to identify natural gas and electricity reduction measures in units, common areas, and central systems. The measures may address the building

envelope; heating, cooling, and domestic hot-water equipment; distribution and controls; lighting fixtures and controls; and appliances.

BAMBE works with local governments in the nine-county region to conduct program marketing and outreach. Peer-to-peer marketing also increases participation. BAMBE's website (bayareamultifamily.org) provides case studies and owner testimonials from properties in all nine counties.

BayREN is a collaboration of local governments led by the Association of Bay Area Governments. The California Public Utilities Commission authorized BayREN to design and administer ratepayer-funded energy savings programs. StopWaste, a joint powers authority of local governments in Alameda County, leads BayREN's multifamily programs, including BAMBE. The Association for Energy Affordability, a nonprofit organization, is BAMBE's regional technical implementer. Frontier Energy is the lead consultancy responsible for project intake and eligibility, reporting, and quality control. The San Francisco Department of the Environment provides technical assistance to projects located in San Francisco.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Since 2013, BAMBE has served more than 26,000 household units in 383 buildings. Its success flows from a three-pronged approach to overcoming barriers:

- *It's simple*. Property owners know up front the exact size of the rebate: $750 per unit. They get to choose their own contractors.
- *It's free*. Owners receive customized, high-quality technical expertise at no cost.
- *It's a one-stop shop*. Owners have a single point of contact for comprehensive planning, measure identification, financial analysis, installation and verification, and financing referrals.

LESSONS LEARNED

Use trusted messengers to increase participation. Multifamily owners are wary of sales pitches promising big savings but perceive local governments to be a known and trusted source of information.

Cookie-cutter programs do not work. Every multifamily property presents unique challenges and opportunities. The BAMBE program model is flexible, with a concierge-like service tailored to each property's specific needs and priorities.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$9.0 million	$6.4 million	$6.5 million
Number of households	7,512	5,000	5,195
Annual electric energy savings (MWh gross)	3,384	1,980	2,200
Annual peak demand savings (MW)	0.29	0.22	0.80
Annual gas energy savings (therms gross)	222,420	173,379	139,099
Lifetime electric energy savings (MWh gross)	60,905	31,150	27,880
Lifetime gas energy savings (MMtherms gross)	4.00	2.90	2.00
Cost-effectiveness results, Utility Cost Test (UCT), combined gas and electric	1.40	1.25	1.14
Most recent program evaluation pda.energydataweb.com/api/view/1852/2013_2015 Ren MF Impact Evaluation_Final Draft.pdf			

Eversource, Multifamily Initiative

PROGRAM AT A GLANCE

Implementation organization	Eversource
State where offered	Connecticut
Customer segment served	Multifamily
Program start date / year established	2008
Annual energy savings (net)	14.5 million kWh, 406,685 CCF (2017)
Peak demand (summer) savings	1,540 kW (2017)
Budget	$9.2 million (2018)
Funding source	Ratepayer funding
Website	www.energizect.com/your-home/solutions-list/Multifamily
Contact for program information	Enoch Lenge Supervisor, Energy Efficiency Eversource 860-665-5369 enoch.lenge@eversource.com

The Eversource Multifamily Initiative provides customized energy efficiency solutions for Connecticut property owners with existing multifamily buildings or complexes (five or more units) for income-eligible and market-rate tenants. For income-eligible projects, the program offers incentives of up to 75% of a standard project's cost, or 80% for a comprehensive project based on an estimated energy savings measure value. For market-rate buildings, it is 40% for standard projects and 50% for comprehensive projects.

Besides incentives, the initiative offers assessment of the building's energy-saving opportunities, project assistance, and financing. The program also provides resources to support in-depth assessment of a full range of strategies for further improvements including solar and other renewable energy, as well as health and safety measures.

Any property owner—or contractor on behalf of a property owner—can submit a project. Eligible projects must meet specific equipment measure guidelines for building envelope, equipment upgrades, lighting, water-saving upgrades, and controls. The program considers custom measures with justified engineered energy savings calculations as a backup for review by Eversource.

Eversource is the program implementer. The Eversource Multifamily team is the primary point of contact, and it has direct relationships with trade allies to develop and implement successful projects. Eversource markets the program through its trade ally networks, contractors, and trade show exhibits.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The Multifamily Initiative is exceptional for two primary reasons: comprehensiveness and successful relationship building. Between 2014 and 2017, the number of comprehensive projects increased by more than 40%. This is primarily due to multifamily customers having a single point of contact at Eversource who has formed successful, long-lasting relationships

with trade allies and organizations including the Department of Housing (DOH) and the Connecticut Housing Finance Authority (CHFA).

LESSONS LEARNED

The 2016 evaluation showed that some of the measures in the Multifamily Initiative were not achieving the projected savings, resulting in low realization rates. Eversource took steps to overcome this by implementing a billing analysis on projects. This analysis proposed energy savings measures in comparison to the actual utility bills at the associated properties. This method has resulted in savings verification and eliminated overstating of results, and the anticipated savings now more closely reflect what appears on actual utility bills.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$9.1 million	$14.5 million	$12.3 million
Number of participants	9,314	17,691	24,496
Annual electric energy savings (MWh net)	7,385	13,939	14,482
Annual peak demand savings (MW)	617	1,664	1,540
Annual gas energy savings (therms net)	372,988	405,682	406,685
Lifetime electric energy savings (MWh net)	98,614	167,003	177,524
Lifetime gas energy savings (MM therms net)	7,613	8,900	6,538
Cost-effectiveness results, Utility Cost Test (UCT), electric	1.24	1.25	1.49
Cost-effectiveness results, UCT, gas	1.39	1.41	1.30
Most recent program evaluation [R157] Multi-Family initiative Process Evaluation 2015 www.energizect.com/connecticut-energy-efficiency-board/evaluation-reports			

Puget Sound Energy, Multifamily Retrofit and New Construction for Market Rate and Low Income

PROGRAM AT A GLANCE

Implementation organizations	CLEAResult (retrofit and new construction), Community Action Partnership (CAP) Agencies (low income)
State where offered	Washington
Customer segment served	Multifamily (low and moderate income, market rate)
Program start date / year established	2006
Annual energy savings	20.5 MW, 139k therms combined savings (2017)
Peak demand (winter) savings (MW)	4.3 (2017)
Other measures of program results	39,178 total average multifamily households served per year
Budget	$14.6 million (2017), $25.9 million (2018/2019)
Funding sources	Market rate: ratepayer conservation rider Low income: ratepayer conservation rider, state and federal funding
Website	pse.com
Contact for program information	McGregor Snow Program manager Puget Sound Energy 425-424-6798 mcgregor.snow@pse.com

The Multifamily Retrofit program offers a full suite of prescriptive and custom calculated incentives for both electric and gas customers. Puget Sound Energy (PSE) conducts a free walk-through site assessment to identify savings opportunities. Depending on the energy assessment results, the program will install no-cost measures (e.g. showerheads and LEDs) as well as provide incentives for more capital-intensive upgrades (e.g., windows, insulation, and air sealing). Participants are also eligible for incentive packages through new construction and low-income programs. These programs take a whole-building approach and achieve beyond-code energy savings.

The program provides robust incentives to overcome the split-incentive issue renters face. The structure of the program also addresses split incentives by offering incentives for in-unit measures, which directly benefit tenants, as well as comprehensive weatherization, common area measures, and space and water heating upgrades, which benefit property managers and property portfolio owners.

Through written materials, trainings, and onsite community meetings, the Multifamily Retrofit program has educated residents on PSE energy-saving resources including website, mobile app, and daily energy use tracking.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

PSE conducted a SEM pilot that utilized behavior-based strategies, resident education, and staff operations and maintenance (O&M) training to target 5% energy savings over a 12-

month period. The program engaged a range of low-income, senior living, and market-rate properties. In addition to creating a suite of educational materials, the SEM pilot organized community events, ran a "Battle of the Buildings" energy challenge, and provided energy scorecards that aided in property-level energy analysis and load disaggregation to property managers and portfolio owners.

LESSONS LEARNED

PSE had previously characterized two- to four-unit buildings as single family (SF). Most residents in these homes are renters and therefore face the split-incentive problem. To solve this problem, PSE determined that these sites meet the criteria for multifamily campus and therefore have access to the higher incentives in the multifamily program.

Evaluation reports found that advanced power strips had lower than expected persistence and savings realization. This played a significant role in the program decision to end the measure in 2017.

Ongoing program analysis and evaluation to balance risk and program performance led to the discontinuation of free replacement of qualifying in-unit refrigerators and in-unit clothes washers.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$14.5 million	14.5 million	14.6 million
Number of households	41,382	36,736	39,415
Annual electric energy savings (MWh gross)	20.6	21.7	27.6
Annual peak demand savings (MW)	5.8	4.8	4.3
Annual gas energy savings (therms gross)	111,244	210,526	139,070
Lifetime electric energy savings (MWh gross)	488.2	399.8	343.6
Lifetime gas energy savings (MMtherms gross)	1.31	3.28	2.08
Cost-effectiveness results, Utility Cost Test (UCT), electric	2.23	2.13	1.51
Cost-effectiveness results, (UCT), gas	1.13	1.12	1.12
Contact PSE for most recent program evaluation (not available online). Annual report: pse.com/aboutpse/Rates/Documents/ees_2017_annual_rpt_energy_conservation_accomplishments.pdf			

Public Service Electric and Gas Company (PSE&G), Residential Multifamily Housing Program

PROGRAM AT A GLANCE

Implementation organization	PSE&G
State where offered	New Jersey
Customer segment served	Residential multifamily housing buildings
Program start date / year established	2009
Annual energy savings	1,242 MWh, 522,860 therms (2017)
Peak demand (summer) savings (KW)	887
Other measures of program results	800 buildings with 20,000 apartments in the program
Budget	Anticipated investment $10 million in 2018, minimum $10 million in 2019
Funding source	Conservation rider on customer bills
Website	www.pseg.com
Contact for program information	Rachael Fredericks Program Manager PSE&G 973-430-7442 Rachael.PendletonFredericks@pseg.com

The PSE&G Residential Multifamily Housing Program targets multifamily housing with five or more units in PSE&G's electric and/or gas service territory. The majority of the work to date has been with senior citizen and affordable housing. The program addresses market barriers to multifamily energy efficiency by providing upfront funding along with incentives and on-bill financing.

Delivery occurs in five steps: energy audit, design and bidding, construction administration, commissioning, and post-project measurement and verification. Audit and engineering professionals employed by PSE&G and hired through a competitive bid process deliver program services.

The program provides as deep a retrofit as possible by offering a variety of cost-effective measures for both apartment (resident meters) and common area (common meter) opportunities. Efficiency measures include lighting, HVAC, motors, domestic hot-water equipment, appliances, insulation, and air sealing.

PSE&G provides upfront funding for engineering and construction. The total project, including engineering, is then subject to a project buy-down. Participants typically pay for about 40% of the total project costs and repay their portion, interest free, on their PSE&G utility bill over a 5- or 10-year period, or in one payment if the customer chooses.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The program targets multifamily housing with an innovative combination of turnkey expertise, project financing, and on-bill repayment. It has achieved high savings and participation, generating $4.5 million in bill savings annually for customers in 800 buildings with 20,000 apartments.

LESSONS LEARNED

- Provide a turnkey approach for realization of deep retrofit energy efficiency.
- Offer a flexible energy audit structure.
- Provide upfront funding for engineering and construction costs, with repayment at 0% interest and on-bill repayment.
- Align the progress payments with the customer's construction and cash flow schedules.
- Provide post-installation monitoring and verification for persistence of savings post-project completion.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$4.1 million	$8.5 million	$6.8 million
Number of participants (customers or households)	6,100 units in 340 buildings (2015–2017)		
Annual electric energy savings (MWh gross)	2,116	1,196	1,242
Annual peak demand savings (MW)	0.157	0.072	0.091
Annual gas energy savings (therms gross)	132,260	628,460	522,860
Lifetime electric energy savings (MWh gross)	32,643	18,450	19,160
Lifetime gas energy savings (MMtherms gross)	3.05	10.68	9.15
Cost-effectiveness results, electric ($ per kWh)	0.0406	0.0406	0.0406
Cost-effectiveness results, UCT, gas ($ per therm)	1.05	1.05	1.05
Contact PSE&G for most recent program evaluation			

LOW-INCOME: STATEWIDE COMPREHENSIVE

Efficiency Vermont, Low-Income Electrical Efficiency Program (LEEP)

PROGRAM AT A GLANCE

Implementation organization	Vermont Energy Investment Corporation (VEIC), operating Efficiency Vermont under an order of appointment by Vermont Public Utility Commission
State where offered	Vermont
Customer segment served	Low-income Vermonters
Program start date / year established	2000: Efficiency Vermont (statewide energy efficiency utility) 2010: Low-income Electrical Efficiency Program
Annual energy savings (net MWh)	1,728 (2017)
Peak demand (summer) savings (net kW)	143 (2017)
Other measures of program results	Geo-equity: all counties in Vermont served by LEEP
Budget	Incentives available in 2018 for Efficiency Vermont's LEEP total $1.6 million
Funding source	Utility ratepayers via a system benefits charge added to customer bills (20 utilities statewide)
Website	www.efficiencyvermont.com/services/income-based-assistance/energy-bill-reduction
Contact for program information	Lauren Wentz Program Manager Efficiency Vermont 802-540-7617 lwentz@veic.org

The Low-Income Electrical Efficiency Program (LEEP) is Efficiency Vermont's primary strategy for meeting its low-income performance metric. Approximately 12% of the residential electricity incentive budget ($1.6 million) is allocated for LEEP projects.

The program is open to Vermont homeowners and renters with household incomes no higher than 80% of state median income. LEEP runs on two tracks, augmenting the low-income weatherization services provided by Vermont's five Weatherization Assistance Program (WAP) agencies and offering a Targeted High Use Program for income-eligible households that use more than 10,000 kWh per year.

Efficiency Vermont contracts with the state's WAP agencies to install electrical efficiency measures in income-eligible single- and multifamily homes referred by WAP. Efficiency Vermont also identifies high electric use homes for the Targeted High Use Program. In both, Efficiency Vermont pays WAP energy coaches to conduct energy education, assess whole-house electric efficiency opportunities, conduct walk throughs, directly install measures, and coordinate with contractors to install energy-efficient appliances and HVAC equipment at no cost to the customer. LEEP provides the following:

- ENERGY STAR LEDs
- Electric water heating measures, including faucet aerators, low-flow showerheads, water tank temperature setback (retired in 2018), and installation of heat pump water heaters
- Cold climate heat pumps
- ENERGY STAR refrigerator and freezer replacement (if manufactured before 1993)
- ENERGY STAR clothes washer replacement
- High-efficiency exhaust fans
- Custom measures (as applicable)

Customers learn of LEEP through WAP outreach. Efficiency Vermont also markets LEEP via direct mail to customers meeting income eligibility and high electric use criteria.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

From 2015–2017, LEEP delivered average savings of 1.67 MWh and $1,250 in incentives per home, with an average program yield of $746/MWh. LEEP reduces energy burdens by providing whole-house direct-installation energy services and pays for the cost of energy coaching while creating minimal disruption for customers because energy coaches manage projects. WAP partnerships lead to analysis of energy reduction opportunities that may not otherwise be achieved if delivered independently of each other. Installed measures result in long-term cost reductions and meet Efficiency Vermont's societal cost–benefit test due to the 15% low-income and 15% nonenergy benefits adder. Heat pump technology results in $50–100 reduction in monthly electricity bills for customers previously using electric resistance space and water heating.

LESSONS LEARNED

Form partnerships with affordable housing, health, and WAP to expand organizations' services and ability to reach low-income Vermonters. Support partners' delivery of whole-house services with flexible funding, and optimize program impact by allowing partners to use efficiency program funding in the least restrictive way possible while still complying with efficiency program metrics. Use a robust quality-control approach to assure impact. Keep lines of communication clear with partners. Use market opportunities to expand impact by piggy-backing on low-income housing rehab programs when funding allows.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$1.3 million	$1.3 million	$2 million
Number of participants	963	906	1,162
Annual electric energy savings (MWh net)	1,336	1,494	1,728
Annual peak demand savings (kW net)	114 (summer) 290 (winter)	113 (summer) 309 (winter)	143 (summer) 389 (winter)
Lifetime electric energy savings (MWh net)	17,628	16,202	17,978
Cost-effectiveness results, Societal Cost Test (SCT)*	2.61	2.54	1.85
Most recent program evaluation www.efficiencyvermont.com/Media/Default/docs/plans-reports-highlights/2017/efficiency-vermont-savings-claim-summary-2017.pdf			

*Efficiency Vermont is required to use the SCT to screen its programs and portfolio. The SCT measures the net cost/benefit to society of a program.

New York State Energy Research and Development Authority (NYSERDA), EmPower New York

PROGRAM AT A GLANCE

Implementation organization	CLEAResult
State where offered	New York
Customer segment served	Low-income one- to four-family households, renters in multifamily buildings
Program start date / year established	2004
Annual energy savings achieved	4,493 MWh, 149,878 MMBtu (2017)
Peak demand (summer) savings	N/A
Other measures of program results	$42.5 million annual customer savings
Budget	$54 million (2018)
Funding sources	Clean Energy Fund, sourced through the System Benefits Charge (ratepayer collections from electric customers) National Fuel Gas Low-Income Usage Reduction Program (LIURP), collections from National Fuel Gas customers Regional Greenhouse Gas Initiative (RGGI) Home Energy Assistance Program: for 2017, NYS OTDA transferred 4% of LIHEAP budget to NYSERDA for provision of energy efficiency to HEAP recipients Miscellaneous funds such as attorney general settlement funds
Website	www.nyserda.ny.gov/empower
Contact for program information	Laura Geel Program Manager NYSERDA 518-862-1090 ext. 3446 Laura.Geel@nyserda.ny.gov

EmPower New York is a comprehensive energy efficiency program that provides no-cost electric reduction and home performance measures to low-income households across New York State. It is a primary element of achieving the Public Service Commission's energy affordability policy, whose goal is a 6% energy burden for low-income customers. The program is open to homeowners and renters of one- to four-family homes and tenants of multifamily buildings. It has been the default ratepayer funded low-income energy efficiency program in New York since 2004.

Services include a home energy assessment, in-home energy education, air sealing, insulation, health and safety assessment, heating system clean and tune, replacement of inefficient appliances, efficient lighting, and low-flow devices. The average project cost is approximately $4,000, with a cap of $7,500 per project. The program also employs cost caps on measures to control project costs.

A network of 180 contractors deliver program services across the state. Each contractor is assigned an account manager who provides them with direct support. NYSERDA has an

implementation contractor, CLEAResult, to handle customer intake and work scope review and approval and to provide technical support and training to the network of contractors. A portion of completed projects are subject to in-field, third-party quality-assurance inspections. NYSERDA also conducts impact and process evaluations on a periodic basis.

NYSERDA administers the program on a fuel-neutral basis statewide, with the exception of Long Island, which the local utility programs serve. NYSERDA accepts referrals of low-income customers from utilities, human service organizations, and contractors. Customers may also apply directly to the program. NYSERDA works with the utilities to prioritize referrals into the program, focusing on low-income customers who have the highest energy consumption or have other characteristics such as a high level of arrears. NYSERDA also coordinates with the WAP on projects, using a combined application for the two programs to reduce the administrative burden for clients and agencies.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

EmPower has served more than 140,000 households and provides long-term energy/bill savings in addition to addressing health and safety issues. As a statewide program, EmPower provides New York State and utilities the opportunity to leverage administrative cost savings, avoid redundancy, provide a consistent level of service for customers statewide, simplify coordination with other programs (e.g., WAP and HEAP), and be responsive to priorities—such as storm response. The delivery infrastructure can be leveraged to test other interventions or delivery models for low-income customers. Recently this has included solar, smart thermostats, and demand response opportunities.

LESSONS LEARNED

- Close coordination with utilities, human service organizations, and communities is essential for raising awareness.
- Flexibility in delivery is key. NYSERDA also has the ability to manage resource allocations to allow for increased effort in different parts of the state when necessary (e.g., storm response activities).
- A statewide program can serve as a platform for incorporating additional services to mitigate energy burden. NYSERDA is developing a no-cost community solar program to align with EmPower.
- A focus on participant and contractor experience is important. NYSERDA utilized LEAN techniques on operational elements to simplify participation and reduce administrative time and costs for the program and participants.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$58 million	$43 million	$31.4 million
Number of households	15,742	13,173	8,352
Annual electric energy savings (MWh gross)	8,303	6,602	4,493
Annual peak demand savings (MW)	N/A	N/A	N/A
Annual gas energy savings, all fuels (therms gross)	3,140,456	2,019,889	1,498,780
Lifetime electric energy savings (MWh gross)	124,545	197,595	125,280
Lifetime gas energy savings, all fuels (therms gross)	78,511,400	50,497,225	37,469,500
Cost-effectiveness results, Total Resource Cost (TRC), electric	Applied at portfolio level, which includes non–low-income programs		
Cost-effectiveness results, TRC, gas	Applied at portfolio level, which includes non–low-income programs		
Most recent program evaluation www.nyserda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2015ContractorReports/2015-EmPower-National-Fuel-Gas-Evaluation-Report.pdf			

National Grid, Eversource, Unitil, Blackstone Gas Company, Berkshire Gas, Columbia Gas of Massachusetts, Liberty Utilities, and Cape Light Compact, Low-Income Energy Affordability Network (LEAN)

PROGRAM AT A GLANCE

Implementation organization	Massachusetts LEAN
State where offered	Massachusetts
Customer segment served	Income-eligible low-income households
Program start date / year established	1998
Annual energy savings (net MWh)	45,000
Peak demand (summer) savings (MW per year)	6.2
Other measures of program results	Serves 20,000+ households annually
Budget for most recent year	$110 million
Funding source	Utility funding, via rates, $10 million comes as a set-aside from the fuel assistance program, $6 million from DOE-WAP.
Websites	www.Leanmultifamily.org (multifamily programs) www.Masssave.com/en/saving/income-based-offers/income-eligible-programs (single-family programs)
Contact for program information	Jerrold Oppenheim Attorney LEAN 978-335-6748 (cell) jerroldopp@democracyandregulation.com

LEAN provides comprehensive weatherization, appliance efficiency, and heating system measures and services to eligible low-income households in Massachusetts regardless of the fuel used (electricity, gas, oil, propane) and at no cost to the customer served. LEAN is a network of the individual nonprofit agencies that deliver energy efficiency services under the federal WAP, fully integrated with funding provided from the eight program administrators listed above.

The program installs LED lightbulbs, replaces inefficient appliances, weatherizes the building envelope, performs minor related repairs, and tunes-up, repairs, or replaces inefficient or inoperative heating systems.

All households with income at or below 60% of state median income are eligible, whether renters or homeowners. The program also services customers in multifamily buildings of all sizes in which 50% or more of the tenants are income eligible. LEAN and the program administrators (PAs) are currently piloting the delivery of no-cost energy services to households between 60% and 80% of median income in order to overcome the barriers these households face in accessing non-low-income rebate programs.

The seven participating utilities and one municipal compact provide funding and oversight. LEAN delivers the program through a network of carefully screened and trained contractors who provide true whole-building services including energy audits, oversight and

management, technical assistance, and quality control. Approximately 85% of the funding for the LEAN programs comes from the PAs; 5% from WAP; and 10% from a set-aside of fuel assistance funding for repair and replacement of old and inefficient heating systems.

LEAN markets to one- to four-unit buildings primarily through the fuel assistance program, which serves 160,000 households annually. It engages in direct outreach to public and private owners of affordable housing, including housing authorities and community development corporations.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

LEAN delivers services worth more than $100 million per year. In the multifamily sector, it offers single point of contact services, facilitating ease of application and providing a full scope of whole-building services while addressing barriers that are common to low-income programs. It provides quality-controlled end-to-end management at no cost to the customer.

LESSONS LEARNED

Successful programs require strong and respectful relationships among program administrators, agencies (here, LEAN), and relevant state and federal agencies. On the multifamily side, extensive and open discussions with owners of affordable multifamily housing has better-informed LEAN on program design. Once successful programs have been in operation, it is essential to have ongoing best practices meetings among the relevant players to allow for changes in energy efficiency measures and technologies deployed, and to address any issues that arise in program delivery. Quality control on 100% of the jobs is also key.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$101 million	$98 million	$110 million
Number of participants*	43,000	40,000	50,000
Annual electric energy savings (MWh net)	48,000	40,000	45,000
Annual peak demand savings (MW)	5.1	4.6	6.2
Annual gas energy savings (MMtherms net)	2.7	1.9	2.2
Lifetime electric energy savings (MWh net)	477,000	342,000	419,000
Lifetime gas energy savings (MMtherms net)	53	37	46
Cost-effectiveness results, modified Total Resource Cost (TRC), electric, single family	2.75	2.97	3.26
Cost-effectiveness results, modified TRC, electric, multifamily	1.3	1.12	1.56
Cost-effectiveness results, modified TRC, gas, single family	1.77	2.74	2.16

*** These counts include duplicates. We count each household getting gas measures and electric measures twice. The unduplicated count is more than 20,000/yr.**

New Hampshire Utilities (Eversource, Liberty Utilities, New Hampshire Electric Cooperative, Unitil Energy Systems, Northern Utilities), NHSaves Home Energy Assistance Program

PROGRAM AT A GLANCE

Implementation organizations	New Hampshire utilities, New Hampshire Office of Strategic Initiatives, New Hampshire Community Action Agencies
State where offered	New Hampshire
Customer segment served	Income-eligible residential
Program start date / year established	2002
Annual energy savings, electric, natural gas, oil, propane, kerosene, and wood combined (MMBtu)	22,394 (2017)
Budget	$5 million (2017), $7.8 million (2018)
Funding sources	Utility System Benefits Charge (electric), ISO-NE Forward Capacity Market (electric), Regional Greenhouse Gas Initiative Allowance proceeds (electric), Local Distribution Adjustment Charge (natural gas)
Website	www.nhsaves.com
Contact for program information	Kate Peters Supervisor Eversource Energy 603-634-3112 katherine.peters@eversource.com

The Home Energy Assistance (HEA) program is a fuel-neutral weatherization program that helps income eligible single-family and multifamily housing customers. The program provides a no-cost energy audit and comprehensive recommendations for cost-effective measures for installation by qualified contractors. Customers who qualify for HEA receive 100% of the cost of weatherization services, up to $8,000.

Measures include air sealing, insulation, high-efficiency lighting, low-flow showerheads, faucet aerators, programmable and/or Wi-Fi thermostats, hot-water pipe insulation, duct sealing, refrigerator replacements, hot-water temperature setback, and window and door replacements. Also included are a variety of health and safety measures and end-of-life heating system replacement.

Additional incentives are also available for high-efficiency oil and propane space and water heating if installed in conjunction with weatherization. Other incentives for natural gas heating are available through the natural gas programs.

Contractors affiliated with the New Hampshire Community Action Agencies (CAAs), who must hold Building Performance Institute certification and undergo quality-assurance review, perform installations.

The New Hampshire utilities are the program administrators, and they implement the program in partnership with the CAAs. Partnering with the CAAs allows for seamless

collaboration with additional state and federal WAP funds administered through the New Hampshire Office of Strategic Initiatives.

The program delivery mechanism is designed to make it easy for customers to participate because the CAA contractor can provide all services from income verification to energy audit to implementation of measures. The CAAs also maintain a wait list of income-qualified customers and can provide assistance beyond energy efficiency, such as heating fuel assistance or accessibility measures.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The NHSaves Home Energy Assistance program utilizes limited funding to achieve high-impact, cost-effective energy efficiency projects. It does this through collaboration among utilities, the Community Action Agencies, and the New Hampshire Office of Strategic Initiatives, enabling access to additional state and federal funds. The added funds allow for comprehensive whole-house projects. The fuel-neutral nature of the program means that customers save on all of their energy use, including oil, propane, kerosene, and wood heating fuels.

LESSONS LEARNED

Income-qualified customers often qualify for multiple services, and the array of offerings can be confusing for customers to navigate on their own. Partnering with the CAAs creates a single point of contact for the customer and the opportunity to leverage multiple funding sources.

The fuel-neutral, whole-house approach means that the CAA contractor is doing all of the possible work as part of one project rather than staggering smaller projects over a period of time. A comprehensive approach makes the project smoother for the customer and yields the highest possible energy savings.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$4.9 million	$4.8 million	$5 million
Number of participants	1,036	967	984
Annual electric energy savings (MWh adjusted gross)	887	784	716
Annual gas energy savings (MMBtu adjusted gross)	5,572	8,022	5,577
Lifetime electric energy savings (MWh adjusted gross)	16,004	13,810	10,209
Lifetime gas energy savings (MMBtu adjusted gross)	114,258	162,429	115,225
Annual fuel-neutral savings (MMBtu adjusted gross)	9,777	11,282	14,376
Lifetime fuel-neutral savings (MMBtu adjusted gross)	201,840	255,843	210,385
Cost-effectiveness results, Total Resource Cost (TRC), electric	1.37–1.71	1.12–1.26	1.11–1.23
Cost-effectiveness results, TRC, gas	1.20–1.21	1.01–1.13	1.03–1.07
Most recent program evaluation www.puc.state.nh.us/Electric/Monitoring and Evaluation Reports/PSNH/Final Report HEA Impact 1-26-06.pdf New evaluation under way in 2018			

LOW-INCOME: NATURAL GAS UTILITY

Columbia Gas of Ohio, WarmChoice®

PROGRAM AT A GLANCE

Implementation organizations	Corporation for Ohio Appalachian Development (COAD), Ground Level Solutions (GLS), Mid-Ohio Regional Planning Commission (MORPC), Neighborhood Housing Services of Toledo (NHST), IMPACT Community Action
State where offered	Ohio
Customer segment served	Income-qualified residential customers with incomes at or below 150% of federal poverty guidelines
Program start date / year established	1987
Annual energy savings (average Ccf per participant)	320
Budget	$14 million (2018), $14.2 million (2019)
Funding source	Ratepayers
Website	ColumbiaGasOhio.com/WarmChoice
Contact for program information	Adrian Andrews WarmChoice Program Manager Columbia Gas of Ohio 614-460-4783 AAndrews@NiSource.com

Columbia Gas of Ohio's WarmChoice program provides no-cost energy efficiency services to income-qualified households, including owners and renters, whose income is at or below 150% of the federal poverty guidelines (FPG). The program targets high natural gas usage households and households that have accumulated high arrearages under Ohio's Percentage of Income Payment Plan (PIPP).

For each participating household, natural gas energy efficiency measures are determined through a diagnostic inspection process that includes safety checks of natural gas appliances (i.e. gas leaks, carbon monoxide). Measures may include attic and wall insulation, floor insulation, duct insulation, natural gas water heater insulation, water pipe insulation, strategic air and duct leakage sealing, and repair or replacement of natural gas furnace, water heater, and/or natural gas cook stove.

Columbia Gas of Ohio collaborates with local community-based organizations to provide implementation services for the WarmChoice program. These organizations are responsible for all aspects of program delivery, including the application process, inspections, heating and weatherization work, and quality assurance. Additionally, community-based organizations coordinate and oversee private and nonprofit heating and weatherization contractors utilized to perform program services.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The WarmChoice program achieves high natural gas savings while also addressing the health and safety issues customers face. Average natural gas savings for program

participants is approximately 320 Ccf/year. A key benefit of the partnership between WarmChoice and community-based organizations is the ability to leverage multiple funding sources, including but not limited to the Home Weatherization Assistance Program (HWAP) and electric utility weatherization funding, in order to serve more customers. WarmChoice has begun a weatherization pilot for multifamily rental structures.

LESSONS LEARNED

The combination of attic and sidewall insulation, air sealing, and high-efficiency heating systems is a key driver in realizing natural gas savings. Elimination of the property owner's financial contribution for furnace replacements in rental properties has helped increase participation. The WarmChoice program has begun to take a block-by-block approach to weatherizing neighborhoods to help create greater trust in the community.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$11.9 million	$11.6 million	$12 million
Number of participants	2,085	1,820	1,967
Annual gas energy savings (Ccf net)	655,524	580,034	610,557
Lifetime gas energy savings (Ccf net)	13,110,480	11,600,680	12,211,136
Cost-effectiveness results, Utility Cost Test (UCT), not including nonenergy and non-natural-gas benefits	0.54	0.45	0.40
Columbia Gas of Ohio does not share evaluations publicly			

Oklahoma Natural Gas (ONG), Low-Income Energy Efficiency Assistance Program

PROGRAM AT A GLANCE

Implementation organizations	Titan ES, Skyline Energy Solutions
State where offered	Oklahoma
Customer segment served	Residential
Program start date / year established	2015
Annual energy savings (therms)	295,060
Other measures of program results	UCT B/C: 7.11
Budget for most recent year	$700,000
Funding source	ONG utility rates
Website	www.oklahomanaturalgas.com
Contact for program information	Teri B. Green Manager, Energy Efficiency Program Oklahoma Natural Gas Company, a division of ONE Gas 405-552-1802 Teri.Green@onegas.com

The Low-Income Energy Efficiency Assistance Program provides evaluation and installation of residential energy efficiency improvements free of charge to low-income or fixed-income customers. The program is available to all residential electricity and natural gas customers who own or lease a single-family, duplex, or mobile home and meet certain income requirements of less than $35,000 for Public Service Company of Oklahoma partnership and less than $50,000 per year for Oklahoma Gas and Electric partnership. Weatherization services are also available to tenants of rental properties, if the eligible tenant has approval from a property owner.

Implementers assess each home to determine the appropriate weatherization measures, which may include attic insulation, air sealing, and duct sealing. Contractors install the efficiency measures and evaluate program performance. Oklahoma Natural Gas (ONG) claims credit for natural gas energy savings. The appropriate electric utility claims the electricity savings.

ONG is the sponsoring utility. Titan ES is the implementer of the program in those portions of ONG's service territory served by Public Service Company of Oklahoma. Skyline Energy Solutions is the implementer of the program in those portions of ONG's territory served by Oklahoma Gas & Electric. ONG manages the incentive payment process and uses an educational campaign to promote the program.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Because the program is offered cooperatively with electric utilities in the ONG service territory, it achieves savings much more cost effectively than a single fuel program. A 2017 ACEEE report, *Making a Difference: Strategies for Successful Low-Income Energy Efficiency Programs*, commended the program for providing a single point of contact for customers and for contractors. The same report also indicated that the program results in significant savings, having achieved the second highest deep savings rank in a 2015 ACEEE survey.

Recent data for this program indicate savings that are 20% higher than the previous value reported and greater than the highest-rated program in 2015.

LESSONS LEARNED

Since the program's inception, the primary barrier to success has been the selection of an appropriate partner to provide services. Previous attempts at teaming faced record-keeping and service-quality challenges. These problems have been largely if not completely overcome with the implementation of the current teaming arrangement.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$249,640	$252,900	$642,347
Number of participants	284	311	855
Annual gas energy savings (therms gross)	74,230	89,940	295,060
Lifetime gas energy savings (MMtherms gross)	1.49	1.80	4.83
Cost-effectiveness results, Utility Cost Test (UCT)	4.33	5.37	5.90

LOW-INCOME: TARGETED/SOCIAL EQUITY

Maryland Energy Administration, EmPOWER Clean Energy Communities Low-to-Moderate Income Grant Program

PROGRAM AT A GLANCE

Implementation organization	Maryland Energy Administration
State where offered	Maryland
Customer segment served	Low-to-moderate income
Program start date / year established	2010
Annual energy savings (average 2014–2016)	178,761 therms, 5,019 MWh
Peak demand (summer) savings (MW)	1.2
Other measures of program results	Buildings retrofitted (residential and commercial): 3,658 (FY2016), 2,611 (FY2015), 2,953 (FY2014) Job hours worked on LMI projects: 81,516 (FY2016), 86,182 (FY2015), 65,602 (FY2014)
Budget	$5 million (FY2018), $5 million (FY2019)
Funding sources	Part of EmPOWER Maryland initiative. Funded through Strategic Energy Investment Fund (SEIF). SEIF funds come from Regional Greenhouse Gas Initiative (RGGI).
Website	energy.maryland.gov/govt/Pages/CleanEnergyLMI.aspx
Contact for program information	Dean Fisher Program Manager Maryland Energy Administration 410-537-4068 dean.fisher@maryland.gov

The EmPOWER Clean Energy Communities Low-to-Moderate Income (LMI) Grant Program provides funding for energy efficiency measures that benefit low-to-moderate income Marylanders. It covers existing residences, new residential construction, commercial buildings, and schools and community centers that serve the target population. The LMI program also covers master-metered multifamily buildings.

Nonprofits and local governments with access to buildings serving the target population are eligible to apply for LMI grants for projects that generate significant energy savings through energy efficiency. All forms of energy-saving measures across multiple energy sources are eligible if they are cost effective. In addition to covering the cost of approved efficiency measures, LMI allows for health and safety upgrades, such as mechanical ventilation, that enable implementation of energy efficiency measures.

The majority of LMI projects consist of whole-building upgrades where a BPI audit qualifies energy efficiency measures that, in aggregate, result in an estimated simple payback of 10 years or less. For buildings on a commercial meter, the audit needs to qualify energy efficiency measures that, in aggregate, have an estimated simple payback of 15 years or less.

Grantees typically engage home performance contractors to quantify and implement eligible measures. Where possible, utility programs may be leveraged to add funds or additional measures, allowing more work per building to occur.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The MEA LMI Program creates local jobs, serves the entire state of Maryland, leverages additional funding sources, and has helped to grow the network of nonprofit and local government providers of assistance to the LMI populace. Equally important, the LMI program generates cost-effective energy savings and fosters healthier and safer living spaces. The program accomplishes these outcomes in a highly scalable format in which MEA staff actively direct and implement the program. By weighing savings in aggregate and allowing any form of energy savings, LMI can implement many measures that would not be eligible for other programs.

LESSONS LEARNED

Energy reductions exceeding 20% can be achieved cost effectively in many buildings. The LMI program has realized cost-effective savings from additional measures that other programs do not permit. Serving multiple types of buildings (existing residential, new residential, and commercial buildings) expands the range of possible project types and increases energy savings.

PROGRAM PERFORMANCE

	2015	2016
Program spending	$8.8 million	$8.8 million
Number of grantees	56	53
Annual electric energy savings (MWh net)*	4,033	7,389
Annual peak demand savings (MW)	1.2	1.4
Annual gas energy savings (therms net)	191,587	174,859
Lifetime electric energy savings (MWh net)**	40,330	73,894
Lifetime gas energy savings (MM therms net)**	1.916	1.749
Cost-effectiveness results: Simple Payback (years), combined gas and electric	10.5	6.1
Most recent program evaluation www.newportpartnersllc.com/PDFs/Low-to-Moderate-Income-Grant-Program-EMV-Results_2_9_18_FINAL.pdf		

* Program electric energy savings based on program calculators. Starting in FY2017 these data are determined based on an adjusted calculator from a 2017 EM&V evaluation. **Estimated lifetime of the project is 10 years. The savings are multiplied by 10 years without any utility escalation.

Xcel Energy, Low-Income Program

PROGRAM AT A GLANCE

Implementation organization	Energy Outreach Colorado
State where offered	Colorado
Customer segment served	Residential low income or income eligible
Program start date / year established	2009 (start date for expanded low-income offering), 1994 (low-income program original start date)
Annual energy savings	804,770 therms net, 6,638 MWh net gen (2017)
Peak demand (summer) savings (MW)	0.97 (2017)
Other measures of program results	Number of customers benefitted, electric and gas savings, rebates provided, dollars leveraged, bill savings realized
Budget	$7.3 million: $3.8 million gas, $3.5 million electric (2017) $6.7 million: $3.5 million gas, $3.2 million electric (2018 estimated)
Funding source	Xcel Energy Demand-Side Management rebates and administration
Websites	Xcel Energy: https://www.xcelenergy.com/xe/programs_and_rebates Energy Outreach Colorado: https://www.energyoutreach.org
Contact for program information	David Hueser Product Portfolio Supervisor DSM Marketing 303-294-2696 David.A.Hueser@xcelenergy.com

The Xcel Energy Low-Income Program provides weatherization services for low-income customers. Services offered include free energy assessments, identification of custom and prescriptive rebates, procurement, installation, contracting, project management, and behavior-change education. The program provides gas and electric energy efficiency measures including HVAC upgrades, insulation, air sealing, storm windows, showerheads, aerators, programmable thermostats, refrigerator replacement, electrically commutated motors, LEDs, and evaporative coolers.

The program has three prongs:

- Single-family home weatherization through the WAP and Colorado Affordable Residential Energy (CARE). WAP serves customers at or below 200% of the federal poverty level; CARE participants are at or below 80% of area median income (AMI). WAP and CARE are prescriptive programs designed to cover the entire installation cost of energy efficiency measures by leveraging multiple funding sources, including Xcel Energy prescriptive rebates that cover 100% or more of the incremental cost.
- Income-qualified multifamily buildings (MF) with at least 66% of tenants at or below 80% AMI. The MF program includes custom and prescriptive rebates and direct-install measures.

- The Nonprofit Energy Efficiency Program (NEEP) for nonprofit organizations serving income-qualified communities. NEEP extends the reach of the program to shelters, schools, food banks, and healthcare and other facilities Like the MF program, NEEP includes custom and prescriptive rebates and direct-install measures.

As administrator, Xcel Energy performs engineering analysis to determine cost effectiveness and approve rebates. Energy Outreach Colorado (EOC), a nonprofit organization, delivers the program in partnership with other state and local agencies. EOC does customer outreach, energy audits, bids, and contracts. EOC also acquires additional funding, recruits trade allies, and coordinates with third-party weatherization organizations and the Colorado Energy Office. In addition to the Xcel Energy rebates, EOC has leveraged more than $5 million from private, government, and other utility sources to further offset participant costs.

The program promotes its services through neighborhood outreach and gets referrals through Xcel Energy business services and managed accounts.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

This utility–nonprofit partnership takes a multipronged approach combining WAP, CARE, multifamily, and NEEP. Since 2009, the program has

- Served 38,000 households
- Saved 45 GWh and 5 million therms
- Leveraged $5 million in outside funding
- Realized $73 million in bill savings
- Put back $18 million into programs directly benefiting the low-income community

LESSONS LEARNED

WAP did not support all of the low-income community, so in 2016, to augment the federal program, Xcel Energy and EOC developed a separate single-family program that serves customers at or below 80% AMI.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$6.3 million	$6.9 million	$7.3 million
Number of multifamily and nonprofit buildings	103	50	70
Number of single-family homes	10,756	10,166	8,671
Annual electric energy savings (MWh net gen)	6,503	7,233	6,638
Annual gas energy savings (therms net)	603,750	838,330	804,770
Lifetime electric energy savings (MWh net gen)	87,146	96,197	75,678
Lifetime gas energy savings (therms net)	9,394,350	13,270,764	12,039,359
Cost-effectiveness results, Utility Cost Test (UCT), electric	0.99	1.25	0.89
Cost-effectiveness results, UCT, gas	1.25	1.23	0.93

2014 Process Evaluation: Multifamily Weatherization (most recent)
www.xcelenergy.com/staticfiles/xe-responsive/Admin/Managed Documents & PDFs/CO-DSM-2014-Multifamily-Weatherization-Evaluation.pdf

2011 Single-Family Weatherization Program Evaluation (most recent)
www.xcelenergy.com/staticfiles/xe/Regulatory/Regulatory PDFs/CO-DSM/2011-CO-Low-Income-Single-Family-Weatherization-Program-Evaluation.pdf

*Includes Xcel Energy's Energy Savings Kits product.

NEW CONSTRUCTION

AEP Ohio, EfficiencyCrafted Homes℠

PROGRAM AT A GLANCE

Implementation organization	MaGrann Associates
State where offered	Ohio
Customer segment served	Residential new construction
Program start date / year established	2010
Annual energy savings (MWh)	26,337
Peak demand (summer) savings (MW)	9.625
Budget	$1.8 million (2018), $1.8 million (2019)
Funding source	Energy efficiency peak demand reduction (EE PDR) rider
Website	www.EfficiencyCraftedHomesAEPOhio.com
Contact for program information	Jim Miller EE & Consumer Program Coordinator Senior AEP Ohio 330-438-7755 jrmiller@AEP.com

The EfficiencyCrafted Homes program aims to move the residential new construction market toward increasingly more efficient above-code energy. The program provides incentives for electrical savings as measured against a User Defined Reference Home, but generates savings across all fuel types. The program has two tiers: EfficiencyCrafted Homes and EfficiencyCrafted Plus ENERGY STAR Certified, each with a pay-for-performance incentive ($/kWh) on top of a base incentive. Program services include builder and rating company recruitment, qualification and enrollment, training, quality assurance on administrative processes, energy ratings, and field inspections by participating raters.

AEP Ohio administers the program and MaGrann Associates implements it. The implementer is responsible for program design, recruitment and support of builder and rater participants, quality assurance and administrative processing, and builder and consumer education and marketing. Marketing includes development of program informational materials, sales collaterals, web content, events, and public relations. Outreach efforts target builders, HVAC, insulation, and other trades; realtors and sales professionals; code officials; builder associations; and other stakeholders in residential new construction as well as consumers

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

This long-lived program has shown consistent market engagement and delivery of cost-effective savings despite advances in baseline energy code and ENERGY STAR versions. The introduction of HERS- and ENERGY-STAR-based tiers preserved participation during the most substantial ENERGY STAR program updates. Progressively adjusting incentives toward lower HERS scores (and now the current linkage directly to savings) has driven performance. The program has received ENERGY STAR Partner of the Year recognition for seven consecutive years.

LESSONS LEARNED

AEP Ohio EfficiencyCrafted has modified reporting requirements if they become too burdensome and changed the incentive structure based upon fluctuations in participation. The program switched to a savings-based incentive in 2017 to increase the reward for incremental improvements. This change also minimized the effects of adjustments to HERS and ENERGY STAR standards.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	707.7 thousand	1.9 million	2.0 million
Number of homes	1,842	1,792	1,762
Annual electric energy savings (MWh net)	4,196	4,144	5,299
Annual peak demand savings (MW)	0.97	2.5	2.8
Annual gas energy savings (therms net)	463,154	529,742	438,245
Lifetime electric energy savings (MWh net)	104,849	103,538	132,208
Lifetime gas energy savings (MMtherms net)	104,849	103,538	109,290
Cost-effectiveness results, Utility Cost Test (UCT)	2.5	3.6	3.4
Most recent program evaluation dis.puc.state.oh.us/TiffToPDf/A1001001A18E15B40605B03478.pdf			

Energy Trust of Oregon, EPS New Construction

PROGRAM AT A GLANCE

Implementation organization	CLEAResult
States where offered	Oregon, SW Washington
Customer segment served	New construction builders and third-party raters (verifiers)
Program start date / year established	2009
Annual energy savings (net)	424,805 therms, 5,342 MWh at generator (2017)
Peak demand (summer) savings (MWh at generator net)	1.49 (2017)
Other measures of program results	Achieved market share of 34% (2015), 39.1% (2016), 39.2% (2017)
Budget for most recent year	$11.8 million
Funding sources	Portland General Electric, Pacific Power, NW Natural, Cascade Natural Gas, Avista
Website	insider.energytrust.org/programs/eps-new-construction/
Contact for program information	Scott Leonard Senior Project Manager, Residential Energy Trust of Oregon 503.445.2944 scott.leonard@energytrust.org

Energy Trust of Oregon's EPS New Construction is a performance-based new-home construction program that provides scaled incentives to builders and third-party raters for installing energy improvements above the Oregon and Washington energy codes.

The program's incentives scale up with energy improvements over the Oregon and Washington Code as measured by EPS™, an energy performance scoring system. The minimum requirement for entry into the program is 10% improvement over code, scaling to 40%. Sliding scale incentives range from $623–4,723 depending on the percentage improvement above code. Builders are eligible for participation based on required insurance and valid CCB licensing.

EPS is delivered through a supported third-party rater approach. Raters provide project information to Energy Trust through a customized online platform, which allows for a paperless data submission and streamlined quality-assurance process. All EPS projects receive REM/*Rate*™ file reviews, and 5–10% receive a field quality-assurance inspection.

Third-party raters are required to have Home Energy Rater and/or Building Performance Institute (BPI) certification, energy modeling training, and in-person field mentorship with Energy Trust outreach staff. Both builders and third-party raters are required to enroll in Energy Trust's trade ally network.

The program provides support to trade ally builders and verifiers through training, marketing collateral, and onsite technical assistance as well as business development funds

for qualified projects. The program also trains real estate professionals and builder sales staff on the benefits of promoting energy efficiency and EPS to homebuyers.

The program is implemented by CLEAResult and managed by Energy Trust on behalf of the five funding utilities of Energy Trust: Portland General Electric, Pacific Power, NW Natural, Cascade Natural Gas, and Avista.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

EPS New Construction is a successful model for a new construction program due to: (1) the flexible performance approach, which allows for more inclusion of builders in the program, leading to higher volume of homes and attribution of all available energy savings opportunities; (2) the third-party rater model, which drives job creation and regional expansion; and (3) EPS, which, as a consumption-based metric, allows for builders and home buyers to better understand the operational energy use of the home. The program is adaptable and replicable for other regional programs.

LESSONS LEARNED

Leveraging an online portal called *Axis*, developed by Pivotal Energy Solutions, for project submission reduced manual labor and associated data entry errors. Initial development costs were returned through the reduction in labor hours within two program years. The portal also helped overcome the barrier of scalability as project volume can scale up and down without significant correlated adjustments to labor. Additionally, in 2012, the program transitioned from verification performed entirely by program staff to third-party verification. The diversity of verification/rater organizations drove increased market share, expanded program participation, and reduced delivery cost.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$10.2 million	$12.8 million	$11.8 million
Number of participants (households)	2,534	4,017	3,896
Annual electric energy savings (MWh at generator net)	3,317	5,992	5,342
Annual peak demand savings (MW at generator net)	0.99	1.92	1.49
Annual gas energy savings (therms net)	359,135	448,207	424,805
Lifetime electric energy savings (MWh at generator net)	100,600	183,347	151,328
Lifetime gas energy savings (MMtherms net)	12.99	15.95	12.21
Cost-effectiveness results, Utility Cost Test (UCT), electric*	0.80	1.18	0.78*
Cost-effectiveness results, UCT, gas*	0.69	0.67	1.18*
Most recent program evaluation www.energytrust.org/wp-content/uploads/2016/12/New_Homes_Process_Eval_2014-15.pdf			

*Cost-effectiveness results do not include market transformation savings that are attributed to the program's influence on changes to the Oregon Residential Specialty Code.

Xcel Energy, Energy Design Assistance

PROGRAM AT A GLANCE

Implementation organization	Xcel Energy
State where offered	Colorado
Customer segment served	Medium and large commercial and industrial businesses
Program start date / year established	2007
Annual energy savings (MWh net)	30,161,647 (5-year average)
Peak demand (summer) savings (MW)	6.8 (5-year average)
Other measures of program results	Percentage level of energy savings above code (both electric and natural gas), CO_2e emissions reduction from baseline building designs, annual energy-cost savings
Budget for most recent year	$8.4 million
Funding source	DSM Cost Adjustment Factor ($/kWh charge on customer bill)
Website	Energy Design Assistance
Contact for program information	Parker Cohn Associate Product Portfolio Manager Xcel Energy 303-294-2694 Parker.W.Cohn@xcelenergy.com

Xcel Energy's Energy Design Assistance (EDA) program helps generate energy and cost savings for businesses considering new construction or major renovation projects. It builds energy efficiency and high-performing attributes into projects from the beginning, in pre-design or early schematic design, in a way that helps both the building owner and the design team. It is open to buildings over 50,000 square feet and implemented by local energy modeling/engineering firms.

The program uses personalized computer simulation modeling to forecast the planned building's energy performance, and then suggests energy-saving strategies and projects energy-cost savings. It points teams toward rebates available for measures they adopt. Xcel Energy pays cash incentives to owners for measured and verified energy savings.

EDA modeling helps explore and evaluate various energy-related "what-ifs" for the building. What if, for example, you put in more insulation than code requires? Would better windows make a difference? Are there alternatives to rooftop units? Modeling can include massing, orientation, daylighting, lighting, natural ventilation, HVAC rendering, and office equipment. It shows how these energy-saving options work together to maximize economic and environmental benefits for participants—before resources are committed.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

- Extensive hands-on energy modeling and technical assistance in the design phase, so that energy efficiency measures can be integral to the building plan from the beginning

- Computer energy modeling specific for each building, repeated with various energy-saving options and targets, so owners and design teams can have an energy-optimized building within their budget
- Personalized assistance and communications, such as goal-setting meetings, modeling results meetings, construction document review, and site walk-throughs
- In addition to cash incentives to owners for energy saved, reimbursements include payments to design teams for their time in participating and free calculation of energy points for green building certifications such as LEED

LESSONS LEARNED

In new construction and major renovations, energy efficiency upgrades are usually either considered too late in the design/construction process to be doable, are mistakenly thought to be too expensive for consideration, or are considered someone else's job. This program solves those problems by offering extensive energy modeling and technical assistance to design teams and building owners so they can see which energy efficiency options are worthwhile and within budget.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$9.4 million	$8.8 million	$8.4 million
Number of customers	64	45	46
Annual electric energy savings (MWh net)	42,095,945	25,345,531	24,099,514
Annual peak demand savings (MW)	9.613	7.446	5.697
Annual gas energy savings (therms net)	94,692	58,934	42,186
Lifetime electric energy savings (MWh net)	841,918,900	506,910,680	481,990,280
Lifetime gas energy savings (MMtherms net)	1,893,840	1,178,680	843,720
Cost-effectiveness results, Utility Cost Test (UCT), electric	4.36	4.40	3.27
Cost-effectiveness results, UCT, gas	6.97	5.25	3.38
Most recent program evaluation KEMA Evaluation			

NEW CONSTRUCTION: PATH TO NET ZERO

Efficiency Vermont, High-Performance Homes

PROGRAM AT A GLANCE

Implementation organization	VEIC, operating Efficiency Vermont under an order of appointment by the Vermont Public Utility Commission
State where offered	Vermont
Customer segment served	Single-family residential new construction
Program start date / year established	2012
Annual energy savings (MW net)	247
Peak demand (summer) savings (MW)	72
Other measures of program results	Average HERS = 36
Budget for most recent year	$189,255
Funding source	Utility ratepayers, via a system benefits charge added to customer bills
Website	www.efficiencyvermont.com/services/renovation-construction/residential-new-construction
Contact for program information	Josh Stewart Program Manager Efficiency Vermont 802-540-7857 jstewart@veic.org

Efficiency Vermont's High-Performance Homes program (HPH) offers a net zero ready pathway for residential new construction customers seeking "stick-built" homes, and a Zero Energy Modular (ZEM) Homes℠ pathway primarily for low-to-moderate income (LMI) customers, defined as those earning 80% or less of area median income.

HPH is prescriptive, cost optimized, and climate specific, with minimal red tape. For any new home being built in the state, Efficiency Vermont offers comprehensive technical assistance from the planning phase through construction at no cost to the customer. An incentive between $3,000 and $8,500 is also available, depending on homeowner income. Measures include high R-value insulation, minimal thermal bridges, triple-glazed windows, very low air infiltration, high-efficiency balanced ventilation with heat recovery, ENERGY STAR appliances and heating/cooling systems (air-source heat pumps), and optional PV rooftop panels. The goals are reduced operation energy impacts, enhanced home value at time of sale, and nonenergy benefits including enhanced comfort and indoor air quality.

Since 2012, HPH has engaged passive house experts, solar installers, HVAC suppliers/installers, mobile home park owners, municipal planners, affordable housing partners, a specialized modular home contractor, and real estate professionals to advance the HPH concept and create economic development opportunities.

Successful projects receive "Efficiency Vermont Certified: High-Performance Home" designation, which can supplement ENERGY STAR Homes certification. In addition to the HERS Rating, Efficiency Vermont Energy Consultants assist with code compliance as well as

with completing relevant fields in the Appraisal Institute's Residential Green and Energy Efficient Addendum.

The HPH program is funded and administered through Efficiency Vermont, an Energy Efficiency Utility delivering sustainable energy services to ratepayers of 19 energy cooperatives, investor-owned utilities, and municipal utilities. Burlington Electric Department and Vermont Gas Systems partner in program delivery in their service territories.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The HPH program is based on prescriptive energy efficiency measures that drive residential new construction (RNC) market transformation toward net zero energy readiness. As evidenced by an average HERS index of 36, energy efficiency is maximized to reduce heating loads in Vermont's cold climate. The five-home pilot in 2012 has evolved into 10% of participating RNC homes now achieving HPH status.

LESSONS LEARNED

- Drivers to participation in the HPH standard include reduced operational costs and fossil fuel use, as well as increased comfort, health, and resiliency; prospective customers need a clear understanding of costs and benefits.
- Proper valuation is critical for financing, using tools such as the Residential Green and Energy Efficient Addendum.
- Team integration and at least one energy efficiency champion are needed, especially on the first project.
- Additional technical assistance is often needed on early HPH homes, after which builders can manage more construction details independently.
- Peer-to-peer HPH forums enhance sharing of best practices.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$156,700	$223,920	$189,225
Number of participants	19	46	35
Annual electric energy savings (MWh net)	147	323	247
Annual peak demand savings (MW)	53	117	86
Lifetime electric energy savings (MWh net)	3,561	7,956	6,109
Cost-effectiveness results, Societal Cost Test (SCT)	1.78	1.97	1.64
Most recent program evaluation www.efficiencyvermont.com/Media/Default/docs/plans-reports-highlights/2017/efficiency-vermont-savings-claim-summary-2017.pdf			

Energy Trust of Oregon, New Buildings: Path to Net Zero

PROGRAM AT A GLANCE

Implementation organization	CLEAResult Consulting, Inc.
State where offered	Oregon
Customer segment served	All commercial new construction and major renovations
Program start date / year established	2005
Annual energy savings	50 million kWh/year, 700,000 therms/year
Budget	$12.3 million/year (2018, 2019)
Funding sources	Systems benefits charge and supplemental funding from investor-owned utilities, Portland General Electric, Pacific Power, NW Natural, Cascade Natural Gas, and Avista.
Website	www.energytrust.org/zero
Contact for program information	Jessica Iplikci Senior Program Manager, Commercial Energy Trust of Oregon 503-459-4060 Jessica.Iplikci@energytrust.org

The New Buildings Path to Net Zero (PTNZ) program offers early design consulting and project incentives to achieve ultra-low-energy commercial buildings, both new construction and retrofits. Project personnel meet with Energy Trust outreach managers to establish an energy savings target, efficiency strategies for reaching it, and an incentives package. The program provides whole-building energy modeling and ongoing technical assistance as it helps designers integrate energy efficiency and onsite solar design, construction, and installation. PTNZ offers incentives for standard and custom measures for many building types statewide. The program's key eligibility criterion is an energy use intensity (EUI) metric that aims at energy savings 70% greater than typical building goals.

The program is open to utility customers of PGE, Pacific Power, NW Natural, Cascade Natural Gas, and Avista. Aligned with Architecture 2030, it coordinates with the Northwest Energy Efficiency Alliance to leverage regional activities in several areas, including enhanced codes and activities to support market development of emerging technologies such as advanced lighting and HVAC. In addition to incentives, PTNZ offers research grants called *Net Zero Fellowships* and additional small project grant opportunities. As it develops, the program plans to provide feedback on results to the growing community of ultra-low-energy practitioners and enhance its current offerings.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The nation's first-of-its-kind pilot, PTNZ is designed to overcome barriers to the design of ultra-low-energy commercial buildings, including costs, risk aversion, and applying new strategies. More than 90 projects statewide are creating innovative designs that aim to cut building energy use by 50% or more. The 15 completed PTNZ projects represent some of the nation's first ultra-low-energy buildings. Building a community of professionals, the program is training design and construction practitioners and allies as well as building owners in emerging practices and capabilities. PTNZ is creating a market for net zero

commercial new construction. It has achieved high customer satisfaction with the program and consistently accurate final savings results from third-party evaluations.

LESSONS LEARNED

Early design has expanded potential energy solutions beyond what the program thought possible, enabling continued program development. One key to success was learning how to set goals and engage design teams with an energy target-setting tool. Incentives reflect a process that owners and design teams can follow for high-performance building design. By providing financial support as early as possible in the design process, many energy-reduction strategies can be linked to an EUI target, and this target links incentives that can overcome late-stage value engineering of energy efficiency. At the same time, there are complications with creating incremental costs and comparisons.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$6 million	$9.1 million	$10.7 million
Number of participants	Completed: 318 Enrolled: 611	Completed: 410 Enrolled: 630	Completed: 463 Enrolled: 702
Annual electric energy savings (MWh net)	50	59	55
Annual gas energy savings (therms net)	552,377	733,692	937,633
Lifetime electric energy savings (MWh net)	778.5	853.73	935.55
Lifetime gas energy savings (MMtherms net)	9.89	12.84	16.97
Cost-effectiveness results, Utility Cost Test (UCT), electric	3.54	3.21	2.94
Cost-effectiveness results, UCT, gas	17.9	17.5	18.1
Most recent program evaluation www.energytrust.org/wp-content/uploads/2017/12/2014-NB-Impact-Evaluation-Final-Report-wSR.pdf			

HVAC

Efficiency Maine Trust, Ductless Heat Pump Initiative, Home Energy Savings Program

PROGRAM AT A GLANCE

Implementation organizations	Efficiency Maine Trust, CLEAResult
State where offered	Maine
Customer segment served	Residential, low income
Program start date / year established	2013
Annual energy savings (MWh gross)	11,467 (FY2017)
Other measures of program results	2.41 MW winter peak reduction (FY2017)
Budget	$5.8 million (FY2018), $3.9 million (FY2019)
Funding sources	Electric efficiency procurement funds from payments made by utilities directly to the Trust. Utilities collect funds from ratepayers. Forward Capacity Market revenues from ISO-New England. Maine Yankee Settlement Fund, from a settlement with the federal government for spent nuclear fuel storage.
Website	efficiencymaine.com
Contact for program information	Anne Stephenson Senior Manager for Public Information and Outreach Efficiency Maine 207-213-4150 anne.stephenson@efficiencymaine.com

Efficiency Maine's Ductless Heat Pump (DHP) Initiative promotes market-based investment in high-efficiency DHPs through fixed-price rebates and loans, a vendor network, quality assurance, and customer education. Open to homeowners of all income levels, the initiative offers low-income households enhanced rebates and low-interest micro loans for retrofit measures. Qualifying DHPs must have a minimum efficiency (HSPF) of 12.0 for systems with a single indoor unit, or 10.0 for systems with multiple indoor units.

Efficiency Maine's network of prequalified contractors (called registered vendors, or RVs) serves as an active sales force. When a customer decides to pursue a DHP project, generally he/she uses Efficiency Maine's online RV locator tool to find a contractor. Once the parties agree on project details, the customer has the option to arrange for financing through Efficiency Maine. After installation, either the customer or the RV submits a rebate claim form.

Efficiency Maine supports contractors in various ways including scholarships for installation training. An installation best-practices checklist provides information on the optimal siting of indoor heads and outdoor units, and proper settings to maximize comfort and reduce the need for other heating sources.

Efficiency Maine markets the DHP Initiative through online streaming ads, social media, and community events. The initiative prioritizes continued education of DHP owners to ensure that performance meets customer and program savings expectations. Efficiency

Maine has developed a suite of educational materials, delivered in printed materials, online, and through social media to answer customer questions about how to optimize performance of the units as a supplemental heating source, and about the ability of DHPs to deliver heat effectively in cold winters. The program mails customers user tips to help them get the most savings from their equipment. The online DHP information center provides a heating cost comparison tool, case studies, and education on thermostat settings, zone-heating strategies, and interactive controls.

The DHP Initiative undergoes a periodic program impact and process evaluation. The program also works with DHP owners to assess behavioral and installation strategies.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The DHP Initiative has successfully steered growing consumer interest in DHPs to very high-efficiency models, requiring HSPF ratings significantly above ENERGY STAR efficiency standards. Since its launch, the initiative has contributed to the installation of over 16,000 units. The program has helped establish a large and well-trained DHP installation community throughout Maine, which is especially important for distribution in rural areas.

LESSONS LEARNED

The Trust initially underestimated the degree to which customers would benefit from education about ways to maximize their savings with DHPs. Some customers are unfamiliar with how to manage the interaction of the DHP and the central heating system, while others believe that they should not use DHPs in the winter. New campaigns to inform customers and installers about DHP best practices—such as running the DHP throughout the winter (even during very cold periods), optimizing thermostat settings to address interactive effects of the DHP and the central heating system, and proper maintenance—are helping customers to realize greater savings.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$4.1 million	$3.3 million	$4.0 million
Number of participants	5,954	4,879	4,790
Annual electric energy savings (MWh gross)	9,033	9,247	11,467
Annual peak demand savings, winter peak reduction (MW)	2.45	1.95	2.41
Lifetime electric energy savings (MWh gross)	162,587	166,448	206,402
Cost-effectiveness results, Utility Cost Test (UCT)	5.46	6.58	3.64
Most recent program evaluation www.efficiencymaine.com/docs/Efficiency-Maine-Home-Energy-Savings-Final-Evaluation-Report-DOE.pdf			

Oncor Electric Delivery, Multifamily HVAC Program

PROGRAM AT A GLANCE

Implementation organization	EnerChoice LLC
State where offered	Texas
Customer segment served	Residential HVAC, multifamily, residential low income
Program start date / year established	2016
Annual energy savings (gross MWh)	13,491 (2017)
Peak demand (summer) savings (gross MW)	7.4 (2017)
Other measures of program results	Residential realization rate (kW and kWh): 100% Program results reported within residential sector
Budget	$5.8 million (2017), $3.8 million (2018)
Funding source	EECRF
Website	www.takealoadofftexas.com/
Contact for program information	Carl Brown Senior Program Manager, Program Implementation Oncor Electric Delivery 214-486-3244 carlton.brown@oncor.com

The Multifamily HVAC Program focuses on replacing electric resistance heating systems with high-efficiency heat pumps across its service territory in both urban and rural buildings. It targets three consumer categories: General Residential, Hard-to-Reach, and Targeted Low Income. It combines prescriptive customer incentives and a pay-for-performance model, and it relies on collaborative partnerships with utilities, HVAC companies, and property managers who agree to share costs.

The implementation contractor solicits HVAC companies for bids to replace electric resistance heating systems with high-efficiency heat pumps. Companies submit bids in a form that collects measure specifications and a requested incentive-per-unit, and each bid's cost effectiveness is automatically scored to provide the bidders immediate feedback on their proposals. Oncor selects the most cost-effective bids in each of the three market categories. On acceptance, it pays the HVAC companies 30% of the incentive total to offset the initial equipment investments. Oncor pays the remaining 70% after installations are complete and it has performed an onsite inspection.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The program's innovation lies in the combination of a high-savings measure with a high-volume market and the use of a reverse bid process. In 2017, its first full year following a 2016 pilot, the program achieved growth in participants, savings, and cost effectiveness. It will continue to improve as HVAC companies continue to get more competitive in their bidding.

The program structure is potentially replicable in other markets that have a notable penetration of multifamily complexes with electric resistance heat and a climate that is compatible with heat pump technology.

LESSONS LEARNED

The success of this program lies in the collaboration between utilities, HVAC companies, and property managers. The level of investment required for these projects would not be feasible for most property owners in the absence of incentives, especially given the split-incentive problem that faces multifamily properties.

The size of Oncor's service territory also creates program implementation challenges because customers are located in rural as well as urban centers. The relative size of projects in urban areas can put projects from rural areas at a disadvantage when comparing cost effectiveness. Oncor takes such scenarios into consideration and implements projects across the service territory to improve overall program participation.

PROGRAM PERFORMANCE

	2016	2017
Program spending	$1.7 million	$4.1 million
Number of participants	938	2,399
Annual electric energy savings (MWh gross)	5,764	13,491
Annual peak demand savings (MW)	3.3	7.4
Lifetime electric energy savings (MWh gross)	86,460	202,365
Cost-effectiveness results, Utility Cost Test (UCT)*	1.22	1.66
Most recent program evaluation www.texasefficiency.com/images/documents/RegulatoryFilings/DeemedSavings/py2016v2.pdf		

* Targeted low income is excluded as it is evaluated using SIR.

Toronto Hydro-Electric System Ltd., PUMPsaver Local Program

PROGRAM AT A GLANCE

Implementation organization	Toronto Hydro-Electric System Ltd.
State where offered	Ontario (Canada)
Customer segment served	Business, multiunit residential
Program start date / year established	2016
Annual energy savings (net MWh)	15,569
Peak demand (summer) savings (net MW)	2
Budget for most recent year	$2.1 million
Funding source	Independent Electricity System Operator (IESO)
Website	www.torontohydro.com/sites/electricsystem/electricityconservation/businessconservation/Pages/PUMPsaver.aspx
Contact for program information	Haneef Ansari Sr. Reporting Specialist Independent Electricity System Operator (IESO) 647-294-0378 haneef.ansari@ieso.ca

The PUMPsaver Local Program is a direct install offering that provides funding for the no-cost installation of variable frequency drives (VFDs) on hydronic distribution systems, either as a retrofit or end-of-life upgrade. VFDs reduce electricity consumed by pump motors in existing constant speed designs.

The primary subsectors are multiunit residential building (MURB) facilities, commercial facilities, and industrial and institutional sectors. These include condominiums and office buildings, but the program also targets market segments that may have eligible pump systems such as hospitals, homes for the aged, data centers, malls, industrial customers, schools, and universities.

Toronto Hydro implements the program using third-party service providers in its existing service territory as well as in Oakville Hydro's service territory. These qualified experts guide customers through each phase of the retrofit, beginning with a technical feasibility assessment. Based upon recommendations from the assessment, the program implementers "right-size" the hydronic distribution system for each participant.

Information about the program is distributed using sell sheets and advertisements on Toronto Hydro's website, as well as through direct outreach to key accounts by CDM sales staff.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The PUMPsaver Local Program has been cost effective, achieving a total resource cost of 3.98 and a program administrator cost of 3.16 in 2017. After a successful pilot in 2015, Hydro established it as a Local Program in 2016.

The objective of the program is to influence the industry's approach to hydronic systems, establishing right-sizing as common practice in building design by demonstrating program successes and targeting hydronic balancing contractors as well as building owners and managers.

LESSONS LEARNED

From early implementation, it was evident that knowledge barriers existed in the market that impeded identification of pump-related retrofit opportunities. Experts in electrical efficiency overlook hydronic systems and other constant-flow pumping systems due to the potential for project complexity. Furthermore, customers often do not seek out expert assistance due to the costs associated with hydronic balancing audits. The direct-install approach is a successful implementation technique that overcomes these barriers.

Program experience and market intelligence have also prompted the addition of a new measure. Recently PUMPSaver began offering incentives toward retrofitting constant speed pumping systems with self-sensing variable speed pumps ("smart pumps"). Toronto Hydro intends that the addition of smart pumps will further transform the market, increase program penetration, and drive deeper savings.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$0	$100,075	$2.1 million
Number of participants	10	6	185
Annual electric energy savings (MWh net)	668.0	834	15,350
Annual peak demand savings (MW net)	0.07	0.09	1.97
Lifetime electric energy savings (MWh net)	10,020	14,824	233,531
Cost-effectiveness results	TRC: 2.53 PAC: 2.20	TRC: 3.02 PAC: 2.63	TRC: 2.75 PAC: 2.39

Most recent program evaluation
www.ieso.ca/sector-participants/conservation-delivery-and-tools/evaluation-measurement-and-verification
2016. PUMPsaver Pilot and Local Program.

LIGHTING

ComEd, LED Street Lighting Program

PROGRAM AT A GLANCE

Implementation organizations	ComEd, ICF
State where offered	Illinois
Customer segment served	Municipalities
Program start date / year established	2015
Annual energy savings (MWh)	17,400 (2017)
Peak demand (summer) savings	0.0
Budget	$24 million (2018), $92 million (2018–2021)
Funding source	Utility Rider Energy Efficiency Pricing and Performance (EEPP)
Website	www.comed.com/streetlights
Contact for program information	Bill Burns Sr. Engineer ComEd 630-437-2468 william.burns@comed.com

The LED Street Lighting program targets municipalities with municipal- or utility-owned high-intensity discharge (HID) streetlights for retrofit to LED. The program provides an incentive to drive early retirement of HID streetlights and achieve market transformation.

For utility-owned fixtures, the municipalities pay monthly equipment rental charges and energy charges based on fixture wattage. In the past, if a municipality wanted fixtures upgraded to LED, it had to pay a customer charge to ComEd to convert the fixture to LED. With ComEd's LED Street Lighting program, this charge is covered through the incentive paid by the utility, so the municipality sees energy savings of the LED fixtures at no installation cost.

ComEd is the developer and program administrator of the LED Street Lighting program, with operational support provided by ICF and outreach support provided by Elevate Energy. ICF's role is to process and review incentive applications and issue incentives on behalf of ComEd. Elevate Energy's role is to work directly with municipalities and trade allies to facilitate the completion of applications.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Municipalities often cite utility rate structures as a reason for not upgrading to LED streetlights. Working closely with the Illinois Stakeholder Advisory Group, the ComEd Program Team developed an incentive that addresses the cost impact to the utility and allows municipal customers to see reduced lighting bills due to the significant reduction in energy use.

The program originally covered only utility-owned streetlights, but ComEd expanded the program in 2017 by adding incentives for municipally owned fixtures.

LESSONS LEARNED

Most customers' streetlight fixtures are unmetered. It was a challenge to update bills to customers who upgraded to LEDs because the original billing data often identified individual lamps only by relative location (e.g., "5 poles west of Main St and Pine St"). To ensure that streetlight usage was accurate in the billing system, fixture latitude and longitude had to be recorded. To assist municipalities and contractors in gathering these data, technical support is now part of the outreach effort. Such support has improved the quality of fixture location data. ComEd and ICF are developing additional requirements for contractors to participate in the program to improve data quality further.

PROGRAM PERFORMANCE

	2015–2016	2016–2017	Year 1 (2018)[a]	2018–2021 portfolio
Program spending	$3.8 million	$3.4 million	$24.2 million	$91.9 million
Number of municipalities	41	38	201 est.	900 est.
Annual electric energy savings (MWh net)	5,978	17,447[b]	95,000	354,000
Lifetime electric energy savings (MWh net)[c]	89,670	261,705	1,425,000	5,310,000
Annual peak demand savings, summer (MW)	0.0	0.0	0.0	0.0
Cost-effectiveness results, UCT	0.76	0.76	2.16	2.16
Most recent program evaluation: Contact program representative				

[a] Year 1 (2018) and program years 2018–2021 are as filed values and estimates, based on the approved energy efficiency program plans. [b] Evaluators have not yet reported savings for 2016–2017. Values are utility-estimated net. 2018 is the first year in which municipal fixtures were included in the program. Due to the large number of municipal applications that came in the last week of 2017, the program spending is lower relative to the energy savings because invoices lagged project approval. [c] Lifetime savings are based on a 15-year average fixture life.

Consumers Energy, Advanced Lighting Controls, Large Business

PROGRAM AT A GLANCE

Implementation organization	DNV GL
State where offered	Michigan
Customer segment served	Large business commercial and industrial (C&I)
Program start date / year established	2015
Annual energy savings (gross MWh)	4,010
Other measures of program results	59 representatives from 39 trade ally organizations trained on advanced lighting control (ALC) basics
Budget	$1.3 million (2017)
Funding source	Consumers Energy Business Energy Efficiency Program (CEBEEP)
Website	www.consumersenergy.com/business/energy-efficiency/rebates-and-programs/lighting
Contact for program information	Wesley Whited Senior Consultant, Advanced Lighting and Controls DNV GL 614-551-4244 wesley.whited@dnvgl.com

Lighting savings are an integral part of the Consumers Energy Business Energy Efficiency Program (CEBEEP). Recognizing the speed at which the lighting industry is innovating beyond LED, the CEBEEP team developed a program for advanced lighting controls (ALC) in 2015. ALCs are fully networked lighting systems that leverage multiple control strategies, and have the capabilities to document and export their energy savings.

The program engages and serves the broader lighting community including manufacturers, distributors, design-build professionals, contractors, and end-use customers. The program design breaks participants into two tiers based on building type. Customers with industrial, manufacturing, warehouse, and parking lot facilities are eligible for a $0.12/kWh-saved incentive. These types of facilities often produce higher savings and require lower incentives. Customers with commercial spaces, offices, schools, and hospitals are eligible for a $0.18/kWh-saved incentive. The program specifies a fully networked system of LED lighting and controls, and requires participants to collect energy consumption data at short time intervals. The data must be stored for at least one year and be easily exportable to an Excel file. Consumers Energy and DNV GL have the objective for the Advanced Lighting Controls Consumers Energy Program delivery mechanism to move ALCs from emerging technology to the early adopter stage in the marketplace.

Besides the financial incentives, Consumers Energy has hosted a variety of technical and nontechnical trainings to its trade ally base to raise market awareness. Targeted outreach through Consumers Energy customer account managers, CEBEEP Outreach, and efforts of the program manager provide the primary vehicle to develop prospects and participants for the program. Consumers Energy initially identified potential participants through manufacturer relations and data mining of existing C&I Large Business Program files.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The program hosted multiple trade ally trainings giving hands-on experience in addressing and commissioning wireless control systems. Independent program evaluation found the following:

- An average kWh reduction over baseline of 82%
- For kWh results, "All energy savings (kWh) reported savings values were very reasonable, consistent."
- For kW, "across all projects, evaluated ex post demand (kW) savings higher than program reported ex ante savings."
- Averaged realization rate of 303% of reported ex ante savings

LESSONS LEARNED

Different building types employ different types of lighting technology, which impact return on investment and energy savings potential. Offering multiple incentive levels helps a program attract diverse building types. Networked lighting systems run on software and include many components that may be unfamiliar to a traditional trade ally. Technical and nontechnical trainings help alleviate this challenge.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$610,108	$809,565	$1.3 million
Number of participants	1	2	8
Annual electric energy savings (MWh gross)	253	3,645	8,131
Lifetime electric energy savings (MWh gross)	3,031	42,742	119,988
Cost-effectiveness results, Utility Cost Test (UCT)	0.41	4.50	6.08
Most recent program evaluation: Contact program representative			

Focus on Energy, Retail Lighting and Appliance

PROGRAM AT A GLANCE

Implementation organization	ICF Resources, LLC
State where offered	Wisconsin
Customer segment served	Residential
Program start date / year established	2011
Annual energy savings (MMBtu)	1,223,717 (since 2015)
Peak demand (summer) savings (MW)	40.7 (since 2015)
Other measures of program results	6.57 average TRC 2015–2017
Budget	$15.9 million (2017), $15.3 million (2018)
Funding source	Wisconsin utility ratepayers
Website	focusonenergy.com/lighting
Contact for program information	Keith Cronin Residential Program Manager Focus on Energy, APTIM 608-230-7029 keith.cronin@aptim.com

The Retail Lighting and Appliance program is available to residential customers who have electric or gas service through more than 100 participating Wisconsin utilities. The program consists of upstream incentives to reduce the cost of LED bulbs for customers at retail point-of-sale, midstream incentives paid to participating retailers for qualifying appliance sales, a $75 rebate for smart thermostats (accessible via online application or instant coupon redemption), and a midstream Low-E storm window offering that was introduced in the third quarter of 2018.

General-service, specialty, and connected LED lightbulbs reduce electricity demand for participating utilities and their customers. Smart thermostats and Low-E storm windows also contribute to electric savings as well as natural gas savings.

In addition to financial incentives and rebates, the program offers an online appliance marketplace that facilitates consumer research and provides purchasing options. It also sponsors in-person education events at retail locations around Wisconsin to help customers take advantage of program benefits. The program also participates in the ENERGY STAR Retail Products Platform (ESRPP) pilot.

ICF International implements the program and forms funding agreements with manufacturers and retailers. APTIM is the Focus on Energy program administrator, reporting to the Public Service Commission of Wisconsin and the Statewide Energy Efficiency and Renewable Administration (SEERA). SEERA funds Focus on Energy with a portion of participating utility ratepayer collections.

The marketing strategy centers on a "Lightbulb Moment" branding campaign and includes traditional digital marketing (e.g., search engine ads and Facebook click-to-website ads), mobile proximity marketing with Moasis and inMarket ads, direct mail, and billboards.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Constant improvement for customers is a program hallmark. Instant lighting discounts are available everywhere in Wisconsin at more than 1,000 retailers including chains (big-box and value), independent stores, and an online retailer. More than 100 in-store lighting demonstrations have educated customers about ENERGY-STAR-certified LEDs. Pop-up retail events with Wisconsin's largest companies and utilities have offered rebated products and one-to-one customer engagement. Focus on Energy was the first ESRPP sponsor in the Midwest and is entering its third year of participation. In addition to delivering continuous innovation, the program has maintained an average cost effectiveness of 6.57 over the past three years.

LESSONS LEARNED

Setting an expectation to innovate allows the program to succeed despite external market forces. Lighting technology is evolving rapidly. The program transitioned offerings from 90%/10% CFL/LED sales in 2015 to 30%/70% in 2016, with phase-out of CFLs in 2017. Connected lighting and smart thermostats were introduced as incentivized products in 2017.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$10.8 million	$11.7 million	$15.8 million
Number of customers	856,664	688,204	881,427
Annual electric energy savings (MWh net)	167,418	105,898	80,561
Annual peak demand savings (MW)	19.21	12.35	9.13
Annual gas energy savings (therms net)	0	0	162,889
Lifetime electric energy savings (MWh net)	1,303,434	1,583,150	1,586,665
Lifetime gas energy savings (therms net)	0	0	1,628,890
Cost-effectiveness results, Total Resource Cost (TRC)	9.37	4.51	5.83
Most recent program evaluation focusonenergy.com/evaluation-reports			

Pacific Gas and Electric Company (PG&E), LED Accelerator Program

PROGRAM AT A GLANCE

Implementation organization	Energy Solutions
State where offered	California
Customer segment served	Retail, warehouse, restaurant, bank, medical
Program start date / year established	2010
Annual energy savings (MWh)	6,311 (2017)
Peak demand (summer) savings (MW)	1.7 (2017)
Other measures of program results	47 network lighting control projects
Budget	$2.5 million (2018)
Funding source	PG&E public goods charge
Website	www.ledaccelerator.com/
Contact for program information	Pam Molsick Senior Project Manager Energy Solutions 510-482-4420 ext. 276 pmolsick@energy-solution.com

The LED Accelerator (LEDA) program serves the retail, warehouse, restaurant, bank, and medical customer sectors. LEDA provides tiered incentives for retail, downstream, and pay-for-performance for best-in-class LEDs and networked lighting controls (NLCs). To be eligible, a business must be a PG&E electricity customer and save a minimum of 20 kW. The program covers both new construction projects and custom retrofits where 50% of the load is interior. PG&E administers LEDA, and Energy Solutions implements it.

LEDA serves customers with audits, pilots, design, solicitation, application, installation, commissioning, and on-bill financing. The program reviews manufacturers' products, recommends equipment, assists with NLC plans, estimates incentives, develops M&V plans, and supports installation and commissioning of NLCs with technical advisors. LEDA also expedites product qualification before DLC, assists with DLC/ENERGY STAR certification, approves energy monitoring capabilities, and provides customer feedback to product manufacturers.

The program incentivizes the following measures: Tier II-DLC Premium LEDs and NLCs or energy-efficient redesign with DesignLights Consortium (DLC) premium fixtures, Tier I-Type C LED tubes and NLC or more-stringent specifications above DLC/ENERGY STAR. Large chain customers leverage LEDA incentives to influence manufacturers to produce and competitively price superior products.

LEDA targets marketing and promotion to multisite commercial businesses.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

LEDA's incentives advance deep energy savings, superior lighting products, and nonenergy benefits. The program encourages manufacturers to produce and competitively price

superior products, adding requirements on quality characteristics beyond DLC when necessary to protect customer interests. LEDA achieves deeper energy savings by promoting only the highest-performing LEDs/NLCs. In particular, the NLC requirement gives customers additional capabilities (such as AutoDR, HVAC, and plug-load optimization) and significant nonenergy benefits—capabilities that would be lost until the site's next lighting retrofit 10 years later. LEDA is pioneering advanced data practices that capture deeper and more persistent energy savings by requiring energy monitoring and reporting from NLCs and by using NMEC (utility meter data analysis) to calculate and validate energy savings.

LESSONS LEARNED

NLC retrofits take longer to design, install, and monitor. LEDA suggests a five-year program term. NLC manufacturers need education to design savings reporting that is suitable for utility programs. Contractors need specialized training to install, program, and commission NLCs. To reduce delays and costs, LEDA now requires a signed NLC proposal that includes narrative and sequence of operations to clearly articulate control design and intent to stakeholders. LEDA requires contractors to identify commissioning agents, who are financially responsible for programming corrections. Regulators agree to use real hours and allow verification of control savings via NLCs or NMEC.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$2.6 million	$4.8 million	$2.3 million
Number of participants	92	36	53
Annual electric energy savings (MWh gross)	6,906	0.65	6,311
Annual peak demand savings (MW)	1.6	0.12	1.7
Lifetime electric energy savings (MWh gross)	103,591	9,802	94,672
Cost-effectiveness results, Utility Cost Test (UCT)	1.36	0.67	2.26
No separate program evaluation has been conducted.			

ON-BILL LENDING

Ouachita Electric Cooperative, HELP PAYS® (Home Energy Lending Program, Pay As You Save)

PROGRAM AT A GLANCE

Implementation organization	EEtility
State where offered	Arkansas
Customer segment served	Residential, commercial
Program start date / year established	April 2016
Annual energy savings per customer (MWh gross)	3.953
Peak demand (summer) savings per participant (kW)	1.5
Other measures of program results	Net average savings 3,953 kWh per year for non-fuel-switch participants according to a third-party evaluation Average 22% per home energy savings Average 9.2 out of 10 customer satisfaction score according to surveys conducted at the residence
Budget	$2 million (2018)
Funding sources	National Rural Utilities Cooperative Finance Corporation (CFC): A nonprofit cooperative that provides finance services to member-owners Rural Energy Savings Program: Part of US Department of Agriculture Rural Development office that helps provide loans to rural families and small businesses for energy efficiency measures (pending)
Website	www.oecc.com/help
Contact for program information	Tammy Agard Partner and CEO EEtility 501-351-5212 tagard@eetility.com

HELP PAYS is a tariffed on-bill (TOB) financing program that reduces the upfront costs of energy efficiency upgrades for participants and then allows for a convenient customer payback process. Each program participant in HELP PAYS receives a free energy assessment and may then opt to have Ouachita Electric Cooperative (OEC) pay the upfront costs for cost-effective upgrades identified during the assessment. Participants pay for the upgrades gradually through a fixed charge on the utility bill that is less than the monthly monetary savings; participants get to pocket at least 20% of the average.

HELP PAYS offers its services to residential, municipal, and nonprofit member-owners of OEC, a utility that serves approximately 7,000 member-owners and 9,400 meters across five counties in southern Arkansas. Each program participant receives educational opportunities in addition to the energy assessment and the upfront financing option.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

HELP PAYS identifies the most cost-effective work unique to each participant's home, eliminates qualifying and financing barriers, pays workers based on performance, decreases energy burdens for those who need it most, and achieves quantifiable energy savings that will continue well beyond the life of the tariff charge.

By implementing a tariff-based system, the program promotes energy efficiency inclusiveness by eliminating common qualifiers such as credit scores/debt-to-income ratios and homeowner/renter status. In addition to reducing high energy burdens, HELP PAYS provides improved quality-of-life nonenergy benefits such as increased comfort of homes and healthier living environments. It exemplifies the Rural Electric Cooperative motto that members need to pay the lowest possible cost for energy.

More than 300 members—nearly 5% of Ouachita's member base, including homeowners, renters, multifamily units, governmental buildings, and schools—have been upgraded so far, and post meter verified data show an average energy savings of 22% per meter. Projected savings for each installation over the course of 10 years averages $4,744. Participants save an additional average of $949 over the life of the HELP PAYS term.

LESSONS LEARNED

- The removal of financial qualification barriers and personal debt assignment spurs people to take energy efficiency action.
- In addition to securing the cooperatives investment by placing a tariff charge at the metered location, the establishment of a loss reserve fund for cases where a metered location may become vacant for an extended period or otherwise become uninhabitable provides the cooperative with a near zero risk of not recovering its investment.
- Taking a pay-for-performance approach to the quality of the installs and requiring that quantifiable results are obtained is the best way to ensure that projected savings are realized and will live beyond the term of the tariff charge.

PROGRAM PERFORMANCE

	2016	2017
Program spending	1.3 million	1.5 million
Number of participants (one building per customer)	198	115
Annual electric energy savings (MWh net)	782	270
Annual peak demand savings (MW net)	0.3	0.17
Lifetime electric energy savings per customer over 10 years (MWh net)	39.5	23.5
Cost-effectiveness results, savings to investment ratio, electric	SIR: 1.54 to 2.57	N/A
Most recent program evaluation HELP PAYS® First-Year Report		

AVANGRID, Small Business Energy Advantage

PROGRAM AT A GLANCE

Implementation organization	AVANGRID
State where offered	Connecticut
Customer segment served	Commercial small business
Program start date / year established	2000
Annual energy savings	8,847 MWh, 91,288 therms (2017)
Annual peak demand (summer) savings (MW)	1
Other measures of program results	100% subscribed
Budget	$4.4 million (2017), $2.4 million (2018)
Funding source	A 3 mil per kWh charge referred to as Connecticut Energy Efficiency Fund
Website	EnergizeCT.com/sbea and uinet.com/sbea
Contact for program information	Amanda Gavagan Program Administrator AVANGRID 203-499-2658 amanda.gavagan@uinet.com

Small Business Energy Advantage (SBEA) provides cost-effective turnkey energy efficiency proposals and services to the various types of small businesses within AVANGRID's CT territory.[5] These include mom-and-pop stores, houses of worship, retail spaces, convenience stores, gas stations, restaurants, apartment building common areas, the agricultural sector, light manufacturers, and nursing homes.

Contractors vetted through AVANGRID provide a no-obligation energy assessment identifying the potential energy-saving retrofit measures, the available incentives, and various financing options. These proposals include incentive dollars from the Energy Efficiency Fund for a portion of the cost of the installation as is determined by the energy savings achieved. The more comprehensive a project, the higher the incentive. For example, a lighting-only project incentive may be approximately 30%; for a comprehensive lighting, refrigeration, and HVAC project, incentives may be 40–50%. In most cases, these comprehensive projects max out at the 50% incentive level for multiple technologies.

The minimum loan amount offered to the customer is $500 and the maximum is $100,000, with the ability to offer a loan term of up to 48 months; 0% financing with on-bill repayment is available to all qualified customers.

[5] This profile reflects the work done among the AVANGRID SBEA program staff, engineers, and contractor support. SBEA is part of the state's suite of energy efficiency programs available to commercial and industrial customers, not only those within AVANGRID territory.

The objective is to offer proposals to customers where there is no or little out-of-pocket expense and to create a positive cash flow scenario that lowers their electric and gas bills and where the energy savings achieved each month offsets the payment. Another benefit is that once the loan is paid, the customer's bill will be less, reflecting the reduced energy use.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Most customers in the small business sector can consider making energy-efficient upgrades only with the aid of financing. No-interest on-bill financing allows these customers, who need to cut costs and save money wherever they can, to install energy efficiency projects.

LESSONS LEARNED

It is important to keep the program as current as possible and to provide up-to-date technologies and solutions that will give owners the tools and products they need in order to achieve their energy efficiency goals. Staying up-to-date requires the program to provide training opportunities to vendor partners in order to promote more comprehensive measures and projects.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$3.5 million	$3.3 million	$4.4 million
Number of projects	357	355	369
Annual electric energy savings (MWh net)	8,297	8,053	8,847
Annual peak demand savings (MW)	1	1	1
Annual gas energy savings (therms net)	72,418	84,955	91,288
Lifetime electric energy savings (MWh net)	103,281	100,003	110,908
Lifetime gas energy savings (MMtherms net)	0.91	1.08	1.03
Cost-effectiveness results, Utility Cost Test (UCT), electric	1.5	1.68	2.11
Cost-effectiveness results, UCT, gas	1.95	2.51	2.42
Most recent program evaluation www.energizect.com/sites/default/files/C1639 SBEA Impact Evaluation_Final Report_3.20.18.pdf			

AGRICULTURE

Entergy Arkansas, Agriculture Energy Solutions

PROGRAM AT A GLANCE

Implementation organization	ICF
State where offered	Arkansas
Customer segment served	Agricultural customers
Program start date	2012
Annual energy savings (MWh net)	7,609 (2017)
Peak demand (summer) savings (MW net)	1.04 (2017)
Budget	$1.1 million (2018), $1.1 million (2019)
Funding source	Entergy Arkansas Energy Efficiency Cost Recovery rider
Website	www.entergy-arkansas.com/your_business/save_money/EE/agricultural.aspx
Contact for program information	Beau Blankenship Project Manager, Energy Efficiency Entergy Arkansas 501-377-3913 bblanke@entergy.com

The Agricultural Energy Solutions Program helps farmers and other agribusinesses make their property more energy efficient by offering farm audits, prescriptive and custom incentives, education for suppliers of agricultural equipment, and trade ally oversight, training, and quality control. The goal is to produce long-term, cost-effective electric savings. The program targets both existing facilities and new construction, and any agricultural customer at a facility receiving electric service from Entergy Arkansas is eligible.

Prescriptive measures include efficient lighting technologies. The prescriptive option is a way for farm customers to make efficient choices on predefined energy efficiency lighting measures. The program sets incentives and claimed savings based on predefined technologies and calculation methods.

The custom component supports customers implementing site-specific opportunities through measures not addressed by the prescriptive option, such as VFDs. In 2018, the program added additional custom measures including pump tune-ups, ventilation fans, and integrated high-performance pumping systems for animal and plant production.

Entergy Arkansas partners with the consulting firm ICF, whose account managers, along with lighting supply trade ally networks, promote the program one-on-one. The program supports account managers with print, radio, and digital advertising targeted to the agricultural sector.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The program has doubled annual MWh savings since 2015 while remaining cost effective. Surveys show a 95% satisfaction with program customer service, and 100% of participants were very likely to inform other farmers about the program. Word of mouth among farmers has given credibility to the process, with participants affirming that energy efficiency is good for their business.

Well-documented, with an easily replicable design, the Agricultural Energy Solutions Program serves an untapped, hard-to-reach customer sector.

LESSONS LEARNED

The program has had to overcome implementation barriers in a unique market. With profit margins small, many farmers are hesitant to make energy efficiency improvements. To be successful, program implementers had to meet with farmers onsite to demonstrate how they could save energy and money through specific energy-efficient replacement measures.

Even with financial incentives, some farmers lack funds to invest in energy efficiency. Implementers learned to work with the USDA's REAP program to help secure low-interest loans, and to work with trade allies to incorporate innovative financial solutions.

Implementers also learned that understanding the limitations farmers face in terms of bio-security, disease outbreaks, and other unique issues builds trust for future energy efficiency.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$540,737	$887,504	$765,606
Number of customers	34	59	51
Annual electric energy savings (MWh net)	3,608	7,159	7,609
Annual peak demand savings (MW)	0.47	0.97	1.04
Lifetime electric energy savings (MWh net)	52,795	106,470	76,872
Cost-effectiveness results, Total Resource Cost (TRC)	3.75	3.86	4.42
Most recent program evaluation www.apscservices.info/EFilings/Docket_Search_Documents.asp?Docket=07-085-TF&DocNumVal=662			

Consumers Energy, Agriculture Energy Efficiency

PROGRAM AT A GLANCE

Implementation organizations	Franklin Energy Group, DNV GL Energy Services USA, Inc.
State where offered	Michigan
Customer segment served	Commercial and residential agriculture customers
Program start date / year established	January 1, 2014
Annual energy savings	10,500 MWh, 40,000 MCF
Peak demand (summer) savings (MW)	2,000
Other measures of program results	Customer satisfaction 8.9 on 10-point scale
Budget	$1.9 million (2018), $2.1 million (2019)
Funding source	Consumers Energy
Website	ConsumersEnergy.com/startsaving
Contact for program information	Amy Glapinski Senior Account Manager Consumers Energy 517-262-8206 Amy.Glapinski@CMSEnergy.com

Consumers Energy Agriculture Energy Efficiency Program serves residential and commercial customers. Any customer operating an agricultural-products-producing facility, receiving electric and/or natural gas service from Consumers Energy, and paying the Energy Optimization surcharge is eligible to participate. Agricultural products facilities include dairy farms, greenhouses, cash-crop operations, orchards, fruit storages, and grain drying facilities.

The program offers electric and natural gas prescriptive rebates for 43 technology measures in categories including grain dryers, greenhouse technologies, fans and pumps, irrigation, compressors, refrigeration, VSDs, heat exchangers, and LED lighting. There is also a rebate for USDA Tier 2 audits conducted in partnership with Michigan State University's Farm Energy Audit Program. The program also offers custom projects.

Franklin Energy Group and DNV GL Energy Services USA, Inc. implement the program on behalf of Consumers Energy. Program energy advisors conduct in person meetings with customers, provide walk-through assessments of their facilities, and assist them with rebate application paperwork. The energy advisors engage trade allies who submit rebate applications on the customer's behalf. The program also leverages partnerships with several organizations and associations that are leaders in the agriculture industry.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Since the inception of the pilot in 2011, this program has been able to grow from offering two measures in 2011 to offering 43 measures in 2018, including segment-specific technologies that can more fully meet the unique needs of different agriculture sectors. The program has helped customers to complete 969 energy efficiency projects, collectively earn

over $4.7 million in incentives for their businesses, and save more than $3.7 million in electricity and natural gas in seven years.

LESSONS LEARNED

Program managers have identified three primary barriers to program participation and worked to overcome them. They are: (1) lack of customer trust, (2) ineffective communication leading to lack of awareness, and (3) low engagement of and influence with trade allies. The partnership with Michigan State University has helped to overcome these barriers by validating the credibility of the program with the customer. A field team of energy advisors gets program information out to these customers in person. The advisors help sell the program through trade allies. The program also works with industry experts in the community to close communication gaps with customers.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$0.91 million	$1.4 million	$2.2 million
Number of participants	170	179	257
Annual electric energy savings (MW net)	3,485	6,612	10,568
Annual peak demand savings (MW)	1,199	1,555	2,280
Annual gas energy savings (therms net)	849,404	306,076	387,415
Lifetime electric energy savings (MWh net)	54,647	94,107	150,730
Lifetime gas energy savings (MM therms net)	8.91	2.77	3.68
Cost-effectiveness results, Utility Cost Test (UCT), residential electric	2.79	2.31	1.01
Cost-effectiveness results, UCT, commercial electric	5.07	5.58	2.73
Cost-effectiveness results, UCT, commercial gas	8.83	9.61	3.03
Most recent program evaluation mi-psc.force.com/sfc/servlet.shepherd/version/download/068t00000022ofQAAQ			

UTILITY PARTNERSHIPS

Pacific Gas and Electric Company (PG&E), California Youth Energy Services

PROGRAM AT A GLANCE

Implementation organization	Rising Sun Energy Center
State where offered	California
Customer segment served	Residential, hard to reach
Program start date / year established	2000
Annual energy savings (kWh)	782,166 (2017)
Other measures of program results	42,667 residences served, 1,828 young adults employed, 129.2 million lifetime kWh saved, 104,630 metric tons of CO2 emissions avoided, 208 million gallons of water saved annually
Budget for most recent year	$2.8 million
Funding sources	PG&E Energy Watch partnerships: County of Marin, Alameda County Water District, East Bay Municipal Utility District, Marin Municipal Water District, North Marin Water District, Cities of Oakland, San Leandro, Hayward, Antioch, Martinez, Richmond, Fremont, Clif Bar Foundation, Richmond Community Foundation, StopWaste, Accenture, REDF
Website	www.risingsunenergy.org
Contact for program information	Julia Hatton Director of Strategy Development and Policy Rising Sun Energy Center 510-665-1501 ext. 301 hatton@risingsunenergy.org

Rising Sun's California Youth Energy Services (CYES) program provides a community-based approach to the dual issues of youth unemployment and climate change and delivers measurable energy and water savings to thousands of households annually. Each year the program trains, mentors, and employs nearly 200 local young adults (ages 15–22) as energy specialists who provide free energy efficiency and water conservation services to residents of their communities.

CYES was designed by Bay Area nonprofit Rising Sun in 2000, and in 2006 it became part of the Pacific Gas & Electric Company's local Energy Watch Partnerships. Today CYES is offered in six Bay Area counties and is guided by the input of local governments to ensure that it is responsive to the needs of local communities.

CYES offers no-cost direct-install (deemed) energy efficiency and water conservation measures to any residential ratepayer in the service territory. It includes a home assessment, installations, education/behavior change, and referrals to other resources.

CYES targets underserved residents: multifamily, tenants, seniors, non-native English speakers, and low-to-moderate income households. Marketing is grassroots and

community-based, and all customers receive the service at no cost to them thanks to the utilities' Public Purpose Program charge.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

CYES is a primarily utility-funded energy efficiency program that employs local youth to provide energy efficiency services to residents of their communities. Accessibility, equity, work-based learning, and youth development are core to the CYES model. CYES was founded in 2000 when students at Berkeley High decided that they did not want to just learn about climate change—they wanted to do something about it.

CYES approaches climate literacy as a workforce skill. The program provides local youth with a clean-economy job combined with professional skills training, launching hundreds of green careers each year and building the next generation of energy leaders.

CYES uniquely offers zero barriers to participation, increasing customer uptake among underserved residents. Customer satisfaction rates are exceptionally high at 98%.

LESSONS LEARNED

- Trust and quality are essential to customer participation, especially in underserved communities. Youth represent the communities they serve and include individuals who can offer services in-language.
- Make it easy. Do not require eligibility verification, fees, landlord permission, or different services based on housing type or ownership.
- Direct install offers a face-to-face opportunity to incentivize deeper work.
- Grassroots outreach and strong partnerships with local governments and community-based organizations are crucial.
- Youth are the key to our future; they will meet the high expectations we set for them, and they can have a transformative impact in their communities.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending (millions)	$2.8	$2.9	$3.2
Number of participants	5,704	4,449	4,471
Annual electric energy savings (kWh gross)	967,693	613,523	782,166
Annual peak demand savings (kW)	N/A	N/A	100
Annual gas energy savings (therms gross)	11,315	2,440	2,287
Lifetime electric energy savings (kWh gross)	9,832,995	3,829,821	8,800,552
Lifetime gas energy savings (therms gross)	164,207	24,394	22,870
Most recent program evaluation risingsunenergy.org/about/impact-and-press/			

Los Angeles Department of Water and Power (LADWP), Southern California Gas Company (SoCalGas), Master Inter-Utility Agreement

PROGRAM AT A GLANCE

Implementation organizations	LADWP, SoCalGas
Customer segment served	Residential, nonresidential
Program start date / year established	October 2012
Annual energy savings (from 6 sample joint programs)	Up to 11.59 MWh, 612,153 therms
Budget for most recent year	$8.4 million (LADWP only)
Funding source	Ratepayer funds (LADWP)
Contact for program information	Craig Tranby Strategy & Analysis/Efficiency Solutions Los Angeles Dept. of Water and Power (LADWP) 213) 367-2795 Craig.Tranby@ladwp.com Mugi Lukito Program Advisory/Municipal IDSM Partnerships Southern California Gas Company (SoCalGas) 213-244-4218 mlukito@semprautilities.com

LADWP and SoCalGas have formed a partnership through a Master Inter-Utility Agreement (MIUA) to deliver efficiency programs to their 4 million common customers, the residents and businesses of the city of Los Angeles. This efficiency partnership features two levels: the master umbrella agreement and the multiple program orders (individual programs) that impact their customers.

Program types include

- Energy savings incentives paid directly to customers
- Direct-installation programs provided at no cost to customers
- Technical services and outreach programs that help guide customers to utility incentives
- Research and demonstration programs supporting new technologies and increasing efficiency standards

All joint programs have the potential for electric and natural gas savings, with the exception of one program with gas and water savings.

The MIUA covers the typical utility lawyerly issues of indemnification, severability, customer confidentiality, and other terms and conditions, rendering these issues resolved for the duration of the partnership. This allows programs (currently 17) to be developed and approved with a simple program order/scope of work that includes key staff, roles and responsibilities, costs, invoicing, and other specifics. LADWP administers some programs on behalf of the partnership, and SoCalGas administers others.

The partnership structure allows much flexibility; the lead utility for each program determines the method of providing services, arranges for contracts as needed, and leads marketing efforts. The partner utility also promotes joint programs and funds the measures and/or savings under its purview (LADWP for electric and water savings, SoCalGas for gas savings). The structure allows LADWP to participate in California statewide IOU programs, adapted for the joint customers.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The efficiency partnership is a true public–private partnership, uniting two large utilities via an umbrella agreement and navigating the separate regulatory structures each utility must adhere to. After six years, it is going strong and is flexible enough to quickly add new or modify existing programs as conditions warrant. It features a streamlined process for customers to access incentives from both utilities through one utility contact, increases customer participation and incentives, and helps reach state conservation goals faster. The model has already been replicated by SoCalGas with other municipal electric utilities.

LESSONS LEARNED

- The two utilities leverage each other's existing programs to offer more measures at a lower overall cost and reach more of their common customers.
- The tiered structure of this partnership has proven very valuable; it is worthwhile to work out the legal logistics in one document and apply them to all partnership efforts to keep programs streamlined and easy to develop.
- Customers and contractors appreciate the expanded scopes of work and increased incentive levels.
- Be flexible; seek out new opportunities to partner that produce electric and gas savings.
- Make adjustments as needed. With different regulatory structures, LADWP and SoCalGas must respond to somewhat different conditions and directives. If a specific program is no longer useful for one utility, replace it with something else.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending (LADWP only, for 10–18 programs/yr)	$3.8 million	$6.5 million	$8.5 million
Number of participants (for six sample programs)*	22,097	29,884	27,500
Annual electric energy savings for 6 sample programs (MWh gross)	4.11	11.59	10.29
Annual gas energy savings (therms gross)	309,583	498,814	612,153
Lifetime electric energy savings (MWh gross)	32.86	92.75	82.34
Lifetime gas energy savings (MMtherms gross)	2,476,664	3,990,512	4,897,224
Cost-effectiveness results**	N/A*	N/A*	N/A*
Most recent program evaluation N/A***			

*These sample programs are: (1) California Advanced Homes Program (Residential New Construction); (2) Savings By Design (Commercial New Construction); (3) Single-Family Home Energy Upgrade Program; (4) Energy Savings Assistance Program (Low-Income Direct Install); (5) Commercial Food Service Rebate Program; and (6) Engineering Support for Calculated Programs. ** Cost effectiveness not available because each utility calculates its cost effectiveness differently, and due to the high variability in customer segments and measure profiles. *** Program evaluation has not been performed jointly.

Irvine Ranch Water District, Southern California Edison, Southern California Gas Company, One-Stop Shop for Water and Energy Efficiency

PROGRAM AT A GLANCE

Implementation organizations	Irvine Ranch Water District (IRWD), Southern California Edison (SCE), Southern California Gas Company (SoCalGas)
State where offered	California
Customer segment served	Residential
Program start date / year established	2016
Annual energy savings (gross MWh)	1,190 (2017)
Peak demand (gross kW) savings	448 (2017)
Other measures of program results	71% of participating homes received both water and energy-efficient measures, indicating strong support for the combined program.
Budget	$2.6 million (2017)
Funding sources	IRWD grant from Department of Water Resources Greenhouse Gas Reduction Fund, California utility customers under the auspices of California Public Utilities Commission
Website	http://rightscapenow.com/
Contact for program information	Melody Seesangrit Water Efficiency Specialist Irvine Ranch Water District 949-453-5530 seesangr@irwd.com

Irvine Ranch Water District (IRWD) collaborated with SoCalGas and Southern California Edison (SCE) to offer a water–energy nexus direct-install program to mutual residential customers in the IRWD service area. The program leveraged existing rebate incentives provided by each agency.

The direct-installation program was provided at no cost to participants. IRWD funded water efficiency devices while SCE funded energy efficiency devices. Qualified customers were eligible to receive high-efficiency energy and indoor water efficiency devices during the same visit, by the same contractor, making this program a true one-stop shop. Eligible energy- and water-efficient devices offered through the program included faucet aerators, showerheads, high-efficiency toilets, weather-based irrigation controllers (WBICs), pool pumps, power strips, HVAC tune-up, and lighting fixtures. The outdoor landscape contractor provided additional technical assistance to participants who received weather-based irrigation controllers to instruct them on proper programming and operation of the device.

A strategic marketing approach was employed to identify customers with the highest savings potential for all three utilities: water, natural gas, and electricity. In addition to

customers being screened for previous participation in water and energy efficiency programs, the age of the home also informed the potential water savings.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Almost 2,000 homes participated. The majority (71%) received both water- and energy-efficient measures, indicating strong support for the combined program. The high levels of customer satisfaction led to a 41% participation rate from customers who learned about the program from friends and family. The program's marketing, outreach, and participation rates are well-documented and have been shared with agencies interested in replicating the program.

LESSONS LEARNED

Bundling the water and energy efficiency devices made customers are more likely to participate and schedule time to have many devices installed as opposed to one.

The three utility agencies met biweekly for more than a year prior to launching the program to establish acceptable methods of agency cooperation and customer data sharing. The program is a result of reaching an agreement on program design and workflows, the water and energy measures offered, and the marketing materials that were developed to satisfy all agencies' legal counsel with regard to disclaimer language and use of logos.

PROGRAM PERFORMANCE

	2016	2017
Program spending	$109,181	$2.6 million
Number of participants	265	1,951
Annual electric energy savings (MWh gross)	142	1,190
Annual peak demand savings (KW)	93	448
Annual gas energy savings (therms gross)	379	10,020
Annual water savings (AF/y gross)	0.27	144
Annual embedded energy savings from water savings (KWh gross)	474	319,783
Lifetime electric energy savings (MWh gross)	782	6,309
Lifetime gas energy savings (therms gross)	1,077	33,066
Lifetime water savings (AF gross)	5	2,161
Lifetime embedded energy savings from water savings (MWh gross)	9.48	4,799
Cost-effectiveness results, energy (electric/gas)	1.26	1.10
Most recent program evaluation	Please contact utilities for evaluation	

Xcel Energy, Partners in Energy

PROGRAM AT A GLANCE

Implementation organizations	Xcel Energy, with additional implementation vendor support from Brendle Group and subcontractors Center for Energy and Environment, Vermont Energy Investment Corporation
States where offered	Minnesota, Colorado
Customer segment served	Communities
Program start date / year established	August 2014
Annual energy savings	153.6 GWH, 4,515,500 therms (2017)
Budget (DSM and O&M budget dollars)	$1.6 million (2017), $2.1 million (2018)
Funding source	Xcel Energy's Minnesota's Electric and Natural Gas: spending associated with Minnesota electric and natural gas conservation Public Service Company of Colorado's Demand Side Management Plan, Electric and Natural Gas: spending associated with Colorado electric and natural gas conservation Xcel Energy's operations and maintenance budget: spending associated with renewables, customer choice, customer service offerings
Website	Xcelenergy.com/PartnersInEnergy
Contact for program information	Tami Gunderzik Sr. Program Manager Xcel Energy 612-330-6686 tami.gunderzik@xcelenergy.com

Partners in Energy (PiE) supports the development and implementation of community-driven energy action plans. PiE facilitators help a community recruit a team of local representatives, then lead these stakeholders through a series of 4–5 workshops to develop an energy action plan reflecting the community's unique objectives, be they conservation, greenhouse gas reduction, or cost savings.

The planning process establishes energy consumption and program participation baselines; identifies local market opportunities using utility and third-party data; identifies appropriate resources, including Xcel Energy DSM programs; develops focus areas and goals; and conducts scenario modeling to assure that plan outcomes align with the community's goals. The Xcel Energy team develops the written plan with information and input from the community. This planning service is free for communities.

Implementation support is based on the strategies and tactics that the community identifies in the plan. It is unique to each plan and can include marketing, project management, tracking of impacts, reporting, and funding for incremental staffing or events. Implementation results in communities achieving their unique goals around energy, as well as incremental sales of Xcel Energy's existing portfolio of programs.

Webinars, office hours, and annual in-person gatherings engage communities throughout the process. Online events feature experts on various topics associated with energy planning and implementation, such as community-based social media campaigns, engaging small businesses, and tips for low-income program outreach. This platform allows communities to informally share progress and lessons learned.

PiE combines the utility's expertise in energy and efficiency programs with the vendor's expertise in sustainability and community planning. Xcel Energy employs Brendle Group, which subcontracts the Center for Energy and Environment for work in Minnesota and the Vermont Energy Investment Corporation for online components.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

PiE is built on ongoing, comprehensive collaboration, placing communities in the driver's seat to meet their energy goals. Outcomes are defined by participating community's objectives, and impacts are measurable and tracked. Facilitated engagement, technical assistance, and customized data and metrics enable communities to design strategies that are creative, locally relevant, and technically feasible. As a partner and not just a provider, Xcel Energy can leverage new channels to market programs and services.

LESSONS LEARNED

- The program's design overcomes the barriers of limited community resources, utility data access, and limited awareness of available resources.
- Communities need committed personnel to successfully implement plans. As communities are identified and planning teams are developed, it is critical to involve local personnel in delivery of strategies and tactics.
- Community-driven tactics are effective in reaching markets normally challenging for utilities such as low-income and small business markets. Local initiatives can access outreach channels that are not traditionally used to deliver utility conservation programs.
- Community size is not an indicator of ability to drive program participation. Highly engaged small communities can have impacts similar to large communities with limited resources.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending (DSM + O&M)	$693,400	$995,300	$1.2 million
Number of communities / DSM participants	8 / 10,315	16 / 35,463	27 / 41,112
Annual electric energy savings (MWh gross)	40,771	98,058	153,580
Annual gas energy savings (therms gross)	1,435,400	5,263,000	4,515,500
Lifetime electric energy savings (MWh gross)	499,445	1,201,206	1,881,359
Lifetime gas energy savings (MMtherms gross)	18.302	67.103	57.573
Cost-effectiveness results, Utility Cost Test (UCT), electric (MN / CO)	3.62 / 2.71	4.12 / 2.22	3.00 / 1.76
Cost-effectiveness results, UCT, gas (MN / CO)	4.18 / 2.91	4.66 / 3.09	3.41 / 2.89
Most recent program evaluation N/A			

Partners in Energy is funded through DSM budgets as well as operating dollars for non–conservation-related activities; dollars reported above reflect the DSM component of the budget. Conservation impacts reflect participation in communities for program portfolio. Net incremental impacts from Partners in Energy activity are not identified and program spend reporting does not incorporate direct impact program expenses, only those associated with Partners in Energy. Lifetime savings, levelized cost of saved energy, and cost-effectiveness results are estimated using statewide portfolio averages. MN Demand-Side Management regulatory filings: www.xcelenergy.com/company/rates_and_regulations/filings/minnesota_demand-side_management
CO Demand-Side Management regulatory filings: www.xcelenergy.com/company/rates_and_regulations/filings/colorado_demand-side_management.

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CenterPoint Energy Minnesota, Foodservice

PROGRAM AT A GLANCE

Implementation organization	CenterPoint Energy Minnesota Gas
State where offered	Minnesota
Customer segment served	Small commercial: foodservice
Program start date / year established	1995 (as Conservation Program)
Annual energy savings achieved (therms)	544,390 (2015), 549,780 (2016), 593,020 (2017)
Peak demand (summer) savings	N/A
Budget	$704,155 (2017), $707,405 (2018), $710,655 (2019)
Funding source	CenterPoint Energy commercial ratepayers
Website	www.CenterPointEnergy.com/Foodservice
Contact for program information	Ann Lovcik Foodservice Energy Efficiency Consultant Sales and CIP Department 612-321-5470 Ann.Lovcik@CenterPointEnergy.com

The CenterPoint Energy Minnesota Foodservice Program offers prescriptive rebates promoting energy-efficient natural gas foodservice equipment to commercial, large-volume cooking customers in the Minnesota CenterPoint Energy service territory. The program also offers the resources of the company's Foodservice Learning Center to end-use customers as well as foodservice trade allies.

Several of CenterPoint Energy's natural gas foodservice rebates are directed at technology conversion (e.g., infrared technologies and combi ovens in place of steamers). Some rebates have a tiered structure: tier 1 is technology conversion and tier 2 is best in class of the new technology.

The minimum efficiency requirement for each measure is the same as the energy efficiency criteria for qualifying products used by the Foodservice Technology Center (FSTC) and/or ENERGY STAR, except in those cases where minimum criteria are not available from either source.

Educating trade allies is also key since they interact with end-use customers and impact their equipment choices. With nearly 10,000 restaurants alone in Minnesota, it is vital to partner with the commercial foodservice trade allies. Nearly 400 equipment dealers, local manufacturer's representatives, distributors, designers, consultants, and service agents make up the Minnesota foodservice trade ally industry.

Impact evaluations have not been performed for the Foodservice Program. Each measure rebated through the program is evaluated by CenterPoint Energy's technical experts to verify savings calculations and cost effectiveness. These calculations are reviewed and approved by the Minnesota Department of Commerce during the approval process for

CenterPoint Energy's Triennial CIP Plan. In recent years, energy savings calculations have been based on the approved deemed-savings methodology issued by the Minnesota Department of Commerce.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

Many foodservice customers do not have the ability to test new, high-efficiency natural gas foodservice equipment prior to purchasing. CenterPoint Energy's complimentary Foodservice Learning Center presents an opportunity for these end-use customers to learn via hands-on and lecture-style training about the benefits of high-efficiency equipment. Conveniently located near downtown Minneapolis, the center is one of only a handful of centers of its kind in the country. It has been an influential tool in the customer's equipment decisions.

As CenterPoint Energy has developed foodservice programs in other service territories, it has used the model of the Minnesota Foodservice program to establish a foundation of presence and trust in the industry.

LESSONS LEARNED

- Building and maintaining industry relationships to market and influence customers with energy efficiency equipment
- Keeping up-to-date on the latest foodservice equipment available to customers as well as new technologies being developed
- Using in-house technical expertise to analyze new foodservice energy savings strategies and communicate with industry technical leaders
- Conducting education equipment seminars and training with technical content and equipment demonstrations

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$553,008	$643,009	$647,995
Number of participants*	1,286	1,199	1,196
Annual gas energy savings (therms gross)	544,390	549,780	593,020
Lifetime gas energy savings (therms gross)	6,035,650	6,133,510	7,331,040
Cost-effectiveness results, Utility Cost Test (UCT)	6.41	5.80	5.85

*2015: 660 measures rebated, 626 Foodservice Learning Center attendees. 2016: 594 measures rebated, 605 Foodservice Learning Center attendees. 2017: 499 measures rebated, 697 Foodservice Learning Center attendees.

Eversource, Franchise Customer Initiative

PROGRAM AT A GLANCE

Implementation organization	Eversource
State where offered	Massachusetts
Customer segment served	Medium and large commercial business
Program start date / year established	2016
Annual energy savings (MWh)	3,043
Peak demand (summer) savings (kW)	168
Budget for most recent year	$1.3 million
Funding sources	System benefit charge (SBC): tariff applied to customer kWh consumption Regional Greenhouse Gas Initiative (RGGI): cap-and-trade pollution control programs Energy efficiency reconciliation factor (EERF): tariff applied to customer account Forward capacity markets (FCMs)
Website	None specific to the initiative
Contact for program information	Noel Chambers Energy Efficiency Consultant Eversource Energy 781-441-8399 Noel.Chambers@eversource.com

Eversource designed the Franchise Customer Initiative to deliver immediate and long-term electric savings benefits to franchise business customers—often common brands—in multiple sectors/subsectors, including retail and quick service restaurants, fast and casual dining, gas station and convenience locations, and hotels and motels. The program offers comprehensive consultative technical services at the site level; studies that define the energy cost and savings impacts, as well as the economic case for a given project; implementation guidance; and project-level incentives. Franchisees statewide may participate at the same market offer, regardless of utility provider.

Eversource launched this prescriptive top-down initiative with individually metered franchises within the Dunkin' Brands Group, Inc. (Dunkin' Donuts). Dunkin' Donuts presented the program to a group of highly respected franchisees who helped further its development and engaged their fellow franchisees. The franchisees that enrolled were assigned a lead vendor who acted as an energy management concierge -- coordinating the audits, proposals, and installations via three authorized vendors. Eversource collaborated with Dunkin' Donuts to distribute program information to franchisees.

To ensure all parties understood the impact of the proposed measures, a technical assistance study was performed on six locations, covering the full spectrum of store types. This study was instrumental in developing the overall package and defining the potential incentive value.

Eversource and National Grid used a competitive bidding process to select the lead vendor and three primary contractors, all with extensive knowledge of the incentive requirements and reporting systems. These contractors also employed a variety of specialty subcontractors for various measures including refrigeration controls and energy management systems.

Incentives for the Base package of energy efficiency measures covered 45% of the implementation cost; the Base Plus package covered 55% of the implementation cost. Dunkin' Donuts helped drive the discussion on incentives to ensure that each project had an average simple payback of 2.5 years after incentives and that franchisees' investment would be cash-flow neutral with interest-free financing.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The program addresses barriers unique to the franchise business model and capitalizes on the marketing efficiencies associated with a brand network. The initiative

- Delivers immediate and long-term electric savings benefits and increased participation among franchisees
- Provides a cost-effective approach that yields significant savings relative to its cost and eliminates the need to go door to door trying to sell to each franchisee
- Delivers enhanced customer service
- Is replicable for franchise businesses in any sector by adjusting the technical and financial resources based on the individual characteristics of the customer subset
- Evaluates the impact of energy efficiency on cost-per-product for an active franchisor and helps them assess how operations impact energy costs
- Solves technical and financial resource challenges through a menu-like delivery model of common end-use opportunities

LESSONS LEARNED

The program's prescriptive and top-down approach helped overcome barriers to success, gaining trust and access to resources. It can often be difficult to gain the trust of an individual franchisee. The program's approach alleviates this concern by getting buy-in from the holding company, which then helps justify the energy efficiency value proposition for individual franchisees through credible and pre-vetted resources.

Franchise owners typically do not have in-house facility management resources or access to capital needed for improvements. The program removes uncertainty and provides these low-margin businesses with a comprehensive package that includes technical assistance and convenient, affordable financing that enables a cash-neutral investment.

PROGRAM PERFORMANCE

	2016	2017
Program spending	$140,000	$986,000
Number of participants (individual retail locations)	16	77
Annual electric energy savings (MWh gross)	403.8	2,638.8
Annual peak demand savings (MW gross)	0.13	0.155
Lifetime electric energy savings (MWh net)	1,265.4	12,132.9
Cost-effectiveness results, Utility Cost Test (UCT)	1.67	1.31

Mass Save and Its Program Administrators (Berkshire Gas Company, Columbia Gas of Massachusetts, Eversource Energy, Liberty Utilities, National Grid, Unitil), C&I Natural Gas Water Heater Initiative

PROGRAM AT A GLANCE

Implementation organization	Cohen Ventures dba Energy Solutions
States where offered	Massachusetts
Customer segment served	Commercial and industrial
Program start date / year established	July 1, 2015
Annual energy savings (therms gross)	1,709,684 (2017)
Budget for most recent year	$4.7 million
Funding sources	Mass Save and its sponsors: Berkshire Gas Company, Columbia Gas of Massachusetts, Eversource Energy, Liberty Utilities, National Grid, Unitil
Website	www.masssave.com/en/saving/business-rebates/commercial-water-heaters
Contact for program information	Cassandra Squiers Program Manager II Energy Solutions 714-787-1085 csquiers@energy-solution.com

The C&I Water Heater Initiative is an upstream rebate program that offers cash incentives to distributors for the sale of high-efficiency water heater equipment to customers who receive natural gas service on a commercial or industrial rate in Massachusetts. There are four types of water heaters eligible for incentives: domestic hot-water boilers, condensing storage water heaters, tankless on-demand water heaters, and indirect water heaters.

Distributors use available incentives to (1) maintain stock of high-efficiency water heaters so these units are readily available to customers; (2) educate the market on the benefits of high efficiency; and (3) provide price discounts on high-efficiency equipment to customers.

The initiative is sponsored by Mass Save and its sponsors, National Grid, Berkshire Gas, Columbia Gas of Massachusetts, Liberty Utilities, Eversource Energy, and Unitil. Cohen Ventures, d/b/a Energy Solutions, serves as the initiative implementer.

Participants receive daily support regarding program requirements, submitting applications, incentive payment, and more. The initiative uses an online application portal to accept, process, and pay incentive applications, and the implementer trains participating distributors on how to correctly complete and submit these applications. In coordination with the sponsors of Mass Save, the implementer regularly meets with distributor participants to discuss their participation in the initiative, changes to high-efficiency sales and stocking practices, and trends in the water heater market.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

In its first 2.5 years, the Massachusetts C&I Water Heater Initiative enrolled 40 water heater distributors, reached more than 3,000 commercial customers, and yielded more than 3.2

million gross annual therms in natural gas savings, outperforming equivalent customer mail-in rebate programs in terms of savings by more than 2,000%.

LESSONS LEARNED

The initiative minimizes barriers to participation as program requirements are simple, the application is streamlined, and incentives are paid quickly. By targeting a handful of distributors, who are among the most influential market actors in the supply chain, the initiative reaches thousands of customers to achieve significant, cost-effective energy savings. The initiative facilitates market transformation by incentivizing distributors to stock and sell qualifying equipment, ensuring that high efficiency is readily available to customers so they can benefit from lifetime savings. Because distributors submit and track incentive applications, customers reap the benefits of high efficiency without having to understand program requirements or complete an incentive application.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending, total incentives paid	$178,828	$3.8 million	$2.8 million
Number of participants	119	1,196	1,806
Annual gas energy savings (therms gross)	44,018	1,538,479	1,709,684
Lifetime gas energy savings (MMtherms gross)	743,730	24,972,130	26,786,747
Cost-effectiveness results, Utility Cost Test (UCT)	2.62	Unavailable	Unavailable
Evaluation results are not yet complete			

NV Energy, Residential Demand Response Program

PROGRAM AT A GLANCE

Implementing organization	NV Energy Demand Side Management Department
State where offered	Nevada
Customer segment served	Residential
Program start date / year established	2007 (launch of the Cool Share program)
Annual energy savings (MWh 3-year average)	22,135
Peak demand (summer) savings (MW 3-year average)	200
Other measures of program results	Customer satisfaction 8.1 on a 10-point scale
Budget	$16.2 million (2018)
Funding source	Spending levels authorized by the Public Utility Commission of Nevada (PUCN), cost recovery by way of a per kilowatt-hour Energy Efficiency surcharge that is included on the customer bills
Website	www.nvenergy.com/powershift
Contact for program information	Van Johnson Program Manager Demand Side Management Department 702-402-5384 vanjohnson@nvenergy.com

Participants in this integrated DSM program allow NV Energy to interact temporarily with their end-use loads such as air-conditioning on hot summer days when system peak loads occur or during emergency conditions to reduce peak demand. Participants receive a professional installation of a free smart thermostat(s) along with an energy efficiency service subscription ($300 value) in exchange for their participation in demand response events from June 1 to September 30. In addition to the convenience of the technology, customers save approximately $100/year in energy costs. PowerShift customers also receive an annual tariff-based rebate that varies depending on the amount of energy savings achieved during demand response events. In 2017, the average rebate was $6.05 with a high of $67.65.

The program is based on multiple load-reduction enabling technologies including one- and two-way programmable communicating thermostats (paging systems), Internet-connected and Wi-Fi smart thermostats, and AC-mounted digital control units (paging systems). The thermostats feature mobile access and an away feature to adjust temperature settings remotely. EcoFactor SaaS technology provides a software service that automates HVAC controls based on household patterns to reduce HVAC run time.

The services are marketed through several media channels, including television, email, direct mail, digital, print, and radio. The program is also cross marketed through other energy efficiency offerings.

ADM Associates conducts annual independent third-party EM&V.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

NV Energy has installed more than 124,000 devices across the state, including 75,498 Internet-based and Wi-Fi smart thermostats as of July 31, 2018. The program achieved over 23,000 MWh in energy savings and 218,359 kW in load reduction in 2017. Documentation is extensive; the workflow of each major functional process has been documented in multi-swim-lane Microsoft Visio charts. The program continues to see increases in both customer awareness and satisfaction.

LESSONS LEARNED

- It is difficult to commit the time and energy to create process flows, including roles and responsibilities, but that is key to facilitate cross-program participation.
- Development and tracking of key performance indicators and targets inform management decision making. You cannot manage what you cannot measure.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$12.6 million	$12.5 million	$15.8 million
Number of participants	73,880	78,492	82,800
Annual electric energy savings (MWh gross)	22,639	20,268	23,497
Annual peak demand savings (MW)	186.1	196.5	218.4
Annual gas energy savings (therms/household/year gross)	3.9	7.0	10.2
Lifetime electric energy savings (MWh gross)	120.845	139.958	142.786
Lifetime gas energy savings (MMtherms gross)[1]	2.2	5.3	5.1
Cost-effectiveness results, Total Resource Cost (TRC), electric	2.87	3.37	5.05
Most recent program evaluation pucweb1.state.nv.us/PDF/AxImages/DOCKETS_2015_THRU_PRESENT/2018-6/30449.pdf			

[1] Gas savings averaged across legacy and smart thermostat program.

Public Service Electric and Gas Company (PSE&G), Hospital Efficiency Program

PROGRAM AT A GLANCE

Implementation organization	PSE&G
State where offered	New Jersey
Customer segment served	Hospitals and healthcare facilities operating 24/7
Program start date / year established	2009
Annual energy savings	80,000 MWh, 3,100,000 therms
Peak demand (summer) savings (kW)	9,593
Other measures of program results	Projects complete at 34 hospitals
Budget	Anticipated investment $10 million in 2018 and minimum $10 million in 2019
Funding source	PSE&G
Website	www.pseg.com
Contact for program information	Michael Savage Program Manager PSE&G 973-430-6768 michael.savage@pseg,com

The PSE&G Hospital Efficiency Program serves hospitals and healthcare facilities operating 24/7 in PSE&G's electric and/or gas service territory by providing cost incentives, upfront payments, and on-bill financing for energy efficiency measures including HVAC, water heating, building envelope, motors, lighting, and other energy-consuming equipment that use both electricity and natural gas.

Delivery occurs in five steps: energy audit, design and bidding, construction administration, commissioning, and post-project measurement and verification. Inspections are performed at various phases during project implementation.

Program services are provided through qualified audit and engineering professionals employed by PSE&G and hired through a competitive bid process. PSE&G provides upfront funding, and hospitals will typically repay about 40% of the total project costs. Participants repay their portion interest free on their PSE&G utility bill over a five-year period (or in one payment if the customer chooses). Results are measured and verified for 12 months post-installation to ensure savings.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

- *Innovation*: Targets hospitals specifically; upfront financing and incentives facilitate critical upgrades.
- *Energy savings*: Nearly 80,000,000 kWh and 3,100,000 therms annually; $50 million in customer energy bill savings to date.
- *Cost effectiveness*: Invested $159.2 million and provides $14.7 million annually in bill savings.

- *Market impacts*: Allows hospitals to make deep energy efficiency retrofits. Monetary savings used to further their healthcare mission.
- *Customer service*: Enormously popular; work at 34 hospitals complete with additional facilities underway.
- *Replicable model*: Program is well-documented; could be easily replicated a similar setting.

LESSONS LEARNED

- Designing and implementing energy efficiency improvements needs to be coordinated around patients and staff since hospitals operate 24/7.
- Intensive coordination is required for heavy construction to critical systems, while maintaining a safe, healing environment.
- Certain critical air handlers have only a four-hour out-of-service window daily due to health codes.
- Heating and cooling improvements are seasonal, while lighting and controls can be accomplished whenever a space is unoccupied.

PROGRAM PERFORMANCE

	2015	2016	2017
Program spending	$14.5 million	$2.9 million	$16.0 million
Number of participants	3	2	4
Annual electric energy savings (MWh gross)	4,093	1,501	12,800
Annual peak demand savings (MW)	0.483	0.046	1.701
Annual gas energy savings (therms gross)	6,315,110	82,580	4,022,610
Lifetime electric energy savings (MWh gross)	112,358	32,347	198,267
Lifetime gas energy savings (therms gross)	6,315,110	82,580	4,022,610
Cost-effectiveness results, Utility Cost Test (UCT), electric ($ per kWh)	0.082	0.082	0.082
Cost-effectiveness results, UCT, gas ($ per therm)	0.56	0.56	0.56
Most recent program evaluation unavailable			

Commonwealth Edison (ComEd®), ComEd Energy Efficiency Program Retro-Commissioning Offering

PROGRAM AT A GLANCE

Implementation organization	Nexant, Inc.
State where offered	Illinois
Customer segments served	Commercial, public, industrial
Program start date / year established	2008
Annual energy savings (MWh net)	30,000
Peak demand (summer) savings (MW net)	2.2
Budget	$8.1 million (2018), $8.3 million (2019)
Funding source	ComEd customers in compliance with state law
Website	www.comed.com/RCx
Contact for program information	Matt Dederich Program Manager Nexant, Inc. 608-824-1241 mdederich@nexant.com Rick Tonielli Sr. Energy Efficiency Program Manager ComEd 779-231-1486 Richard.Tonielli@exeloncorp.com

Retro-Commissioning (RCx) optimizes the energy performance of customers' small to large commercial, public, and industrial facilities to improve their bottom line while ensuring a comfortable environment for building occupants. With a well-executed RCx project at their facility, customers can save an average of 5–10% on annual electric bills. ComEd partners with the natural gas utilities in its footprint (Nicor Gas, North Shore Gas, and Peoples Gas) to implement natural gas as well as electric savings opportunities where available.

Customers choose one of four program options, each of which offers its own incentive:

- RCx Building Tune-Up: study worth up to $25,000, plus $0.04 per verified kWh.
- Retro-Commissioning Express (RCxpress): study worth up to $60,000.
- Retro-Commissioning (RCx): study worth up to $100,000.
- Monitoring-Based Commissioning (MBCx): $15K or $25K for installation of monitoring software, plus $0.08 per verified kWh.

Customers receive a fully funded engineering study performed by a ComEd-approved energy efficiency service provider to identify no- and low-cost operational improvements for the facility's existing energy-using systems. Projects are delivered by a closed network of engineering service providers who recruit customers, conduct the RCx investigation, and help customers select measures for implementation, then verify the measures after they are implemented. The target is to have customers implement energy conservation measures that

average a combined simple payback of 1.5 years or less. Customers may also qualify for incentives based on the energy savings achieved at their facility.

Service providers are the primary marketing channel for the RCx offerings. ComEd supports their efforts through provision of collateral (offering overviews, case studies, etc.) and general program outreach.

EXEMPLARY FEATURES AND ACCOMPLISHMENTS

The ComEd RCx offering is the nation's largest RCx program, supporting a robust ecosystem of engineering firms and increasing numbers of participants each year. It continues to expand its target market (adding public sector customers in 2018) and takes advantage of the latest technologies to drive deep, long-lasting energy savings for its customers.

- In the last three program years, the RCx offering delivered almost 80 GWh and over 1.4 million therms of first-year savings.
- Over half of the "ideal" buildings for five-phase RCx in the ComEd service territory have participated.
- An increasing number of customers are enrolling in MBCx, which drives deep energy savings and provides monitoring to ensure savings persist.

LESSONS LEARNED

Since the RCx offering's early years, new options have been developed making RCx available to a wider range of customers. RCxpress and Tune-Up were added to enable participation from smaller buildings. MBCx was added to take advantage of advanced analytics to drive deeper energy savings than traditional RCx.

Regular feedback is collected from customers and service providers and incorporated into the offering design to provide greater value to ComEd customers. For example, the Tune-Up incentive was changed from a fixed service provider fee to a performance-based model, allowing deeper investigation where appropriate.

PROGRAM PERFORMANCE

	2015	2016	2017*
Program spending	$4.8 million	$4.7 million	$7.0 million
Number of customers	64	100	125
Annual electric energy savings (MWh net)	21,703	23,955	33,398
Annual peak demand savings (MW)	2.25	0.475	2.2
Annual gas energy savings (therms net)	579,643	413,098	463,307
Lifetime electric energy savings (MWh net)	108,515	119,775	167,795
Cost-effectiveness results, Total Resource Cost (TRC)	1.89	Under review	TBD
Most recent program evaluation www.ilsag.info/comed_eval_reports.html			

*PY9 was a 19-month program year.