Minnesota Energy Efficiency Potential Study: 2020–2029

Appendix I: Energy Efficiency Program Benchmarking Report

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Conservation Applied Research and Development (CARD) FINAL Report

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Introduction

The full report that this appendix supports, *Minnesota Energy Efficiency Potential Study: 2020-2029*, is available for download on the project website.

Minnesota has a thirty-plus year history of leadership in energy efficiency policy and achievements. In order to continue to maximize the benefits of cost-effective energy efficiency resource acquisition by utilities, the project team, consisting of Center for Energy and Environment (CEE), Optimal Energy (Optimal) and Seventhwave, was commissioned to:

- Estimate statewide electric and natural gas energy efficiency and carbon-saving potential for 2020-2029;
- Produce data-driven and stakeholder-informed resources defining market segments, end uses, measures, and programs that could be targeted in the decade ahead to realize the state's cost-effective energy efficiency potential; and
- Engage stakeholders in order to help advance robust energy policies and energy efficiency programs in the state, and to inform future efficiency portfolio goals.

As part of the Minnesota state-wide potential study, the project team conducted research on best practices in delivering energy efficiency programs, and a developed a summary of recommendations for utilities to consider in their ongoing portfolio planning and implementation cycles. This appendix is a source document for those recommendations, and summarizes programs within Minnesota and around the U.S. that are implemented using best practices, and draws out those elements that could be useful to utilities in planning future DSM portfolios.

When we use the term 'best practice,' we mean programs that are characterized by:

- Higher than average participation, energy savings, and/or cost-effectiveness;
- Benchmarking, both internally and externally, to measure comparative performance;
- Continuous improvement processes, with cycles of planning, implementation and evaluation;
- An approach or method that has become a standard because it's been demonstrated to produce successful results; and
- An approach that is adaptive to recent and anticipated market developments.

This appendix is organized into sections covering customer sectors (residential, commercial and industrial) and utility types (investor-owned, municipal and cooperative), with recommendations for each category plus cross-cutting recommendations.

Program Best Practices Benchmarking

Each electric and gas utility in Minnesota responsible for administering energy efficiency (EE) programs to meet Conservation Improvement Program (CIP) requirements has had multiple rounds of planning, implementation and assessment. Since CIP was launched in 2007, Minnesota's utilities have been accumulating knowledge about how to plan and implement effective programs: hearing directly from customers, trade allies and stakeholders; talking with other utilities; attending conferences; reading white papers; following legislative processes; or engaging in other venues that deal with the specialized and challenging world of energy efficiency program administration. The goal of this summary is to add to the body of knowledge about DSM programs, and to provide practical recommendations to utilities that will help their energy efficiency portfolios succeed in future years.

Looking at a comprehensive set of energy efficiency actions that states can pursue, Minnesota is doing well compared to other states. It was ranked 9th in the 2017 American Council for an Energy Efficient Economy (ACEEE) State Energy Efficiency Scorecard, improving its ranking by one spot over 2016.[1] ACEEE identifies several strategies for states that lead to better outcomes (and a higher score on its scorecard), including:

- An adequately funded energy efficiency resource standard (EERS) is the single most impactful action that states can take to strengthen utility DSM portfolios;
- Policies to encourage and strengthen utility programs for low-income customers, and work with utilities and regulators to recognize non-energy benefits of such programs;
- Updated, more stringent building energy codes, improved code compliance and the involvement of efficiency program administrators in code support;
- Treating cost-effective combined heat and power as an energy efficient resource equivalent to other forms of energy;
- Expanding state-led efforts and making them visible – examples include establishing sustainable funding sources for energy efficiency incentive programs, investing in EE research, development and demonstration centers, and leading by example in incorporating efficiency into government operations; and
- Exploring and promoting innovative financing mechanisms to leverage private capital and lower the up-front costs of EE measures.

[1] Berg, W. et al. The 2017 State Energy Efficiency Scorecard. American Council for an Energy Efficiency Economy. Report Number U1710. September 2017.

Benchmarking Minnesota

In ACEEE's state scorecard, Minnesota was ranked in the top 5 on utility and public benefits programs and policies, a reflection of the success of the Next Generation Act of 2007[2], which created the underlying policy structure for the state's EERS. CIP is the state's administrative mechanism to enact the EERS, and is overseen by the Department of Commerce, Division of Energy Resources, and administered by electric and gas utilities, often (but not always) with support from third party program implementation contractors.

Minnesota's natural gas EE programs were ranked first in the ACEEE scorecard, with the highest percentage of program savings (1.40%) as a percentage of commercial and residential retail sales, an even more impressive achievement considering the fact that Minnesota was ranked 8th in natural gas efficiency program spending (about $36 per residential customer, compared to top-ranked Massachusetts at $137 per residential customer).

Looking across the U.S. as a whole, Minnesota is doing well in achieving energy efficiency goals. Many of the elements of best practice programs are already being implemented, and Minnesota is a leader in many ways, which we will review below.

Methodology

CEE compiled information from multiple sources on best practice programs and portfolios. The results include refinements to the model portfolio for the potential modeling in this study, and recommendations to utilities about program best practices that may help them achieve their goals in 2020-30. The primary sources were:

- Literature review of Minnesota and U.S. examples of best practice programs and portfolios.
- Input from three sub-contractors who are acknowledged experts in energy efficiency:
    - ACEEE provided customized information on best practice programs from around the U.S. across utility types and customer sectors, in addition to a number of publicly available papers documenting high performing programs.
    - E Source provided information on best practice programs based on their experience following and supporting utilities across the U.S., with benchmarked program metrics.
    - Newcomb Anderson McCormick (NAM) provided information and insight on California best practice programs.

[2] https://www.revisor.mn.gov/data/revisor/slaws/2007/0/136.pdf

- Utility interviews – CEE conducted interviews with utility managers and their staffs to elicit information on what they consider their top performing programs, what challenges they see coming in 2020-30, and how their programs and portfolios may evolve over that time frame. The list of utility interviews is in Table 1.

Table 1. Minnesota Utility Interviews

Utility	Structure	Energy Type	Interview Date
Otter Tail Power	IOU	Electric	10/16/17
Xcel Energy	IOU	Electric & Gas	10/17/17 & 11/16/17
Minnesota Energy Resources	IOU	Gas	10/18/17
CenterPoint Energy	IOU	Gas	10/25/17
Minnesota Valley Electric	Co-op	Electric	11/2/17
Southern Minnesota Municipal Power Agency	Municipal Association	Electric	11/8/17
Minnkota Power Cooperative	Co-op	Electric	11/15/17
Great River Energy	G&T cooperative	Electric	12/15/17
Wright-Hennepin Cooperative	Co-op	Electric	12/19/17

Utility Types

Minnesota has a total of 176 electric utilities and 37 natural gas utilities. [3] Of the electric utilities, three are investor-owned utilities (IOUs), 47 are cooperatively-owned, and 126 are municipally-owned. While cooperative and municipal electric utilities (together, "consumer-owned utilities," or COUs) serve the largest geographic territory of the state, the electric IOUs serve a majority of the state's population centers and commercial/industrial hubs. In 2016, 62% of the state's electric load was served by the IOUs, 23% by cooperative utilities, and 15% by municipal utilities.

[3] There are 19 municipal utilities and one investor-owned utility (Xcel Energy) in Minnesota that provide both electric and natural gas service. These combination utilities are counted separately in both the electric and natural gas totals.

Investor-Owned Utilities

Minnesota Perspective

Among investor-owned utilities in Minnesota, CEE interviewed managers and staff from Xcel Energy (electric), Otter Tail Power Company (electric), CenterPoint Energy (gas), and Minnesota Energy Resources (gas).

Xcel Energy[4]

Xcel Energy is the largest electric utility in Minnesota, serving about 1.25 million customers[5], which represents about 83% of electric customers in the state. It has a comprehensive energy efficiency portfolio, serving residential, commercial and industrial customers, and has been recognized by the ACEEE as one of the top ten utilities in 2017.[6]

In the 2017-2019 CIP triennial plan, the focus of efforts and much of the savings are in lower value measures such as retail lighting, which will be reconsidered before the 2020 EISA standards take effect. Xcel will be analyzing its portfolio through a market transformation lens to determine when a program done its job and reached the end of its useful life.

Xcel also wants its portfolio to reflect equity and relatively low free ridership, where non-participants are not over-contributing to the participants in energy efficiency programs. Even as Xcel adapts its portfolio to replace lost lighting savings, and meet increasing savings goals, its net benefits (upon which its performance incentive is based) will continue to erode over time. As program outcomes become more entwined there are also considerations about attribution. The utility wants to guard against double counting savings that may actually be due to another program.

Part of the solution is to drive deeper with holistic programs. The portfolio will focus less on transactional markets to deeper ongoing engagement with customers. Advanced metering infrastructure (AMI) may facilitate this transition, although Xcel may not migrate to AMI meters before 2030. Xcel will also be considering data disaggregation and analytics in marketing plans to target programs more effectively.

[4] Interviews conducted October 17, 2017 and November 16, 2017 with Shawn White (Manager, DSM Regulatory Strategy and Planning), Jon Packer (Product Manager, Energy Efficiency Marketing) and Nick Minderman (DSM Policy and Strategy Consultant).
[5] Baatz 2016 cites Xcel 2014 customers, and Minnesota Utility Data Book 2012 cites total customers state-wide.
[6] Reif, G., B. Baatz and S. Nowak. 2017 Utility Energy Efficiency Scorecard. American Council for an Energy Efficient Economy. Report U1707. June 2017.

For example, residential programs will shift away from LED lighting and towards demand response. Added to this mix is the evolution of the internet of things, and how energy efficiency programs can capture savings from smart control of appliances, including air conditioning, freezers and power strips. It should be noted that getting credit from this bundling of measures and control technologies may take modifications to CIP rules.

Xcel will also consider aligning program offerings with peak generation times and the use of fossil fuels for generation, targeting high cost energy measures, and dropping non-cost-effective measures. Individual measures likely to receive more attention include business lighting, and high peak coincidence and HVAC measures. Recommissioning could also be refocused to work towards economizing during peak periods. Demand response is likely to become more important, with refined mechanisms that focus on shaving peak load, or shifting load through pre-cooling processes.

As Xcel considers what features of energy are most valuable to customers and to the company, it may ask the State for policy modifications and guidance on how to measure environmental benefits so that society captures other values in the utility's energy efficiency portfolio beyond simple kWh. The State could also consider allowing utilities to count non-energy benefits in cost-effectiveness tests.

Xcel identified several best practice elements in its portfolio:

Xcel characterizes the process efficiency program as 'the ultimate in how we interact with customers.' The program offers long term engagement with customers including strategic energy management. The strategy worked so well for industrial customers that Xcel added it to its commercial efficiency program. There are challenges making this approach cost-effective, but it can provide large returns if the utility can identify commercial customers likely to benefit the most.

Midstream lighting – point of sale programs have been launched in Xcel's Minnesota territory within the last five years, and they have achieved much higher volume of products incentivized than previous downstream programs. Administration is streamlined with one invoice a month instead of dozens. One question Xcel had was whether midstream customers were even aware that they were receiving a discount, so Xcel did a market survey which found that 'a healthy percent' of customers is aware of the rebate before making a purchase, so someone in the supply chain – distributors, contractors and/or account managers – has effectively communicated that information.

A high level of engagement with the program's trade allies is key for market successes. The utility sees that where it has highly engaged markets its programs are successful, and has five internal managers who work with program trade allies. A key element in engagement success is aligning programs with trade ally business models, and helping trade allies be more competitive by enabling them to offer their customers quality products at discounted prices.

Analytics for marketing – the use of multiple data sources, including segmentation, prior participation, consumption and other data, are leading to multi-channel targeted, direct marketing campaigns, which leads to higher customer conversion rates.

Support for operational savings, as distinct from behavioral programs. Xcel promotes strategic energy management for industrial and commercial customers, which optimizes operations through continuous improvement in equipment and controls calibration, maintenance, scheduling, and other activities. For example, compressed air leak reduction maintenance programs enable trade allies to engage with commercial and industrial customers on a routine basis.

Otter Tail Power[7]

Otter Tail Power (OTP) has about 61,000 customers in northwest Minnesota, a service area that covers many rural towns, most with about 300 people[8]. Even though OTP is the second largest electric IOU in Minnesota, it is more like a rural co-op in terms of the customers it serves. While OTP has a small base of large industrial customers, it has many 'mom and pop' customers, small businesses that can be a challenge to serve with energy efficiency programs. OTP's savings goals are 2.4% in this triennial cycle, but are projected to be reduced to 1.5-2% in the next three-year cycle, much of this due to the changes in lighting standards that will take effect in 2020. This means that OTP is trending toward lower net benefits, and each triennium the utility is losing about half of its performance incentive for savings achievement above the 1.5% minimum.

OTP has been making changes to its EE programs to continue delivering a cost-effective portfolio:

- One opportunity the utility is interested in is heat pumps. Currently, about 20% of OTP residential customers have electric heat, and about 30% heat with propane. OTP would like to be allowed to get credit for installing heat pumps both for current electric heating customers and for current propane heating customers[9]. OTP has also been exploring geothermal heat pumps, which it sees as having a good niche for schools and other institutional facilities;
- OTP has a successful residential Energy Star lighting program that provides a direct discount at participating retailers. Prospects for this program after 2020 lighting standards take effect are uncertain;
- OTP has a commercial direct install program that has challenges with cost-effectiveness, but has provided positive impacts in communities. While not as cost-effective as recommissioning, it allows OTP to serve small commercial customers;

[7] Interview was conducted on Oct. 16, 2017 with Jason Grenier (Market Planning Manager), Greg Anderson (Energy Efficiency Engineer), Amber Salberger (Rate/Policy Analyst), John Favor (Communications Project Manager), and Brenda Sandall (Residential/Low-Income Program Manager).
[8] Otter Tail Power operates in Minnesota, North Dakota and South Dakota.
[9] Current CIP rules do not allow any savings achievement credit for propane to electric fuel switching.

- OTP also does a range of projects through its custom program, including strategic energy management support, with a bonus incentive if customers complete all cost-effective recommended actions within a certain time frame; and
- Finally, OTP's EE commercial programs rely on five account managers throughout its territory, who spend about 40% of their time promoting EE programs.

CenterPoint Energy[10]

CenterPoint Energy (CPE) is the largest natural gas IOU in Minnesota, serving about 850,000 customers, including the City of Minneapolis. CPE identifies several best practices in its portfolio:

The joint programs it runs with electric utilities, such as the Home Energy Squad program jointly supported by CPE and Xcel Energy, are very important. Ten years ago, there were no joint programs, but today there are 3-4 programs where CPE and electric utilities cooperate to bring services together for residential and business customers using a single program implementer, and sharing savings and costs. Currently, these joint operations are handled informally without contracts, letters of agreement or other legal mechanisms, which leads to flexibility and nimbleness in administration.

The utility administers its efficiency programs internally, including processing rebates, providing engineering services and building relationships with customers through key account managers.

CPE's food service program is among the most robust in the country. The program has a dedicated trade ally representative, similar to a key account managers, and fosters its role as a trusted energy advisor to business customers with gas cooking equipment.

Large commercial and industrial energy management is growing, including pursuit of ISO 50001 certification. CPE sees opportunities to reduce energy waste in institutional facilities such as hospitals, campuses and schools.

CPE cultivates strong relationships with program trade allies, who bring in about 90% of program rebates. The utility hosts several in-person meetings each year, which include presentations of program information and outside speakers covering topics useful to trade allies such as business development. Sometimes CPE and Xcel Energy do joint trade ally meetings. CPE also pays bonuses to trade allies for promoting the highest efficiency equipment.

Other considerations in managing its CIP portfolio include:

[10] Interview conducted October 25, 2017 with Nick Mark (Manager, Conservation and Renewable Energy Policy), Todd Berreman (Director, Energy Efficiency), Erica Larson (Regulatory Analyst), and Ethan Warner (Regulatory Analyst).

- New furnace standards, which the company predicts will happen in 2025 or later, would have an important impact on its energy efficiency portfolio;
- Cold climate heat pumps are still in early stage technology development and prices are currently still high, but are projected to become more cost-effective in the future; and
- Small BTU furnaces with flexible ducting could be cost-effective in new construction. Controls for HVAC systems, including smart thermostats, will become more prevalent in the near future.

CPE would like a clearer policy from the state on combined heat and power (CHP) projects. Its business customers are showing more interest in this technology, not just large industrials but also small and medium commercial customers. It would be helpful to have more flexibility on being able to claim CHP savings in the CIP framework, and to have more clarity on the methodology for counting savings.

Minnesota Energy Resources[11]

Minnesota Energy Resources (MERC) delivers natural gas to about 232,000 customers in 51 counties and 184 communities across Minnesota. Most of the 60 electric utilities in MERC's Minnesota service area are small munis and co-ops.

Challenges to the cost-effectiveness of MERC's energy efficiency portfolio are significant. New home construction standards have impacted MERC's energy efficiency portfolio significantly, causing a loss of about half of new construction savings in the past year. Also, new energy efficient furnace standards are on the horizon, which could make achieving a cost-effective portfolio challenging, although such standards are not being modeled in this potential study, and realistically are not expected to be implemented before 2025.

MERC is responding to these challenges in a number of ways, such as:

- Coordinating with other programs and sharing costs, where feasible;
- Targeting customer segments by data mining with available data on customers;
- Scheduling relevant follow-up outreach messages. For example, MERC sends reminders to customers two years after they got a furnace tune-up to remind them it's time for another;
- Using organizations that serve low-income customers to find potential participants, such as HeatShare and LIHEAP and marketing directly to those customers;
- Offering turnkey services to large customers (using more than 10 DTh/year), and if they have their own engineering staff, setting up an energy efficiency team and plan with them;
- Reducing marketing efforts and costs;

[11] Interview conducted October 18, 2017 with Jim Phillipo (Manager, Energy Efficiency/Public Benefits) and Sue Nathan (Vice President, AEG, Inc.).

- Simple, straightforward incentive rates with no sliding scales or formulas, so customers and trade allies know up-front what rebate they will get; and
- Exploring new technologies that may be implemented once their market viability and cost-effectiveness have been demonstrated, such as gas heat pumps.

MERC offers several recommendations to amend CIP policies to support future success:

- The most impactful could be a policy to encourage, incentivize or require that gas and electric utilities coordinate efforts and share savings. When receiving an energy audit, customers expect a comprehensive energy perspective, but an audit that includes electric and gas recommendations is not widely available for MERC's residential customers. MERC would like to get credit for electric savings its programs bring to customers, which could be claimed as BTU savings, such as for electronically commutated motors in efficient furnace installations. The utility would also be willing to take on comprehensive efficiency projects that include electric savings, or partner with electric utilities and share costs for targeting, marketing, delivery, administration and incentives;
- As administrator for both WAP and CIP, DER could develop a process or soft requirement that a certain number of homes must be jointly weatherized by WAP and the utility, or alternatively, as joint parties leverage more savings, their funding for the next year is increased;
- Relax cost-effectiveness standards for technologies new to mass markets such as gas heat pumps;
- Allow utilities to get savings credit for codes and standards training and support, by directly funding training for industry trade allies, developing educational tools, and working with local code officials. In California, codes and standards related programs accounted for about 60% of claimed savings from the state's 25 largest IOUs[12];
- A state-wide effort to educate utility customers about energy efficiency benefits. It would be helpful if customers understood why a blower door test, air and duct sealing, and quality installation (QI) processes are important in the optimal functioning of efficiency upgrades;
- Develop a mechanism to rate manufactured homes and do energy upgrades without voiding the manufacturer's warranty; and
- Change CIP rules to allow utilities to claim savings from all sources by converting savings with a BTU calculation. Some smaller or rural utilities struggle with cost-effectiveness, and a case can be made to allow CIP credit for all of the energy saved for low-cost, retrofit or equipment measures.

[12] Memo from Newcomb, Anderson and McCormick to MNCEE. October 13, 2017.

National Perspective

As discussed previously, Minnesota utilities perform well compared to other states. In ACEEE's report on programs achieving high levels of electric savings,[13] two Minnesota investor-owned utilities were listed among 14 with demonstrated high achievement: Xcel (dba Northern States Power) and Otter Tail Power. Quantitative review of portfolios looked at several key performance indicators:

- Energy savings as a percentage of retail sales: high achieving utilities' savings ranged from 1.0% - 3.5% in 2014, with a trend of increasing savings from 2005-2014. Otter Tail Power ramped up from 0.45% in 2007 to 1.4% in 2009;
- Spending: the best performers are spending more per customer and show a direct relationship between total program spending and energy savings. For utilities with saving between 1.5 and 1.74% (as in the Minnesota EERS), median spending was $84 per customer;
- Levelized cost of saved energy (LCSE): The ACEEE report found that between 2007-2014, the LCSE held steady within minor fluctuations, while the average net savings as a percent of sales increased from about 0.7% to over 1.8%. However, the relationship between savings as a percent of sales and LCSE is weak, meaning that as the energy savings percentage increases, the LCSE does not necessarily increase. Also, it has been reported more recently that a new trend has emerged, with savings flattening despite increased spending[14];
- Cost-effectiveness: A successful EE portfolio is cost-effective. While the inputs and specific calculations differ across utilities, as measured by the tests they use, utilities show total resource cost test results above 1.0, and the majority exceed 2.0. These ratios have been decreasing over time, possibly because avoided costs were decreasing over the study period largely due to decreases in the price of natural gas; and
- Several policy drivers are associated with utilities that achieve high savings:
    - State and local policies are important in establishing mandated targets for success, particularly an EERS.[15]
    - Decoupling or lost revenue adjustment mechanisms eliminate the throughput incentive, the link between a utility's revenues and the volume of sales. This type of policy

[13] Baatz, B., A. Gilleo and T. Barigye. Big Savers: Experiences and Recent History of Program Administrators Achieving High Levels of Electric Savings. American Council for an Energy Efficiency Economy. Report Number U1601. April 2016.
[14] Xcel Energy. 2017/2018/2019 Minnesota Electric and Natural Gas Conservation Improvement Program. December 2016. https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/2017-2019%20CIP%20Triennial%20Plan.pdf
[15] Molina, M., and M. Kushler. Policies Matter: Creating a Foundation for an Energy-Efficient Utility of the Future. Washington, DC: ACEEE. aceee.org/policies-matter-creating-foundation-energy. 2015.

mechanism is intended to make utilities 'indifferent' to how much energy they sell and remove disincentives to the loss of sales associated with effective energy efficiency portfolios.

- Financial performance incentives also set the stage for strong performance.

Local Government-Utility Partnership Strategies

Cities can support strong utility performance, particularly in forming coordinating advisory or decision-making groups that work with utilities to create opportunities for collaboration.[16] "In cities with IOUs, state policy is usually the primary driver of energy efficiency programs. However, the policies that shape these programs and the level of program investments are often subject to review, and cities can intervene in these processes to advocate for expanded programs that serve their citizens. While cities generally do not directly regulate IOUs, they can partner with them to promote their programs, help them reach their savings targets, and leverage utility resources for city-funded programs. By partnering with utilities as programs are developed, cities can help to align utility incentives with local policy goals."[17] Examples of cities that have shown leadership is working with IOUs include Minneapolis, Boston and Denver:

Minneapolis. In 2014, the City of Minneapolis, Xcel Energy, and CenterPoint Energy launched the Clean Energy Partnership to advance a clean energy future. The partnership aims to help the city reach its Climate Action Plan and Energy Vision with goals for 2040. The partnership is led by a joint City/Utility Board to plan, implement, and market new approaches to delivering energy efficiency in the city. The utility programs that target low-income customers, including the Home Energy Savings Program, coordinate with the Weatherization Assistance Program to offer measures to low-income customers. The utilities also offer both a Multifamily Building Efficiency and Low-Income Multifamily Building Rebate program. The city of Minneapolis has been advocating at the state level for increased data access for years. Since 2012, the city and both partner utilities have participated in a formal Customer Energy Usage Data Work Group and have submitted comments to the public utilities commission on data access topics.

Boston. Through Renew Boston, the city works closely with Eversource and National Grid to promote energy efficiency. Renew Boston leverages utility incentives and city resources to encourage energy efficiency upgrades for residents and businesses, including small businesses, renters, and middle-income homeowners—households that may face more barriers to energy efficiency program participation. The city is also a leading advocate for energy efficiency at the state level as a representative on the Energy

[16] Kushler, M., B. Baatz, S. Nowak, and P. Witte. 2015. Municipal Utility Energy Efficiency: Successful Examples Around the Nation. Washington, DC: ACEEE. aceee.org/research-report/u1510.
[17] Ribeiro, D. et al. The 2017 City Energy Efficiency Scorecard. American Council for an Energy Efficient Economy. Report U1705. May 2017. http://aceee.org/local-policy/city-scorecard

Efficiency Advisory Council, and it has supported legislation that now requires owners of large and medium-size buildings to report their annual energy and water use to the public.

Denver. The Denver Energy Challenge involves coordination between the City of Denver and the electric and gas utilities. Since its inception, this program has saved 23%, on average, for participants. As of 2016, more than 10,320 residents were saving money through the Challenge. Energy Outreach Colorado is a nonprofit organization that advocates for, coordinates, and administers Colorado's low-income efficiency programs and bill assistance programs. Denver advocated for better aggregation standards, whole building data access, community energy reports, better customer disclosure forms (including Spanish-language forms), and custom reports that third parties can request of the utility. As a result of the city's advocacy, Xcel began to provide automated benchmarking services, whole building aggregated data, and community energy reports.

ACEEE has compiled a set of resources for local governments to help them engage with utilities to improve and expand the delivery of energy efficiency programs to their residents and businesses.[18] Utilities can provide extra resources to help local governments meet their energy savings goals, while governments can help their utilities reach more customers through their energy efficiency programs.

Many communities are interested in working with utilities to deliver energy efficiency programs, however those served by investor-owned utilities can have difficulty influencing programs and policies. The Local Government-Utilities Partnership Strategies describe several ways local governments can work with utilities to expand or improve energy efficiency in their community.

Municipal Utilities

Minnesota Perspective

There are 125 municipal utilities in Minnesota, and they tend to be quite small. It is difficult for small organizations to maintain cost-effective energy efficiency programs since they do not have any advantages of scale and are very sensitive to customer rate increases. In the 2017 legislature, 51 municipal utilities with fewer than 1,000 customers were exempted from CIP. Some of these may decide to continue their energy efficiency programs as a customer service, but it is expected that many will wind down their programs in 2018. Among municipal utilities that have more than 1,000 customers, the Southern Minnesota Municipal Power Agency is a leader.

[18] http://aceee.org/sector/local-policy/toolkit/partnership-strategies

Southern Minnesota Municipal Power Agency[19]

Southern Minnesota Municipal Power Agency (SMMPA) provides energy efficiency education, rebate program development, tracking, marketing, implementation, and reporting assistance to its 18-member municipal utilities that have wide ranging size, interest, and need. SMMPA looks for efficiency inspiration across the country and tailors programs to their members and their customers, some receiving national recognition. In 2016, SMMPA and its members won their fourth ENERGY STAR® Partner of the Year award for their active and successful promotion of ENERGY STAR products to residential customers and continuous expansion of their portfolio to embrace new ENERGY STAR measures and initiatives. Another successful campaign utilized business customer outreach through Clean Energy Research Teams (CERTs) in a two-day door-to-door EE blitz in member communities. This greatly increased participation rates and resulted in 1M kWh savings in 9 months. This outreach is particularly successful in small municipalities or concentrated areas. Other SMMPA municipalities have replicated and employed CERTs for similar results.

Concerns are on the horizon, since C&I lighting programs currently contribute roughly 80-90% of total program savings. That leaves a large gap as lighting opportunities decrease and savings values change. Also, measurement and verification can be difficult due to limited resources and diverse and expansive coverage territory. For SMMPA, the TRM and cost-effectiveness will continue to play a large role in program design, in addition to rebate education for customers, trade allies, and retailers. Frequent reminders to customers and regular visits with trade allies keeps SMMPA and their members present as a valued energy efficiency resource.

SMMPA's Compressed Air Leak Program: A Yearly Check-up

Just like a yearly physical, SMMPA offers a yearly compressed air check and their customers see the (energy savings) results. The Compressed Air Leak Correction Program loans an ultrasonic leak detector for customers to identify and fix air leaks. This often takes place with a SMMPA Energy Service Representative (ESR) onsite to perform the before and after leak surveys. The repairs are typically low cost, result in 15% average savings, and provide great customer engagement opportunities on a yearly basis. With an ESR onsite, this 'yearly check-up' provides an opportunity to identify other energy saving programs and measures. Customers appreciate the information and actively participate in the program, as they see savings that can be immediate and quantified.

National Perspective

Cities with municipally owned energy utilities have direct influence over the level of investment and the types of efficiency programs they offer, and many of these cities have been leaders in delivering energy

[19] Interview conducted November 8, 2017 with John O'Neil, Manager of Energy Efficiency & Member Support Programs.

savings. For a group of 23 municipal utilities with strong efficiency achievements, average spending as a percentage of total revenue was 2.44%, which produced average annual kWh savings of 1.00% of total kWh sales.[20]

Among municipal utilities, the highest-ranked factors for providing energy efficiency services were the expectation or requirement by the utility's local governing boards for strong energy efficiency performance. Also important is customers' positive views of these programs. None of the high-achieving municipal utilities surveyed in a more recent ACEEE review on high-performing utilities earn an incentive, and none are decoupled.[21]

Municipal utility efficiency programs are often tied to local policies and sustainability and/or climate plans. For example, Austin Energy—the city of Austin's municipally owned utility—has goals for energy savings, reductions in GHG emissions, and renewable energy generation that are consistent with Austin's Climate Protection Plan.[22]

Examples of Leading Cities with Municipal Utilities:

Fort Collins Utilities. Fort Collins Utilities (FCU) is a Colorado municipal utility that provides electric service to about 71,000 customers. It is one of four member-owners of the Platte River Power Authority, a collaborative agency that secures transmission and electricity on behalf of its members. FCU offers customers a comprehensive portfolio of programs, planned and implemented collaboratively with Platte River, and driven by local policies that are focused on making the city carbon-neutral by 2050. FCU's savings targets are aggressive, at 1.75% in 2017, and ramping up to 2.5% in 2020. Between 2009 and 2014, FCU diversified its portfolio considerably, shifting from a primary focus on business programs, which accounted for 67% of portfolio savings in 2009 to 30% in 2014. FCU increased resources for several other programs over that five-year period, including Home Energy Reports, codes and standards support, and low-income weatherization. The utility launched the ClimateWise program to support local businesses that voluntarily reduce greenhouse gas emissions through waste, water and transportation reduction as well as energy efficiency. FCU is also part of a collaborative pilot between Platte River and Xcel Colorado on an upstream program for commercial rooftop heating and cooling units.[23]

[20] Kushler, M., B. Baatz, S. Nowak, and P. Witte. 2015. Municipal Utility Energy Efficiency: Successful Examples Around the Nation. Washington, DC: ACEEE. aceee.org/research-report/u1510.
[21] Baatz, B., A. Gilleo and T. Barigye. Big Savers: Experiences and Recent History of Program Administrators Achieving High Levels of Electric Savings. American Council for an Energy Efficiency Economy. Report Number U1601. April 2016.
22 See http://aceee.org/local-policy/city-scorecard (p. 72 and p. 96).

[23] Baatz, B., A. Gilleo and T. Barigye. Big Savers: Experiences and Recent History of Program Administrators Achieving High Levels of Electric Savings. American Council for an Energy Efficiency Economy. Report Number U1601. April 2016.

Austin. Austin Energy partners with Texas Gas Service, the local investor-owned gas utility, on energy efficiency program implementation. Austin Energy also partners with many local agencies, including Austin Water, the City of Austin Neighborhood Housing Program, and several not-for-profit organizations to provide energy efficiency services to the community. The city's Climate Protection Plan reinforces these partnerships by establishing shared goals for energy reduction. Austin Energy also runs a low-income energy efficiency program with comprehensive efficiency measures in partnership with Neighborhood Housing and the Green and Healthy Homes Initiative. These partners provide structural and roofing repairs, while Austin Energy provides weatherization improvements. Austin Energy also runs a multifamily efficiency program with direct install measures. Austin Energy signed on with the city to partner on the Department of Energy's Better Buildings Energy Data Accelerator, to facilitate better access to energy usage data.[24]

Burlington. Burlington Electric Department (BED) serves about 20,000 customers, and has implemented energy efficiency programs since 1990, and they have been able to reduce 2014 electric consumption to levels 5.3% below 1989 levels while statewide sales increased by 9%. During this period, Burlington had increases in job growth (5%) and population (8%). DSM spending is about 4% of the utility's annual revenues to achieve savings of 1.5% of retail sales. Up until 2010, as costs increased, savings increased as well. Since 2010, costs have gone up while savings have gone down, a pervasive trend for DSM portfolios across the country. But BED remains committed to energy efficiency, recognizing it as the least expensive future energy supply resource. Burlington is also the first city in the U.S. to get 100% of its power from renewable energy resources.[25]

Cooperative Utilities

Minnesota Perspective

Minnesota Valley Electric Coop[26]

Minnesota Valley Electric Coop (MVEC) This Co-op foresees a future of pairing energy efficiency with demand response and utilizing low cost renewable energy for their programs. One area of growth in residential energy efficiency is interest and implementation of Air Source Heat Pumps (ASHP). Through educational efforts to their members and trade allies, MVEC has seen a modest increase in installations. The ability to layer in additional controls, such as smart thermostats, to high efficiency systems and AMI provides the meshing of EE and DR future they envision.

[24] Ribeiro, D. et al. The 2017 City Energy Efficiency Scorecard. American Council for an Energy Efficient Economy. Report U1705. May 2017. http://aceee.org/local-policy/city-scorecard
[25] Kushler, M., B. Baatz, S. Nowak, and P. Witte. 2015. Municipal Utility Energy Efficiency: Successful Examples Around the Nation. Washington, DC: ACEEE. aceee.org/research-report/u1510.
[26] Interview conducted November 2, 2017 with Ryan Hentges, General Manager.

Additionally, education and engagement is a principle MVEC sees paying off. Through their 'Beat the Peak Energy Challenge' individual participants and 'teams' compete to reduce their electricity usage during high summer demand. MVEC uses AMI data to measure who reduces their kW demand the most and greatest percentage of reduction. Top saving individuals are awarded a bill credit and teams (which are mainly non-profits) receive a cash award. 'Beat the Peak' not only reduces system peak, but provides a platform for communications with members (44% participation rate), awareness of electricity use and energy efficiency education.[27]

Having AMI since 2010 allows MVEC to utilize data analytics in program offerings and design. MVEC could see utilities becoming a coach or consultant for their customers on smart energy technology, though the level of involvement is still a question. They recognize consumer technology price is declining and acceptance increasing, but barriers of customer education and broad public interest remains. Potential counteractions include member education on technology, savings potential, NEBs, and price signals.

Minnkota Power Cooperative[28]

Minnkota Power Cooperative (MPC) serves 11 municipal and 8 cooperative utilities in western Minnesota, of which 10 munis and 5 co-ops currently participate in a joint efficiency program administered by MPC. Because of 2017 state legislation exempting small munis and co-ops from CIP, several of Minnkota's utilities may drop their participation in the program in 2018. While the majority of customers are residential, the majority of CIP savings come from commercial programs.

Minnkota's best practices include:

- The centralized administration of the efficiency programs by Minnkota – they develop the services and incentives to be offered, standardize the rebate forms, file the CIP reports on behalf of their utilities with the state, and work towards consensus agreement among all utilities in any changes made to the programs. They have an annual meeting with their members to work out any changes for the coming year. MInnkota also hosts a meeting for HVAC trade allies to review the programs and communicate any changes to measures or rebates;
- Minnkota works with community action programs (CAPs) on low-income whole home projects, and provides LED light bulbs, faucet aerators, low flow showerheads, refrigerator replacements (up to $800), and air sealing. The cost-effectiveness of this collaboration will change in 2020 when lighting standards tighten; and
- Targeting dairy farms – Minnkota engaged with an implementation vendor to do a blitz of dairy farms offering audits and cooler, fan and lighting upgrades.

[27] https://www.mvec.net/our-community/challenge/
[28] Interview conducted November 15, 2017 with Lisa Severson, Energy Conservation Coordinator.

Great River Energy[29]

Great River Energy (GRE) is a generation and transmission (G&T) cooperative serving 28 electric co-ops and 1.7 million customers in Minnesota. As an aggregator, GRE is mainly interested in infrastructure, both physical and informational, that keeps the whole system running smoothly. GRE promotes energy efficiency for all customer classes but is moving away from an energy efficiency approach based on widgets and towards a more comprehensive approach. This includes opportunities for new end uses, including heat pump water heaters and electric vehicles, for microgrids, and for surgical deployment of distributed energy resources (DER) like solar, wind and storage.

GRE sees new energy efficiency technologies becoming part of load management, such as controllable water heaters, air conditioners and dishwashers. GRE points to quality installation (QI) as a best practice program and sees that QI has helped transform practices around equipment installation.

AMI has been deployed throughout GRE's territory, which has created opportunities for understanding customer load profiles, enabling demand response, and planning for new programs. However, because the individual co-ops do their own procurement, there are seven separate AMI systems, which has meant some challenges for GRE in data integration and communication, although many of these issues have been resolved in a second phase AMI deployment. GRE continues to work capturing and using data to see how customers are responding to programs and to make it easier for them to take advantage of energy technologies.

Wright-Hennepin Cooperative Electric Association[30]

Wright-Hennepin Coop serves about 45,000 electric customers in western Hennepin and Wright counties. The coop offers residential rebates for efficient water heaters and thermal storage, air conditioners and heat pumps, and commercial rebates for a variety of equipment including lighting, HVAC, motors, etc. The utility is interested in load building opportunities such as electric vehicles and radiant heating that is connected to controllable thermostat and its load management program, and which can overlap with smart home technologies like security systems.

The coop is struggling to develop a cost-effective portfolio in the 2020-30 timeframe and is not sure any portfolio can deliver 1.5% savings cost-effectively. There is competition from the local gas utility in new residential construction, which offers a lucrative incentive only if builders install all gas appliances, which limits opportunities for the electric coop.

[29] Interview conducted with Jeff Haase, Strategic Energy & Efficiency Programs, December 15, 2017.
[30] Interview conducted with Tim Sullivan, President, December 19, 2017.

Wright-Hennepin does acknowledge some successes. About 20% of its customers use the My Meter web portal that provides information about how buildings use energy and advice about how to save energy. The coop is also developing a customer engagement platform that will offer more services to customers. Another best practice program is Wright-Hennepin's water heater program, which benefits customers, the utility and the grid. And the coop provides on-site 'tailgating' visits to job sites, which helps to maintain positive relationships with customers and trade allies who deliver efficiency services.

National Perspective

Rural households are different from urban counterparts. About 10% of U.S. households and about 19% of U.S. population are in rural areas (Census 2010 Population Statistics). Rural homes are typically detached, are newer than urban single-family homes. They have about 27% more square footage, but use only about 10% more total energy compared to urban households, although they use about 50% more electricity (Residential Energy Consumption Survey). Rural households have fewer energy options – natural gas is less commonly used for space heating likely because natural gas infrastructure is not as well developed.[31]

There are 47 rural co-ops in Minnesota, of which 18 were exempted in 2017 legislation from participating in the statewide CIP because they have fewer than 5,000 customers.

These differences point to increased barriers and challenges in serving rural residential customers with energy efficiency programs. Nevertheless, there are many successful rural electric cooperative energy efficiency programs. Minnesota co-ops have DSM programs for residential and commercial lighting, heating and cooling system measures, appliances, building retrofits, new construction, low-income programs, and demand response programs. In 2014, the co-ops spent $26.5 million on DSM programs, and for "four out of the five years between 2010 and 2014, the combination of the EERS and the statewide infrastructure support resulted in the cooperatives achieving annual savings between 0.93% and 1.16%."[32]

Rural utilities can help customers eligible for USDA programs by leveraging other funding sources, including:

- Rural Energy Savings Program (RESP) helps rural families and small businesses achieve cost savings by providing loans to qualified consumers to implement durable cost-effective energy efficiency measures: https://www.rd.usda.gov/programs-services/rural-energy-savings-program

[31] Muratori, M. Rural Energy Use and the Challenges for Energy Conservation and Efficiency. National Agricultural & Rural Development Policy Center. Policy Brief 17. November 2013.
[32] Bickford, A. and H. Geller. Review of Leading Rural Electric Cooperative Energy Efficiency Programs. Southwest Energy Efficiency Project. January 2016.

- Energy Efficiency and Conservation Loan Program (EECLP) provides loans to finance energy efficiency and conservation projects for commercial, industrial, and residential consumers: https://www.rd.usda.gov/programs-services/energy-efficiency-and-conservation-loan-program
- The Natural Resources Conservation Service (NRCS) has developed four energy tools designed to increase energy awareness in agriculture and to help farmers and ranchers identify where they can reduce their energy costs: https://energytools.sc.egov.usda.gov/

The Southwest Energy Efficiency Project compiled information from multiple states with successful rural co-op energy efficiency programs, and offered several recommendations to implement effective programs:

- Adopt supporting policies, such as Minnesota's Next Generation Energy Act, which requires annual reporting of results[33] and triennial program plans. Savings goals lead to savings achievements;
- Determine community need through integrated resource planning (IRP) processes, which can put energy efficiency on a level playing field with supply-side resources. IRPs can help determine the impact of energy efficiency programs in comprehensive portfolios and the most appropriate level of DSM needed to protect customers from rate increases that may stem from supply-side resource investments;
- Establish goals, track data and evaluate results. (Minnesota does this through its Energy Savings Platform (ESP), which requires annual reporting of all utilities participating in CIP);
- Develop effective program leadership, including executive commitment and a well-trained work force to manage programs;
- Gain customer support. While may co-ops communicate with their customers about the efficiency programs and incentives available, it is less common for co-ops to educate customers about the "value of these programs for ensuring low system costs over the long run, reducing risk, etc."[34];
- Leverage funding sources. External funding sources, such as those available through the USDA, can help co-ops expand programs without bearing the full cost and rate impacts; and
- Develop an effective contractor and vendor infrastructure. Low population density means much higher distances between customers compared to urban utilities, which can be a logistical challenge for the businesses that deliver energy efficiency services to rural areas. These challenges can be mitigated by developing trade ally alliances, supporting training for area trade allies, pitching in on bringing in technical experts for specialty work (such as dairy farm

[33] Reporting is hosted by the Department of Commerce, Division of Energy Resources, in the Energy Savings Platform (ESP) database.
[34] Bickford and Geller (2016), p. 21.

upgrades), and partnering with existing community-based organizations that can support DSM programs.

Other opportunities for small utilities:

- Leverage new data and communications technologies, notably advanced metering infrastructure (AMI), demand response and smart thermostats.[35] For co-ops and munis, particularly if they already have AMI infrastructure in their service areas, these new technologies have advantages in their ability to remove geographic barriers and become effective tools for enabling energy efficiency and engaging customers remotely; and
- Have regular meetings with other small utilities. The generation and transmission aggregators are particularly well-suited to create opportunities for ongoing peer engagement, including annual meetings with presentations and discussions, quarterly webinars and other forums that provide a chance for busy managers to network, share information and build collaboratives.

Municipal utilities and cooperatives are similar in key areas:

- They serve small numbers of customers, and are challenged to scale down successful strategies deployed by large IOUs;
- They often have a large residential base compared to their commercial and industrial base, and have the disadvantage of lack of scale in implementing programs;
- They lack budget and staff resources, so planning and delivering a cost-effective efficiency portfolio is more difficult compared to larger utilities;
- Smaller utilities may benefit from smart devices and data as effective, low-cost tools for enabling energy efficiency and engaging customers remotely.[36] This is particularly true for utilities that have already implemented AMI, as many small public utilities have done in Minnesota; and
- Municipal utilities are different from co-ops in that local municipal leaders may have developed sustainability or carbon-related goals, as is seen in towns like those discussed above. Local values-driven decision-making processes can support energy efficiency under certain conditions.

[35] Koliner, J. “Small Utilities and Big Data – Cooperative and Municipal Utility Programs in the Digital Future.” Proceedings of the American Council for an Energy Efficient Economy 2016 Summer Study on Energy Efficiency in Buildings. August 2016

[36] Koliner, J. “Small Utilities and Big Data – Cooperative and Municipal Utility Programs in the Digital Future.” Proceedings of the American Council for an Energy Efficient Economy 2016 Summer Study on Energy Efficiency in Buildings. August 2016

Program Sectors

Minnesota is a top-ten performing state in energy efficiency in the U.S., so it is reasonable to conclude that Minnesota utilities are already engaging in many best practices in the design and execution of their DSM portfolios.

For larger IOUs, a best practice portfolio has comprehensive programs that serve all customer sectors, that have diversified offerings, and that balance program savings achievements and cost-effectiveness with equity and customer service.

For smaller utilities, including many of Minnesota munis and co-ops, it can be difficult to achieve the same ends as larger utilities, since many small utilities lack economies of scale, and must also contend with serving a smaller number of customers spread over a wide service area.

This summary reviews program types by sector, with the recognition that larger IOUs will have the scale and resources to pursue most or all types, while smaller and more rural public utilities will design and implement programs that work for their customers and service areas and may not include all program types.

Program and Measure Types

The following is a list of program, segment and measure types typically found in comprehensive energy efficiency portfolios:

- Building codes are generally recognized as the most cost-effective way to get energy savings in all applicable new construction in a jurisdiction (or most, depending on how well those codes are communicated and enforced);
- New construction programs offer services and incentives to build with better-than-code efficiency measures, and includes support for efficient design, equipment, controls, benchmarking and commissioning;
- Building envelope measures encompass walls, roofs, windows, and floors, crawlspaces and basements, and include insulation, air sealing, duct sealing, windows and window treatments;
- Building performance takes a comprehensive approach to improving energy efficiency in buildings with an effort to use diagnostics to assess where a building is and what specific measures are recommended, including: envelope measures, HVAC[37], appliances and other

[37] Heating ventilation and air conditioning (HVAC) – mechanical systems that provide thermal conditioning and air quality in indoor spaces.

equipment, controls, and operations & maintenance. For commercial buildings, building performance is typically delivered through building tune-ups, retrocommissioning, energy studies and equipment retrofits;

- Building rating and disclosure is a tool to communicate how a building is performing compared to other similar buildings. While ratings can apply to either the asset (related to the building and its equipment profile) or the operational aspects, most rating programs operating in the U.S. focus on asset ratings. The Leadership in Energy and Environmental Design (LEED), Energy Star Portfolio Manager and the City Energy Project are all programs dedicated to creating standards for building ratings and expanding the number of rated buildings;
- Retrofits – any energy efficiency upgrade made to an existing building or replacing existing equipment (unless it is an early replacement made before the end of the equipment's useful life);
- Energy audits, studies, and modeling are often the first step in helping customers understand how their buildings are operating and what upgrades can accomplish in terms of performance or savings. This step by itself does not save energy, but is needed in order to determine which measures or program services would likely achieve savings, and what the implementation cost and cost-effectiveness is for those measures and services;
- Commissioning and retrocommissioning (aka recommissioning) – a quality assurance process that ensures that commercial and industrial building systems and equipment are operating optimally. Commissioning applies to new buildings, while retrocommissioning targets existing buildings; and
- Targeting building types can enable utilities to dedicate specialized resources that can deliver assessments, service and incentives more effectively and efficiently. Some building types around which utilities have built programs or program tracks include: office buildings, public buildings, hospitals, data centers, convenience stores, restaurants, hotels, dairy farms, ski resorts, etc.

National Perspective

While long-standing utility portfolios have tended to rely on equipment-based rebate programs, targeting lighting, appliances and equipment. With the changes to lighting standards that took effect in 2012 and 2014, and those expected in 2020, utilities have needed to substitute other types of measures and consider innovative delivery models to continue achieving high performance. Xcel Energy (dba Northern States Power) is considered to have an innovative portfolio that is comprehensive and diverse, and that pursues innovative approaches to supplement and/or supplant traditional programs, and that

uses cycles of continuous improvement to refine programs over time.[38] Innovative program types include:

- Market transformation initiatives, including upstream and midstream programs;
- Demand response (for kWh savings)[39]; and
- Residential behavior

Residential Sector

Residential DSM programs, particularly weatherization programs, have struggled for cost-effectiveness over the last several years. These programs tend to be high touch - have multiple customer contacts, require skilled technicians to do audits, air sealing and other measures, and the savings per participant are on a different scale than savings that result from large commercial retrofits. Low avoided costs have also strained cost-effectiveness of comprehensive programs. Utilities and their program implementers have continued to modify program designs so that they can continue to serve residential customers with energy-saving options that balance equity and cost-effectiveness.

Some rural Minnesota utilities have not been able to maintain programs for residential customers because of the challenges described here. Other utilities that have comprehensive residential programs will need to continue adjusting communications, services and incentives for residential customers to maintain a balanced and cost-effective portfolio, and to continue to attract their customers to participate in energy efficiency programs.

Social science research can provide some guidance. A report about California's publicly owned utilities summarizes research on motivations for residential customers to engage in energy efficiency programs, and concludes:

- Energy savings and monthly utility bill cost savings are often not the motivating factor behind a residential customer's decision to invest in energy efficiency, and
- Many residential customers will not pursue energy efficiency retrofits, even if they receive sizeable benefits at no monetary costs, if the process to complete the retrofits is onerous and burdensome.[40]

[38] Baatz, B., A. Gilleo and T. Barigye. Big Savers: Experiences and Recent History of Program Administrators Achieving High Levels of Electric Savings. American Council for an Energy Efficiency Economy. Report Number U1601. April 2016.
[39] Demand response is covered in Appendix E, and behavioral programs are covered in Appendix D.
[40] California Municipal Utilities Association. Energy Efficiency in California's Public Power Sector: A 2015 Status Report. 2015.

Programs will need to understand why customers invest in energy efficiency, which may differ from region to region. Market research can help utilities understand what their customers value and create communications that speak to those values. Also, programs need to continue streamlining operations so that program processes are not considered onerous.

Examples of Innovative Programs

There are several examples of innovative residential programs that may be examples for Minnesota utilities to consider in future years:

Residential Audit and Weatherization[41]

In this dual fuel program, DTE paid incentive amounts varied based on the type of weatherization measure installed (i.e., attic insulation, wall insulation, infiltration reduction). Customers who completed a Comprehensive Energy Assessment were paid higher rebates for weatherization measures than those who did not complete an assessment, subject to specific measure caps. Customers who completed an assessment were also offered the new multi-measure bonus incentive. The amount of the bonus incentive equaled $150 for 3 qualifying measures, $200 for 4-6 measures, and $300 for 7+ measures.

Residential Emerging Tech Program[42]

The goal of this pilot was to leverage DTE's new AMI infrastructure. It worked with a first of its kind app provided by DTE to help educate customers on their energy usage and drive behavior change. Customers can see how much energy they have used each day, week, and month, track usage trends and view progress. It features helpful ideas and challenges to inspire energy use reduction and savings. It also offers the PowerScan feature (for iPhone users only), a convenient way to measure the energy consumption of devices by scanning the power cord. DTE spent $900,000 on the pilot for 57,000 customers, and achieved a cost of 14 cents per kWh, with a total resource cost test ratio of 0.29. This pilot is an example of how utilities may invest in innovative technologies that may not be cost-effective at the pilot stage, but show promise for a wider roll-out.

New Movers Program[43]

National Grid Rhode Island's New Movers Program offers a unique experience for customers who recently moved into a new home or apartment. The first of its kind in the country, the program is specifically designed to engage customers at one of the most opportune times for promoting energy efficiency—moving into a home. By targeting these customers with personalized and feasible efficiency

[41] Source: E Source email communication September 29, 2017.
[42] Source: E Source email communication September 29, 2017.
[43] Source: E Source email communication September 29, 2017.

recommendations, National Grid helps them become immediately aware of their home's energy usage. The program also introduces them to National Grid's energy-efficiency programs.

Low-Income Efficiency Programs

Most low-income efficiency programs include lighting, air sealing and insulation at little or no cost to participants. Low income customers face significant barriers to participating in energy efficiency programs, including high up-front costs of investments, split incentives between owners and renters, lack of access to information about efficiency programs, language barriers, and aging housing stock likely to have structural issues affecting health and safety that may make efficiency upgrades unviable. But programs across the U.S. have found ways to achieve high participation and/or deep savings for low income customers.[44]

Features associated with low-income program success include:

- Statewide coordination, formalized with regular coordination of stakeholders or through a single statewide program implementer;
- Single point of contact for customers and for contractors, based on a simplified program design and administration. Some programs work with only one contractor;
- Market segmentation and targeted program offerings, enabling programs to focus activities on different types of customers, such as high energy users, elderly customers, renters and owners of multifamily buildings;
- Emphasis on quality control and training, where programs provide regular, ongoing training for contractors, and have strict quality control requirements for projects;
- Leveraging of diverse funding sources to focus on comprehensive dual-fuel or fuel-neutral upgrades including health and safety measures;
- Accommodation of health and safety measures through program design and relaxed cost-effectiveness requirements;
- Prioritizing measures that achieve deep savings, which can be supported by using a trusted contractor network and savings-based incentives for contractors;
- Formation of partnerships to better market and deliver services to hard-to-reach customers, such as food banks, health organizations and nonprofits; and
- State policy, where states ensure a reliable funding source for low-income energy efficiency programs over the long term.

[44] Gilleo, A., S. Nowak and A. Drehobl. Making a Difference: Strategies for Successful Low-Income Energy Efficiency Programs. American Council for an Energy Efficiency Economy. Report Number U1713. October 2017.

On average, programs achieve participation rates of about 1% of low-income customers at electric and gas utilities. High performing programs at electric utilities across the U.S. had participation rates of over 5%, and the best reached over 8%. High performing gas utilities reported participation rates of above 4%, and the best reached over 11%. Programs that achieved the deepest savings offer a mix of measures including insulation and air sealing.

There is a trade-off between maximizing participation and delivering deep savings to each program participant. Some programs have included both low-cost direct install measures and deep retrofit programs, while others have prioritized either participation or deep savings opportunities. In the programs studied, there was an inverse relationship between participation rates and savings per customer, although some electric utilities have found ways to achieve both high savings and high participation. Savings rates were strongly correlated with spending per customer.

Table 2. States supporting high-performing low-income programs[45]

Table 8. State policies supportive of high-performing low-income programs by state

State	Requirements for minimum level of state or utility support of low-income energy efficiency programs	Special cost-effectiveness provisions for low-income energy efficiency programs	Coordination of funding, administration, or implementation between utility and WAP programs	Other state-specific policies supporting low-income programs
Arkansas*	No	Yes[e]	Yes	Yes
California	Yes[c]	Yes[f]	Yes	Yes
Colorado	No	Yes[g]	Yes	No
Connecticut	Yes[a,c]	Yes[e]	Yes	Yes
Massachusetts	Yes[a]	Yes[d]	Yes	Yes
Michigan	Yes[a]	Yes[e]	Yes	No
Minnesota	Yes[a]	Yes[e]	Yes	Yes
New York	Yes[a]	Yes[e]	Yes	Yes
Ohio	No	Yes[e]	Yes	Yes
Oklahoma	Yes[a]	Yes[f]	No	Yes
Pennsylvania	Yes[b,c]	Yes[e]	No	No
Vermont	Yes[a]	Yes[f]	Yes	Yes
Wisconsin	Yes[a]	Yes[e]	No	Yes

* Arkansas does not allow utilities to base program qualification on income explicitly, but utilities reach low-income customers through programs designed for customers who are "hard to reach." [a] A required level of spending on low-income energy efficiency has been established. [b] A required savings goal for low-income energy efficiency has been established. [c] A customer participation goal has been established. [d] Quantifiable low-income nonenergy benefits (NEBs) are included in cost–benefit calculations. [e] Low-income programs are not required to, or are exempted from, passing cost-effectiveness test. [f] Cost-effectiveness threshold has been lowered to accommodate low-income programs. [g] Multiplicative adder is applied to approximate low-income NEBs. *Source:* Berg et al. 2017.

Commercial & Industrial Sectors

Generally, commercial and industrial (C&I)[46] energy efficiency programs are the largest component of a utility's DSM portfolio. They account for the highest share of costs and savings, and often have higher cost-benefit ratios compared to other program types, which often makes them flagship programs within utility portfolios.

[45] From Gilleo et al. 2017.

[46] In the context of this report, agricultural and multifamily programs are included in this sector, based on the size and scope of projects, types of measures recommended, delivery channels and other program elements that are shared across most non-residential DSM programs.

Opportunities for commercial buildings include improving the operations and maintenance of existing buildings, and ensuring that efficiency programs are achieving high penetration in new construction markets. Standard measure types in commercial programs include lighting, office equipment, consumer electronics, air conditioners, furnaces, boilers, packaged refrigeration, water heating, cooking, elevators, and standby power.[47] Most comprehensive commercial efficiency programs include all of the above measures, supported by either prescriptive or custom incentives.[48]

Challenges in C&I programs (including multifamily) include:

- Split incentives that often occur between the bill-payers and the tenants in commercial buildings;
- In large companies, decisions about capital investments are often made in different departments than decisions about operations budgets, making it more difficult to develop a comprehensive road map for increasing energy efficiency in large facilities. In some cases, companies have vendors who maintain energy management control systems, but they are not well-integrated with building maintenance people; and
- Lack of financing and project management resources among institutional customers (schools and public buildings). Programs targeting institutional customer often help them get access to capital for efficiency improvements,[49] and may provide support for project management and technical oversight to help projects move forward in barrier-filled environments.

Examples of Innovative Programs for C&I

Small & Medium Business

The majority of gas and electric utility commercial customers are small businesses, but this market segment has generally been underserved by DSM programs, for several reasons:

- These customers do not have time for energy efficiency projects, or have too small a staff to delegate projects;
- Small businesses often lack capital to make investments;

[47] Phantom loads that draw power even when equipment is turned off
[48] Xcel Energy. 2017/2018/2019 Minnesota Electric and Natural Gas Conservation Improvement Program. December 2016. https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/2017-2019%20CIP%20Triennial%20Plan.pdf
[49] https://aceee.org/sector/commercial

- Many small businesses rent their facilities and do not have authority to make investment decisions;
- Many or most small businesses are not aware of energy efficiency programs, or the benefits or the economics of participating; and
- The sector is diverse in terms of industry, building types, energy end uses, savings opportunities, financial needs, culture and language, etc.

Utilities face a trade-off between serving more customers or maximizing cost-effectiveness. In the small commercial market, there is limited potential for savings, and programs try to capture as much as possible in a single visit to keep costs down. Given the challenges, experts recommend successful practices for this sector, recognizing that there is no single best model for small business program design, but there are promising approaches[50]:

- Provide streamlined installation and lighting measures likely to deliver the most cost-effective savings, using direct install delivery, preferred vendors or other mechanisms to produce volume replication of installations;
- Segment the market by classifying businesses using common characteristics, and offer customized approaches to those niche markets;
- Tailor and target marketing and communications to customer needs – move away from generic messages with limited relevance to many customers. Use customer and market data analytics to segment and target potential high-savings customers;
- Offer financing to encourage comprehensive retrofits and deeper savings. A review of programs found a high correlation between the best-performing small business programs and those that offer financing, especially on-bill financing and on-bill repayment. The highest correlation was with programs that offer 0% financing;
- Offer a wide set of eligible measures besides lighting, including programmable (or smart) thermostats, refrigeration, and natural gas measures;
- Provide dedicated project process managers who can provide direct technical assistance including energy walk-throughs and support with measure installation;
- Establish partnerships with local community and civic organizations that can provide access to customers and engage them as trusted local partners;
- Consider pay for performance, where the utility works with an implementation contractor or service provider who offers turnkey services at a negotiated contractual price for energy

[50] Nowak, S. Big Opportunities for Small Business: Successful Practices of Utility Small Commercial Energy Efficiency Programs. Report Number U1607. American Council for and Energy Efficiency Economy. November 2016.

savings. This model is well-suited to lighting measures, but leaves lost opportunities for deeper retrofits; and

- Provide energy assessments on utility websites geared towards small business, develop more customer engagement tools and integrate them with customer billing and marketing data.

A recent study from Minnesota concluded that "small businesses, which may have limited capital for large investments, are good candidates for low-cost behavior change conservation".[51] The study found that different strategies showed promise depending on customer characteristics, and created a taxonomy of recommendations by segment. [52]

Direct Install

Tucson Electric Power Company Small Business Direct Install Program:

The program is an upstream market program, providing incentives directly to contractors for the installation of selected high-efficiency lighting, motors, HVAC, and refrigeration measures. The incentives are set at a higher level for this market in order to encourage contractors to market and deliver the program, thus offsetting the need for TEP marketing and overhead expenses. In order to further reduce overhead expenses, the program has employed Internet-based measure analysis and customer proposal processing, which has made the process easier for both contractors and customers. The program includes customer and trade ally education to help them understand the technologies being promoted, the incentives offered, and how the program functions.

Strategic Energy Management

Strategic Energy Management (SEM) programs are making inroads in utility portfolios in several states. The Consortium for Energy Efficiency defines SEM as "a holistic approach to managing energy use in order to continuously improve energy performance, by achieving energy and cost savings over the long term. It focuses on business practice change from senior management through shop floor staff, affecting organizational culture to reduce energy waste and improve energy intensity." These programs are demonstrating that investments in people and organizations, rather than strictly in technology, "can

[51] Hannigan, E., A. Fryer, J. LeZaks, S. Pigg, S. Schuetter, and M. Scanze. "Finding Big Potential in Small Businesses: Behavior Change Opportunities and Targeting Approaches from a Statewide Study." Proceedings for the 2017 International Energy Program Evaluation Conference. 2017.
[52] Behavioral efficiency programs are covered in substantially more detail in the Appendix on Task 6.

drive powerful results: enhanced visibility and operational control for industrial businesses, and deep, persistent and cost-effective energy savings."[53]

SEM models have the following essential elements: goal setting, executive commitment, training to help achieve goals, and tracking of progress toward goals.[54] Engagements last from 12 months to 3 years, and can be structured with one-on-one engagements for very large customers, or cohorts of varying sizes[55] for smaller or specialized groups of customers.[56]

Continuous energy improvement programs have been shown to save from 0-22% electricity and 0-23% gas. In the one documented case where a program administrator tried to isolate operational and maintenance savings from traditional measure-based savings, the O&M savings were estimated to be 4.7-6.7% gross electric and 3.8-9.8% gas.[57]

Other related activities are also important in maintaining efficient operations and maintenance, including building operator training and recommissioning. These different approaches can work together, especially if the utility has a system to maintain customer relationships. For large customers, most utilities have account managers who dedicate a substantial part of their time to promoting and coordinating energy efficiency engagements. SEM cohorts can provide similar services, perhaps more cost effectively, for smaller commercial customers.

Puget Sound Energy (IOU)

The Urban Smart program uses an Energy Management Information System (EMIS), Strategic Energy Management (SEM), and community-based social marketing (CBSM) to drive energy savings in the downtown urban core. SEM is a holistic approach to energy efficiency that includes strategic implementation of O&M best practices, behavioral energy reduction programs, and capital projects to achieve maximum energy savings.

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[53] Burgess, J. et al. "The Second Generation of Strategic Energy Management Programs." Proceedings of 2015 American Council for an Energy Efficiency Economy Summer Study on Energy Efficiency in Industry. August 2015.
http://aceee.org/files/proceedings/2015/data/papers/1-31.pdf

[54] DNV KEMA, & Research into Action. (2014). NEEA Industrial Initiatives - Market Progress Evaluation Report #8. https://neea.org/docs/default-source/reports/neea-industrial-initiatives--market-progress-evaluation-report-8.pdf?sfvrsn=10

[55] Cohorts of 7 to 22 companies were observed in a review of three utilities' SEM programs.

[56] Burgess, J. et al. "The Second Generation of Strategic Energy Management Programs." Proceedings of 2015 American Council for an Energy Efficiency Economy Summer Study on Energy Efficiency in Industry. August 2015.
http://aceee.org/files/proceedings/2015/data/papers/1-31.pdf

[57] Energy Trust of Oregon, & The Cadmus Group. (2014). 2014 Energy Trust Workshops on Strategic Energy Management Impact Evaluation.
http://energytrust.org/library/reports/SEM_Evaluation_Workshop_Report.pdf

Behavioral, Recommissioning and Operational Measures

Residential behavioral programs have achieved fairly high utility market penetration over the last several years, mostly driven by the Home Energy Report model. A more varied and complex approach has led to a focus on operational savings in commercial and industrial facilities. IOUs in California, for example, introduced into their 2017 energy efficiency portfolios behavioral, retro-commissioning and operational (BRO) measures. BROs are a subset of measures for which custom baselines can be used for energy efficiency incentive calculations.[58]

Benchmarking

Duke Energy Carolinas Smart Energy in Offices Program

The Program leverages communities to educate and engage building owners, property managers, building operators, tenants and occupants of a building on ways to reduce energy usage in the workplace through simple behavioral changes. This is accomplished by providing participants with detailed information of the account/building's energy usage, support to launch tenant and building operator energy saving campaigns, forums that allow networking and exchange of building operation best management practices, and information showing comparisons between their building's energy performance and others within their community and actionable recommendations to improve their energy performance.

Energy Star Portfolio Manager

The U.S. Environmental Protection Agency created a tool called Portfolio Manager that enables commercial building managers to benchmark their buildings compared to other similar buildings. Portfolio Manager also has a data platform that captures and reports on all of the buildings that share their information, creating a data warehouse that provides transparency about building performance and helps to drive efficiency in commercial buildings.

Upstream

Upstream incentive programs work through manufacturers, distributors and retailers to provide a point-of-sale discount on efficient technologies.[59] Traditional downstream programs have had low participation rates and market penetration, partly because distributors have not typically stocked highly efficient equipment, and getting it required special orders and delays. This has created a market barrier for equipment, such as HVAC equipment, that often is replaced at failure on an emergency basis. Upstream programs provide incentives for distributors to stock and promote efficient equipment. Since

[58] Memo from Newcomb, Anderson and McCormick to MNCEE, November 28,2017.
[59] Programs targeting manufacturers are called 'upstream,' while programs that work with distributors and retailers are usually referred to as 'midstream.'

some technology types are procured almost exclusively through distributors or directly from manufacturers, upstream programs have the potential to dramatically increase the market penetration of efficient technologies compared to downstream incentive programs which directly engage the consumer.

The Southwest Energy Efficiency Project reviewed upstream programs,[60] and found that when compared to traditional downstream programs, upstream programs:

- Reduce upfront cost barriers to customers; i.e., customers get discounts at point of sale instead of waiting for a rebate payment;
- Reduce program administration and transaction costs associated with rebate fulfillment;
- Reduce incentive payments as well as mark-ups at distributor and contractor levels;
- Encourage stocking of efficient products by distributors;
- Use rebate budgets more effectively;
- Are more cost-effective;
- Capture previously lost efficiency opportunities with persistent savings;
- Leverage key actors in the marketplace, namely manufacturers and distributors; and
- Align with existing commercial sales and marketing processes.[61]

Upstream programs have been used successfully by the following program administrators for a wide range of equipment types. In consumer markets:

- Lighting (retailers) – implemented by most program administrators;
- Electronics and appliances (retailers) – NEEA, PG&E, SoCal Edison, SMUD, MassSave, Efficiency VT, and others;
- Ductless heat pumps (manufacturers, utilities and contractors) – NEEA;

In commercial and industrial markets:

- Lighting (distributors) – PG&E, MassSave, Efficiency Vermont, ComEd;
- HVAC (distributors) – PG&E, Centerpoint Energy, MassSave;
- Computers (manufacturers, utilities, distributors, retailers, ENERGY STAR) – NEEA;

[60] Quaid, M. and H. Geller. Upstream Utility Incentive Programs: Experience and Lessons Learned. Southwest Energy Efficiency Project (SWEEP). 2014. http://www.swenergy.org/data/sites/1/media/documents/publications/documents/Upstream_Utility_Incentive_Programs_05-2014.pdf

[61] In the programs researched for this brief, double dipping was not permitted; either a piece of equipment was eligible for a downstream rebate, or its price was discounted to the distributor, but not both.

- Water-cooled chillers (distributors) – PG&E;
- Water heaters (distributors) – PG&E;
- Variable refrigerant flow systems (distributors) – PG&E;
- Circulating pumps (distributors) – Efficiency Vermont; and
- Food service equipment (distributors) – PG&E.

In a recent review of the 50 largest electric IOUs found that half of the utilities had upstream program offerings and 17 had midstream offerings.[62] Examples include:

Xcel Colorado: Midstream Cooling for Businesses[63]

"Midstream measures are a newly emerging offering under this product designed to deliver incentives to market actors who sell qualifying high efficiency HVAC equipment. The logic that underscores this approach is that a small number of midstream market actors are in a position to impact hundreds of thousands of customers and influence their choice of equipment by increasing the stocking and promotion of high efficiency HVAC equipment. Distributors currently have limited stock of high efficiency HVAC equipment. This condition limits the current program's effectiveness with replace-on-burn-out projects. The midstream model cost-effectively leverages existing market structure and relationships. The product also provides a web-based paperless rebate application system to facilitate program participant sales and invoice tracking, which further reduces administrative costs as compared with paper application processing. This feature has been shown to increase the number of participants and dramatically increase the level of participation. The Midstream measures are designed to adapt to market changes, and the Company will continue working with relevant industry players to enhance the program to include new midstream incentives for "beyond-code efficient" equipment."

MassSave Upstream Lighting Program:

"The first C&I upstream program in Massachusetts was launched in late 2011, targeting the replacement lamp market. Since then, upstream programs have grown and matured into mainstream statewide offerings, providing significant savings along the way. Over 25% of the C&I program savings in Massachusetts are expected to come from upstream programs during the 2016-2018 plan."[64]

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[62] Reif, G., B. Baatz and S. Nowak. 2017 Utility Energy Efficiency Scorecard. American Council for an Energy Efficient Economy. Report U1707. June 2017.

[63] https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/DSM-Plan-Revised-2017.pdf

[64] Sondhi, R., N. Strong and J. Horenstein. "Are We There Yet? Upstream 2.0: The Future of Upstream Energy Efficiency Programs." 2016 American Council for an Energy Efficient Economy Summer Study on Energy Efficiency in Buildings. August 2016.

"In order to capture the total available opportunity, upstream programs are best viewed in the context of a channel strategy. This includes conducting a value/supply chain mapping for each market to establish the different points of influence (market players) and degree of influence of each actor.

Upstream efforts are an important part of the Massachusetts Program Administrators' channel strategy. The Massachusetts PAs have developed close relationships with the leading manufacturers and their distributors. A key component of this strategy is to have informal or formal agreements with the manufacturers to support and promote upstream programs. This enables program administrators to collect sales and incremental cost data, both of which are critical for a meaningful program design. Additionally, strong relationships with distributors provide local market intelligence and data on customer preferences and technology trends. Program Administrators can then develop savings and budget estimates using these data points and trends."

Conclusion: "The upstream approach has already proven to be a game-changer for some utilities and program administrators in achieving aggressive energy savings goals. It also has the potential to change market behavior at an accelerated rate by overcoming barriers associated with traditional delivery models. Additionally, the upstream approach can be a win-win proposition for all stakeholders involved. The upstream delivery model does not replace all traditional incentive delivery methods, however. It is an additional tool for Program Administrators to complement existing programs and requires careful planning and execution to avoid channel conflict and overlap with existing downstream offerings. A thoughtful program design can achieve scale, streamline internal workflows, and deliver a consistent message to stakeholders. This allows the upstream model to be a significant contributor to the overall portfolio while improving the end customer's experience with energy efficiency programs."[64]

Energy Star Retail Products Platform (ESRPP)[65]

The ENERGY STAR Retail Products Platform (ESRPP) is a nationwide collaborative midstream initiative of ENERGY STAR, energy efficiency program sponsors, retailer partners, and other key stakeholders, facilitated by the U.S. Environmental Protection Agency. In the long term, the ESRPP is expected to offer a gateway for energy efficiency programs to capture energy savings in the growing "miscellaneous/plug load" product categories at a significantly lower cost than current programs incur.

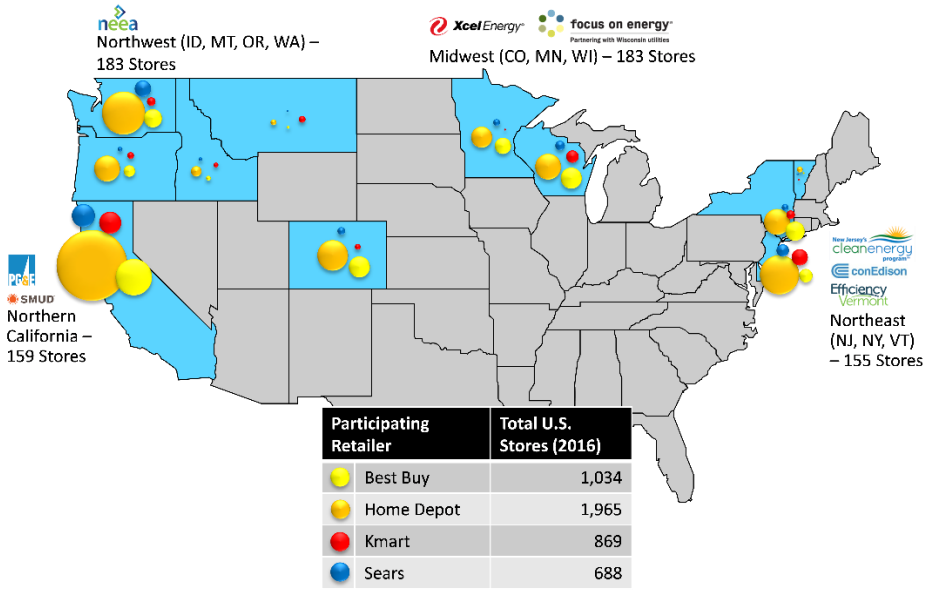
The ESRPP allows participants to leverage each other's resources, to avoid duplication of effort and redundancy across neighboring service territories, and to streamline operations. The focus is providing retailers with incentives from utilities and other energy efficiency program sponsors to change their inventories to sell increasing numbers of ENERGY STAR certified products.

In 2016, its first pilot year, three retailers, and eight program sponsors representing 11 states and almost 18 percent of the U.S. participated in the ESRPP. ENERGY STAR certified models in five product categories were promoted by program sponsor-labeled signage in almost 700 stores.

[65] https://www.energystar.gov/ESRPP

In 2017, the product portfolio was expanded to include two additional products: clothes washers and refrigerators. New sponsors and the addition of Nationwide Marketing Group will expand coverage to approximately one-third of the U.S. market by the end of 2017. Xcel Energy is one of the participants in this program.

Figure 1. Energy Star Retail Products Platform Implementations



Aggregation Strategies

Michigan's Statewide Administrator

Michigan requires its utilities to file Energy Optimization (EO) Plans, similar to Minnesota's CIP in some ways, but with key differences, one of which is that Michigan selects a State Administrator, which in 2015 was the Michigan Community Action Agency Association, a membership organization of 30 local community action agencies covering the entire state and having extensive experience in the provision of energy efficiency services. In 2015, 50 of the 64 utilities in the state were "formally coordinating the design and implementation of their EO programs in order to reduce administrative costs, create consistency among programs, and improve customer and contractor understanding of program offerings and administrative procedures. The remaining 14 utilities independently administer their own programs. To the extent feasible, the utility providers that independently administer their programs try to align with the program design offered by the coordinated utility providers' programs to improve customer and contractor participation."[66] The State Administrator, under the name Efficiency United, has reported

[66] Michigan Public Service Commission. Report on Utility Energy Efficiency Programs in Michigan. 2016.

reduced costs of implementation and believes they achieve operational efficiencies similar to Michigan's largest utilities, and operates 'at performance levels seen in some of the best run programs both in Michigan and nationally.

California's Regional Energy Networks and Community Choice Aggregators

Publicly owned utilities in California have recently created Regional Energy Networks (RENs) and Community Choice Aggregators (CCAs) to pool resources and provide joint offerings. RENs and CCAs are considered non-resource programs, and in 2016 accounted for less than 1% of savings claims. Their impact is expected to grow over time as they gain experience. RENs provide services such as design, development and rebate processing support, while CCAs provide joint energy efficiency and clean energy procurement options for their customers. Some examples of services offered with pooled resources include:

- Onsite energy audits and hands-on technical services;
- Web-based energy report services (e.g. OPower platform);
- Retro-commissioning programs;
- Volume purchasing discount for energy efficiency projects; and
- Direct install lighting programs.[67]

General Program Recommendations

In a research report on program administrators that achieve high levels of savings, Baatz et al. drew several conclusions[68]:

- Programs have become more diverse as utilities rely less on lighting programs, a trend expected to continue. Going forward, efficiency portfolios will consist of many different sources of energy savings;
- Control measures and automation, including lighting controls and smart thermostats, are likely to play a bigger role in future portfolios. Lighting programs that support both controls and measures will continue to be important;
- Behavioral programs will continue to grow. While these programs produce modest savings and have only a one-year measure life, they have been evaluated independently and demonstrated to deliver cost-effective savings;

[67] Memo from Newcomb, Anderson and McCormick to MNCEE, November 28,2017.
[68] Baatz, B., A. Gilleo and T. Barigye. Big Savers: Experiences and Recent History of Program Administrators Achieving High Levels of Electric Savings. American Council for an Energy Efficiency Economy. Report Number U1601. April 2016.

- Other measures in the 'silver buckshot' approach in a diversified portfolio include industrial process, geothermal heat pumps, energy management systems and deep retrofits;
- New approaches such as midstream and upstream programs that have a goal of market transformation are part of successful diversification.

The paper offered several recommendations based on interviews with successful administrators:

- The most common recommendation that program administrators offer is to ensure that program delivery infrastructure – internal and external – is in place and ready to deliver the volume of services necessary to meet new program demands;
- Quality control of the work done by the organizations delivering the program, along with having delivery infrastructure, ensures customer satisfaction and long-term success;
- Work closely with trade allies to leverage their expertise and relationships;
- Partnerships with third parties, local governments and other organizations are necessary to deliver successful market transformation and community-based initiatives;
- Customer engagement and marketing are essential to helping customers understand the programs, products, services and incentives that are being offered; and
- Integrate evaluation with program planning and delivery, and use the results to modify and improve program performance.

Elements of Best Practice Programs

These recommendations are meant as helpful guidance to utilities that are planning for 2020-30 portfolios considering the challenges that will face DSM portfolios in that time frame – a significant loss of savings from lighting, continued low avoided costs, increasing costs of saved energy, accelerating technological advances in AMI, energy management, controls and other emerging technologies. IOUs will be in a stronger position due to economies of scale to consider each of the following elements. Smaller public utilities can work with many of these suggestions, but also need special consideration.

- Reach as many customers as possible: Comprehensive portfolios that serve all types of customers are common among larger IOUs, and equity is a core value for many state program administrators[69]. But this approach can be a significant challenge for small, rural public utilities, which sometimes focus their portfolios on a small set of individual measures or a targeted program that only serves a small portion of their customer base. With the ongoing evolution of internet-based solutions for outreach and program delivery, even small utilities can offer almost every customer some energy efficiency measure or service, including online energy assessments

[69] Such as Energy Trust of Oregon and Efficiency Vermont.

(with links to related programs and/or relevant vendors), mailed kits with low-cost energy-saving devices[70], or agreements with local trade allies and distributors that result in more efficient equipment being installed;

- Engage customers in new ways: Customer engagement strategies will continue to evolve as data, analytics and communications capabilities expand. With the increasing focus on customer satisfaction as a driver for energy efficiency, utilities are beginning to invest in solutions that bridge multiple technologies, including AMI, smart meter, smart appliance, demand response, and behavioral approaches to achieving savings.[71] For industrial customers, compressed air leak detection and fix programs provide an annual opportunity to visit customers, provide a service that increases customer satisfaction, and produces immediate savings;
- Build data, analytics and communication linkages with customers: Many large industrial and commercial customers already have integrated data and communications systems that support ongoing energy management and optimization activities, and that point to investment-level upgrades. Utilities can leverage the huge amounts of data becoming available from such systems to know their customers better, offer them more relevant messaging and efficiency opportunities, and foster an ongoing relationship. As innovations trickle-down to smaller markets through ongoing innovations over the next several years, these capabilities can be scaled down. AMI meters and smart thermostats can create opportunities with residential customers for energy savings, peak management and load control;
- Explore online capabilities to support program operations: While paper will continue to be necessary for some customers or in specific situations, most fulfillment processes handled through online portals and applications would be less expensive, have less error, lead to faster turnaround and easier reporting, and have other positive outcomes for both utilities and their customers;
- Collaborate with other organizations when feasible, to leverage resources available for projects:
    - Collaborate with other utilities to deliver the broadest spectrum of program offerings and enhance cost-effectiveness. This applies primarily to electric and gas utilities, but could also include water utilities. Minnesota is already a national leader in collaboration between electric and gas utilities, and can build on this achievement by exploring ways for smaller utilities to collaborate or coordinate their programs.

[70] Mailed kits would be more cost-effective if they include devices for both electric and gas end uses.
[71] From the utility perspective, this list also includes electric vehicles and customer-sited renewable energy and storage. While these features are part of an integrative approach to customers, and included in any engagement portal a utility might build, they are not considered DSM.

  - Cultivate strong positive relationships with the program implementers and trade allies who deliver utility programs to customers, meeting regularly, offering training and incentives, and recognizing top performers.
  - Work with local governments that may have their own energy and sustainability goals, may be able to directly support program recruitment, and may have resources to leverage utility programs.
  - Engage with local business, community and charitable organizations and associations, which can provide venues for program representatives to educate and market to a variety of audiences about utility programs.
  - Reach out to vendors that are innovating in DSM technologies, including promising emerging technologies and software, analytics and communications platforms that provide opportunities for demonstrations that lead to pilots or program enhancements;
- More sophisticated market segmentation efforts will identify customer segments that have historically been hard to reach, such as small & medium businesses. Program approaches can be refined to attract segments with low participation rates, including segmentation research, targeted marketing, financing, no-cost assessments and web-based resources; and
- Match resources to potential savings: Analytics and targeting can support more refined triage, where a customer's goals can be met by offering a spectrum of services, from a single measure rebate to an online dashboard with relevant information to regular check-ins for the largest customers:
  - For C&I customers with large savings potential, utilities are already dedicating significant account management resources to maintaining ongoing relationships with customers, supporting strategic energy planning including energy management and capital investment.
  - For customers with small savings potential or who want only a single rebate, utilities have 'one-off' solutions that align with existing traditional DSM programs. Depending on the technologies covered, upstream or midstream programs can also serve these customers effectively.
  - For customers in between large managed accounts and small businesses, utilities can create opportunities for ongoing engagement driven by the customer. This may include a customer web portal with a dashboard, information about program services and incentives that are targeted on the basis of combined analysis of the customer's energy use, past program participation, demographics and customer segmentation, and other data that may be available. While account managers focus on large customers, utilities could dedicate a project manager to work with small and medium businesses.

Newer Program Models to Consider

- Migrate upstream for certain technologies that align well with this delivery model. Several measure types have been shown to be a good fit for working directly with distributors and/or manufacturers, including HVAC, commercial lighting, and other types of equipment. Once upstream and/or midstream markets are established, administration costs are lower, since utilities are processing a limited number of incentive reimbursements compared to a volumetric downstream rebate fulfillment process; savings are higher, since more market activity is captured by distributors and/or manufacturers[72];
- Energy efficient building codes can offer cost-effective savings to utilities that are given permission to claim savings from their efforts, including code adoption, compliance and/or training activities; and
- Explore financing options to help customers access capital for energy efficiency investments. On-bill financing is an effective tool for creating a simple and convenient mechanism for customers to invest in efficient technologies.

Considerations for Customer Owned Utilities

Municipal utilities and cooperatives are similar in key areas:

- They serve small numbers of customers, and are challenged to scale down successful strategies deployed by large IOUs;
- They often have a large residential base compared to their commercial and industrial base, and have the disadvantage of lack of scale in implementing programs;
- They lack budget and staff resources, so planning and delivering a cost-effective efficiency portfolio is more difficult compared to larger utilities;
- Small utilities have a higher potential for leakage, the loss of reportable savings due to rebates being claimed outside their boundaries, reducing achievable potential; and
- Municipal utilities are different from co-ops in that local municipal leaders may have developed sustainability or carbon-related goals, as is seen in towns like those discussed above. Local values-driven decision-making processes can support energy efficiency under certain conditions.

[72] Sondhi, R., N. Strong and J. Horenstein. “Are We There Yet? Upstream 2.0: The Future of Upstream Energy Efficiency Programs.” 2016 American Council for an Energy Efficient Economy Summer Study on Energy Efficiency in Buildings. August 2016.

Recommendations for Customer Owned Utilities

- Small utilities can develop scale and reduce leakage risks by aggregating some activities and investments related to energy efficiency through municipal utility associations or generation and transmission (G&T) cooperatives; and
- Small utilities may benefit from smart devices and data as effective, low-cost tools for enabling energy efficiency and engaging customers remotely.[73] This is particularly true for utilities that have already implemented AMI, as many small public utilities have done in Minnesota. It is recommended that utilities develop standard formats for data and software to ease the financial burdens of implementation, which will result ultimately in lower burdens for analysis and data management.

References

American Council for an Energy Efficient Economy. *Residential Energy Use Disclosure: A Guide for Policymakers*. June 2014. http://aceee.org/sector/local-policy/toolkit/residential-disclosure

Baatz, B., A. Gilleo and T. Barigye. *Big Savers: Experiences and Recent History of Program Administrators Achieving High Levels of Electric Savings*. American Council for an Energy Efficiency Economy. Report Number U1601. April 2016.

Berg, W. et al. *The 2017 State Energy Efficiency Scorecard*. American Council for an Energy Efficiency Economy. Report Number U1710. September 2017.

Bickford, A. and H. Geller. *Review of Leading Rural Electric Cooperative Energy Efficiency Programs*. Southwest Energy Efficiency Project. January 2016.

Burgess, J. et al. "The Second Generation of Strategic Energy Management Programs." Proceedings of 2015 American Council for an Energy Efficiency Economy Summer Study on Energy Efficiency in Industry. August 2015.
http://aceee.org/files/proceedings/2015/data/papers/1-31.pdf

California Municipal Utilities Association. *Energy Efficiency in California's Public Power Sector: A 2015 Status Report*. 2015.

[73] Koliner, J. "Small Utilities and Big Data – Cooperative and Municipal Utility Programs in the Digital Future." Proceedings of the American Council for an Energy Efficient Economy 2016 Summer Study on Energy Efficiency in Buildings. August 2016

Cluett, R. and J. Amann. *Residential Energy Use Disclosure: A Review of Existing Policies*. American Council for an Energy Efficiency Economy. Report Number A131. April 2013. http://aceee.org/research-report/a131

Cox, R. *Envision Charlotte: Billed Electric-Energy Savings and Corresponding Emissions Reductions. Final Report*, reviewed by Envision Charlotte Measurement Committee. April 2017. http://envisioncharlotte.com/wp-content/uploads/2017/04/UNCC-Envision_energy_reporting_final_v5.pdf

DNV KEMA, & Research into Action. (2014). *NEEA Industrial Initiatives - Market Progress Evaluation Report #8*. https://neea.org/docs/default-source/reports/neea-industrial-initiatives--market-progress-evaluation-report-8.pdf?sfvrsn=10

Dunsky P. et al. *Valuing Building Energy Efficiency through Disclosure and Upgrade Policies*. Dunsky Energy Consulting for Northeast Energy Efficiency Partnerships (NEEP). 2009.

Energy Trust of Oregon. "Using Analytics to Achieve High Performance Buildings." Building Energy Simulation Forum. October 18, 2017.

Energy Trust of Oregon, & The Cadmus Group. (2014). *2014 Energy Trust Workshops on Strategic Energy Management Impact Evaluation*. http://energytrust.org/library/reports/SEM_Evaluation_Workshop_Report.pdf

Envision Charlotte Project. *2016 Building Technologies Office Peer Review*. Award DE-EE0007066. 2016. https://www.energy.gov/sites/prod/files/2016/04/f30/222106_McCord_040516-1105.pdf

Gilleo, A., S. Nowak and A. Drehobl. *Making a Difference: Strategies for Successful Low-Income Energy Efficiency Programs*. American Council for an Energy Efficiency Economy. Report Number U1713. October 2017.

Grevatt, J., I Hoffman and D Hoffmeyer. *Keys to the House: Unlocking Residential Savings with Program Models for Home Energy Upgrades*. Lawrence Berkeley National Laboratory for U.S. Department of Energy's Building Technologies Office. July 2017. https://emp.lbl.gov/sites/default/files/keys-to-the-house-final-07052017.pdf

Hannigan, E., A. Fryer, J. LeZaks, S. Pigg, S. Schuetter, and M. Scanze. "Finding Big Potential in Small Businesses: Behavior Change Opportunities and Targeting Approaches from a Statewide Study." Proceedings for the 2017 International Energy Program Evaluation Conference. 2017.

Institute for Market Transformation. *Benchmarking Progress: Examining the Effectiveness of Benchmarking and Transparency Programs*. July 2017.

Katipamula, S. *Improving Commercial Building Operations thru Building Re-tuning: Meta-Analysis*, Pacific Northwest National Laboratory. PNNL-SA-110686. 2015. http://buildingretuning.pnnl.gov/documents/pnnl_sa_110686.pdf

Koliner, J. "Small Utilities and Big Data – Cooperative and Municipal Utility Programs in the Digital Future." Proceedings of the American Council for an Energy Efficient Economy 2016 Summer Study on Energy Efficiency in Buildings. August 2016

Kushler, M., B. Baatz, S. Nowak, and P. Witte. 2015. *Municipal Utility Energy Efficiency: Successful Examples Around the Nation.* Washington, DC: ACEEE. aceee.org/research-report/u1510.

Lawrence Berkeley National Laboratory "The Cost-Effectiveness of Commissioning New and Existing Commercial Buildings: Lessons from 224 Buildings." http://evanmills.lbl.gov/pubs/pdf/ncbc_mills_6apr05.pdf

Michigan Public Service Commission. *Report on Utility Energy Efficiency Programs in Michigan*. 2016.

Minnesota Department of Commerce. The Minnesota Utility Data Book. Published 2012. http://www.commerce.state.mn.us

Molina, M., and M. Kushler. *Policies Matter: Creating a Foundation for an Energy-Efficient Utility of the Future.* Washington, DC: ACEEE. aceee.org/policies-matter-creating-foundation-energy. 2015.

Muratori, M. *Rural Energy Use and the Challenges for Energy Conservation and Efficiency*. National Agricultural & Rural Development Policy Center. Policy Brief 17. November 2013.

Nowak, S. *Big Opportunities for Small Business: Successful Practices of Utility Small Commercial Energy Efficiency Programs*. Report Number U1607. American Council for and Energy Efficiency Economy. November 2016.

Quaid, M. and H. Geller. *Upstream Utility Incentive Programs: Experience and Lessons Learned.* Southwest Energy Efficiency Project (SWEEP). 2014. http://www.swenergy.org/data/sites/1/media/documents/publications/documents/Upstream_Utility_Incentive_Programs_05-2014.pdf

Reif, G., B. Baatz and S. Nowak. *2017 Utility Energy Efficiency Scorecard*. American Council for an Energy Efficient Economy. Report U1707. June 2017.

Ribeiro, D. et al. *The 2017 City Energy Efficiency Scorecard*. American Council for an Energy Efficient Economy. Report U1705. May 2017. http://aceee.org/local-policy/city-scorecard

Sondhi, R., N. Strong and J. Horenstein. "Are We There Yet? Upstream 2.0: The Future of Upstream Energy Efficiency Programs." 2016 American Council for an Energy Efficient Economy Summer Study on Energy Efficiency in Buildings. August 2016.

Xcel Energy. *2016 Status Report & Associated Compliance Filings*, Minnesota Electric and Natural Gas Conservation Improvement Program. Docket No. E,G002/CIP-12-447. April 2017.

Xcel Energy. *2017/2018/2019 Minnesota Electric and Natural Gas Conservation Improvement Program*. December 2016.
https://www.xcelenergy.com/staticfiles/xe-responsive/Company/Rates%20&%20Regulations/Regulatory%20Filings/2017-2019%20CIP%20Triennial%20Plan.pdf