Commercial Whole-Building Pay for Performance Program Opportunity in Minnesota

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Table of Contents

List of Figures

List of Tables

Definition of Terms and Acronyms

Advanced Metering Infrastructure (AMI): digital meter hardware and software used together to capture interval data measurement with continuously available remote communication that allows for two-way information sharing (e.g., a customer receives price signals from a utility)

Average savings method: the method currently allowed in Minnesota to calculate and claim energy savings for utilities under programs that leverage behavioral strategies (generally, all behavior and operational improvements)

Behavior-based measures: efforts or innovations that use social science theory and identify energy usage behaviors that are to be changed (Illume, 2015)

Single-entity behavioral project: an approach that provides information, training, and incentives to operators and occupants of commercial, industrial, or institutional buildings to encourage implementation of operational and behavioral energy savings measures [1]

Group behavioral project: an approach that encourages relatively large number of residential or small commercial utility customers to reduce their energy usage through a variety of means. Savings are measured through billing analysis, preferably using a difference-in-differences approach between a control group and a test group. [2]

Cognition: a type of strategy used in behavioral programs that appeal to emotions and rely on information delivery as a means of driving change

Calculus: a type of strategy used in behavioral programs that provides energy-related information needed to make economically rational decisions about energy use

Social interaction: a type of strategy used in behavioral programs that incorporates the sharing of information through social interactions

Conservation Improvement Program (CIP): a state framework supporting utility programs dedicated to the conservation of energy, as defined by state statute, administered by the Minnesota Department of Commerce, Division of Energy Resources

Customer-funded program: when incentives are paid directly to the customer, not to a contractor or third party for the benefit of the quality services they provide

Energy Use Intensity (EUI): the total annual energy use in a building divided by the area of conditioned building space, where energy is in kBtu and area is in square feet (Kbtu/SF/year)

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[1] Docket No. CI-08-133, 20122-71927-05. Supplemental Comments, DOC DER. Page 3 (February 27, 2012)
Note: Single-entity behavioral projects are compared to a baseline, whereas group behavioral projects are compared to the outcomes of a control group.

[2] Minnesota Environmental Initiative's (MEI) 1.5% Energy Efficiency Solution Project Final Report. Page 76 (March 2011)

International Performance Measurement and Verification Protocol (IPMVP): standards and suggested best practices used for estimating energy or water savings

Measured savings: savings that are verified, but determined using meter data instead of savings based on average estimates from engineer calculations for a given measure

Whole-building programs: defined by the Consortium for Energy Efficiency as programs that "treat buildings as integrated systems and help owners and operators embed energy considerations in ongoing building management, operations, and maintenance" [3]

[3] Cadmus. *Energy efficiency Platform,* 2018

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Findings Snapshot

This study gathered input from commercial customers, energy design professionals, program providers, and utilities to evaluate interest in and feasibility of a pay for performance conservation program in Minnesota. Below is a snapshot of the key findings.

Key Trends Nationally & Locally:

1. **Meter-Verified Savings:** Also known as **meter-based savings** or **measured savings**, more utility commissions and utilities are looking at the value of meter-based energy and demand savings as a basis for tracking and providing incentives.
2. **More Complex Buildings:** Buildings are becoming more connected and intelligent, and the opportunity for interoperable equipment, controls, operational settings, scheduling, and behavior is increasing.
3. **Building Performance Targets:** There is a small but growing trend of building operators benchmarking their energy performance and setting targets to help lower bills, meet corporate goals, or to gain recognition.
4. **Savings That Cut Across Measure Types:** There are a growing number of whole-building energy efficiency programs being deployed across the country. These programs allow customers (and program providers) technology-agnostic, flexible means for achieving deeper energy performance goals.

Customer Value Proposition:

Interviews and focus group discussions provided evidence that large, high-performing commercial buildings and new construction projects (the target markets) are interested in a performance-based incentive offering. Every building operator and engineer engaged believed that their building has the potential to perform more efficiently. The key value propositions for building owners and operators are:

- Increase the performance of their buildings and support a culture of high performance
- Have access to tools and technical support to help make building operators more valuable

Key Customer Segments:

Four end-use customer target market segments (with some overlap) were identified through this research. To reach these customers, researchers identified a primary channel for reaching each segment. The four segments are:

Target Market A: Large, high-performing commercial customers (existing buildings)

Target Market B: Commercial new construction and major renovation projects

Target Market C: Small to large businesses operated by a resource management firm (existing buildings)

Target Market D: Small- and medium-sized businesses, served by energy efficiency providers (existing buildings)

Study Participant Quote

"Pay for performance would be better…. You would need to keep thinking about the project over time to keep saving energy. This can change the culture of operations."

– Facility Engineer, Minnesota State

A Key Program Offering:

Pay for performance could be offered as an overlay to existing programs as a performance-based (metered) incentive alternative to deemed savings. This could work for a targeted group of existing programs, especially when the risk of unearned incentives can be minimized through program support and screening tools. The following are the programs that might be most well suited to pair with pay for performance incentives:

Near-Term Pairing Opportunities:

- High-performance new construction programs
- Ongoing monitoring or operational efficiency programs
- Energy service company contractors

Future Pairing Opportunities:

- Benchmarking programs
- Building operator training
- Custom efficiency programs that require an energy study ahead of time

Energy Savings Potential:

This study identified four target markets and a separate channel for reaching each of these customers. These include target marks: (A) Large, high-performing existing buildings, (B) new construction, (C) managed moderate and small buildings, and (D) all customer types through energy efficiency program providers (Table 1).

Table 1. Target Markets Identified

Market/Approach	Electric Savings (MMBtu)	Natural Gas Savings (MMBtu)	Total Energy Savings (MMBtu)	Potential for Peak kW Reductions
Target Market A	76,700	54,500	131,200	X
Target Market B	16,000	8,700	24,700	X
Target Market C	13,500	9,500	23,000	X
Target Market D	NA	NA	NA	X
TOTAL	**106,200**	**72,700**	**178,900**	

Challenges to Overcome:

- **Cost:** Minnesota utility rates are lower than other markets currently offering pay for performance options to their commercial customers. This is due to low utility avoided costs. Program design and testing would have to focus on how to manage project costs.
- **Attribution:** Under a whole-building approach and Minnesota's current framework for claiming asset-based savings and behavioral or operational savings, accounting can be complicated, add to project administration costs, and create barriers for program implementer innovations that might encourage customers to mix and match types of improvements. Any approach selected would need to further consider how to reduce these barriers.
- **Measurement & Verification:** Without broad deployment of advanced metering infrastructure (i.e., smart meters), Minnesota utilities and program providers lack local field experience and understanding of the advantages and shortcomings of various measurement and verification protocols that leverage incremental energy use data.

Program Design Preferences:

These program design considerations are put forth as recommendations to utilities that may engage in pay for performance program design and implementation.

- Design programs with flexible participation durations, engaging customers for two to three years, with the opportunity to continue
- Incorporate performance targets not just as a prerequisite for participation, but as an ongoing point of customer engagement
- Provide technical services, operational recommendations, and energy use dashboards or snapshots to help ensure that participants do not fail to meet performance targets
- Use innovative incentive design to help encourage incrementally deeper energy savings, such as tiered incentives with or without additional rebate bonuses
- Provide commercial customers with a self-screening tool to help them assess their potential for success in a pay for performance program given existing building characteristics and resources — customers saw this as a way to broadly evaluate risk (i.e., forgone incentive dollars) of choosing a pay for performance incentive as an alternative to an up-front rebate (i.e., through deemed savings) if given the option.

Executive Summary

Framing the Findings

This study explores whether pay for performance programs would be a helpful tool in Minnesota for achieving deeper energy savings. It also sought to identify the barriers and benefits of such offerings. As a model that is seeing increasing uptake in other parts of the country, understanding the opportunity in Minnesota is important for helping utilities, commercial building owners, operators, and developers capture deeper energy savings.

Findings from this study include answers to initial research questions such as is there interest in pay for performance programs in Minnesota and which customers have the most interest and fewest barriers? And, what is the technical potential of this opportunity? However, in exploring questions about whole building pay for performance, more fundamental sub-questions arose. These questions relate to the broader value of whole-building programs versus measure-based efficiency programs and the value of meter-based savings versus the current system of deemed savings. As a result, study findings include both targeted findings about the barriers and opportunities with pay for performance as well as discussion of these broader, more philosophical sub-questions.

While much of this report will focus on targeted observations related to whole-building pay for performance programming, broader observations will be discussed throughout and are addressed in this report under Section 7. Recommendations.

Deeper Savings from a Whole-Building Approach

Pay for performance is an incentive model that compensates building owners for energy performance over time, rather than through one-time, upfront rebates for design or equipment installation. Under this model, building owners have potential to receive a larger incentive than they could through traditional deemed, measure-based incentives. While pay for performance pilots and programs are increasingly common in the coastal states, this model has yet to be applied in Minnesota.

Whole building pay for performance programs are generally of interest because they look at building energy savings more holistically. This not only allows a program to be more customer friendly and more akin to a building operator, it also allows utilities and program providers to leverage different combinations of conservation strategies to achieve savings targets. These programs have the potential to leverage equipment improvements, operational practices, and behavioral changes. However, one of the challenges of enabling a whole-building approach is how to measure savings in the context of existing rules and regulations that require different types of savings to be claimed and tracked separately.

For Example, in Minnesota, utilities claim equipment-based savings using deemed savings, an approach that relies on engineer calculations based on equipment sizing and average assumptions, but does not account for operations. Any operational savings or energy reductions from occupant behavior change must be claimed under a separate method, the Average Savings Method. Under current conditions,

programs administrators and customers do not enjoy all the benefits intended from a whole-building approach. Program administrators must meter at the equipment level in addition to whole-building metering which increases programs costs. Alternatively, equipment savings must be "subtracted out" from whole-building, meter-based savings using deemed savings calculations. Neither one of these approaches allow for true whole-building programming that can get at deeper energy savings.

Advanced Metering & Other Trends

Deeper energy savings is the driver for further investigating the benefits and barriers of whole building pay for performance for commercial customers. However, there are some additional trends that are also driving the opportunity and need for new types of program offerings. These include:

- **Meter-Verified Savings:** Also known as **meter-based savings** or **measured savings**. As utility commissions encourage the roll-out of advanced metering for broader purposes, utilities are looking at the value of meter-based energy and demand savings.
- **More Complex Buildings:** Buildings are becoming more connected and intelligent, and the opportunity for interoperable equipment, controls, operational settings, scheduling, and behavior is increasing.
- **Building Performance Targets:** There is a small but growing trend of building operators benchmarking their energy performance and setting targets to help lower bills, meet corporate goals, or to gain recognition.
- **Savings That Cut Across Measure Types:** There are a growing number of whole-building energy efficiency programs being deployed across the country. These programs allow customers (and program providers) technology-agnostic, flexible means for achieving deeper energy performance goals.

Advanced metering is perhaps the most influential force and is estimated (by some Minnesota utilities) to start rolling out to commercial customers in the next five years and is already underway for residential customers in targeted areas. With this new technology coming online, there is an interest to understand the benefits that it can offer ratepayers. In addition to being a tool for facilitating time-based pricing, there are questions about its roll in tracking and verifying energy savings for the purpose of meeting policy goals, providing customer incentives, and providing inputs for resource and distribution planning.

On the eve of this technology change, Minnesota, like many states, has not yet had a full discussion about the value of "actual" (meter-based) energy savings. And if there is a value to them, how should that value be captured and applied, meaning should it just be applied for the purposes of resource planning, or also for tracking energy savings and for providing incentives. For example, if actual savings were fundamentally determined to be more valuable because they make a material impact on utility avoided costs, a whole-building pay for performance program could offer greater incentives for energy savings because they were verified savings. This could make pay for performance programs more attractive to customers. Pay for performance programs might be valuable to test in the near term for the purposes of learning about costs and benefits. However, these are fundamental questions for

stakeholders to weigh in on so that utilities have clearer direction on how to implement meter-based programs — if at all.

Study Scope & Approach

This study sought to better understand the market interest and technical potential for whole building pay for performance programs in Minnesota. The team studied potential target markets and evaluated market barriers, opportunities, and other trends that are influencing the need and opportunities. CEE focused specifically on whole-building pay for performance offerings for commercial customers — both existing and new construction buildings. The data gathering approach used by the study was primarily collecting market information both in Minnesota and in markets where pay for performance is already scaling. Interviews with program managers in other states and topic experts were used to build a sense of common practices, lessons learned, and market segmentation. Models that were then stressed tested through local interviews. Historic building energy use data was also collected for 10 buildings to see how building performance trended overtime, comparing baseline energy use to post-improvement energy use (after equipment and operational changes). The study focused on two building case studies that illustrate different opportunities and challenges for pay for performance, providing more of a use-case approach to the findings.

Market Observations & Results

We reviewed seven other pay for performance programs from other states to get a base understanding of what is and is not working in these markets. Below is a summary of those programs that we learned about through direct interviews and surveys.

Study Interviews (2019)

- Pay for Performance (P4P): VEIC (provider) — for NYSERDA serving New York
- Pay for Performance (PfP): VEIC (provider) — for DCSEU serving Washington, DC
- Strategic Energy Management and Pay for Performance: Energy Trust of Oregon (provider) and Portland General Electric (utility) — serving the Portland area (electricity only)
- EUI New Construction Pilot: McKinstry (provider) and Avista (utility) — serving eastern Washington, northern Idaho, and parts of Oregon (electricity only)
- Pay for Performance: Puget Sound Energy (utility) — serving Seattle/Tacoma metro and surrounding areas
- Deep Retrofit Pay for Performance: Seattle City Lights (utility) and Energy RM (provider) — serving the city of Seattle (electricity only)
- MEETS (package of software, business model, and M&V) — applied in the Seattle City Lights program, but available for broader applications
- Xcel Energy (utility) — serving parts of Colorado, demand response performance program

Observations from the U.S. and Minnesota Market

Each of the reviewed pay for performance programs were developed to help meet energy conservation standards, but also because key customers or collaborators expressed interest in the program model. These stakeholders were either customers or building operators themselves, cities or institutions, or third-party contractors. The motivations stated by these stakeholders are as follows:

1. Building owners: businesses or institutions with high-performance goals looking for more tools and resources, often tied to corporate or institutional energy or sustainability goals
2. Cities: when one-time recommissioning was not delivering desired results of "beyond benchmarking" efforts [4]
3. Second- and third-party contractors: energy service companies (ESCOs), new construction design teams, recommissioning providers, and energy project financers desiring to grow

In New York City and in parts of Oregon, all these reasons led to the development of a pay for performance program. In New York, the energy efficiency industry felt there was a shortage of energy service contractors and saw pay for performance as an approach to attract new start-ups or to attract ESCOs from other markets to participate locally. [5] For Avista (eastern Oregon service territory), two pay for performance programs were developed because of the demand from ESCOs themselves. They saw the opportunity to bring value to large commercial and institutional customers — especially those on campuses or those sharing a district energy system — and that additional, direct customer incentives would help drive business. [6]

For buildings that are held by the developer and have one or more tenants, there is evidence that high-performing buildings have lower occupancy rates and higher resale value. [7] Interviewees (developers as well as key energy efficiency program providers) see pay for performance for new construction playing an important role in delivering high-efficiency, net-zero energy buildings. [8]

Through our interview and focus group with Minnesota building operators, owners, developers, and utilities we observed many trends, and generally heard an interest in testing or piloting a pay for performance program offering to experience the benefits and risks firsthand.

Table 2 is a summary of the responses received from each stakeholder type:

[4] Beyond Benchmarking refers to activities and efforts that do more than just disclose building performance. These efforts are intended to improve benchmarking scores such as energy audits.

[5] Szinai, Judy. "Putting Your Money Where Your Meter Is: A study of Pay for Performance Energy Efficiency Programs in the United States." Prepared for Natural Resources Defense Council and Vermont Energy Investment Corporation. January 2017.

[6] Interview: William Pokorny & Matt Ophardt, McKinstry (September 25, 2018)

[7] Institute for Market Transformation. *Added Value of ENERGY STAR-Labeled Commercial Buildings in the U.S. Market.* 2016

[8] Interview with Scott Hackle and Brett Bridgeland, Slipstream. November 19, 2019.

Table 2. Summary of Responses from Stakeholders

Large Commercial Building Operators & Managers (private & public facilities)

Key Interests & Value

1. Increased quality install transparency and verified savings
2. Supporting a culture of performance as an operator
3. Earning a larger overall financial incentive (in NPV)

Challenges or Concerns

1. Providing enough benefit-to-risk potential to motivate customers to participate
2. Determining *if* and *when* a project is a good candidate for program participation
3. Ensuring measurement and verification protocols are fair, clear, and understandable for participants

"Pay for performance would be better…. You would need to keep thinking about the project over time to keep saving energy. This can change the culture of operations."
—Facility Engineer, MN State

"If given the choice, I would take a smaller up-front incentive for a chance to reduce the payback period by six months or more."
—Property Manager, CBRE

New Construction Developers (build to own)

Key Interests & Value

1. Want to keep operating costs and energy costs low
2. Interested in renewables and aware that efficiency is a good way to maximize the value of on-site solar

Challenges or Concerns

1. How to cover initial costs without a full up-front incentive
2. Incentives large or visible enough to be motivating
3. Need to continually reeducate on out-of-date information that efficient buildings cost a premium

"First costs are a hurdle that our clients need to deal with, but they want to focus more and more on low, long-term operations costs — perhaps pay for performance can find the right balance."
—Developer, Duval Companies

Targeted Energy Efficiency Program Providers (whole-building or operations focused)

Key Interests & Value

1. Greater flexibility in strategies used to achieve savings

Challenges or Concerns

1. Operations programs have great potential, but are disadvantaged under the average savings method
2. Allocating savings as asset-based or behavioral is challenging at the whole-building level

"AMI (or similar) is important at the whole-building level because it increases the confidence interval when verifying energy savings and allows us to look at more nuanced saving opportunities."
—Energy Intelligence, CEE

Utilities (IOU, Cooperative, and Municipal)

Key Interests & Value

1. Opportunities to reduce peak demand (kW)
2. Deeper and broader customer engagement approaches
3. Verified savings for IRP and IDP processes

Challenges or Concerns

1. Cost-effective programs in the face of low avoided costs

"Verified savings are more valuable than estimated savings as we look at long range projections for integrated distribution planning."
—Minnesota Power

Target Markets

Beyond building type, pay for performance programs in other markets are most appropriate for high-performing buildings. A common threshold is buildings larger than 50,000 square feet,[9] though some programs target buildings down to 25,000,[10] while others require minimum areas of 150,000 or 250,000 square feet.[11] However, size requirements for buildings are rarely eligibility requirements, but are used as guidelines for helping customers self-identify. To understand the pay for performance target markets in other states, it is most helpful to look at the eligibility requirements and history of participation to understand the customers for whom these programs are suitable.

Beyond building type, size, and compliance with a minimum estimated savings requirement, the only additional customer attribute identified was a minimum annual peak demand requirement. A little over half of the programs reviewed stated a minimum peak load, but this was only sometimes used as a requirement — other times it was simply a guideline. The minimum peak load guideline or requirement tended to range from 200 to 500 kW.[12]

Our work identified four target markets that pay for performance could be applied to in Minnesota. Some of these target markets are direct service to the customer, while others target large buildings through second or third parties. These markets include:

Direct Incentives to Customers

- **Target Market/Approach A:** Large, high-performing existing buildings
- **Target Market/Approach B:** New construction and major renovation projects (small to large), engaged through the developer

Incentives to Second or Third Parties

- **Target Market/Approach C:** Moderate and small commercial buildings through commercial property portfolio managers

Incentives to Third Parties[13]

- **Target Market/Approach D:** Third-party providers for key energy efficiency programs

[9] (Joesph Fernandi, Seattle City Lights. Interview, October 16, 2018)

[10] University of California Monitoring-Based Commissioning Program. https://www.aceee.org/files/proceedings/2012/data/papers/0193-000137.pdf

[11] Szinai, Judy. "Putting Your Money Where Your Meter Is: A study of Pay for Performance Energy Efficiency Programs in the United States." Prepared for Natural Resources Defense Council and Vermont Energy Investment Corporation. January 2017.s

[12] *In the Matter of the Clean Energy Programs and Budgets for Fiscal Year 2019*. Docket No. QO18040393. New Jersey Public Utilities Commission. June 22, 2018. https://www.bpu.state.nj.us/bpu/pdf/boardorders/2019/20190329/3-29-19-8D.pdf

[13] Incentives could be kept by third parties or passed through to the end customer(s).

A high-level assessment of the energy savings in three of these target markets was completed and is summarized in Table 3. The largest of these markets is Target Market A, which focuses on providing whole building pay for performance incentives. It is recommended that such a program would also include tools and technical assistance for customers to help boost the value proposition of the offering in the eyes of the customer and to achieve deeper savings through operations that would otherwise be under captured.

Table 3. Summary of High Level Assessment for Three of Four Target Markets

Market/Approach	Electric Savings (MMBtu)	Natural Gas Savings (MMBtu)	Total Energy Savings (MMBtu)	Potential for Peak kW Reductions
Target Market A	76,700	54,500	131,200	X
Target Market B	16,000	8,700	24,700	X
Target Market C	13,500	9,500	23,000	X
Target Market D	NA	NA	NA	X
TOTAL	**106,200**	**72,700**	**178,900**	

Challenges and Barriers

This study identifies four primary barriers for pay for performance programming in Minnesota.

1. Separating behavioral savings and asset-based savings from whole-building savings
2. Measurement and verification of practices that fairly capture measured or meter-based savings
3. The target market for pay for performance is often correlated with district energy heating and cooling, utilities that are not directly covered under CIP
4. Program cost-effectiveness in a market with low energy rates and low avoided costs

Separating behavioral savings and asset-based savings (attribution) for programs measuring savings at the whole-building level is a key barrier to creating whole-building pay for performance. There are two types of energy savings in Minnesota today, each following a different method for claiming savings. This bifurcation requires program providers to spend more time and effort accounting for various types of energy savings. Instead, this time could be spent engaging with customers and focusing on deeper energy savings. One of the key benefits of whole-building programs is their holistic view of building performance — more like that of an owner or operator. By having to manage and track different types of energy savings, some of that benefit is lost.

Because whole-building, meter-based savings (actual performance) incentive programs are not yet implemented in Minnesota, there is risk in using M&V methods that are not fair and balanced for participating customers, ratepayers, and utilities. This issue deserves considerable analysis and consideration for lessons learned from utility programs in other states. Currently, utilities feel customer satisfaction risk when rolling out a new offering. Even when new energy savings opportunities are at

stake, utilities are risk averse when there is potential for criticism from customers, regulators, or advocates. The fear is that this could diminish trust between customers or regulators and the utility and that this may not be worth it. Having buy-in from all Minnesota utilities and regulators will help all parties hedge against these risks.

Potential for Impact

Through the 10 buildings that we studied and the two in depth case studies that we developed, we were able to illustrate some initial examples of how not all high-performing buildings will be a good fit, or a low-risk fit for pay for performance. However, they could still benefit from the program offering because of the potential to improve operations and in-building behavior, and to increase quality installation of new equipment. That said, there is a need to look more in-depth at how incentives would need to be designed to motivate building owners/operators. As was discussed in our focus group, building owners are motivated by reducing improvement project payback periods by six months or more.

Between our two case studies — DeLaSalle High School and Butler Square — we can see that not all projects will have the same incentive needs. Some buildings may need some incentive upfront to make a project pencil, while others might be able to rely solely on performance over time. A few scenarios of low, moderate, and high incentive rates ($/unit of energy saved) are outlined in Table 4 and compared to deemed savings.

Table 4. Case Study Compared Savings

	Deemed		Meter-Based			
Buildings	Energy Savings	Rebates ($)	Total Applied to Incentives	Low Incentives: $0.015/kWh & $0.27/Dt	Moderate Incentives: $0.025/kWh & $0.57/Dt	High Incentives: $0.025/kWh & $0.57/Dt
Case Study 1: DeLaSalle High School						
Electricity (kWh)	117,177	$ 11,653	626	$ 6	$ 9	$ 13
Natural Gas (Dt)	3,238	$ 3,101	1,579	$ 790	$ 2,364	$ 7,897
Total Difference	-	**$ 14,754**	-	**$ (13,955)**	**$ (12,381)**	**$ (6,845)**
Case Study 2: Butler Square						
Electricity (kWh)	362,944	$ 31,646	1,858,521	$ 18,585	$ 27,878	$ 37,170
Natural Gas (Dt)	400	$ 1,145	8,046	$ 4,023	$ 12,042	$ 40,228
Total Difference	-	**$ 32,791**	-	**$ (10,183)**	**$ 7,129**	**$ 44,608**

While deemed savings are shown here for comparison, it is important to emphasize that deemed savings are intended to reflect lifetime savings (for equipment improvements). By comparison, the meter-based savings only reflect what savings were observed over a three-year period and included whole-building performance. Under this model, it would be ideal for a customer to participate in the

program in an ongoing fashion, in multiple three to five-year periods or through a program with a longer participation timeframe.

Recommendations & New Key Questions

Overall, there are near-term opportunities for Minnesota utilities to access new, deeper energy savings through whole-building, metered-based performance program options such as pay for performance. Other state's such as New York, California, and Washington[14] are demonstrating that deeper savings can be achieved when program providers and building owners/operators are given the flexibility to find savings at the whole-building level, instead of just on a per-measure basis.[15] Some of this work is still in pilot phase, but evidence supports the opportunity.[16] Based on customer feedback, there is also interest in being incentivized based on actual performance, when those incentives are paired with tools and technical support to help a building owner or operator exceed. Together, these findings suggest that a pay for performance program has a place in the Minnesota marketplace.

To better understand the full value and to evaluate challenges to delivering such a customer offering, there are several actions that we recommend be considered and addressed.

Recommendation 1: As the next three years are slated to see significant roll-out of advanced metering in commercial buildings, it is recommended that the Department of Commerce and Public Utilities Commission consider hosting a broad discussion on the value of measured savings.

Recommendation 2: The Department of Commerce should consider developing a whole-building pay for performance method for claiming energy savings to support measured-savings in the growing context of AMI.

Recommendation 3: Adopt a measurement and verification protocol that targets new construction buildings, such as IPMVP Option D or similar, as a Minnesota approved method.

Recommendation 4: Implement a whole-building pay for performance pilot program with one or more utilities to demonstrate that high-performing large commercial customers like the program experience and can achieve deeper energy savings through this model.

Whole building pay for performance has an opportunity to be piloted in Minnesota. While extensive advanced metering will not be deployed for five years or more, AMI is not essential to the implementation of such a pilot. On-the-ground experience of how to design and operate such a

[14] Interview: 2050 Institute, Poppy Storm. January 7, 2020.

[15] Lee, Allen and Tolga Tutar. *Assessment of Common Barriers to Commercial Whole Building Energy Efficiency Solutions and Platform Solutions*. Energy Efficiency Platform. Cadmus Group. http://psdconsulting.com/oep-documents/Assessment-of-Common-Barriers-and-Potential-Solutions.pdf

[16] PG&E Commercial Whole Building Demonstration - Joint Study Report. February 21, 2019. https://pda.energydataweb.com/api/view/2135/CWBD%20Study%20Process%20Report%20Draft%20Final%20Report%2002.21.2019.pdf

program would be valuable experience for the utility and regulators as full AMI deployment approaches and thus piloting may make sense in the interim period.

Section 1. Introduction

The Need for Innovative Paths to Deeper Conservation

Energy efficiency remains the least-cost energy resource in Minnesota, helping keep energy bills low and our environment clean. Under Minnesota's Next Generation Energy Act (2007),[17] each public utility must have an annual energy-savings goal equivalent to 1.5% of gross annual retail energy sales. To meet this goal, Minnesota's natural gas and electric utilities — IOUs, cooperatives, and municipal utilities — are looking for ways to achieve new and deeper energy savings. To date, these goals have been met largely through traditional equipment-based improvements with associated deemed savings, with some use of behavior-change approaches. However, with increasing stringency of codes and standards, and for utilities that have recently made deeper commitments to energy efficiency, the need to find new energy savings is a key interest.

In addition to meeting the 1.5% energy savings goal, the Minnesota Public Utilities Commission (PUC) has asked utilities to take a more integrated approach to resource and distribution planning. Regulators are looking for anticipated energy conservation to be taken into consideration more fully to avoid distribution infrastructure upgrades and procurement of new generation. To this end, the PUC has signaled the importance of more granular energy use data and understanding how to handle and leverage it.[18] This and other value streams have prompted utilities like Minnesota Power, Xcel Energy, and more indirectly a number of cooperatives, to roll out advanced metering. While there is a general understanding that utilities better know how to use more granular energy use data, the value of measured savings versus deemed savings is only implied and not documented as well to date.

As advanced metering rolls out to more customers (both residential and commercial), conservation programs can begin to harness detailed energy use data and apply it to program design and claimed energy savings. The ability to not only track energy savings persistence, but also further characterize the location, timing, and the frequency or reliability of certain savings may have growing value to regulators, utilities, and ratepayers.[19] Pay for performance is a leading approach to achieve persistent energy savings along with providing non-energy benefits to utilities and ratepayers. It is actively being used in the commercial sector in at least 10 states, including in California, Colorado, Massachusetts, New Jersey, New York, Oregon, Texas, Vermont, Washington, and Washington, DC. It has also been launched in multiple residential markets, including California and Massachusetts.

[17] MN Statute 216B.241 Subd. 1c

[18] Synapse Energy Economics, Inc. Updating the Energy Efficiency Cost-Effectiveness in Minnesota. Department of Commerce, CARD. (August 2018).

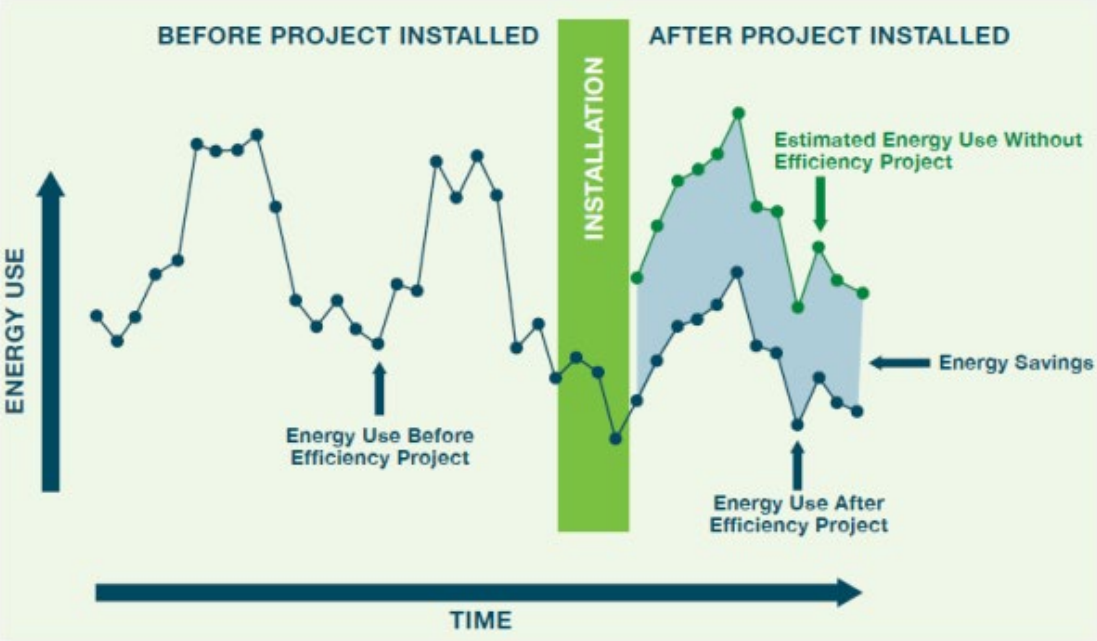
[19] Synapse Energy Economics, Inc. Updating the Energy Efficiency Cost-Effectiveness in Minnesota. Department of Commerce, CARD. (August 2018).

Defining Pay for Performance

The term "pay for performance" has various definitions and encompasses programs with significant design differences. For the purposes of this study **pay for performance** is defined as an energy savings approach that provides incentives for the delivery of actual energy savings instead of estimated or deemed savings. Under the pay for performance model, building owners have the potential to receive a larger incentive over time than a traditional up-front incentive because the value of verified energy savings combined with other non-energy benefits, such as customer engagement around other services, hold greater value to the utility.

Generally speaking, pay for performance uses a baseline of historic energy use (for existing buildings) or modeled energy use (for new construction) as a comparison to how a building consumes energy after improving energy use practices or making equipment changes (see Figure 1).[20] For different pay for performance programs, this might look at equipment improvements, operational improvements, behavioral improvements, or some combination of all three. The verified difference between the baseline and actual energy use is the basis for providing an incentive to a customer and would be delivered (paid) at some regular interval over the duration of the program.

Figure 1. Performance Incentive Concept Diagram



State and Local Energy efficiency Action Network. 2012. *Energy Efficiency Program Impact Evaluation Guide*. Prepared by Steven R. Schiller, Schiller Consul ting, Inc., www.seeac on.energy.gov.

[20] State and Local Energy Efficiency Action Network. 2012. Energy Efficiency Program Impact Evaluation Guide. Prepared by Steven R. Schiller, Schiller Consulting, Inc., www.seeaction.energy.gov. https://www4.eere.energy.gov/seeaction/system/files/documents/emv_ee_program_impact_guide_0.pdf

While there are a variety of program features that can be added to a pay for performance program to help reflect the goals of the program (e.g., non-energy benefits such as deeper customer engagement or more automation to help manage program costs) there are only a few fundamental activities that need to take place to operate a pay for performance program. The program provider needs to market and recruit customers or participants, manage customer relationships and communication, measure and verify actual energy savings, and administer payments. Other activities such as maintaining program screening tools and energy dashboards to help increase energy use transparency or special incentive designs are optional, and many are beneficial, but they are not required. The details of program design will be discussed in the Program Design Best Practices & Lessons Learned section of the report.

Broadly speaking, pay for performance programs aim to provide incentives at the equipment-level or look at broader savings opportunities at the whole-building level. This study is focused on the latter of these two, known as **whole building pay for performance**, where the utility meter is the main source of data about energy savings. In other states, this whole-building model has demonstrated deeper energy savings compared to equipment-level programs. Based on our interviews and literature review, deeper savings from pay for performance are primarily attributable to two factors:

1. a whole-building approach that allows for flexibility and creativity in how to achieve savings
2. providing guidance and motivation to customers to save energy

The **first factor** is important because it is less prescriptive in how savings are achieved than other programs and more holistic, allowing for more enterprising energy saving efforts. Other ramifications of whole-building programs are the need for a method for tracking and claiming all types of energy savings achieved in a building. The **second factor** is a set of behavioral-science strategies that influence occupant behavior from incentives to timely technical assistance, energy use transparency, and setting savings targets as benchmarks for achievement.

Of course, there are concerns about the pay for performance model as well. Primarily, concerns stem from program cost-effectiveness and precision of verified savings. These two challenges come hand-in-hand as more rigorous measurement and verification takes more time and resources for the utility or program provider. But in addition to the effort needed, there are many factors that need to be accounted for when establishing a relevant baseline. Tracking ongoing energy use can be challenging as well, as there needs to be a reliable log of routine and non-routine events, and improvements can make ongoing energy use tracking challenging as well.[21]

To date, the *whole building* pay for performance model has not been used in Minnesota. However, it is a model that has been growing in prevalence on the west and east coasts in both the residential and commercial sectors. In the last few years, residential pay for performance programs have seen more growth than commercial programs, in large part because the building stock is more similar and better

[21] California PUC. *Rulebook for Customer Program and Projects Based on Normalized Metered Energy Consumption (NMEC)*. March 2018. ftp://ftp.cpuc.ca.gov/gopher-data/energy_division/EnergyEfficiency/RollingPortfolioPgmGuidance/Draft_Rulebook_OUT.pdf

suited for aggregation opportunities.[22] However, there are many examples of commercial pay for performance across the country, 13 of which we reviewed in detail.

Although pay for performance provides the opportunity to capture additional energy savings, these programs are not without their complexities and challenges. The purpose of this white paper is to explore the barriers, risks, opportunities, and customer interest for commercial, whole building pay for performance in Minnesota. This paper describes the extent to which customers and third parties see value in this program concept and how this model may increase the impact of existing utility conservation programs and services.

Study Scope

The scope of this study is to look at the interest and concerns related to pay for performance options to serve the commercial customer market, including existing buildings and new construction. The focus on *whole-building* pay for performance means that energy savings are captured at the meter level instead of at the equipment level (or both), which has the potential to capture all types of savings — asset-based and behavioral or operational. Beyond these, there are other program design decisions that are common among pay for performance programs in the country; however, those elements are not prerequisite features. We will address more detailed design preferences in this study, reflecting what we heard from Minnesota customers and what should be considered for programs that might be designed for the Minnesota market in the future.

The pay for performance model can be applied through *direct* incentives to customers or *indirectly* through service or program providers, contractors, or client representatives.[23] In this study, we explored opportunities for using all three channels, although our exploration of program design opportunities and preferences focused primarily on first- and second-party channels. While not an emphasis of our initial scope, we have included some discussion of third-party incentive channels in this report because in some states this model provides an important leverage point for getting deeper energy savings.

This Report

This report contains a discussion of relevant state and national trends, an initial target market characterization for pay for performance, the primary interests and concerns from the perspective of those that could receive a pay for performance incentive, the interests and concerns of utilities about this program model, and the technical energy savings potential of four key market segments. The scope

[22] Web content: https://www.homeenergyoptimization.com/

[23] Generally, the recipients of incentives can be characterized one of three ways: first-party, when the utility customer paying for the cost of energy service; second-party, when one who is related to the customer and has primary influence over a buildings energy use and performance, but does not pay the energy bill (e.g., building owner's representative or property manager acting on behalf of the customer); and third-party, when an independent energy expert or service provider that is motivated through a contract, to the customer or another party, to deliver energy performance (e.g., program implementers or an energy service company).

of the opportunity was focused on energy savings, but also looked at kW savings and other value streams (e.g., non-energy benefits). Preferences related to program design or tools that could be paired with a pay for performance program were also explored and are discussed in this report.

Section 2. Methodology

Key Research Questions

This work followed four key questions intended to help the research team answer whether pay for performance as a program concept would be a good fit for targeted commercial customers in Minnesota. These questions were created by the research team and vetted by the peer review team.

1. In which commercial market segments will pay for performance be most well received, and how do we define and differentiate these customers?
2. What value do customers receive from participating in a pay for performance program and are these benefits great enough to motivate participation and engage building operators?
3. What program and incentive design barriers and preferences are important to be considered for Minnesota customers and what existing conservation programs might this model pair with best?
4. What is the magnitude of (statewide or building) energy savings that could be achieved from a commercial, whole building pay for performance offering (considering key segments)?

Literature Review

These key questions were accompanied by four literature review themes that guided what information to collect and ultimately helped shape the questions that were asked in our interviews with customers (e.g., property operators, managers, and owners), developers, and utilities. These included:

- **Regulatory Context:** policy limitations and cost-effectiveness
- **Target Market:** attributes of key market segments and acceptance of risk
- **Whole-Building Performance:** identifying technology needs, baselining methods, and measurement and verification protocols
- **Program Design:** preferences regarding program features and tools (e.g., participation period, incentive design, and tools for performance transparency)

Data Collection

This study is the first study of its kind to be conducted in Minnesota. Overall awareness of pay for performance as a program model was relatively modest, and customer understanding of its concept relatively superficial, although there were exceptions. For this reason, the research team sought out a peer review team to import national expertise on the issue while studying it in a local context. The review team vetted the initial research questions and framing and reviewed findings and recommendations. This team consisted of reviewers from NRDC, 2050 Institute, and Slipstream Inc. Additional key interviewees provided review as well.

The research team collected qualitative data via the literature review, interviews, surveys, and focus groups. The literature review was structured around the four literature review themes listed above and served as grounding for the study and what issues and opportunities to explore further. For

measurement and verification technologies and methodologies, we interviewed national experts to understand the leading edge of the industry as well as its cost and limitations.

Interviews focused on two broad groups. First were interviews with program providers and managers in other states, either utility employees or third-party providers. The second group focused on local stakeholders and was further broken down into three categories: utility representatives, developers, and architects of new construction buildings, and finally, existing building operators, managers, and owners. Utility interviews always included a representative from a conservation program management team, but sometimes included regulatory staff as well. A full list of those interviewed and surveyed can be found in Appendix B and is summarized in Table 5.

Table 5. Summary of Interviews & Survey Respondents

Interviews Conducted & Surveys Completed	Quantity
Minnesota Customer Interviews (interviewees)	10 (16)
Building Operators	10
Property Managers or Owners	6
Publicly/Privately Owned Buildings	7 / 3
Minnesota Focus Group Attendees	10
• Building Operators	4
• Property Managers or Owners	6
• Publicly/Privately Owned	10
Minnesota Utilities Interviewed (Interviewees)	7 (12)
CenterPoint Energy, Great River Energy, MN Power, Otter Tail Power, Southern Minnesota Municipal Power Authority, Xcel Energy, & District Energy*	
National Pay for Performance Experts	11
• Program provider interviews (interviewees)	
• Program provider surveys	6
• M&V 2.0 Content Experts	3
Minnesota Developer or Architect Interviews (Interviewees)	3 (4)
Key Minnesota Energy Efficiency Service Providers	3
TOTAL COUNT OF INTERVIEWEES	42

*District Energy is not a regulated by the State and not subject to the requirements of the Conservation Improvement Program, but they were interviewed to gather insights from a holistic customer experience perspective.

Months after the interviews with program providers in other states, an in-depth survey was conducted online or by phone to systematically gather some of the same data points across multiple programs as benchmarks and guidance to Minnesota utilities and regulators. The focus of the survey was the scale of the program, the extent of savings, and the cost of implementation. This was sent to seven program administrators, of which six responded.

Building owners, managers, and operators were the primary group of stakeholders that we interviewed. We interviewed representatives from 10 buildings to gather a broader base of insight, as many factors affect the needs and interests of a building — from building type to types and age of mechanical systems and ownership structure. These interviewees were selected to represent the target markets as much as was feasible. Ahead of interviews, these stakeholders were asked to provide historic energy usage data as well as information about major energy improvements or program participation. This data

was used by our team to conduct a high-level analysis of the potential for pay for performance to recognize greater savings for these customers than was claimed under the current deemed saving method.

In addition to qualitative data collection, historic energy use data was collected for all 10 of the buildings that we engaged in this project. We collected pre- and post-improvement energy use data with a minimum of two years of data. One year of pre-improvement energy use data was used to create baseline energy use. At least one year of post-improvement energy use data was collected, reflecting energy use after asset-based or operational energy savings efforts had been completed. In many cases, there were several improvements made over a number of years. For several buildings, we were able to capture the changes in energy use for both electricity and natural gas, and in some cases also district hot water or steam.

Energy Savings Analysis Method

As mentioned above, we received pre- and post-improvement energy usage data for 10 buildings in Minnesota to evaluate whether the energy savings exceeded or fell short of what was anticipated by a deemed savings estimate. For the four new construction projects, bill data was used to compare actual performance to energy design targets. We conducted a simple weather- and occupant-normalized energy savings analysis, the details of which can be found in Appendix D. In practice, a pay for performance program would be required to follow one of several specific measurement and verification protocols. Particularly for new construction buildings, these protocols may require that buildings simulations be created to help establish a baseline, based on a peer building with similar characteristics. A full energy analysis using one or more of these protocols (e.g., IPMVP Options C and D) was beyond the scope of this white paper. However, our simple weather- and occupant-normalized comparison of pre- and post-improvement energy use provided an initial basis for identifying customers that might be a good fit for a future pay for performance offering.

Customer Benefit Evaluation Methods

Our research team evaluated and synthesized insights gathered from our interviews and focus group to outline the pros and cons of pay for performance that are of interest to utilities, program providers, and regulators. First, we evaluated the benefits and barriers of pay for performance in the form of discussion to weigh them against each other. This is a first-cut attempt to understand the opportunity without conducting an in-depth cost–benefit analysis. Subsequent evaluations were conducted to understand the nuance of the benefits discussed as well as the types of programs and the extent of potential energy savings that could be achieved. These evaluations included selecting criteria for helping identify what existing programs might pair best with pay for performance. It also included a high-level quantification of the scale of the markets that could be suitable to participate in a near-term pay for performance offering.

Section 3. Observations from Other Markets

In this section we outline the relevant national trends for whole building pay for performance in Minnesota. These are takeaways from the variety of whole building pay for performance programs that have been or are currently being implemented in other states. Insights from our literature review, interviews, and program manager survey provide an important foundation for assessing local opportunities.

Influential Trends in Energy Distribution & Use

The following is a brief review of four relevant major trends.

Trend 1 — Meter-Verified Savings: Energy efficiency, no matter when it occurs, remains a valuable tool for customers to reduce their bills and to insulate against the cost and comfort impacts of extreme weather. At the same time, the cost of generating and delivering electricity is changing as our grid leverages more renewable energy that is produced during off-peak hours. Overall, the kilowatt hours saved during peak time have greater downward pressure on the utility rates than those saved during off-peak hours. Additionally, there is great value in being able to quantify energy use reductions at a specific time for the purposes of maximizing distribution capacity and having more accurate signals of when to turn on new generation resources or to buy from the market.

In Minnesota, we continue to track energy conservation under the deemed savings approach, which are based on anticipated savings from engineering calculations. Until now, this non-dynamic method has made sense. However, reflective of the conditions discussed above, the electricity industry is in the midst of a complex combination of changes that include a huge increase in decentralized generation via renewables that are highly dynamic and contingent upon weather conditions. In this context, a system of measured savings can help utilities and regulators track actual energy savings and avoided costs at a speed that is more helpful for planning and daily dispatch.

As renewable penetration on the grid continues, particularly as more solar is integrated in Minnesota and the Upper Midwest, avoided costs will become even more dynamic. In recent years, California has sometimes experienced very low avoided cost of energy because of their high penetration of solar.[24] For them, mechanisms that help determine measured savings have been helpful in coping with this dynamic. Actual energy savings data has allowed utilities and third-party providers in California to home in on *which customers* and *which measures* are most effective and reliable achievers of intended kWh and kW savings.[25]

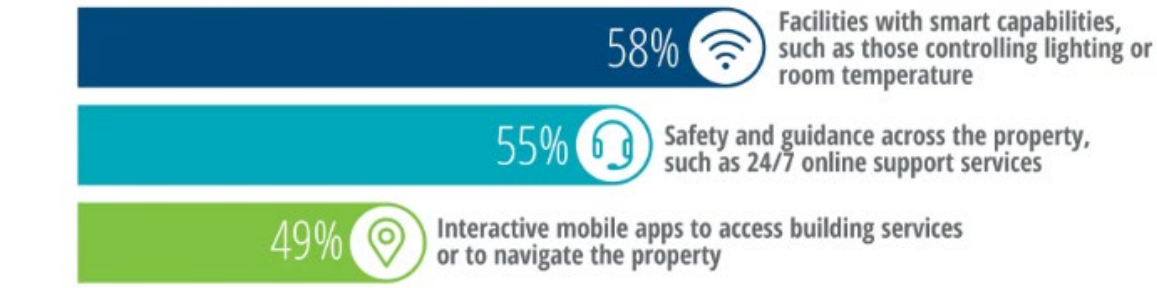
[24] United States Court of Appeals for the Ninth Circuit No 17-55297, D.C. No. 2:11-cv-04975-SJO-JCG. http://cdn.ca9.uscourts.gov/datastore/opinions/2019/04/24/17-55297.pdf

[25] Golden, Matt, Adam Scheer, and Carmen Best. "Decarbonization of Electricity Requires Procurable, Market-Based Demand Flexibility." *The Electricity Journal.* Volume 32, Issue 7. (2019)

Seeing the value of measured savings and the ability to get more granular energy use data and new forms of customer engagement, advanced metering infrastructure is starting to be deployed more broadly in Minnesota.[26] Scaled deployment of AMI and greater familiarity with how to leverage the data will bring many lessons learned to utilities across the state. Having smart meters in the field will make measured savings more feasible and provide Minnesota with the opportunity to further discuss the need for and the intended role of actual measured savings.

Trend 2 — More Complex Buildings: The second trend is that buildings are getting more complex. According to findings from Navigant Research, the smart buildings movement of interoperable buildings systems, more extensive equipment monitoring and micro and macro controls will have grown from a $4.7 billion industry in 2016 to $8.5 billion in 2020. Deloitte's 2020 Commercial Real Estate Outlook survey reported that investments in technology that support a better built environment are the most important way to improve a tenant's experience (Figure 2). Smart buildings also allow companies and organizations (i.e., building owners) to capture benefits beyond bill savings, such as carbon reductions and resiliency.[27]

Figure 2. Commercial Real Estate Owners - Investment in Building Technologies is on the Rise (Deloitte 2020 Outlook)



Source: Deloitte Center for Financial Services analysis.

This trend of intelligent buildings increases their complexity. Building systems are becoming increasingly automated and interactive with occupants, in some cases further blurring the lines between types of energy savings. In turn, demand-side management tools and strategies are starting to follow suit. Programs are becoming more holistic, operations oriented, and more technology diverse.[28]

Trend 3 — Building Performance Targets: Extrapolating from local building stock data, the average life of existing buildings is currently about 80 years.[29] The buildings that are built today will be the fabric of

[26] Xcel Energy is rolling out its Residential Time-of-Use pilot in 2020 with AMI meter deployment starting in 2019. AMI for commercial customers is currently slated to begin in the 2022–2023 timeframe.

[27] Deloitte. Building the Future. Real Estate Predictions 2018.

[28] NYSEDA and DPS Plans for Pay-for-Performance Efficiency in New York, 2018. www.recurve.com/blog/nyserda-and-dps-announce-plans-for-pay-for-performance-efficiency-in-new-york

[29] City of Minneapolis historic building stock data (Email correspondence with the City of Minneapolis, October 2019)

our cities and communities for the next three generations or longer. In the United States, codes and standards continue to drive more efficient and higher-performing buildings.[30] However, building energy codes are hitting the limits of what are known as **prescriptive** requirements and compliance pathways. Meaning, building efficiency can only be driven so far by requirements that specify key attributes of building equipment and envelope materials (e.g., the R-value of insulation or the overall equipment efficiency). Instead, the trend is that codes and standards are leaning into performance-based requirements that allow design teams the flexibility to achieve deeper performance, use clean fuels, and pursue resilience. One of the performance pathways in play is **outcome-based performance**, which is essentially energy benchmarking, but applied to new buildings immediately post-occupancy (and on an ongoing basis for at least some period of time).[31] For both new buildings and existing buildings, monitoring performance at the whole-building level — and more and more frequently disclosing the information publicly — is leading building owners and operators to think actively about energy use, energy costs, and overall performance.

Trend 4 — Savings that Cut-Across Measure Types: Some states, such as California, are looking to simplify what has become a complex accounting system of claimed savings practices that vary by measure type — asset, operations, and behavior-based measures.[32] One way that utilities, program administrators, and regulators are dealing with this, as well as looking for deeper savings, is through the growth of whole-building programs.[33] Through whole-building programs there is an opportunity to capture and verify broad energy savings and to treat all of those savings in one way for the purpose of claiming savings and offering customer rebates.

There is notable growth of programs that are becoming measure and technology agnostic. In February 2019, NYSERDA announced their plans to roll out a pay for performance program to help provide more program flexibility and to access deeper energy savings. This program would not require that a distinction be made between equipment-based improvements, operational modifications, or behavioral changes.[34] While these programs are popping up in California and New York, currently there is little evaluation of how these types of programs are overcoming key barriers, such as confidence in claimed savings, integration around data management systems, program costs, and standardization in savings methodologies.[35] These barriers require further scrutiny, which is happening in multiple states, but the main benefit of moving toward technology-agnostic programs is that they are more customer-friendly,

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[30] ACEEE. *Energy Efficiency in the United States: 35 Years and Counting*. June 2015. www.aceee.org/research-report/e1502

[31] Rosenberg, M., J. Zhang, R. Hart, and R. Athalye, 2015. Roadmap for the Future of Commercial Energy Codes. Pacific Northwest National Laboratory www.pnnl.gov/main/publications/external/technical_reports/PNNL-24009.pdf

[32] Existing Buildings Energy Efficiency Action Plan, 2015. California Energy Commission.CEC-400-2015-013-F. https://efiling.energy.ca.gov/getdocument.aspx?tn=206015

[33] *Open Efficiency Platform*. Cadmus. 2018.

[34] NYSEDA and DPS Plans for Pay-for-Performance Efficiency in New York, 2018. www.recurve.com/blog/nyserda-and-dps-announce-plans-for-pay-for-performance-efficiency-in-new-york

[35] *Open Efficiency Platform*. Cadmus. 2018.

positioning programs to think about energy improvements at the building operator project level, not just the measure or rebate level. [36]

Table 6. Recent Inventory of Key Whole Building Programs Across the Country by Type (Consortium for Energy Efficiency, 2016)[37]

Whole-Building Program Type	Number of Programs
New Construction or Major Renovations	63
Energy Audit or Assessment	58
Commissioning (e.g. recommissioning, monitoring-based commissioning)	43
Financing	33
Meters, Energy Management Information Systems, or Other Tools	28
Other Program Types	17
Strategic Energy Management	16
Feasibility Study	8
Total	**266**

In total, these market trends point building owners and operators, utilities, program providers, and regulators in a direction of harmonizing between the increasingly complex and dynamic systems of tomorrow and the relatively static approaches to defining measures, providing incentives, and measuring savings.

Pay for performance aligns with many of these trends. At the same time, it is a new way of doing business. While it can be integrated incrementally across a utility's portfolio of programs, it requires long-term, comprehensive thinking on the part of the regulator and utilities. There is a need for flexibility around technology rollout, alignment across energy-saving accounting practices, and, perhaps most importantly, clarity on the value of measured energy savings — total or at a given moment in time — across a state. This value could be a driver that enables a state and its utilities to look at the picture broadly, beyond the traditional balance of costs and benefits.

[36] Interview: Jon Packer, Xcel Energy. September 4, 2019.

[37] Consortium for Energy Efficiency. Comparative Analysis of Meter Data-Driven Commercial Whole Building Energy Efficiency Programs. 2018. www.library.cee1.org/system/files/library/12951/CEE_CommWB_MeterDataDrivenProgramOverviews_12202018.pdf

Other Pay for Performance Program Observations

In January 2017, NRDC and VEIC jointly published a report[38] that surveyed 17 commercial pay for performance pilots and programs across the country. Of those, 12 were commercial customer facing and focused on energy conservation. This study was comprehensive, looking at whole-building pay for performance programs as well as equipment-level offerings (Table 7). Since that time, a number of these pilots have matured into programs, and new commercial programs have emerged.

Table 7. Summary of Programs Reviewed

Program	Study (2019)	NRDC-VEIC Study (2017)
Pay for Performance (P4P): VEIC (provider) — for NYSERDA serving New York	Yes	Yes
Pay for Performance (PfP): VEIC (provider) — for DCSEU serving Washington, DC	Yes	No
Strategic Energy Management and Pay for Performance: Energy Trust of Oregon (provider) and **Portland General Electric** (utility) — serving Portland area (electricity only)	Yes	No
EUI New Construction Pilot: McKinstry (provider) and **Avista** (utility) — serving eastern Washington, northern Idaho, and parts of Oregon (electricity only)	Yes	No
Pay for Performance: Puget Sound Energy (utility) — serving Seattle/Tacoma metro and surrounding areas	Yes	No
Deep Retrofit Pay for Performance: Seattle City Lights (utility) and Energy RM (provider) — serving city of Seattle (electricity only)	Yes	Yes
MEETS (package of software, business model, and M&V) — applied in Seattle City Lights program, but available for broader applications	Yes	Yes
Xcel Energy (utility) — serving parts of Colorado demand response performance program	Yes	No
Energy Service Company offerings (multiple states)	No	Yes
New Jersey Clean Energy Program P4P	No	Yes
University of CA Monitoring-Based Commissioning Program	No	Yes
PG&E Whole Building Program	No	Yes
New York Energy Services Industry Program Standard Performance Contract (NYSERDA)	No	Yes

Note: Not all programs in the NRDC–VEIC report were reviewed in detail.

[38] Szinai, Judy. "Putting Your Money Where Your Meter Is: A Study of Pay for Performance Energy Efficiency Programs in the United States." Prepared for Natural Resources Defense Council and Vermont Energy Investment Corporation. January 2017.

To deepen and update insights for this report with a focus specifically on whole-building offerings, our interviews and survey gathered information from three of the programs this report studied (Seattle City Lights, NYSERDA, and PG&E) and gathered additional insights from four new offerings. In total we conducted 11 interviews representing seven programs, three of which focused on programs which have matured from pilot phase due to market acceptance. The remaining four are pilots or programs that have started implementation since late 2017.

For the purposes of this study, we defined whole-building programs as those that look at total change in energy use at the whole-building level through meter-level verification. This allowed us to look at programs that support overall high-performance practices as well as programs that accept a comprehensive set of multiple measures — a distinction made in the NRDC–VEIC report. This definition is inclusive of all programs that encourage whole-building high-performance and excludes programs that only look at capital improvement measures and equipment-level measurement and verification.

Target Market from Existing Programs

Based on our review, nearly all commercial pay for performance programs across the country target large commercial buildings. Within this segment, municipal, university, school, and hospital facilities (sometimes called "MUSH") are a common target, as are larger multifamily buildings. Industrial customers are also a prevalent target market for many pay for performance programs in other states, but secondary to the other commercial customer segments mentioned. The industrial customer market is not included in the scope of this study.

Beyond building type, pay for performance programs in other markets are most appropriate for high-performing buildings. A common threshold is buildings larger than 50,000 square feet,[39] though some programs target buildings down to 25,000,[40] while others require minimum areas of 150,000 or 250,000 square feet.[41] However, size requirements for buildings are rarely eligibility requirements, but are used as guidelines for helping customers self-identify. To understand the pay for performance target markets in other states, it is most helpful to look at the eligibility requirements and history of participation to understand the customers for whom these programs are suitable.

For pay for performance programs with a minimum energy savings requirement, the most common minimum savings thresholds were 10% or 15% of total building energy use. Five of the programs we reviewed require customers to provide an "energy savings plan" to participate, serving as screening tool for anticipated energy savings. Seattle City Light's program and New Jersey's Clean Energy Pay for

[39] Joesph Fernandi, Seattle City Light. Interview, October 16, 2018.

[40] Meiman, Andrew et al. "Monitoring-Based Commissioning: Tracking the Evolution and Adoption of a Paradigm-Shifting Approach to Retro-Commissioning." 2012 ACEEE Summer Study on Energy Efficiency in Buildings. Asilomar, California. 2012.

[41] Szinai, Judy. "Putting Your Money Where Your Meter Is: A study of Pay for Performance Energy Efficiency Programs in the United States." Prepared for Natural Resources Defense Council and Vermont Energy Investment Corporation. January 2017.

Performance Program are examples of programs that set aggressive minimum savings targets in this range.

The impetus for some programs to include a minimum energy savings threshold is twofold. First, the minimum helps ensure that the cost of administering the measurements, verifications, and incentives for the customer's project is substantial enough to make the program delivery cost-effective. Second, depending on the average size of participating buildings, a larger energy savings target helps the measurement and verification be more likely to meet the 90% +/- confidence interval expectation. This level of confidence is identified across all IPMVP options as the ideal minimum confidence interval.[42]

Other states have widely varied eligibility requirements, some flexible and others restrictive. In Avista's EUI New Construction Pilot program in Spokane, Washington, there is no estimated minimum savings requirement, and in Washington, DC, (served by DC SEU) the program only requires a minimum savings estimate of 5% of total building energy use. Conversely, in Seattle under both Puget Sound Energy's Pay for Performance program and Seattle City Light's Deep Retrofit Pay for Performance program, building owners must provide evidence of saving 15% of total building energy use above the baseline.

Beyond building type, size, and compliance with a minimum estimated savings requirement, the only additional customer attribute identified was a minimum annual peak demand requirement. A little over half of the programs reviewed stated a minimum peak load, but this was only sometimes used as requirement — other times it was simply a guideline. The minimum peak load guideline or requirement tended to range from 200 to 500 kW.[43]

Other factors such as operator capacity, tools, and training were not used as direct eligibility requirements for any of the programs. For example, whether a building had a building automation system or an on-site energy manager was not a central concern for eligibility. Thus, the customer segments currently participating are often best identified by the eligibility barriers than by any other factor. This is true for the existing building sector as well as the new construction sector. To better understand what elements of pay for performance would be most appealing to Minnesota customers, we defined a model target market based on what other utility programs have characterized as their target markets.

Review of Program Costs & Scale

The number of customers served by pay for performance programs across the country varies, especially since some are delivered in the form of private financing or third-party energy service contracts. Other programs have a highly defined target market that allowed them to have greater focus, stability, and savings.

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[42] International Performance Measurement & Verification Protocol, Vol. 1. 2002. www.ipmvp.org. https://www.nrel.gov/docs/fy02osti/31505.pdf

[43] *In the Matter of the Clean Energy Programs and Budgets for Fiscal Year 2019*. Docket No. QO18040393. New Jersey Public Utilities Commission. June 22, 2018. https://www.bpu.state.nj.us/bpu/pdf/boardorders/2019/20190329/3-29-19-8D.pdf

For example, the University of California's Monitoring-Based Commissioning Program was created specifically to serve buildings across the 33 campuses in the state. The program had unique access to a broad portfolio of large buildings; however, it was created because standard benchmarking practices were not helping achieve the desired energy savings. This program achieved 20 million kWh per year and 1.7 million therms per year from 2009 through 2011.[44] Based on a study conducted by Lawrence Berkeley National Lab, the average simple payback for participating buildings was 2.5 years with whole-building level savings of 9% for electric energy reduction (4% for kW reduction).[45] It is relatively common for utility pay for performance programs to cap incentives at 50% or 75% of project improvement costs. However, under the University of California program incentives are capped at 80% of verified project costs.

While budget and resource information are not yet well established for some of the pilots we reviewed, our program manager survey did capture cost and benefit information for three existing offerings (two programs and one pilot). Other cost and scale information was found through our literature review. The younger programs reveal targets between five (for a utility with 50,000 commercial and 410,000 residential customers)[46] and 20 participants in a year (for a utility with 883,000 total customers).[47] While there is a lack of reliable data related to program administration costs, our data showed that pay for performance programs have annual implementation budgets in the range of $200,000–$500,000. Staffing is minimal, especially when implemented directly by the utility. Beyond program oversight and recruitment, staffing usually consists of at least one engineer to assist with measurement and verification activities.

Table 8. Summary of Program Savings & Spending

Pay for Performance Programs	Annual Energy Savings				Annual Resources	
	Electricity (MWh)	Natural Gas (Dt)	Total (MMBtu)	Participation Goal	Program Staff (FTE)	Annual Program Spend (Budget)
Seattle, Deep Retro	1,000	NA	3,412	12	5	$ 500,000
PSE (Pilot)	-	-	-	5	0.2	$ 225,000
DC SEU	650	500	2,718	20	3	NA
Avista for NC (Pilot)	-	-	-	10	NA	NA
Energy Trust OR (Pilot)	-	-	-	5	1–2	NA
NJ CEP for NC	6,362	82,744	104,452	-	NA	NA
NJ CEP for Existing	13,002	1,647,228	1,691,593	-	NA	NA

[44] Meiman, A., Anderson, M. & Brown, K. Monitoring-Based Commissioning: Tracking the Evolution and Adoption of a Paradigm-Shifting Approach to Retro-Commissioning. (2012).

[45] Mills, Evan. "Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse-gas Emissions." E.O. Lawrence Berkeley national Laboratory. Berkeley, CA. 2009.

[46] Seattle City Light 2018 Annual Report www.seattle.gov/light/pubs/AnnualRpt/2018/2018_AnnualRpt.pdf

[47] Pepco web page. https://www.pepco.com/AboutUs/Pages/CompanyInformation.aspx

Table 8 provides a summary of energy savings, program budgets, and program scale (e.g., customers served each year). This figure points out that there continues to be a lack of mature cost data on the newest programs and pilots. For those that can provide data points, we can see that program scale is relatively modest considering the size of the markets that these utilities serve.

One of the documented challenges to pay for performance programs is the cost of implementation — additional resources are often needed to conduct sufficient measurement and verification. While we were able to capture some new information from program administrators to better understand the volume of electric and thermal savings and the operating costs for these programs, it was hard to tease out how efficient these programs are at achieving energy savings compared to other customer offerings. One trend that we saw from two pay for performance programs was broadening of eligibility requirements to increase participation and improve cost-effectiveness (as seen in Energy Trust of Oregon's filing to the PUC in 2018).[48]

Beyond this we also sought to compare the cost-effectiveness of pay for performance to other commercial and industrial programs. Being that most programs are relatively new, the New Jersey Clean Energy Program statewide portfolio was selected because of its maturity and because it targets both commercial customers and third-party contractors. As you can see in Table 9, pay for performance receives a lower societal cost test score than other C&I programs, but it is still ultimately cost-effective. The new construction program, which targets third parties more than end-use customers, tends to score better than the existing building offering that targets building operators.

Table 9. New Jersey's Clean Energy Program and Budget Report (FY2019)[49]

Sector	Program	PCT	PACT	RIM	TRC	SCT
C&I	New Construction	14.4	5.0	0.3	3.3	7.7
C&I	Retrofit	5.1	4.6	0.3	1.6	3.3
C&I	Direct Install	4.0	1.3	0.3	1.2	2.3
C&I	P4P NC	6.7	1.5	0.3	1.6	2.6
C&I	P4P EB	6.4	2.4	0.2	1.1	1.8
C&I	LEUP	3.2	1.5	0.3	0.8	1.7
C&I	Customer Tailored	10.5	2.9	0.2	1.7	3.1
C&I	**C&I Sector**	**5.3**	**2.5**	**0.3**	**1.4**	**2.8**

[48] Summary Report for Executive Order 17-20 Action Item 5A. Oregon Public Utility Commission. www.oregon.gov/energy/Get-Involved/Documents/2018-BEEWG-Directive-5A-Summary.pdf

[49] *In the Matter of the Clean Energy Programs and Budgets for Fiscal Year 2019*. Docket No. QO18040393. New Jersey Public Utilities Commission. June 22, 2018. https://www.bpu.state.nj.us/bpu/pdf/boardorders/2019/20190329/3-29-19-8D.pdf

Program Drivers & Barriers

Each of the reviewed pay for performance programs were developed to help meet energy conservation standards, but also because key customers or collaborators expressed interest in the program model. These stakeholders were either customers or building operators themselves, cities or institutions, or third-party contractors. The motivations stated by these stakeholders are as follows:

1. Building owners: businesses or institutions with high-performance goals looking for more tools and resources, often tied to corporate or institutional energy or sustainability goals
2. Cities: when one-time recommissioning was not delivering desired results of "beyond benchmarking" efforts[50]
3. Second- and third-party contractors: energy service companies (ESCOs), new construction design teams, recommissioning providers, and energy project financers desiring to grow

In New York City and in parts of Oregon, all these reasons led to the development of a pay for performance program. In New York, the energy efficiency industry felt there was a shortage of energy service contractors and saw pay for performance as an approach to attract new start-ups or to attract ESCOs from other markets to participate locally.[51] For Avista (eastern Oregon service territory), two pay for performance programs were developed because of the demand from ESCOs themselves. They saw the opportunity to bring value to large commercial and institutional customers — especially those on campuses or those sharing a district energy system — and that additional, direct customer incentives would help drive business.[52]

None of the utilities or program providers interviewed pointed to any policy barriers that needed to be navigated to develop and deploy pay for performance offerings in their respective states. Instead, several utilities in the northwest pointed to decarbonization policies that are helping drive support for measured savings programs. The two barriers that were quoted, however, were finance or marketing related. As you will see in the next section, several programs had to cope with the reduction in rebates dollars provided up front to help cover equipment, design, or installation costs. One program also highlighted the challenges of participant recruitment and finding the right balance between attractive program design and a description that is simple to understand and market.

[50] Beyond Benchmarking refers to activities and efforts that do more than just disclose building performance. These efforts are intended to improve benchmarking scores such as energy audits.

[51] Szinai, Judy. "Putting Your Money Where Your Meter Is: A study of Pay for Performance Energy Efficiency Programs in the United States." Prepared for Natural Resources Defense Council and Vermont Energy Investment Corporation. January 2017.

[52] Interview: William Pokorny & Matt Ophardt, McKinstry (September 25, 2018)

Program Design Best Practices & Lessons Learned

Our interviews and literature review collected a list of design traits that were important considerations for designing a commercial program in any market. Not all programs incorporate all these attributes. The comprehensive list of attributes is:

1. Participant eligibility requirements, such as building size or type
2. Required minimum savings
3. Eligible types of energy savings (equipment, operational, behavioral)
4. Incentive design (structure, frequency, form)
5. Delivery channels (second or third parties)
6. Performance or participation period
7. Customer-level tools (feedback)
8. Third-party tools
9. Measurement and verification methodology
10. Baseline method and sample group
11. Required or preferred meter technology
12. Allowances around program participation or incentives during participation

Because pay for performance programs are still relatively young, we are still in the early stages of understanding what design features provide the most value to customers and important to cost-effective program design. The next two subsections will provide further discussion around program attributes that are emerging as best practices and others that still vary greatly and are being piloted and tested.

National Look - Trends & Similarities

The decision that garnered the most consistent attention across all programs was how to balance risk and reward for participating customers. One way that utilities have dealt with this is breaking up the incentive into a hybrid of guaranteed and performance-based incentives. While some programs only offer an option for full performance-based incentive over time, these are often in conjunction with a rate-based business model approach, such as MEETS, or a third-party financer like Metrus. That leaves most programs to leverage incentive design to balance risk and the motivational powers of financial rewards (and possibly other features like recognition).

In many cases, programs reduce risk by providing a partial up-front incentive (of 20% to 50%) at the time an energy savings evaluation is completed — or more often, at the time equipment-level measures are installed. The other approach is to influence the "reward" side of the equation and offer tiered incentives or bonuses for customers that exceed performance targets or estimated potential. The tiered incentive approach is used today in the Seattle City Lights offering, by NJCEP's Pay for Performance program,[53] and by Xcel Energy in Colorado for their newly implemented, but peak-demand curtailment-

[53] NJCEP requires a minimum of 15% energy savings, but for each additional percent of whole-building energy savings, customers earn $0.005 more per kWh saved and $0.05 per therm saved.[53]

focused performance-based program, Peak Rewards.[54] For example, a tiered incentive approach might offer a natural gas customer $5 per decatherm saved up to the first 10% of total building energy saved (the current savings rate for custom efficiency measures). For all natural gas savings above and beyond 10%, the customer might earn $5.50 per decatherm saved, potentially with an additional bump in dollars per decatherm at 12% savings or 15% savings.

National Look - Differences

Contrary to what seemed to be general perception, pay for performance programs are being implemented in utility service territories with and without advanced metering infrastructure (AMI). While most pay for performance programs have access to AMI data, there are some that do not, such as Avista's, PGE's, and NJCEP's programs. In Washington, DC, AMI has been rolling out to large commercial PEPCO customers; however, this granular meter data has not been systematically integrated into the pay for performance program activities. For these providers, the measurement and verification are still taking place, but by using monthly billing data, with some on-site verification.

Based on our interviews and literature review, there is tension about which measurement and verification protocols are best for whole building pay for performance programs. Of course, IPMVP protocols A through D (see table below) are designed to fit different project circumstances, and thus the right protocol should be applied in turn. However, even across programs with similar scope of multiple measures or operational and behavioral-level improvements, the protocols required by program vary. In general, there are a number of programs that allow for multiple options, often B, C, and D, or at least C and D offering program implementers flexibility in design and the cost of administration (Table 10). Only Option D is appropriate for new construction projects, and it is thus allowed by the programs intended for existing and new construction buildings. Additionally, some programs will also use energy management system data, which is seen as an equally valid form of data.[55]

In recent years, M&V 2.0 has become a hot topic of discussion in the inner circles of strategic energy management, ongoing commissioning, and pay for performance programs. With AMI in place, the promise of M&V 2.0 is to reduce the cost of measurement and verification at the whole-building level. The M&V 2.0 method relies on processing vast amounts of interval meter data quickly and automating most or all of the analytics.[56] The intended benefit of this capability is to help building operators, utilities, and third-party energy managers respond to verification information more promptly and to help make more measured savings programs cost-effective.[57] None of the programs that we reviewed via direct interview are currently using M&V 2.0. The reasons for this were not explored in detail, but it is at least in part because while some (not all of the host utilities) have AMI in place, they are still

[54] Interview: Brian Doyle & Lee Hamilton, Xcel Energy. (September 10, 2019)

[55] US DOE, M&V Guidelines, 2015.: Measurement and Verification for Performance-Based Contract Version 4.0. U.S. Department of Energy. https://www.energy.gov/sites/prod/files/2016/01/f28/mv_guide_4_0.pdf

[56] ditto

[57] Presentation by Elliot Crowe, LBNL. CEE Policy Forum, November 2017. https://www.mncee.org/blog/december-2017/2017-cee-technology-forum-event-in-review/

working out the operating kinks of collecting and levering granular and two-way communicating meter data and the systems that manage it.

Table 10. Industry Accepted IPMPV M&V Protocol Options (with Current MN Options Annotated[58])[59]

Approach	Description	Measurement Boundary	Typical/Example Application
Option A: Key Parameter Measurement	Short-term measurement of key parameters impacting energy use	Equipment or system	Lighting retrofit: power measured, hours estimated
Option B: All-Parameter Measurement	Short- or long-term measurement of all parameters impacting energy use	Equipment or system	Variable-speed drive retrofit of a pump; continuous measurement of pump kW
Option C: Whole-Facility	Whole-building utility billing analysis	Building	Deep energy retrofit with system interactions
Option D: Calibrated Simulation	Calibrated building simulation modeling	Building	Beyond-code new construction
	*Not currently approved as an M&V option in MN under M&V Protocols for Large Custom CIP Projects V 1.0		

Lastly, of all the programs we reviewed through direct interview, none offered participating customers access to tools to help them identify energy savings opportunities or to see more frequent interval energy use data, even if metering would allow. In our survey, all five survey respondents noted this was not a value of their program (although most customers have the minimum ability to login to a customer account to see general billing data) and that this was noted as the greatest area for improvement, along with improved marketing.

[58] Minnesota Department of Energy Security, 2008. Measurement and Verification Protocols for Large Custom CIP Projects Version 1.0. http://mn.gov/commerce-stat/pdfs/cip-mv-protocols-large-project.pdf

[59] Franconi, Ellen M., M. Gee, M. Goldberg, J. Granderson, T. Guiterman, M. Li, B.A. Smith, 2017. The Status and Promise of Advanced M&V: An Overview of "M&V 2.0" Methods, Tools, and Applications. Lawrence Berkeley National Laboratory. https://eta.lbl.gov/sites/all/files/publications/lbnl-1007125.pdf

Program Case Studies

Puget Sound Energy Program

Puget Sound Energy (PSE) has several programs that look at whole-building energy use, one of which is a program pilot launched in 2018 for pay for performance. The pilot program relies on energy service companies (ESCOs) to recruit buildings that have been analyzed for 15% or greater savings to receive a utility incentive based on actual performance rather than calculated savings. The incentive was based on custom rebate savings values of 30 cents per kWh and $5 per therm. While participants do not receive a greater incentive for achieving greater than 15% savings, the program operates under the assumption that buildings will still appreciate going above and beyond custom rebate values if they receive a financial reward for doing so. According to an interview with a utility program representative, this provides an added value to the utility because there is less risk for paying for savings that are not realized. Ideal customers for the program also have minimal fluctuations in occupancy and energy use data, as buildings that have not upgraded tenant spaces are more likely to have higher savings potential.

Industrial customers are excluded, as energy savings models are harder to calculate given their unique needs. After a customer enrolls in the five-year program, in the first year they can receive up to 50% of the total projected savings for all implemented projects and the remaining half of the incentive is dispersed over the next 2–4 years. A customer must have interval rate ready service, to allow PSE to run a bill analysis for measurement and verification of savings. Preliminary pilot results are finding it difficult and time consuming to recruit participants, but due to high initial engagement with ESCOs, the program staff still has hope that recruitment will pick up as word spreads.

Program highlights:

- Program is targeted to commercial customers only
- Building size threshold to participate is 50,000 square feet
- Market the program to energy service companies (ESCOs) for the recruitment, usually following an engineering study of a building with a recommendation of five or more energy projects and 15% or greater savings
- Provide customers with a MyData Dashboard that gives building staff access to interval data reports as well as monthly data for greater transparency for their energy data.

District of Columbia Sustainable Energy Utility

District of Columbia Sustainable Energy Utility (DCSEU) operates efficiency and renewable energy programs for businesses and residents in the Washington, DC, area and is funded through surcharges on gas and electric utility bills. One of these business programs offered is a pay for performance program. The program targets opportunities with savings exceeding 5% annual energy. The utility works with both 15-minute interval electric data as well as monthly gas usage data to determine savings. While any qualified commercial customer may participate in the pay for performance program without a contractor's assistance, DCSEU's intent is to build a network of pay for performance partners who have proven their capability to influence energy savings in buildings and understand what DCSEU needs to fulfill its evaluation requirements, which reduces the risk for the energy efficiency utility.

The program targets a variety of measures including behavioral and operational changes, recommissioning and retrocommissioning, controls, and automation systems. The incentive structure is based mostly on energy savings but also considers cost, scope, and funding availability to determine an incentive agreement with the customer. The agreement is issued upon finalization of a baseline energy model. The incentive is issued to the utility ratepayer or directly to the contractor, and these incentives are paid only after a post-project evaluation period determines that the savings are valid. DCSEU's pay for performance program can be combined with other efficiency programs, but the other rebates are subtracted from the pay for performance incentive.

This program targets commercial and industrial customer with existing buildings exceeding 100,000 square feet. These customers must use more than 500,000 kWh of electricity and 1,000 MMBtu of natural gas annually. In addition, if a customer's energy usage is highly irregular and a baseline energy model proves infeasible, this will preclude the customer from the program. Ideal customers include hotels, commercial real estate office buildings, hospitals, and universities. Multifamily buildings are not typically a good fit for this program unless they have individual gas and electric meters. There is a high degree of available customers in the DC area — including roughly 2,000 buildings above 50,000 square feet, but there is also high concentration of LEED-certified buildings. While low-hanging fruit such as lighting measures may already be present in these buildings, they may not be operating as efficiently as they can, especially over time. DCSEU's pay for performance program provides the incentive for these buildings to stay on course and continue to operate in the most efficient manner possible.

Savings are determined through a multiple regression analysis of a building's baseline energy usage from the past year or more. The energy usage is paired with heating degree days, cooling degree days, occupancy changes, and events to create a representative model of baseline energy usage

Section 4. Minnesota Market Opportunities

Section 5 and Section 6 of this study focus on the opportunities, barriers, and preferences that were observed through on-the-ground research. Input from our interviews, focus group, data analysis, and Minnesota-specific literature review are discussed and analyzed in these sections. First, in this section, we discuss which commercial market segments have interest in a pay for performance program model and the extent of the energy savings opportunity.

Customer Interests & Concerns Snapshot

Our interviews were a primary data source when evaluating which markets and channels might be most appropriate in Minnesota. Based on the wealth of insights collected through our local and national expert research, here we synthesize the interests and challenges expressed by potential program participants. These sources were influential in our target market analysis and used to help identify which delivery channels might be most strategic. Below we discuss the value of pay for performance to customers (as well as to utilities and program providers).

Feedback from Large Building Operators & Property Managers

Study participants say pay for performance is a motivating mechanism for building operators to stay engaged and focused on more effective building and budget management. To this end, we used our focus group as a venue to discuss the concept of risk — the risk of giving up an up-front, guaranteed incentive for a larger incentive later. Our team characterized risk and reward for building operators in several ways. From these discussions we were able to learn that:

1. building operators and managers think about risk and reward most frequently in terms of project payback;
2. it would be helpful for building operators and managers to have some indicator of the potential incentive gain or loss under a pay for performance approach as well as what effect this could have on project payback; and
3. for many customers, the most valuable part of a pay for performance program would be the technical guidance and ongoing customer engagement. The benefit of these services can be hard to quantify for a customer, so characterizing the services in terms of a potential benefit would help them make a decision that balances risk and reward.

For most building owners and operators, particularly those in the public sector, the delay in receiving the incentive is less of the concern than the potential that the incentive will be less overall than what they would have earned under the traditional, up-front rebate approach. They would see this as money "left on the table."

The two outliers stated that they watch their utility bill over two or three months to observe trends, but they don't compare actual energy bill savings to any benchmarks or expectations. All but two of the 25 building owners, managers, and operators engaged for this study stated that they do not verify energy savings after capital project completion. Building operators and engineers generally feel this is an area where they could be better leveraging the money they have already spent on a capital improvement

project to ensure that they are getting their full value. Improving preventative maintenance practices was underscored to keep monthly operating costs low, but also as a way to reduce the need for larger capital improvements, which are harder dollars to access. [60]

Aligning with the theme of valuing technical assistance and customer engagement, part of our focus group event was spent discussing the aging building operator workforce and the depleting expertise in the industry. They valued the opportunity to access free services that grow operator capacity in the long run, not just managing immediate savings.

A Discussion of Risk & Reward

To get at the key question of the customer's interest and tolerance for risk and reward, focus group participants were asked to respond to a scenario on pay for performance. This scenario illustrated the extent to which a customer might receive in incentives and the likelihood of their project to have a general outcome on this spectrum. This helped our research team better understand how target market customers think about risk and the extent of their tolerance (specifically Target Markets A and C, described in the **Segments & Channels Defined** section below).

The costs and rebates used in this scenario were based on the costs of projects and incentives earned by customers that participated in our study. The increased incentive values were based roughly on the limits of utility avoided costs and current incentive rates used in custom and efficient controls programs. Participants were asked to share how much additional incentive they would need to take on the additional risk. Generally, incentives that could reduce a project's payback period by six months was the minimum threshold of opportunity that grabbed customer interest. This was particularly true for building managers as opposed to building operators or facility managers (Target Market C).

While the discussion was only conceptual, the conversation allowed building operators and property managers to think about the potential benefits and risks of pay for performance from a financial angle. They shared that this type of information and broad analysis would be helpful at the time of pay for performance program sign-up if selecting this path instead of the traditional deemed savings (up-front rebate) path.

[60] Focus Group. August 7, 2019. Minneapolis

Feedback from New Construction Stakeholders

There is an increasing emphasis from the business, nonprofit, and public sectors on wanting to build and lease space in buildings that are energy efficient and supplied with clean energy. Based on our interviews with architects and developers that are building to own, there is interest in tools that will help them look at long-term paybacks and what might improve their paybacks. The concept of pay for performance was of interest, but similarly to the existing building market, customers needed scenarios to grasp the extent of the opportunity and risk that they might be signing up for under a pay for performance program.

Developers were open to the idea that they could help offset more high-performance design selections up front with the opportunity to earn a greater incentive over time. The challenge to them seemed to reside less with the ability to have the right staff and capacity to operate the building at a more efficient level —their concerns were focused more on the initial cost of capital. Utility rebates are easy ways to drop these first costs. Without these, they said that other mechanisms, such as low-interest loans, could help cover these gaps. Without these resources the program would still be of interest, but the opportunities for participation might be fewer and would have to be decided on a case-by-case basis.

The interest in a pay for performance offering will likely be greatest with those companies and institutions that are going to be long-term owners and that are prioritizing building resiliency and low cost of long-term ownership. Overall, developers are constructing buildings to sell them within a year of completion. Otherwise, they are likely to own the facility for 15 years or longer.[61] For buildings that are held by the developer and have one or more tenants, there is evidence that high-performing buildings have lower occupancy rates and higher resale value.[62] Interviewees (developers as well as key energy efficiency program providers) see pay for performance for new construction playing an important role in building delivering high-efficiency, net-zero energy buildings.[63]

[61] Interview with Eric Morin, Ryan Companies. November 26, 2018.

[62] Institute for Market Transformation. *Added Value of ENERGY STAR-Labeled Commercial Buildings in the U.S. Market.* 2016

[63] Interview with Scott Hackle and Brett Bridgeland, Slipstream. November 19, 2019.

Table 11. Summary of Stakeholder Interests & Barriers Considering Pay for Performance

Large Commercial Building Operators & Managers (private & public facilities)

Key Interests & Value

1. Increased quality install transparency and verified savings
2. Supporting a culture of performance as an operator
3. Earning a larger overall financial incentive (in NPV)

Challenges or Concerns

1. Providing enough benefit-to-risk potential to motivate customers to participate
2. Determining *if* and *when* a project is a good candidate for program participation
3. Ensuring measurement and verification protocols are fair, clear, and understandable for participants

"Pay for performance would be better…. You would need to keep thinking about the project over time to keep saving energy. This can change the culture of operations."
—Facility Engineer, MN State

"If given the choice, I would take a smaller up-front incentive for a chance to reduce the payback period by six months or more."
—Property Manager, CBRE

New Construction Developers (build to own)

Key Interests & Value

1. Want to keep operating costs and energy costs low
2. Interested in renewables and aware that efficiency is a good way to maximize the value of on-site solar

Challenges or Concerns

1. How to cover initial costs without a full up-front incentive
2. Incentives large or visible enough to be motivating
3. Need to continually reeducate on out-of-date information that efficient buildings cost a premium

"First costs are a hurdle that our clients need to deal with, but they want to focus more and more on low, long-term operations costs — perhaps pay for performance can find the right balance."
—Developer, Duval Companies

Targeted Energy Efficiency Program Providers (whole-building or operations focused)

Key Interests & Value

1. Greater flexibility in strategies used to achieve savings

Challenges or Concerns

1. Operations programs have great potential, but are disadvantaged under the average savings method
2. Allocating savings as asset-based or behavioral is challenging at the whole-building level

"AMI (or similar) is important at the whole-building level because it increases the confidence interval when verifying energy savings and allows us to look at more nuanced saving opportunities."
—Energy Intelligence, CEE

Utilities (IOU, Cooperative, and Municipal)

Key Interests & Value

1. Opportunities to reduce peak demand (kW)
2. Deeper and broader customer engagement approaches
3. Verified savings for IRP and IDP processes

Challenges or Concerns

1. Cost-effective programs in the face of low avoided costs

"Verified savings are more valuable than estimated savings as we look at long range projections for integrated distribution planning."
—Minnesota Power

Minnesota Target Market Characterization

A primary objective of this white paper is to identify customer concerns and interest in pay for performance and to characterize the target commercial customer market segments. To accomplish this task, we created a working model or characterization of what the target market might be, which we then refined through our research. This working model became the guide for identifying program participants for whom we then conducted pre- and post-measure energy bill analysis and in-depth interviews. Findings from our participant engagement and a separate focus group were the key tools for validating whether the starting market characterization was accurate and how it could be adjusted.

Our target market model included large office, institutional, schools, retail, public, and multifamily commercial buildings (>100,000 square feet) that have a building automation system and (ideally) an on-site energy manager.[64] Recruitment for participation in our study focused on engaging buildings that met these criteria. This method did not include comprehensive engagement with commercial customers of all types and sizes but focused on engaging the target markets as observed in other parts of the country. Using this approach, our research led us to identify target market segments that were broader than our initial working model.

Segments & Channels Defined

Pay for performance programs have tended to be targeted toward large-energy-use commercial customers, industrial customers, or portfolios of residential customers. Our research found that large, high-performing customers are a key market segment in Minnesota. However, our focus group and interviews pointed to other commercial market segments that would allow the benefits of pay for performance to be made available to more customers and allow for greater program scale.

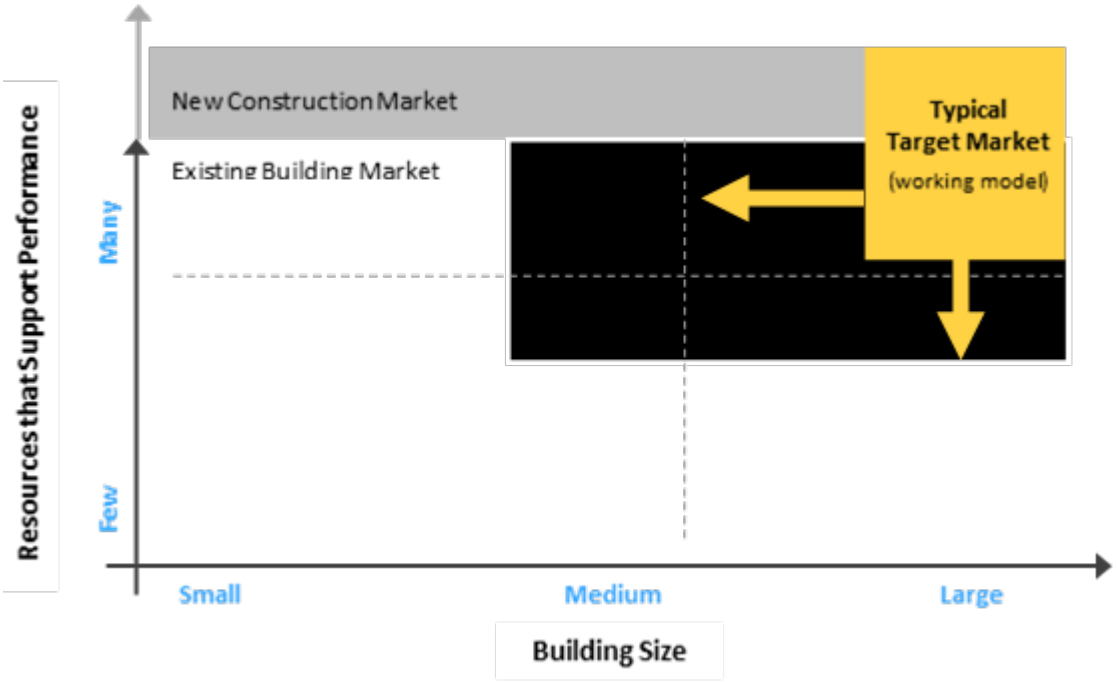
Figure 3 illustrates where typical pay for performance participants fit within the broad commercial customer market. The yellow box in the upper right quadrant represents the typical customers that are engaged in a pay for performance program. Based on findings from our research, medium to large customers expressed interest in having access to a performance-based incentive program, as was mentioned in the previous subsection. While large buildings have the tools and knowledge to respond to operational changes and other improvements that might be triggered during a performance period. These resources and awareness afford them lower risk than buildings that are run with fewer resources and less on-site energy knowledge.

During our focus group, leaders from local BOMA chapters and property managers noted that more moderately sized buildings would have as much or more to gain from a program like pay for performance. This line of discussion highlighted the interest and opportunity to structure pay for performance programming that includes smaller and more moderately sized buildings through other

[64] Consortium for Energy Efficiency. *Comparative Analysis of Meter Data-Driven Commercial Whole-Building Energy Efficiency Programs*. 2018. www.library.cee1.org/system/files/library/12951/CEE_CommWB_MeterDataDrivenProgramOverviews_12202018.pdf

engagement and management channels. This opportunity for expanding beyond the typical large building, high-performer market segment is shown in Figure 3. Key examples of these customers are small and moderate-sized buildings that have some of the resources and tools needed to perform well, or are managed by property management firms that can provide some of those resources, but from a centralized, portfolio-wide position.

Figure 3. Typical and Expanded Target Market Diagram



Note: Resources that support performance refers to tools, expertise, and human capacity or time to dedicate to consider and implement building operations and bill reduction best practices on-site.

Based on our target market insights, below we detail not only the characteristics of the target customers, but also the channels for reaching them. Pay for performance programs are sometimes offered to energy customers directly and other times to second (e.g., property managers) or third parties (e.g., energy service providers). For this reason, as we walk through each key market segment, we will also discuss one or more recommended channels for reaching these segments. We label the market segments as **target markets** and the combination of key segments paired with recommended channels we refer to as **approaches**. Each of the four target markets and approaches identified are outlined below:

Summary of Key Market Segments

Direct Incentives to Customers

- **Target Market/Approach A:** Large, high-performing existing buildings
- **Target Market/Approach B:** New construction and major renovation projects (small to large), engaged through the developer

Incentives to Second or Third Parties

- **Target Market/Approach C:** Moderate and small commercial buildings through commercial property portfolio managers

Incentives to Third-Parties[65]

- **Target Market/Approach D:** Third-party providers for key energy efficiency programs

Below, each segment (i.e., target market and approach) is characterized in greater detail. We provide these characterizations as a way of understanding the size and nature of each segment, but not necessarily as participation eligibility requirements. While the size of each market is noted here, the technical potential for energy savings by market segment and channel for reaching those end customers will be discussed later in this section.

Direct Customer Incentive Market Segment

Target Market/Approach A: Existing building high performers

We will call this commercial customer segment the **high performers**. This is one way that these commercial customers might self-identify — a helpful indicator of whether pay for performance will be a good fit. In general, these customers operate larger buildings with relatively high staff capacity and have access to tools that allow for central control of most equipment systems and increased visibility of equipment interoperability. This is a targeted and relatively small wedge of the commercial market. As high performers, they will tend to already be relatively efficient, but as our interviews and focus group pointed out, every building operator agreed that their buildings could be operated more efficiently.

For this relatively sophisticated segment of the market, the building operators and owners are the major influencers of energy efficient practices and improvements. While many facilities in this segment use outside energy consulting, based on input during our focus group, those consultants provide energy use tracking and look for load anomalies but do not directly coach operators in how to achieve deeper energy savings. **Thus, these individuals remain the dominant influencers and arguably the most effective recipients of pay for performance incentives.**

[65] Incentives could be kept by third parties or passed through to the end customer(s).

Key Commercial Customer Characteristics:

- Buildings 100,000 square feet or larger
- Have on-site or dedicated facilities personnel with energy management responsibilities
- Have relatively flexible loads (i.e., not emergency or 24/7 facilities)
- Class A and B offices, institutions, schools, and retail; potentially also multifamily, hotel, and hospital buildings
- Have a building automation system
- Have corporate/organizational energy use reduction or performance goals
- Set performance goals at the start of a building energy improvement
- Has participated or could participate in an existing whole-building efficiency service (utility or other)

Key Project Characteristics:

- Improving operational practices
- New equipment quality installation verification
- Behavior-change activities or campaign
- Recommissioning or ongoing commissioning
- Combinations of equipment, behavior, or operations level improvements

Estimated Size of Market: 2% to 5% of commercial buildings could be eligible, but account for 20% to 25% of the existing building area in the state.[66]

Table 12. Average Load by Building Type and Size

Building Type	SF Threshold (+/- 15%)	Unit	Total Energy Use (Low Avg.)	Total Energy Use (High Avg.)
Office	50,000	kWh	384,000	118,000
		MCF NG	700	3,500
	100,000	kWh	1,058,000	6,840,000
		MCF NG	3,000	10,000
	250,000	kWh	6,100,000	15,900,000
		MCF NG	2,500	25,000
Retail	100,000 - 250,000	kWh	1,700,000	3,450,000
		MCF NG	2,000	20,000
School / College or University / Fitness	50,000	kWh	300,000	887,000
		MCF NG	1,500	1,800
	100,000	kWh	245,000	2,100,000
		MCF NG	4,000	6,700

[66] U.S. EIA CBECS Database, HVAC conservation features and building area (2012 data) https://www.eia.gov/consumption/commercial/data/2012/bc/cfm/b5.php

Target Market/Approach B: Owners or developers of new buildings and major renovation projects

We explored the new construction and major renovations market segments through interviews with a small sample of architects, developers, and energy design and construction performance program providers. This approach targets architects and general contractor firms that are providing services to developers and building owners. For these parties there is increasing demand to deliver high-performing buildings and to ensure such performance. A mechanism like pay for performance keeps them tied to the performance of a building financially, offering them the opportunity for an incentive based on performance in exchange for taking on additional risk at the project's onset (i.e., schematic design). Engaging designers and contractors have also been a model that has seen success in the residential market in states such as Massachusetts.[67]

Here we characterize the types of actors that pay for performance could engage, as well as the types of commercial construction projects that it might suit best, in terms of risk for the design and development and construction team(s).

Key Customer Characteristics:

- Building owner developing to own
- Developer looking to market building high performance

Key Project Characteristics:

- Building owner pays all energy bills
- Office, schools, hotel, retail, public facilities, recreation spaces, or multifamily building
- Single- or multi-tenant buildings
- Has or could design and build to a voluntary or stretch standard above code
- Will set an energy performance target at the time of design
- Has or could participate in an energy design assistance program (utility or other)
- Has or could require verified energy performance as part of the design or construction firm contract

Estimated Size of Market: Between 2003 and 2012, U.S. commercial building stock grew between 1% and 3% (1.6% in number of buildings and 2.3% in floor area).[68] On average, this period of time likely saw lower growth than the period between 2012 and today. In urban areas at high times of growth, that can be as high as 10% or 15% by building area (Minneapolis building stock data, 2000–2019). Of this market, interviewees said that somewhere between 5% and 10% of projects follow an above-code voluntary standard.

[67] Interview: Ian Finlayson, Director of Energy Efficiency, Massachusetts Department of Energy. May 2019.

[68] Commercial Buildings Energy Consumption Survey (CBECS), A Look at U.S. Commercial Buildings Stock: Results from EIA's 2012 Commercial Building Energy Consumption Survey.
https://www.eia.gov/consumption/commercial/reports/2012/buildstock/

Second- and Third-Party Market Segments

The following target markets are not the commercial customers themselves, but collaborators and service providers that have greater influence over energy performance than the end customer. However, in the following cases there is a market failure due to a split incentive between the entity that pays and the entity that uses the energy. Pay for performance can be used in these circumstances to help correct this market failure by providing an incentive to this influential party by rewarding them for their decisions and actions. By overlaying pay for performance on to specific existing programs (and modifying the participant eligibility) or creating new stand-alone pay for performance programs, these parties can be leveraged to deliver new energy savings.

In the realm of pay for performance, there is often no distinction made between second- and third-party recipients. However, because extra emphasis was put on the direct customer delivery and second-party opportunities, we will make the distinction in this report.

Target Market/Approach C: Commercial property portfolio managers

This market is defined as commercial property management firms that specialize in managing facility financials, amenities for tenants and occupants, and general operations and building maintenance. In most cases, these firms also pay the utility bills out of a monthly or annual operating budget and special projects likely come from a capital improvement budget (capital expenditures) that requires approval from the owner. Many of the larger firms operate hundreds of thousands of square feet across a city or local region, with individual properties ranging in size from 5,000–10,000 square feet and up.

> "I manage my buildings like I own them," said one property manager in the focus group. All four of the other property managers in the room echoed that practice."
>
> — Property Manager, CBRE

Pay for performance can be well suited for property management firms and individual managers that oversee moderate to large portfolios of buildings. Local stakeholders recommended that property managers with minimum portfolio sizes starting at 250,000 to 500,000 square feet might be a particularly good fit.[69] Performance-based incentives could motivate property managers, even if they are not paying the energy bills, to operate buildings more efficiently than they do. Instead of getting compensation for energy bill savings, the current incentive is to keep the client (e.g., building owner) happy. Pay for performance could help to solve this market failure, as the operators are the more influential actors. Depending on the structure of the program, incentives could be directed directly to the utility customers or be provided to the property manager as a second party. Under this paradigm, property managers could earn incentives for work that often goes unrewarded.

By working through property managers who may or may not be the actual utility customers, programs could expand their reach to mid-sized buildings. At the portfolio level, property managers that have

[69] Study Focus Group, August 7, 2019. Minneapolis.

access to a broader set of tools — experienced building engineers and more know-how — could be leveraged to raise performance in this hard-to-reach market.[70]

Key Property Manager Characteristics:

- Manage >250,000 square feet of property across multiple buildings
- Have high-performance interest
- Have on-site or dedicated energy managers per property
- Have strong, regular communication between property manager and facility operator/engineer
-

Estimated Size of Market: According to CBECS 2012 data, 1% to 2% of commercial building area is managed by property management companies. For moderate and large buildings (25,000 to 50,000 square feet and up) this percentage is significantly higher particularly in office, multifamily, and multitenant retails spaces. In urban areas, most large commercial real estate is managed professionally. It is estimated that in Minneapolis, 55% of commercial office space (SF) is managed professionally by the five largest property management firms in the metro (with a professional firm managing only or owning and managing).[71]

Target Market/Approach D: Key energy efficiency service providers

Another type of third party that could be leveraged by pay for performance are the energy efficiency program providers themselves. Third-party pay for performance programs are growing faster in number than direct customer programs, particularly in the largest states such as California, Texas, and New York. In a market like Minnesota's, with lower natural gas and electricity rates, offering incentives to those that can influence energy performance most directly and are looking for resources and flexibility to do their jobs better, could be an effective leverage point.

Here, the pay for performance incentive would be provided directly from the utility to existing or future energy efficiency program providers that have the ability to get at deeper energy savings. Eligible third parties may include energy service companies (ESCOs), providers of mandatory or voluntary benchmarking programs, or providers of operational efficiency, strategic energy management, ongoing monitoring, or recommissioning programs. Using existing program and customer relationship channels, a third-party approach has the potential to reach a broad end-customer base. The type of commercial customer reached could be quite varied in building size and building use, potentially using a peak load of 100 or 200 kW as a minimum requirement, as well as advanced metering infrastructure.

The pay for performance incentive would encourage providers to think beyond specific measure-level activities as a way of getting at deeper savings for the benefit of earning bonus incentives or tiered incentives based on how much they are able to deliver measured savings beyond a savings target. The flexibility to look beyond measure-specific savings is important, particularly at the whole-building level,

[70] Study Focus Group, August 7, 2019. Minneapolis.

[71] This value was estimated using City of Minneapolis building stock data and Minneapolis/St. Paul Business Journal data about the largest commercial real estate property management companies in the Twin Cities metro area.

where interactions between measures are hard to distinguish.[72] It is important to note that there would be some overlap between this third-party approach (Market D) and the direct customer approach (Market A), which will allow customers more choice and innovation.

In other states, these parties are often referred to as "aggregators" or "portfolio providers" as their role is to secure reliable and measured energy efficiency. While there is potential for this third-party market to be leveraged in the future, the still-nascent deployment of AMI meters will need to reach more customers before this is a viable option. Since the third-party market was not the focus of this study, we will not discuss this approach in detail in this study. However, if Minnesota decides to take advantage of the flexibility of a third-party approach, public discussion will be needed to clarify expectations around the delivery of measured savings and how these savings will be used in generation and distribution planning, among other key questions.

Key Program Provider Characteristics:

- Operate a whole-building energy efficiency program or service in moderate or large commercial buildings
- Engaging five to 10 or more buildings a year (begin to see benefits of scale)
- Want program design flexibility to go deeper using multi-measure approaches & operational best practices

Estimated Size of Market: Likely applicable to multi-measure programs already engaging across the whole-building level or touching building operations or behavioral strategies

Delivering Pay for Performance

To reach the target markets outlined in the previous section, there is the opportunity to either create new, stand-alone pay for performance programs or to provide a pay for performance overlay that would be paired with existing utility programs (i.e., an alternative incentive structure that focused more on outcomes). While a stand-alone program would have the benefit of being designed for a more targeted segment of customers, there are a number of existing programs — both utility and non-utility implemented — that would provide operational support and whole-building performance guidance (a best practice). Thus, it could be most cost-effective to develop a pay for performance incentive option for customers that could be overlaid on key existing programs.[73] This option would allow customers to select between two types of incentives: either an up-front deemed savings incentive (what is typically offered today) or a pay for performance incentive — increasing opportunities for customer choice.

[72] Two interviews, Ethan Goldman. Recurve, October 2019.

[73] It is important to note that by adding an incentive offering under one program, there is the risk that the cost of implementing the pay for performance incentive mechanism could add too much program admin costs and make an existing cost-effective program less cost-effective. However, if administration costs were systematized, there may still be room for efficiencies by one overarching pay for performance program to be offered to customer through multiple existing program channels.

To better understand the existing programs with which pay for performance would best pair, we evaluated whole-building type programs that exist in Minnesota. The intent was to look at all whole-building types of programs in the state, either directly or through considering similar programs that share key characteristics. These programs were then scored based on five criteria, assessing the extent to which pay for performance could be a complementary overlay.

Using information collected from utility program materials and interviews, we evaluated 13 programs broken into groups of six program types. After selecting programs that align with Target Market A, B, and C (high-performance customers, new construction customers, and property portfolio managers, respectively), programs were evaluated under the five criteria. These criteria were defined based on the top customer and utility interests and concerns identified through our interviews and focus group:

1. **New Savings Potential.** This criterion specifically values programs that may have the ability to reach deeper savings, particularly through operational energy savings or influencing quality installation of equipment and seeks to identify programs and conservation measures that are potentially undervalued through current deemed savings method.
2. **Customer Engagement**. This criterion values the channels and approaches used engage customer with technical support and education. It also values tools and performance monitoring that are already part of a program's design as well as the duration of engagement and the strategic timing of interactions. For programs that do not have significant engagement channels currently, it values program designs that may be able to integrate these interactions with relative ease and for low cost.
3. **Performance Target**. This criterion values program with the tools and process to help or require a customer to set a performance target, such as an EUI or percentage reduction in energy consumption. This is important for providing a benchmarking for measuring change and defining success of any changes in equipment performance, install, operational practices, or behavior change strategies.
4. **M&V Conducive**. This criterion values programs that area currently set-up for regular or monthly measurement and verification that would be needed for pay for performance through ongoing energy consumption monitoring and bill analysis. Programs with M&V protocols that are balanced in cost and rigor were valued as they would be a necessary function and cost of administering pay for performance
5. **Demand Savings Potential**. While not the focus of the programs evaluated, the opportunity to find demand savings or shift kW use to non-peak times is an opportunity for the pay for performance model to leverage not only energy savings but demand (kW) savings. This could help increase the value of pay for performance for a utility, potentially providing a path toward overall higher performance-based incentives and the ability to motivate the customer.

The weighted composite score of this evaluation represents the programs with which pay for performance would pair most naturally (i.e., requiring few program design modifications). While utilities may define their own criteria for determining eligibility, these criteria provide a starting point for evaluating channels for offering pay for performance directly to customers. This exercise also was

helpful for the team as these programs are the basis for estimating the market size and technical potential for Target Market D.

Based on this high-level evaluation conducted by the research team, we identified three groups of programs or services that are well suited for pairing with pay for performance in the near term. Three other general types of programs were identified as having notable potential benefit if paired with pay for performance. Over time, if pay for performance is piloted successfully in Minnesota, other programs on this list may be considered as a next generation of programs that could pair with it cost-effectively.

Generally, programs that set performance targets and have the opportunity to influence deeper energy savings in the form of operational practices are the programs that rank the highest (i.e., received the most "yes" answers in the table below). In addition to existing building programs, multiple new construction (and major renovation) programs scored well. This includes energy design assistance types of programs and services that help select performance targets or benchmark performance over time, such as Performance-Based Procurement or design standards such as SB2030 or even LEED®.

Other programs with high scores are those that provide a relatively high level of customer engagement and offer energy performance monitoring. Programs that are conducive to adding direct customer engagement or engagement tools also scored relatively well (e.g., a dashboard or technical assistance advisor that checks in regularly). The full summary is captured in Table 13.

Table 13. Summary of Programs Evaluated for Pay for Performance Fit

Key Offerings Evaluated for Third-Party Pay for Performance Fit					
Key Evaluation Criteria:	Deeper Savings Potential	Customer Engage. In-Place	Integrate Perform. Target	Monthly M&V Conducive	Potential to Influence Peak kW
1. High Performance New Construction	•	•	•	•	•
• Enhanced Energy Design Assistance*	Yes	Maybe	Yes	No	Maybe
• Performance-Based Procurement	Yes	Yes	Yes	Yes	Maybe
• SB2030	Yes	Maybe	Yes	Yes	Maybe
• voluntary standard (e.g., LEED®)	Maybe	No	Maybe	Maybe	Maybe
2. Energy Service Company services	Maybe	Yes	Yes	Yes	Yes
3. Ongoing monitoring or op. efficiency					
• Large Bldg. Operational Savings	Yes	Yes	Maybe	Maybe	Maybe
• Ongoing Commissioning	Yes	Yes	Maybe	Yes	Maybe
• Energy Information Systems	Maybe	Yes	No	Yes	Yes
4. Benchmarking programs					
• municipal or state programs	Maybe	Maybe	No	No	No
• portfolio level	Maybe	Maybe	No	Maybe	No
5. Building operator training					
• Building Operator Certification	Maybe	Maybe	No	No	Maybe
6. Custom efficiency programs that require a study					
• Recommissioning	Yes	Maybe	No	Maybe	Maybe
• Commercial Efficiency (custom)*	Yes	Maybe	No	Maybe	Maybe

*Offerings that are often used in combination with other programs (utility and non-utility)

Note: Customer Engagement In-Place refers to existing programs that have customer engagement feature going on today that pay for performance can leverage to motivate operational improvements. **Monthly M&V Conducive** refers to existing programs that could include meter-based M&V on a semi-regular basis if that is not already taking place today.

Data Analysis & Savings Opportunity in Minnesota

The strength of pay for performance is its ability to get deeper savings and actual, meter-based savings data. Today, only a small variety of whole-building programs exist in Minnesota. Additionally, there are currently only a small variety of measure-based equipment rebates that commercial customers have access to.[74] Our research looked at the incremental potential for energy savings that could come from pay for performance above and beyond the savings that are captured through existing utility energy efficiency programs. Thus, our estimate of additional energy savings technical potential is based on the additional (marginal) energy savings that pay for performance would enable when paired with multiple existing programs.

The channels through which a pay for performance program is delivered will likely have an impact on the extent of the achievable savings. For calculating the technical potential for additional energy savings, we considered utility programs as well as local government types of programs (e.g., benchmarking). While we do believe ESCOs could be an important channel for delivering pay for performance incentives in the long run, our analysis did not estimate this potential (Target Market 4).

While this study did not analyze the process, cost, and challenges of measuring meter-based savings through granular customer data, we did conduct bill analysis to have a better understanding of how many customers (out of a sample of 10 buildings) would be good candidates for participating in a whole-building pay for performance program. This is discussed below, along with other observations that were made along the way.

Data Analysis Takeaways

Our data analysis set out to explore the extent to which whole-building pay for performance might enable customers to find additional energy savings — beyond what current incentive design supports. This was done by retrospectively studying the energy use and energy efficiency changes of 10 buildings, four new construction buildings and six existing buildings. For each existing and new construction building, we conducted weather normalization to provide a first-cut look at energy use over time relative to a baseline and recorded energy improvements. For two of the 10 buildings (our "case studies" — both existing buildings), we conducted full measurement and verification using the IPMVP Option C protocol. These two buildings have been developed into full case studies and are included in Appendix A.

The two case studies provided a detailed look at customer energy use and improvements over an extended period (a one-year baseline with a 33- to 36-month performance period). We also explored anticipated (i.e., deemed) energy savings and rebates received compared to the savings that would be

[74] **Measure** refers to definitive improvement captured in a state or utility technical reference manual.

claimed and rewarded incentives under a pay for performance model. Because most building owners do not track expected savings from an energy improvement or the energy savings that were used to calculate their rebates, retrospectively gathering accurate and complete data was a challenge.

Comparisons between deemed energy savings and performance-based savings were made by looking at total energy savings compared to the baseline, for electricity use and natural gas use respectively.[75] This was calculated by comparing the total deemed savings during the performance period and comparing it to a building's meter-based performance. Additionally, we looked at the total utility rebates received for the improvements and compared this to two potential pay for performance incentive scenarios to help compare what a building owner might earn. This was captured in absolute dollars. Since incentives would be provided annually or more often, a net present value analysis was not necessary.

Since we were only using historic monthly bill data, the granularity was limited. As other research and program evaluation studies show, access to hourly or 15-minute data can capture short spans of reduced energy use that are otherwise undetected. Cumulatively this could highlight a notable amount of deeper energy savings that could potentially increase program costs and increase energy savings.[76]

Key Performance Observations from Existing Buildings:

Of the 10 buildings we evaluated, we found that five buildings are likely to benefit from pay for performance.[77] This was indicated by two pieces of evidence. First, each of these buildings reduced their energy use intensity (EUI) over the period we evaluated. This demonstrates that they are thinking about energy use or have investment and operational practices that allow them to make steady reductions in energy use. The second piece of evidence is that each of these five buildings undertook operational improvements without utility rebates (in addition to rebated equipment improvements). Through operational improvements these buildings were able to capture energy savings that are not visible under a deemed savings approach. Along these lines, these buildings could further leverage operational improvements and practices to get at deeper energy savings in the future.

We will use DeLaSalle High School to illustrate some of our key observations. DeLaSalle High School had a notable reduction in natural gas and electricity consumption over the course of its performance period. This customer works hard to increase energy efficiency and would be a good candidate for pay for performance.

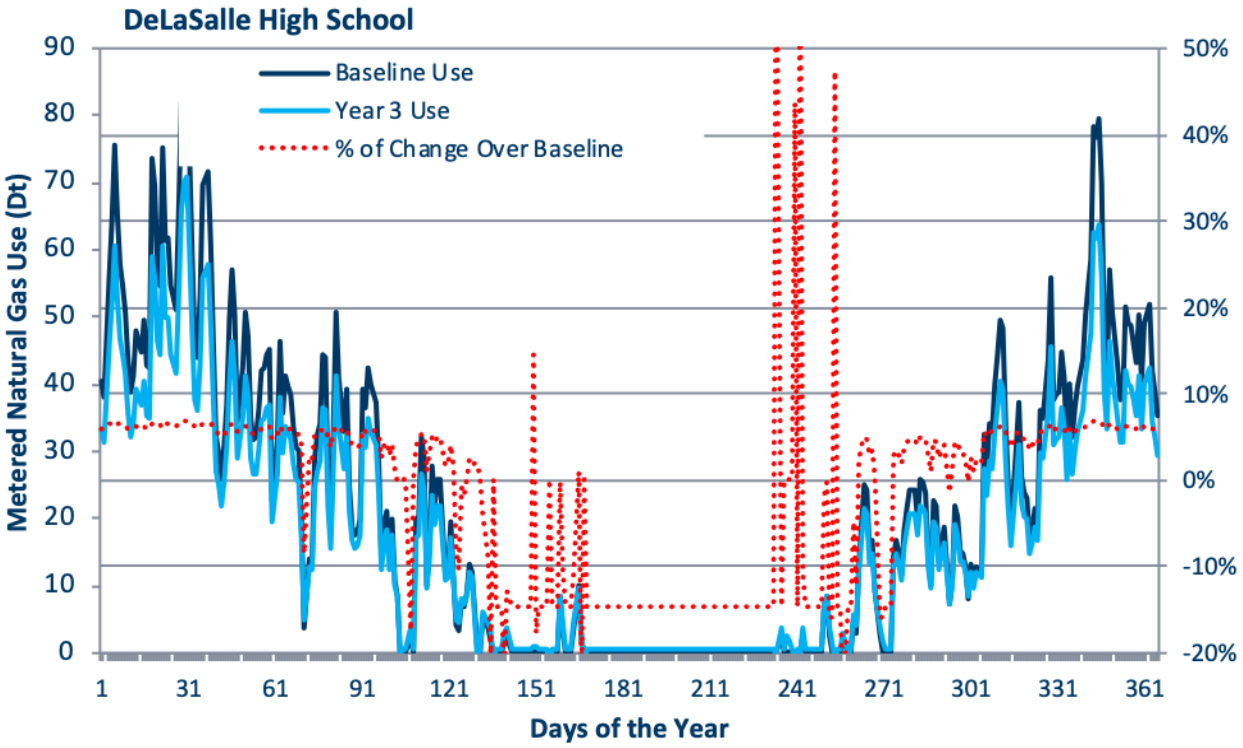
[75] We looked at total energy savings over the three-year period compared to the baseline, not just the new savings compared to the previous year.

[76] This is further supported by customer interactions seen through the Energy Intelligence program (Center for Energy and Environment, 2015).

[77] Of the 10 buildings for which we collected energy use data, two buildings ended up having characteristics that would make them poor candidates for pay for performance. The two project that were determined to be poor fits were: (1) a residential building that is master metered and has trouble disaggregating meter data, and (2) a public building that operates 24 hours a day with an inelastic energy use profile.

In Figure 4, we can see that natural gas use declined over the three-year performance period. After weather and occupancy normalization and adjustments for building operating mode, **whole-building natural gas consumption was overall 15.6% below use in the baseline year.** This customer received approximately $3,100 in utility rebates for 3,230 Dt worth of improvements made during the three-year performance period. Based on our meter-data analysis, DeLaSalle only saved 1,579 Dt during this same period. However, as actual savings, the utility may choose to compensate the customer differently than they would under the deemed savings approach. Instead of performance being rebated based on project costs, it could reflect actual impacts. Depending on how this is rewarded, this customer might have received somewhere between half as much in incentives (if the incentive rate were close to $1/Dt saved) to more than double (under a $5/Dt incentive rate). These results are laid out in Table 14.

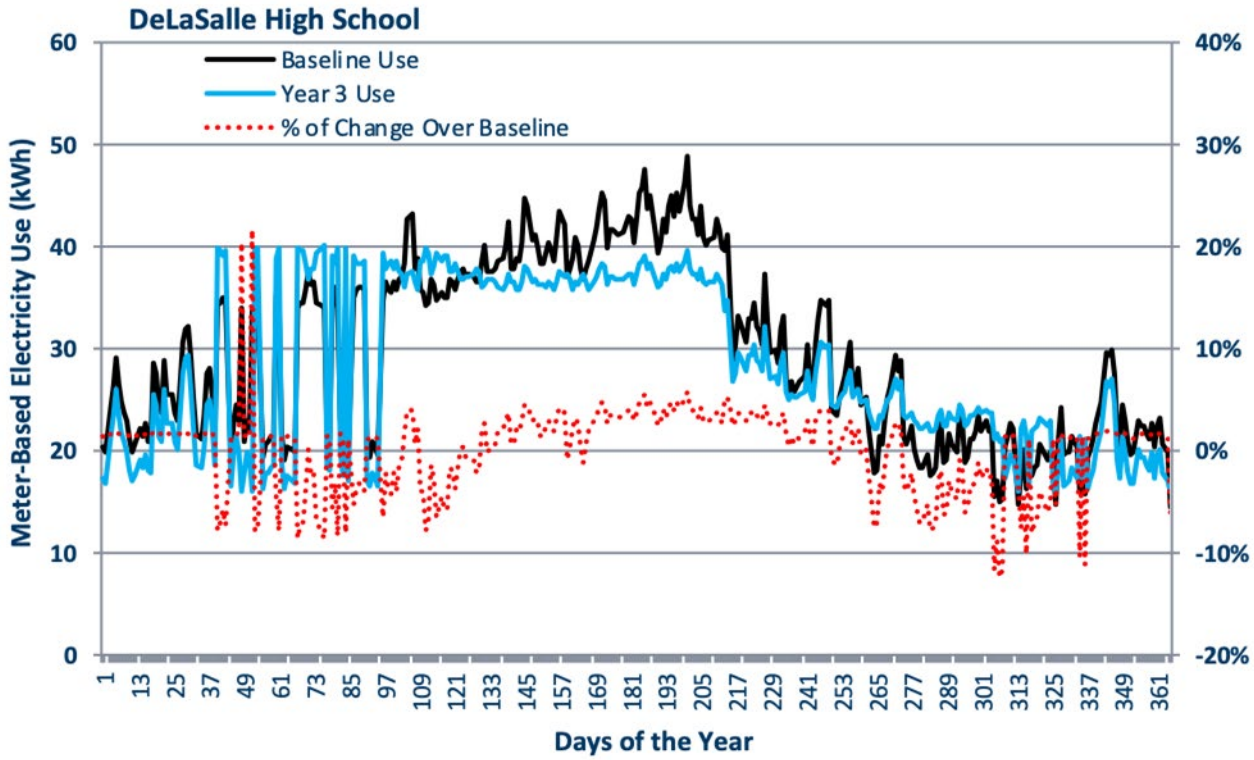
Figure 4. Whole-Building Weather and Occupant-Normalized Natural Gas Use



Due to several lighting retrofits, installation of VFDs, installation of a building automation system, and other controls, the school saw electricity use go down 5.3% in the first year. Over the course of the three-year performance period whole-building electricity use was down by 4.8% compared to the baseline year (see Figure 5). The school submitted and received rebates for approximately 117,000 kWh worth of electric efficiency improvements and earned a total of $11,653 in electric utility rebates over the course of the three years. By contrast, our analysis showed that DeLaSalle saved significantly less electricity than they were rebated for under the deemed savings model. Over the course of the performance period only 626 kWh of electricity were saved compared to the baseline (see Table 14). Some of this could be due to rebates that were granted after work (i.e., lighting retrofits were completed) and thus rebates that were captured during this period are not reflected in the baseline and performance periods.

As a separate issue, both of our case study buildings demonstrate that not all energy savings were accounted for in the savings claimed by utilities. This was in part due to some improvements not being filed with the utility for a rebate as well as that some improvements exceeded the expected deemed savings reflected in their rebate. **This points to a) the opportunity to capture more savings from a customer and b) the challenge of controlling for improvements that a customer would make without being incentivized (free ridership).** Under a meter-based (measured) savings approach, free-ridership would have to be treated differently, perhaps by adjusting for an assumed amount of naturally occurring efficiency.

Figure 5. Whole-Building Weather and Occupant Normalized Electricity Use



Incentive Scenarios

For the purpose of comparing what a customer earned under the deemed savings model to what they might earn with pay for performance, we conducted a simple earned-incentive analysis to compare the value of up-front rebates rewarded through deemed savings versus the value of a model where the customer is incentivized based on good performance over time (annually or more often). For this analysis, we used a three-year performance period and conservatively assumed that the customer would receive their incentives at the end of each performance year.

To get a sense of what types of incentives a customer may see under a pay for performance model, we evaluated the observed energy savings under two incentive rates — a low rate and a moderate rate. To complete this task, we used incentive and average annual energy savings data from the 2018 CIP Status Updates (Xcel Energy and CenterPoint Energy). We looked at the measures that would be most

applicable to a pay for performance program, particularly custom efficiency, but also recommissioning, heating efficiency, and commercial efficiency (as well as business segment portfolio-wide efficiency). We then selected a low and a moderate rate ($/unit of energy saved). When available, these rates were also informed by the incentive rates offered through other custom or SEM programs in Minnesota (e.g., Michaels Energy's Strategic Energy Management (SEM) pilot). Knowing that a commercial customer may pursue operational improvements or behavior-change activities outside of equipment upgrades, these are simply being used as guides to reflect current avoided costs and other rebate offerings.

How metered energy savings would be accounted for and incentivized is a complex topic. As a high-level analysis of what performance-based incentives might look like, many considerations identified, but not systematically accounted for in the process of determining these incentive scenarios. As discussed in other sections of this report, creating a new system of meter-based incentives and claimed savings will require input from a wide variety of stakeholders. We will also need a deeper understanding of the administration costs for a program like pay for performance. Short of this, our high-level analysis did not include other factors such as the impacts of tiered incentives and also compensated customers only for the energy savings that they demonstrated during the performance period, not the lifetime of measures beyond the three-year time frame (although the performance period could vary based on program design decisions).[78]

Table 14. Case Study Summary of Energy Savings, Rebates, and Pay for Performance Incentives (absolute value)

	Deemed		Meter-Based			
Buildings	Energy Savings	Rebates ($)	Total Applied to Incentives	Low Incentives: $0.015/kWh & $0.27/Dt	Moderate Incentives: $0.025/kWh & $0.57/Dt	High Incentives: $0.025/kWh & $0.57/Dt
Case Study 1: DeLaSalle High School						
Electricity (kWh)	117,177	$ 11,653	626	$ 6	$ 9	$ 13
Natural Gas (Dt)	3,238	$ 3,101	1,579	$ 790	$ 2,364	$ 7,897
Total Difference	-	**$ 14,754**	-	**$ (13,955)**	**$ (12,381)**	**$ (6,845)**
Case Study 2: Butler Square						
Electricity (kWh)	362,944	$ 31,646	1,858,521	$ 18,585	$ 27,878	$ 37,170
Natural Gas (Dt)	400	$ 1,145	8,046	$ 4,023	$ 12,042	$ 40,228
Total Difference	-	**$ 32,791**	-	**$ (10,183)**	**$ 7,129**	**$ 44,608**

Table 14 provides a summary of the deemed energy savings and rebates as well as the meter-based energy savings for both case study buildings. Overall, DeLaSalle performed below deemed savings estimates, and Butler Square (the second case study subject) performed better. Using year-over year-savings (i.e., the baseline resets each year to the year prior, as is common among pay for performance programs), Butler Square would have earned $7,000 to $44,000 given a moderate or high incentive rate.

[78] Because incentives were generally higher than under the deemed model, this may require the utility to consider that a customer can only participate once in a five- to six-year period.

For DeLaSalle, they would have earned less under a pay for performance model, potentially losing out on anywhere from 45% to nearly 95% of the rebates they received under the traditional rebate approach.

Deemed savings and measured-savings approaches were not designed to go together, and our data analysis highlights this point. For most whole-building or multi-measure pay for performance programs in other states customers are incentivized based on meter-based energy savings, and so the two accounting systems are kept separate. For programs that deduct energy savings from equipment-level improvements for the purposes of attributing savings and influence to the right programs, it is apparent how this could unfairly diminish the "credit" that non-deemed savings programs receive, which is a barrier to understanding the value of meter-based savings.

Overall, a building like Butler Square would have benefited through a pay for performance offering and, in the end, would have likely received greater financial incentives. In contract, DeLaSalle believes they would have benefitted from a pay for performance program as well, however they may have not received all the same incentives as they did under the current deemed savings approach. Based on our data analysis and interview with the head of facilities, DeLaSalle stated that a program like pay for performance would have helped them further optimize operations and allowed them to earn more incentives, which would be reinvested in energy improvements. Also, pay for performance could have provided some quality installation oversight as one of their improvements did not reap all the expected savings (based on post-installation calculations). While not studied here in detail, DeLaSalle may highlight a customer case that is interested to participate in pay for performance, but requires certain program design elements, such as some upfront incentives along with performance incentives.

Since some of the rebates that DeLaSalle earned were custom rebates, offering this customer a performance-based incentive does not detract from the "on average" theory underpinning the current deemed savings approach. Instead, it points to how these two systems can coexist and offer added customer, utility, and ratepayer value.

Key Observations from New Construction Buildings

Two of the four new construction buildings we evaluated were identified as strong candidates for pay for performance. These customers performed as well or better than the energy use targets set during design, resulting in the potential to earn more incentives than they did under the traditional up-front rebate approach. **Overall, these buildings — a community center and an office building — used approximately 0% to 6.6% less energy (respectively) across the whole building than the customer was compensated for through rebates at the time of design.** Based on interviews with the lead facility operators, this was likely due to several variables, but included careful operational practices that were not accounted for in their utility incentives.

We compared this range of performance to a larger sample of new construction projects in Minnesota. Figure 6 shows the largest sample of publicly benchmarked new construction buildings in the state that

have both design EUI targets and ongoing performance data.[79] Here, we see 13 buildings that show design EUI targets and actual energy usage to see the potential for helping new construction projects meet their design goals. While performance varied on average, it fell short of EUI design targets by 14% to 15%. As was noted during our interviews, not one of the 14 building operators we spoke to knew if their building had a design EUI target or what it was (four of these buildings were built in the last two years).[80] This sample includes buildings that are both meeting and falling short of design EUI targets and illustrates an opportunity to better link design EUI to operations.

Multiple energy efficiency and architectural experts in Minnesota spoke of the gap in the new construction market between energy design and operations, as well as the potential for a performance-based incentive to help close it.[81] Additionally, multiple utilities across the country are offering new construction pay for performance programs after seeing that there is a need to serve this customer segment (e.g., New Jersey's state-administered Clean Energy Program and Seattle City Light).

Figure 6: Operating EUI (meter-measured) as a Percentage of Design Energy Use Intensity (kBtu/SF)[82]

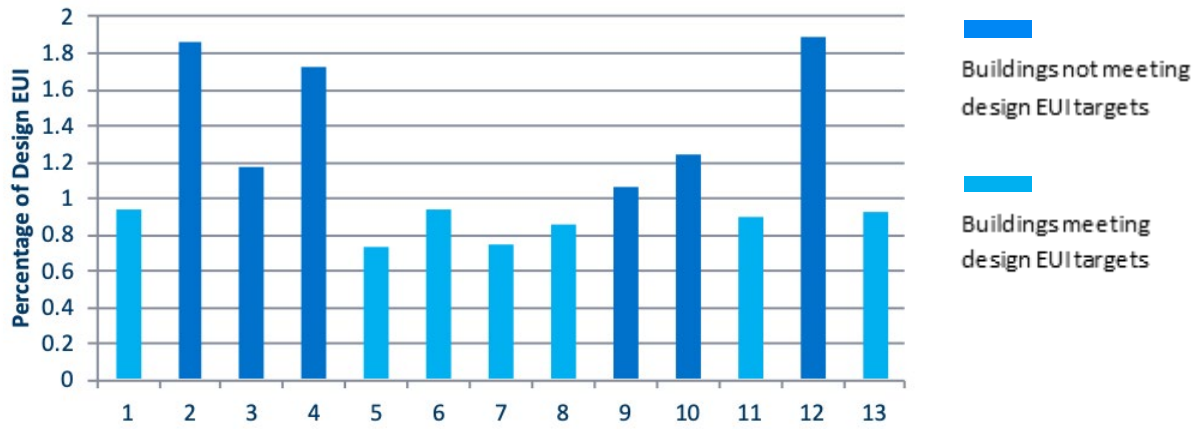


Table 15 shows the number of new construction-oriented programs from across Minnesota — not just utility programs — as context of the potential for engaging new construction customers. On average in 2017, over 250 commercial customers participated in energy design assistance or a high-performance standard (voluntary or mandatory). These customers would be ideal candidates (Target Market B) and could be reached through a pay for performance overlay to one or more of these programs.

[79] Minnesota Benchmarking website. https://mn.b3benchmarking.com/

[80] Of the four building operators interviewed, with five buildings in question, none of them new the design EUI for the buildings they were operating.

[81] Ryan Companies Interview, Eric Morin (December 26, 2018). Slipstream Interviews, Scott Hackle and Brett Bridgeland (November 19, 2019). CSBR Interview, Pat Smith (May 22, 2019). TKDA Interview, Elizabeth Tomlinson (October 19, 2019).

[82] Building data provided through the Buildings Benchmarking and Beyond (B3) database, under which commercial buildings have to set design EUI targets and meet a state-adopted standard known as SB2030.

Table 15. New Construction Programs to which Pay for Performance Could Be Added[83]

Savings Estimates Compared to Code Baseline	Participant Count*	Average Per Customer Electric Savings (MMBtu)	Average Per Customer Natural Gas Savings (kBtu)	KW Savings	Data Year(s)
Energy Design Assistance**	201	1,604	2,500	105	2017
SB2030	19	729	596	n/a	2014–2017
LEED® ***	33	481	394	n/a	2016–2019
Performance Based Procurement	3	729	596	n/a	2016–2018

*Only electric customers counted for total EDA type program participation so to not double count between natural gas and electric participants, but respective participation counts applied for determining average savings per customer.

**Energy Design Assistance types of programs included all those programs that offer beyond code plan review or energy modeling support for new construction and major renovations, with the exception of new construction lighting-only programs which would not be prime candidates for pay for performance.

***Assume that 35% of the 94 LEED projects in MN (weighted average based on U.S. distribution of LEED projects) are new core and shell construction or major renovations instead of tenant improvement projects (interior renovations) which may not meet the recommended requirements for participation.

Estimated Technical Potential

Based on interviews and a program administrator survey of providers in other states, stand-alone pay for performance programs are primarily seeing savings in the realm of 15%–20% of total building energy use. Since this is a required estimate for multiple programs, customers are generally hitting this target with an error of 10% +/-. This is reinforced by program and incentive design decisions around an allowable margin of error and can impact the last 25%–50% of customer rebates — the other 50%–75% allocated earlier in the performance period.

While aligning performance periods with actual equipment improvements (as opposed to the date of rebate) proved to be challenging, our data analysis illustrated one case of a building performing better than deemed savings reflected and one case where the building performed worse. From our two in-depth case studies looking specfically at candidates that align with Target Market A, we saw whole-building electric savings ranging from 1.6% to 10%, and natural gas savings of 0% to 5.2%.

These observations align with what other programs in Minnesota have found around performance-based savings. Xcel Energy's Energy Information System (EIS) program implemented by Michaels Energy in Minnesota and in Colorado noted that they are seeing savings in the range of 3% to 12% of total building energy with no consistent split between electric and natural gas savings. This is after

[83]Effinger, J. et al. Overcoming Barriers to Whole Building M&V in Commercial Buildings. Portland Energy Conservation (PECI). ACEEE Summer Study 2012. https://pdfs.semanticscholar.org/ea12/ee01626328de71f8089766de938f59241fc9.pdf

equipment-based savings are subtracted out. In a 2014 ACEEE Summer Study Report, Nexant reported that in two separate studies 36% to 40% of buidlings in a large sample of buidlings undergoing whole-building energy analysis save in excess of 10% of total buidling electricity. Conservatively speaking, the level of savings seen by Xcel Energy's EIS program/pilot could be representative of what pay for performance could achieve if overlayed over a broader array of existing programs.

Using these savings assumptions as guides, the energy savings technical potential for each each Market is shown in Figure 14. Assumptions around the distribution and prevelance of certain building sizes and types were derived from the Dodge Database 2014–2017. Energy load information was from U.S. Department of Energy's Commercial Buildings Energy Consumption Survey (CBECS) database was used in combination with this data to calculate total energy loads by energy use type. CBECS data and commercial real estate reports were used to account for the prevalence of key building characteristics such as having building automation systems or being managed by a third-party proerpty management company.[84]

Table 16. Summary of Energy Savings Technical Potential by Approach

Market/Approach	Electric Savings (MMBtu)	Natural Gas Savings (MMBtu)	Total Energy Savings (MMBtu)	Potential for Peak kW Reductions
Target Market A	76,700	54,500	131,200	X
Target Market B	16,000	8,700	24,700	X
Target Market C	13,500	9,500	23,000	X
Target Market D	NA	NA	NA	X
TOTAL	**106,200**	**72,700**	**178,900**	

Since pay for performance incentives to third parties were not a primary focus of this study, we did not calculate a top-down technical potential energy savings estimate for Market/Approach D. However, as a proxy, we inventoried the current number of whole-building and complex multi-measure programs offered by the seven largest utilities in the state (Minnesota Power, Otter Tail Power, Xcel Energy, CenterPoint Energy, Minnesota Energy Resources, Great River Energy, Southern Minnesota Municipal Power Authority, and Rochester Public Utilities).

[84] It is clear that AMI is not necessary for implementing a pay for performance program (e.g., DCSEU does not have full AMI roll-out), however it can help get at deeper savings, through more granular measurement in addition to more immediate guidance based on proximate energy use patterns. Our analysis of the technical potential did not allow us to test the motivational and informational benefit of regular performance incentives and ongoing technical assistance.

Based on the energy savings documented in the most recent CIP Status Reports (see Figure 15) and utility annual reports, these programs save 34 million kWh and 200,000 Dt in 2017. Applying the same logic used to assess the energy savings technical potential of the other target market segments, program providers could find 3% to 12% additional savings under a pay for performance model. This does not account for the potential additional motivation that more frequent incentive payments might have on the participants. This could further engage that party, raising awareness and motivation. Conservatively, the flexibility to look for deeper technology-agnostic savings tied to performance-based incentives could offer Minnesota commercial customers and utilities access up to 4 million kWh and 24,000 Dt of new, deeper energy savings.

Table 17. Whole-Building and Multi-Measure Energy Efficiency Programs in Minnesota

Source	Rebate/Program Types	Participants	kWh/Dth Claimed	Customer kW	Year
TOTAL ELECTRIC SAVINGS	Custom efficiency, Recommissioning, Efficient building controls, Energy management system programs, engineering studies	203	34,877,911	5,879	2017
TOTAL NATURAL GAS SAVINGS		148	205,299	-	2017

Section 5. Identification & Discussion of Challenges

Interviews with utilities and program providers identified several concerns and challenges that would impact the development and implementation of pay for performance programs in Minnesota. Some of these challenges are actual barriers to pay for performance program creation and may require action on the part of regulators, utilities, and industry stakeholders. We outline the ramifications of current conditions and impacts of taking action to change these conditions (e.g., CIP policies and practices).

The primary barriers identified by our research are listed below. These issues are not discrete and do overlap. However, in this section they are discussed in turn.

1. Separating behavioral savings and asset-based savings from whole-building savings
2. Measurement and verification of practices that fairly capture measured or meter-based savings
3. The target market for pay for performance is often correlated with district energy heating and cooling, utilities that are not directly covered under CIP
4. Program cost-effectiveness in a market with low energy rates and low avoided costs

1. Claiming Savings from Whole-Building Programs

Separating behavioral savings and asset-based savings (attribution) for programs measuring savings at the whole-building level is a key challenge for the whole-building pay for performance model. There are two types of energy savings in Minnesota today, each following a different method for claiming savings. This bifurcation requires program providers to spend more time and effort accounting for various types of energy savings. One of the key benefits of whole-building programs is their holistic view of building performance — more like that of an owner or operator. By having to manage and track different types of energy savings, some of that benefit is lost.

The two types of savings mentioned above are (1) asset-based and (2) behavioral energy savings. For asset or equipment-based energy savings, program providers and utilities claim energy savings based on engineering calculations under the Minnesota Technical Reference Manual (TRM) or their own engineering calculations and measurement and verification for custom projects. For behavioral savings, which broadly encompasses individual and group occupant behavior change, operator behavior change, and operational adjustments such as schedule or set-point changes, the Average Savings Method is applied.[85]

Under the Average Savings Method, an average lifetime of three years is applied to all measures and programs are conducted in increments of three years. One-third of the energy savings observed in the first year are claimed across each of the three years. Figure 16 illustrates how savings are claimed under this method. For more detail, refer to the Energy Efficient Behavioral Programs CARD report by Illume

[85] For comparison to Minnesota, in 2017 the Colorado PUC redesigned this method to achieve a method that was seen by that Commission as more flexible (Decision No. C14-0731).

(2015).[86] The reason this method is used is to put behavioral savings on a more even playing field with equipment-based savings, since counting behavioral savings in each year of the program results in double-counting savings that is persisting from year-to-year. This is unlike equipment-based savings accounting, which only counts the first-year savings, even though the savings persists for the lifetime of the equipment

Table 18. Example of How the Average Savings Method is Applied

Average Savings Method	Year 1	Year 2	Year 3	Year 4	Year 5
Observed Savings	150	225	281	225 (=80% of previous year	180 (=80% of previous year
1st year report savings	50	50	50		
2nd year report savings		75	75	75	
3rd year report savings			94	94	94
Savings Claimed toward CIP Goals	50 (=1/3 of observed)	75 (=1/3 of observed)	94 (=1/3 of observed)	0	0

As a practical matter, whole-building conservation programs either target one type of (asset-based or behavioral) during a participation period, or one type of savings must be tracked and separated out. This must be done for the purpose of administering rebates as well as claiming energy savings. Under the existing claimed savings methods mentioned above, this level of accounting is cumbersome for smaller utilities and increases implementation costs while also potentially making programs less customer friendly.

The key issue here is that the bifurcation between asset-based (i.e., equipment) and behavioral savings is potentially a barrier to getting at deeper energy savings. This barrier and opportunity have been identified in New York (working on building system level and whole-building level efficiency programs)[87] and California (Normalized Meter-Based Energy Consumption or NMEC)[88] and is currently being

[86] The savings after year one only account for the savings above and beyond the savings observed in the previous year. Savings that may occur in the years after year three are disregarded, including the residual 1/3 savings from year 2 and the 1/3 savings (x2) from year three. The basis for this methodology is that behavioral savings will not persist if feedback mechanisms are not in place, hence the reason for not continuing to claim savings after a program ends (after three years. *For additional details, see the 2015 CARD report from Illume: Energy Efficiency Behavioral Programs: Literature Review, Benchmarking Analysis, and Evaluation Guidelines.*

[87] City of New York, One City Built to Last: Transforming New York City Buildings for a Low-Carbon Future, The City of New York, Mayor's Office of Sustainability. http://www.nyc.gov/html/gbee/downloads/pdf/TWGreport_2ndEdition_sm.pdf

[88] https://pda.energydataweb.com/api/view/2135/CWBD%20Study%20Process%20Report%20Draft%20Final%20Report%2002.21.2019.pdf

explored in each state. The goal of this exploration is to see what additional savings can be captured through whole-building programs are when conservation efforts are not limited by measure line items. These programs may be able to capture more energy savings, but understanding the cost of these deeper savings is key because in some states deeper energy savings are worth more than in states with lower avoided energy costs, as is the case in Minnesota.

Using whole-building savings methods could be helpful in encouraging proper operation and commissioning of equipment, resulting in additional savings. For example, quality assurance programs are not common in commercial utility programs, yet research shows gaps in commissioning and installation of more complex equipment such as energy recovery ventilation units.[89] Under a whole-building approach incentives and tools could incentivize a building operator to take action if equipment is not installed properly, a value-add that is not accounted for in the current measure based system. However, currently these individuals are not incentivized right after the point of equipment install when their follow-through could be most impactful. In the case of ensuring that equipment is properly installed and commissioned, operators can act when these jobs are not carried out correctly. In whole-building programs, currently, these savings are counted as equipment-based savings ignoring the roll of operator action.[90]

Measure Lifetime

Pay for performance is intended to influence those that have an impact on energy use and by nature engage building operators. Facility operators range in experience and training, but particularly for large buildings and higher-performing customers, they have the potential to make operational changes that persist beyond the three-year timeframe currently outlined in Minnesota's average savings method. Examples of these types of changes are schedule changes that are made in building controls and that do not rely on behavioral muscle-memory. While the three-year measure lifetime (under the Average Savings Method) is not a barrier for pay for performance programs, in some cases it could undervalue the impact of operational changes.[91]

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[89] Quinnell, J. *Energy Recovery in Minnesota Commercial and Institutional Buildings: Expectations and Performance*. Center for Energy and Environment. Prepared for the Minnesota Department of Commerce, Conservation Applied Research & Development Grant COMM-20130501-72920. April 2017. https://www.mncee.org/resources/resource-center/technical-reports/energy-recovery-in-minnesota-commercial-and-instit/

[90] The program engaging the building operator gets credit for *influencing* energy savings, but the accounting becomes complicated, and it undermines programs that work on follow-up actions to ensure actual energy savings.

[91] While less central to the concerns raised in our interviews, single-entity and group behavior change (i.e., changes made because of individual prompts or behavioral campaigns), there is new evidence that behavior changes persist longer than the three-year assumption in place today. Illume's 2015 study points to studies that provide evidence that five years might be a more accurate estimate for persistence, yet treating behavior change as having a measure life continues to provide challenges of accuracy.

The Value of Measured Savings

Another barrier to pay for performance is that there is currently no clear signal to utilities and program providers regarding the value of measured savings. To date this has not been an issue, as smart meter (i.e., AMI) deployment has mostly been in the residential sector (primarily by Minnesota Power and Wright-Hennepin Cooperative). As AMI is deployed more aggressively in the commercial sector in the next five years, there will be more potential to track and use measured savings — not just to support accounting of savings under CIP, but also as measurable resources that can be used during integrated resource and distribution planning. Minnesota Power commented on this benefit during our interview. They pointed to the future value of understanding customer demand and peak demand patterns by customer segment and geographically. They further commented on how this would be helpful during distribution planning and resource planning.[92]

Greater clarity on the value of measured (meter-based) energy savings could be helpful for developing whole-building pay for performance programs.

Greater clarity on the value of measured (meter-based) energy savings could be helpful for developing whole-building pay for performance programs in Minnesota. If expressed through an alternative claimed savings method, regulators and stakeholders could outline a holistic and streamlined way of treating all savings across a building. Its design could also consider how to complement programs that are increasingly customer and operator friendly, and in the case of pay for performance, operator oriented. Finally, an alternative method could also help to capture new benefit that the technology is helping enable.

2. Confidence in Measurement & Verification

Measurement and verification, or the process of tracking and processing meter-data for the purpose of providing customer incentives and claiming savings, is a central consideration when developing a pay for performance program. It has been raised as a key consideration in nearly all reports studying pay for performance in recent years.[93] During our interviews, every utility raised measurement and verification (M&V) as an issue to address and expressed a need for more education about current best practices or concern about the burden of administering.

Because whole-building, meter-based savings (actual performance) incentive programs are not yet implemented in Minnesota, there is risk in using M&V methods that are not fair and balanced for participating customers, ratepayers, and utilities. This issue deserves considerable analysis and consideration for lessons learned from utility programs in other states. Currently, utilities feel customer

[92] Interview. Minnesota Power. July 31, 2019.

[93] Cadmus Group. Review of Impact Evaluation Best Practices Report (R91). Connecticut Energy Efficiency Board. March 2016. https://www.energizect.com

satisfaction risk when rolling out a new offering. Even with new energy savings opportunities are at stake, utilities are risk averse when there is potential for criticism from customers, regulators, or advocates. The fear is that this could diminish trust between customers or regulators and the utility and that this may not be worth it. Having buy-in from all Minnesota utilities and regulators will help all parties hedge against these risks.

Thorough M&V can be expensive. A 2015 report from the Federal Energy Management Program notes that the appropriate amount of M&V for a project tends to account for 2% to 5% of total project costs. The greatest expense comes from the need for developing simulations in the case of complex retrofits or in the case of new construction (e.g., IPMVP Option D). In these cases, simulations function as a counterfactual or baseline, against which metered savings would be compared. These are time consuming and subject to missed reporting between the building operator and the M&V party.[94]

As was discussed earlier, the promise of the emerging M&V 2.0 approach is to bring down cost through process automation. This is still a work in progress. Pilot programs performed in Missouri and Michigan have been studying M&V 2.0 through pilots and as recently as 2017 have not been able to determine the cost of implementation, in large part because the cost of software packages offered to utilities is not consistent.[95] The level of automation and the accuracy of outputs from M&V 2.0 is not yet where the industry needs to be to provide a reliable offering to customers.

With a lack of experience benchmarking newly constructed buildings for the purposes of providing incentives, utilities expressed few opinions about how meter-based performance programs for commercial customers would be implemented in Minnesota. Based on the practices and lessons learned from program providers in other states, acceptable, cost-effective practices appear to be emerging around how to create a credible baseline in the absence of historic energy use. Instead of using code as the baseline for comparison, a baseline is formed from a group of peer new construction buildings of similar type and size in the same climate zone, are.[96] This approach helps to account for local building practices and interpretations of code that might not be captured in a "code" baseline. In Seattle, the sample of peer buildings was only three or four buildings, but the average energy use per square foot for these buildings provided an energy use intensity (EUI) comparison that was deemed fair to both the building owners and utility.

State regulators could help encourage meter-based performance programs through regular updates to approved M&V protocols and best practices that address not only existing buildings but new construction buildings.

Overall, for existing and new construction projects, there is more agreement on what factors should be tracked and normalized. The Strategic Energy Management program being implemented by Michaels

[94] MYV Guidelines: Measurement and Verification for Performance-Based Contracts Version 4.0. DOE FEMP, 2015.

[95] Kusper, Jason, et. al., 2016 M&V 2.0: Hype vs. Reality, 2016 ACEEE Summer Study on Energy Efficiency in Buildings. https://aceee.org/files/proceedings/2016/data/papers/2_868.pdf

[96] Interview: Seattle City Light, Joseph Fernandi (September 26, 2018).

Energy in Minnesota and Colorado for Xcel Energy customers has adopted a number of these practices, and it has gone beyond in some cases. Across the seven programs that we studied in detail, the key practices seen in multi-measure or whole building pay for performance programs are:

- Weather normalization that is based on custom heating and cooling degree days based on the customer's balance point
- Occupancy normalization that includes a day of the week variable that treats weekends or Sundays separately, a holiday variable, and a variable for remarkable operational changes

Beyond adoption of approved M&V protocols, which Minnesota has done,[97] further direction from regulators on best practices for utilities could help make program implementation costs more certain. Performance-based programs that need to incur M&V costs will still be more expensive to implement than traditional deemed savings rebate programs, greater clarification on the rigor of the protocol will allow program providers to provide the minimal amount of M&V that is needed to verify savings with sufficient confidence. A pay for performance pilot could test one or more M&V protocols to provide more clarification on preferred practices. A pilot could use both equipment level and whole-building meter data to further analyze the extent to which whole-building meter-based savings are accurate.

In the coming era of advanced metering, capabilities for more rigorous M&V will increase as the issue is studied across the country. However, with that capability and access to more data, there can be added costs and complexity if expectations of how to treat the data are not updated and clarified. Measurement and verification protocols will continue to better leverage technology solutions to increase accuracy and lower processing costs. In the interim, it is important that Minnesota utilities, regulators, and program providers become more familiar with applying preferred protocols for existing and new construction buildings. Only with hands-on experience will we get smarter about the challenges we need to overcome and how to harness measured savings for incentives and in utility planning processes.

3. Market Segments Served by District Energy

As was discussed previously, the best-suited customers for a direct pay for performance program are large commercial customers with above average tools and resources — "high performers" (Target Market A). While it was not originally part of the scope of this study to look at the overlap of the target market with use of district energy, it became apparent that it is a common circumstance among this customer segment. High-performing customers tend to be in dense urban areas, business parks, or institutional campuses. For these customers, they receive some combination of their space heating and cooling and domestic hot water from district energy utilities, and in some cases snowmelt and process water services.

For these customers, these services largely replace natural gas consumption with some trade-offs on electric energy use between reduced fan power and more use of pumps. These customers are often

[97] Minnesota Department of Energy Security, 2008. Measurement and Verification Protocols for Large Custom CIP Projects Version 1.0. http://mn.gov/commerce-stat/pdfs/cip-mv-protocols-large-project.pdf

served by district energy providers that provide hot and chilled water or steam *at cost*, passing through all costs to customers as they occur. However, as nonregulated utility services, markets served by district energy — like customers that heat their spaces and domestic water on-site with natural gas — do not have access to conservation programs through Minnesota's CIP.

For these customers, a substantial amount of the energy needed to operate a commercial is supplied through district energy services — 35% to 54% on average for offices, schools, and retail facilities.[98] As a result, the opportunity to benefit from a program like pay for performance is greatly diminished. Traditionally, heating and cooling are where the deepest energy savings can be achieved and for these customers, they are unable to control these types of efficiencies. Instead, these are captured at the plant level.

The potential to scale pay for performance is undermined by the fact that, for district energy customers, the opportunity to achieve savings that are significant enough to earn a meaningful incentive will be more narrow. While an incentive is not the only key benefit that interests this market (e.g., access to tools and technical assistance), this could be a barrier for attracting customers, and certainly it diminishes the overall savings opportunity as it pertains to CIP.

Over 50% of the buildings we reviewed through data analysis or through the focus group are on district systems. Despite this context, every large building operator and manager we spoke to expressed interest in participating in a pay for performance pilot program. To serve these customers in a way that supports overall building performance, whether Target Market A, B or C, perhaps there is a way for electric and natural gas utilities to collaborate with the district energy companies to increase customer engagement. While not standard practice today, this could be a novel way to serve this customer segment holistically and provide them with added value.

4. Program Cost-Effectiveness

Developing a cost-effective pay for performance program requires overcoming some of the obstacles already discussed in this report. By nature, whole building pay for performance is intended to "mine" energy savings that you don't get through traditional rebate programs. While customer engagement and energy use transparency are not definitive traits of a pay for performance program, they are features Minnesota customers value highly. With these features, the opportunity with pay for performance is to get at deeper savings that would not be reached through other means, and potentially to do so more cost-effectively.

Whole building pay for performance programs are now being implemented in at least 10 states.[99] In these states, pilots have matured to programs and, although relatively new, they are proving to be cost-

[98] Commercial Buildings Energy Consumption Survey (CBECS), Table E1. Major fuel consumption (Btu) by end use, 2012. https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/e1.php

[99] Northeast Energy Efficiency Partnership (NEEP), Is Pay for Performance Performing? https://neep.org/sites/default/files/resources/P4PWebinarIsPayForPerformancePerforming2.pdf

effective. While Minnesota has low energy rates and low avoided costs compared to most of the states currently implementing pay for performance programs or pilots, this is not true across the board.

Demand Savings

One of the major interests brought up by four of the five electric utilities interviewed by our team was the opportunity to capture peak demand savings (kW). Saving kW at peak times is a valuable resource to most electric utilities in Minnesota. Under the current CIP framework, utilities can earn cost-recovery for efforts made to reduce peak kW, provided there are associated energy savings. **If utilities see whole building pay for performance as a vehicle for capturing energy savings (kWh) to help meet CIP goals and reduce peak demand (kW), the value proposition could be significantly more appealing.** Many of the existing pay for performance programs in other parts of the country are capturing and measuring kWh and kW, demonstrating that there are models that capture both.

Pay for performance could be an important channel for capturing demand reductions, namely because the offering is meter-based and focused on measured outcomes by nature. It also sends signals to the customer through customer engagement and incentives that it is important how you consume energy and to be able to control your load at various times. Because any one of the Target Markets is large enough to aggregate significant peak demand (kW), the potential to leverage such a program for larger-scale demand curtailment could be a valuable tool for electric utilities.

Non-Energy Benefits & New Construction

Beyond the potential to deliver demand savings, pay for performance provides other, *non-energy* benefits that are important to the utility. Pay for performance is an approach that allows for ongoing customer engagement. A participant would stay engaged in the program for three years (under current behavior program guidelines, though this could be extended), through which time the utility would become a technical partner, a trusted expert, and an educator. Participating customers would also see the utility valuing deeper energy savings through the collaboration they receive to get those savings and potential in how incentives are structured (i.e., tiered incentives or bonuses). In addition to the customer engagement value, meter-based pay for performance programs would provide a significant learning value to utilities as they grapple with how to leverage granular, advanced-metering customer data.

For the new construction market, pay for performance could fill a rebate gap that exists in the marketplace. As more new construction buildings are looking to build above code — in part because of the success of utility programs that provide energy design support — there are more buildings that are designed to meet a specific energy performance target (e.g., EUI). These customers can acquire rebates at the measure level based on estimated energy savings. However, with design targets in hand, these buildings are prime targets for receiving benefit based on actual performance. Performance incentives to the customer, especially those who build to own, could be kept, or passed on to design professionals in circumstances where third parties were obliged to ensure that their client meets their energy performance target.

If some of the barriers discussed earlier in this section are addressed, it could have important impacts on whole building pay for performance cost-effectiveness in Minnesota.

Section 6. Program Design Preferences & Tools

Previously we discussed the core design elements of a pay for performance program, but in this section, we look at the key features that could make a program valuable in Minnesota. These observations are based on our review about what would make a program unique compared to other program options, as well as what preferences customers in Minnesota expressed.

In short, these include:

Building Operators and Property Managers:

1. Providing enough benefit to risk potential to motivate customers to participate
2. Determining *if* and *when* a "project" is a good candidate for program participation
3. Ensuring measurement and verification protocols are fair, clear, and understandable for participants

Architects and Developers:

1. How to cover first costs without a full incentive up front
2. An incentive large enough or visible enough to motivate

While it is not in the scope of this study to design a program for delivery, based on the key design considerations seen in other programs across the country and hearing key concerns from the parties that would be eligible to participate, we have provided guidance on a number of these design features below.

Program Design Considerations

- **Setting a Performance Target:** Whether an existing building or new construction building, the value of targets is significant not only as a tactic that appeals to a natural sense of competition and achievement, but also because it is helpful for robust incentive design.[100] By setting one or more performance targets, such as energy use intensity (kBtu/SF) or a reduction in whole-building energy use, an incentive can be provided when that level of performance is exceeded. The incentive could also scale based on the extent to which savings occur beyond the goal (relative to a program requirement or guideline or created on a per customer basis). Creating multiple tiers of achievement is seen as a best practice. Incentives can then come in the form of $/kWh and $/kW saved within a bracket of savings relative to a performance target or in the form of a bonus once hitting a new benchmark.
- The setting of a performance target is also necessary in new construction projects. It is an industry best practice to set energy design targets in early design for new construction and major renovation projects that are thinking about long-term energy cost and operations. While

[100] Sailer, Michael, Jan Ulrich Hense, Sarah Katharina Mayr, and Heinz Mandl. "How Gamification Motivates: An Experimental Study of the Effects of Specific Game Design Elements on Psychological Need Satisfaction." *Computers in Human Behavior*. Volume 69, Pages 371-380. April 2017.

incentives can be provided to these customers based on how they perform compared to peer buildings, tying incentives to a performance target that is also tied to the energy design target can help motivate building owners and utilities to bridge the coordination gap between the design team and the operator at the time of occupancy hand-off.

- **Incentive Design:** As seen through our interviews and literature review, the most common method for administering an incentive was through a customer reimbursement that was provided on an annual basis. In contrast, there were some offerings that provided incentives on a quarterly or semi-annual basis, but this was rarer. While other options such as offering high performers a reduced rate ($/kWh) or providing on-bill payment, these were not practiced in any of the largest programs in the country. Based on Minnesota commercial customer interviews, the preferred interval was to receive incentives quarterly. More frequently was not seen as more helpful and could possibly loose a sense of reward or importance. More often than semiannually could be challenging for the utility or program administrator, so a balance between semiannual and quarterly was most acceptable.
- Overall, customers expressed an interest in incentive and program design that would help them drive down project payback or give them the potential to drive it down the most. From our interviews, including one with Xcel Energy regarding their performance-based incentive program Peak Rewards offered in their Colorado service territory, tiered incentives are a best practice. By providing a $/kWh or $/kW that changes based on the tier of savings achieved or relative to a goal EUI, customers are motivated to go just a bit deeper on energy savings. Rewards can also be provided in the form of bonuses, but this does not continue to motivate a customer once receiving that bonus as much as a higher rate of incentive on a kWh basis.
- **Performance Period:** The performance period for a customer is synonymous with a customer's duration of participation. On the short end, some performance periods lasted only six months, compared to the longest programs that were three to five years. For Minnesota, considering current behavioral-measure limitations, it is recommended that a three- or six-year participation period be offered. If the recommended engagement period for behavior programs were modified, we would continue to recommend that participants have the flexibility to choose between two participation period durations.
- **Meter Technology:** Whole building pay for performance programs are offered by utilities with traditional meter technology and by utilities with advanced metering infrastructure (AMI). Utilities offering pay for performance tend to correlate with those that have AMI in place, but its main value is the speed at which performance feedback can be provided and how that performance may or may not be integrated with a utility's billing system. It is recommended that participating customers have AMI or anticipated having AMI soon. Access to more granular data will allow program administrators to see changes in energy use in a more nuanced way, allowing for action to be take on opportunities that could save smaller amounts of energy (2% to

4% of total building energy use) resulting in overall deeper energy savings [101] and can improve accuracy[102]

Xcel Energy's Peak Rewards Program (Colorado)

Xcel Energy's Peak Partner Rewards program is a performance-based demand response program offered to commercial customers in Colorado. The program has two incentives, both focused on time-specific energy curtailment. The first is based on the amount of load (kW) that a customer agrees to curtail if a peak demand event is called. The second incentive is separate and performance based, providing a $/kWh incentive for energy saved during an event. Customers do not take on any risk of missing out on an incentive while enrolled, but instead could be removed from the program if they do not meet their load curtailment performance targets more than once in a year. Customers are responsible for meeting load reduction targets during called events (only a few a year). As a resource, customers have an online account to access to daily consumption and real-time energy use and demand. Incentives are administered as credits on a customer's monthly energy bill, making rewards relatively frequent and commensurate with customer action.

While not a program currently offered in Minnesota, Xcel Energy is gaining experience with customer-facing performance-based incentives and how to structure them to get the greatest value and efficiency system-wide.

- **Transparency Platform:** Interestingly, most pay for performance programs explored operated without a lens into ongoing or real-time performance. This might include access to a dashboard where 15-minute, daily, or monthly energy consumption is visualized for comparison to a baseline or a performance target. While greater clarity is needed around what design features might categorize pay for performance as a behavioral program (unless an alternative method to claiming whole-building measured savings is created), a tool that increases customer feedback is encouraged, particularly at the customer (i.e., first-party) level.
- **Self-Screening Tool:** Develop a simple, but helpful screening tool to help customer determine if it is the right moment in time for them to participate in the program. This could potentially take the place of an energy study by allowing them to enter information into a calculator-style tool the types of improvements or operational practices they plan to make and an energy reduction

[101]Center for Energy and Environment. "Energy Intelligence for Industry: Technical Assistance with Electric Meter Interval Data to Maximize Savings for Small Industrial Customers." ACEEE Summer Study on Energy Efficiency in Buildings. Asilomar, CA, August 2018.
[102] Cadmus Group. Review of Impact Evaluation Best Practices Report (R91). Connecticut Energy Efficiency Board. March 2016. https://www.energizect.com

goal they hope to achieve. This will help increase customer engagement and reduce risky projects for the customer, and the utility will keep barriers to participate low.

The Role of Tools & Feedback Mechanisms

The namesake benefit of pay for performance to the program participant is the incentive itself. In a way, all incentives and rebates are a behavioral intervention that is provided with the intent of changing an actor's behavior. However, this alone does not categorize pay for performance as a behavioral program. However, behavior-change science tells us that as nonrational actors, humans often do not complete the desired action for a financial incentive alone. Real-time prompts, information feedback, and competition are some of the mechanisms that are proven to change behavioral outcomes.[103]

By definition, pay for performance does not assume that behavior-change practices will be part of program design. In fact, of the programs reviewed across the country, three have incorporated elements such as regular feedback while the remaining nine programs have not.[104] Yet, incorporating targeted behavioral elements such as real-time prompts or benchmarking could have a significant impact on participant performance — for end-user customers and contractors or program providers alike.

The role of a customer-facing dashboard is a feature that not all pay for performance offerings in other states provide. As suggested through our interviews, such a tool would be valued by customers in Minnesota. Beyond an opportunity for earning financial incentives, customers were most interested in technical assistance that helps evaluate and suggest energy saving opportunities. Even in high-performing buildings, building operators only take time once a year (or in some outstanding cases, quarterly) to look at energy consumption patterns and think about what they expected to pay versus what they were billed. This includes thinking about quality installs and if they are seeing the performance results they intended (if they tracked intended saving at all).

A customer-facing dashboard would help enable regular technical assistance and could provide a visualization of anticipated versus actual energy savings at the time of an operational change or equipment upgrade. As was discussed in our focus group and seen in Center for Energy and Environment's Energy Intelligence program, customers may only look at the dashboard once or twice on their own.[105] Thus, the ideal dashboard would be integrated with other dashboard, like a building automation system, to help increase frequency of use.

There are several products in the marketplace that can play this role, but some better than others. Ideally, as we hear from customers, a dashboard that is integrated with utility data as well as the

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[103] Casal, S., N. DellaValle, L. Mittone, I. Soraperra. 2017. "Feedback and efficient behavior." *PLoS ONE* Volume 12 No.4. April 2017. https://doi.org/10.1371/journal.pone.0175738

[104] Although this is true regarding the tools specifically connected to the program, all utilities beside one provide customers with online account access that shows them at least monthly energy use.

[105] Center for Energy and Environment. "Energy Intelligence for Industry: Technical Assistance with Electric Meter Interval Data to Maximize Savings for Small Industrial Customers." ACEEE Summer Study on Energy Efficiency in Buildings. Asilomar, CA, August 2018.

building automation system would be preferred and most used. Since BAS systems are a go-to information source for operators, this would help encourage more frequent oversight and engagement. It is hard to find all these features in one tool, but the market of such tools is growing rapidly. Some of the most robust and integrated tools are proprietary and only available when signed up with the energy service company that owns them. Tools such as Sensei and Power Takeoff are among those most aligned Minnesota customers across Markets A through C. It is worth noting that some programs, such as the Energy Information Systems program through Xcel Energy, have an approved tools list and both Sensei and Power Takeoff are on this list.

Recurve's OpenEEmeter

OpenEEmeter, a tool developed and supported by Recurve, has a wide variety of functions that serve customers ranging from utilities, energy efficiency program providers, energy efficiency and demand aggregators to individual customers. It allows users to track, filter, and analyze data so that past and current activities can be evaluated for trends and to understand effective approaches to engagement and technical assistance or other interventions, such as incentives.

OpenEEmeter is an open source, automated system that is fed by a set of inputs such as meter data, project dates, and occupancy. The tool creates a weather-normalized, counterfactual model associated with typical annual average temperature. The calculation methods are open source with the code hosted by GitHub, which means that all the energy savings calculations are traceable and can be run by any user with a background in Python,[106] a common programming language used in the development of many other energy softwares. Energy savings estimates are derived using the CalTRACK method, a collaborative and open source process for arriving at a calculation to estimate savings. This method acts similarly to Minnesota's Technical Reference Manual, but is built to be implemented through software, such as OpenEEmeter to allow dynamic and or aggregated tracking

The OpenEEmeter works well with 15-minute interval data and has predetermined minimum data input and data availability requirements to ensure valid results. During data processing, the model can determine best fits in terms of change points for both heating and cooling regressions, which adds a higher degree of accuracy to the savings calculation and counterfactual model. The dashboard functions for program operators and "aggregators" of energy efficiency. Recurve's dashboards allow program operators to track pay for performance participants at scale in combination with modular outputs such as hourly carbon savings. Recently, Recurve has been working with NYSERDA to launch their third-party pay for performance program as one strategy to advance the goals of the REV initiative.[107]

[106] Recurve Web content: https://www.recurve.com/open-source/how-it-works

[107] Recure Web Content on Pay for Performance. https://www.recurve.com/blog/nyserda-p4p-is-a-critical-opportunity-for-efficiency-implementers

While less central to the focus of this study, there is a role for tools that is important, but different than those just discussed. Under Market D, program providers, ESCOs, or similar third parties could have access to a dashboard tool to help them see how they are acquiring their savings, which customers are responsible for the savings, and how they are tracking relative to energy savings targets. These targets might be self-set or set by the utility. From a utility perspective, a dashboard is helpful, if not necessary, for tracking the energy savings that have been achieved in total and at the provider level (or as referred to in some markets, "aggregators") for the purpose of administering incentives when benchmarks or goals are exceeded. The most prevalent tool that is serving this purpose is a tool known as OpenEEmeter.

Section 7. Recommendations

Overall, there are near-term opportunities for Minnesota utilities to access new, deeper energy savings through whole-building, metered-based performance program options such as pay for performance. Other state's such as New York, California, and Washington[108] are demonstrating that there deeper savings can be achieved when program providers and building owners/operators are given the flexibility to find savings at the whole-building level, instead of just on a per-measure basis.[109] Some of this work is still in pilot phase, but evidence supports the opportunity.[110] Based on customer feedback, there is also interest in being incentivized based on actual performance, when those incentives are paired with tools and technical support to help a building owner or operator exceed. Together, these findings suggest that a pay for performance program has a place in the Minnesota marketplace.

To better understand the full value and to evaluate challenges to delivering such a customer offering, there are a few actions that we recommend be considered and addressed.

Recommendation 1: Understanding how to manage and leverage granular energy use data for the purposes of measuring and verifying small increments of energy savings will take time. As the next three years are slated to see significant roll-out of advanced metering in commercial buildings, it is recommended that the Department of Commerce and Public Utilities Commission consider hosting a broad discussion on the value of measured savings. This would help utilities and other industry stakeholders better understand how technology could or should be integrated into the way utilities track or claim energy savings for the purposes of CIP planning and reporting, in addition to integrated resource planning and distribution planning.

Recommendation 2: The Department of Commerce should consider developing a whole-building pay for performance method for claiming energy savings to support measured-savings in the growing context of AMI. This method would be distinct from deemed savings or the average savings method and would account for programs that are designed to capture deeper energy savings through a whole-building approach. It may also consider the circumstance of programs that ask customers to take on some risk of forgone up-front reward for the chance to earn a greater incentive over time. This recommendation could be acted upon as a step toward a broader measured-savings dialogue or in addition to Recommendation 2.

Recommendation 3: Adopt IPMVP Option D as an approved method for measurement and verification in Minnesota, enabling measured performance opportunities for claiming savings in new construction and major renovation projects. If not Option D, consider adopting another

[108] Interview: 2050 Institute, Poppy Storm. January 7, 2020.

[109] Lee, Allen and Tolga Tutar. *Assessment of Common Barriers to Commercial Whole Building Energy Efficiency Solutions and Platform Solutions*. Energy Efficiency Platform. Cadmus Group. http://psdconsulting.com/oep-documents/Assessment-of-Common-Barriers-and-Potential-Solutions.pdf

[110] PG&E Commercial Whole Building Demonstration - Joint Study Report. February 21, 2019. https://pda.energydataweb.com/api/view/2135/CWBD%20Study%20Process%20Report%20Draft%20Final%20Report%2002.21.2019.pdf

rigorous and reputable measurement and verification protocol that is designed for new construction projects.

Recommendation 4: Implement a whole-building pay for performance pilot program with one or more utilities to demonstrate that high-performing large commercial customers like the program experience and can achieve deeper energy savings through this model. As part of this pilot, develop a customer screening tool that could be used to help determine when a customer has the right energy conservation plans and goals in place to be a successful participant.

Whole building pay for performance has an opportunity to be piloted in Minnesota. While extensive advanced metering will not be deployed for five years or more, AMI is not essential to the implementation of such a pilot. On-the-ground experience of how to design and operate such a program would be valuable experience for the utility and regulators as full AMI deployment approaches and thus piloting may make sense in the interim period.

After evaluating key research questions as well as several sub-questions that arose during the research, the team recognizes the challenges of introducing a new paradigm for providing incentives in Minnesota. However, as metering technology changes and utility planning processes change (integrated distribution and resource planning) it will be important to consider systems for tracking and claiming energy savings that provide flexibility to the customer in how they manage energy conservation and that is streamlined administratively.

Appendix A: List of Key Interviewees & Surveyed Individuals

Thirty-four (34) interviews were completed in total, with over forty interviewees (40). Some individuals were only interviewed, while others were both interviewed and surveyed. Those that were surveyed are indicated with an (*). Those that participated in the focus group did not participate in either the surveys or the interviews.

Program/Company Interviewed/Surveyed			
Name	**Title**	**Program, Company**	**Date Interviewed**
Beth Robin Weiler	Program Manager	Portland General Electric	9/26/2018
Jason Gregory	Energy Analyst	Energy RM	10/5/2018
Joseph Fernandi	Program Manager	Seattle City Lights	10/16/2018
Matt Ophardt	Senior Engineer	McKinstry	9/25/2018
Rob Harmon	Coalition Director	MEETS	9/24/2018
Michael Li	Senior Policy Advisor	U.S. DOE (EERE)	9/24/2018
Carl Simonson	Product Manager	Michael's	9/11/2019
Nicole Kesler	Program Manager	CEE	12/28/2018
Patti Boyd	DCSU Program Manager	VEIC	9/27/2018
Dan Fredman	NYSERDA Program Analyst	VEIC	9/27/2018

Utilities Interviewed/Surveyed			
Name	**Title, Role**	**Utility**	**Date Interviewed**
John O'Neil	Manager of Energy Efficiency	SMMPA	12/18/2018
Leah Peterson	Key Account Analyst	MN Power	7/31/2019
Katie Frye	Supervisor of Customer Programs & Services	MN Power	7/31/2019
Craig Kedrowski	Energy Efficiency Analyst	MN Power	7/31/2019
Jason Grenier	Company Market Planning Manager	OtterTail Power	1/3/2019
Jeff Haase	Member Technology & Innovation Leader	Great River Energy	12/18/2018
Carter Dedolph	CIP Implementation Manager	Center Point Energy	7/24/2019
Nina Axelson	VP of Sustainability & Outreach	District Energy	8/28/2019
Lee Hamilton	Sr. Product Portfolio Manager	Xcel Energy	9/10/2019
Brian Doyle	Strategic Segment, Team Lead	Xcel Energy	9/10/2019
Shawn White	DSM Regulatory Strategy & Planning Managerbrian	Xcel Energy	5/21/2019

Building/Company Interviewed/Surveyed Name	Title	Building, Company	Date Interviewed
Jordan Lutz	Sustainability Project Manager	Memorial Hall, Bemidji State University	5/2/2019
Travis Barnes	Director of Facilities	Memorial Hall, Bemidji State University	5/2/2019
Michael Kruse	Electronics Technician Senior	Memorial Hall, Bemidji State University	5/2/2019
Brian Field	Senior Vice President of Management Services	Lawson Commons, Frauenshuh	3/7/2019
Ron Bell	Lead Engineer	Lawson Commons, Frauenshuh	3/7/2019
Jim Giebel	Energy Coordinator	City of Saint Paul	6/11/2019
Joe Buzicky	Parks Asset Manager	City Hall Annex & Arlington Hills, City of Saint Paul	6/11/2019
Jeff Nowicki	Building Maintenance Supervisor	City of Saint Paul Police Department	6/11/2019
Ed O'Connor	City Hall Annex Facilities Manager	City of Saint Paul	6/11/2019
Nicholas Grue	Executive Director of Operations	De La Salle High School	6/14/2019
Thomas Schmidt	Power Plant Chief Engineer	Snarr Hall, Moorhead University	5/16/2019
Angela Samargia	Senior Property Manager	Butler Square, McGough Construction	5/31/2019
Josh Yates	Building Engineer	Butler Square, McGough Construction	5/31/2019
Beth Molitor	Property Manager	Hines	7/23/2019
Rob Schueler	Engineering Manager	Wells Fargo	7/23/2019
Tim Stefans	Chief Engineer	Brookfield Properties	7/23/2019
Robert Sherwood	Engineering Manager	Hines	7/23/2019
Julie Samuelson	Vice President – Facility Management	Cushman & Wakefield	7/23/2019
Cody Grendel	Chief Engineer	NA	7/23/2019
Kjersten Jaeb	General Manager	Cushman & Wakefield	7/23/2019
Renee Pinkney	Associate Real Estate Manager	Ryan Companies	7/23/2019
George Beatty	Associate Product Developer	Xcel Energy	7/23/2019
Jenae Batt	Senior Communications Specialist	Ever Green Energy	7/23/2019

Appendix B: Interview & Survey Questions

Building Owner & Operator Interview Questions

1. Describe the top energy efficiency improvement(s)/design choices you recently made to your building (also, confirm when these improvements were started and completed — by approximate month).

2. [*If they own the building] How long do you plan to own this building?

3. Were any energy savings or energy performance goals set for this project at the outset or since?

4. How important were guaranteed energy savings when you pursued these improvements/design decisions?

5. Do you have any ROI or payback goals or requirements for building construction/renovation projects?
    a. Can you provide an example of what these are for this building improvement project or others in your portfolio?

6. A) How influential were the role of utility rebates in deciding to make these investments?
   B) How important was it that this rebate was received upfront in the project?

7. Do you (or someone on your staff) track energy costs or energy use on a regular basis? Who oversees this (in-house, external expert)?
    a. If not, is this likely to change/become a focus in the future? What are the barriers?
    b. If so, how does this information inform or change building operations? What impacts or value have you seen from this?

8. Do you have a sense of what fraction of your operational costs are energy related? The average commercial building spends 22%–30% of operational budget on energy. [111, 112, 113]

9. Do you believe that your building has the potential to be run more efficiently?
    a. What indicators inform your response?

10. **Show interviewee the results of the data analysis** *Orient them to the charts and how they are performing compared to a baseline or their performance target if they have one.*

    a. Does this align with how much you thought you were saving?
    b. Do you have any reactions to the data? Does this motivate you to take any action (e.g., work to better manage energy use)?

[111] MGE webpage. https://www.mge.com/images/pdf/brochures/business/managingenergycostsinofficebuildings.pdf

[112] Enervise webpage. http://www.enervise.com/news-events/answersto-8-common-building-operation-cost-questions

[113] Facilities Net webpage. https://www.facilitiesnet.com/energyefficiency/article.aspx?id=5218

11. Would you be interested in tools (e.g., an hourly or daily energy usage dashboard) that allow you or other building operations staff to actively manage energy use and lower monthly bills?

12. What level of monthly or annual energy savings would this be enticing?
    a. A 2%-3% reduction on your current energy bill
    b. 5% reduction of your energy bill
    c. 5%-10% reduction of your energy bill
    d. More than 10% reduction of your energy bill

13. **[*If the building owner has non-MN buildings in their portfolio]** As an incentive method that is seeing more prevalence in other parts of the country, do you see value in using pay for performance on your own projects so that you have experience on development projects where your client want to use pay for performance (e.g., as a form of new construction building performance verification)?

14. Do you see pay for performance as an appealing option for your buildings or building projects in Minnesota?
    a. What barriers or concerns do you have about choosing a pay for performance approach? Do you feel you would choose this approach?
    b. What is helpful to characterize the risk?

15. If you were to participate in a pay for performance program, would you be interested in short-term participation (1 year) or long-term (2–5 years)? Why?

16. A pay for performance offering can be structured to provide no upfront incentive or partial upfront incentives with the majority of the incentive paid overtime. Would the lack of an up-front incentive be a significant hit to meeting project ROI goals or budget?
    a. With what frequency would the utility incentive need to be provided? Annually? Semi-annually? Quarterly? Monthly?
    b. Would there be a preference whether the incentive is received as a bill deduction versus a check (at whatever interval is offered or preferred — see above question)?

Developer Interview Questions

1. For a project you build and plan to own, how important is energy design and performance? Would you characterize this as a top tier priority for the company and how project dollars are invested?

2. Generally, do you manage your own buildings once built, or do you have a third party do the facility management?

3. Do you track energy costs on a regular basis? Who oversees this (in-house, external expert)?
    a. If not, is this likely to change and become a focus in the future? What are the barriers?
    b. If so, how does this information used to inform or change building operations? What impacts or value have you seen from this?

4. Do you have a sense of what fraction of your operational costs are energy related? [#__]

5. Do you believe that your buildings (built and now owned by you) have the potential to be run more efficiently?
    a. What indicators inform your response?
6. How often do your projects follow a voluntary sustainability or energy standard?
7. How often do your projects set energy performance targets?
8. How often do your projects participate in a utility program, complete recommissioning, or work with an energy service company to optimize efficiency?
9. How long do you plan to own most projects (standard assumptions)?
10. Do you have any ROI or payback goals or requirements?
    a. How important are utility rebates and incentives for hitting these targets?
11. Do you see an energy efficient building as being more competitive in the marketplace? Do you think that verified savings are more attractive?
12. How helpful are upfront incentives today?

Anticipated value and barriers:

13. Do you see pay for performance as an appealing option (for receiving utility incentives)?
    a. What barriers or concerns do you have about choosing a pay for performance approach?
    b. Is pay for performance more attractive, in your mind, for some of your projects over others (e.g., new construction over renovation projects)?
14. Would the lack of an up-front incentive be a significant hit to meeting project ROI goals or budget?
15. As a method of incentivizing that is seeing more prevalence in other parts of the country, do you see value in using pay for performance on your own projects so that you have experience on development projects where your client wants to use pay for performance (e.g., as a form of new construction building performance verification)?

Utility Interview Questions

1. There are many different versions of pay for performance programs across the country. How familiar are you with pay for performance as a program model and what defines this model for you?
2. Is pay for performance a program or incentive mechanism the utility has been looking at?
    a. What research or exploration have you done to date?
    b. What have your interests/discussions been focused on?
3. What do you see as the utility benefits of implementing a pay for performance program or program overlay?
    a. Other ratepayer or customer benefits you are interested in?

4. Is pay for performance an approach that any of your customers have been asking for?
    a. Are you interested in educating certain customers about this model?

5. What opportunities or concerns do you have about the pay for performance approach?

6. What departments have been participating in discussions or driving interest in this approach? (program development, regulatory, other)

7. Pay for performance at its core is looking to increase transparency around actual savings and link incentives to these savings. Does the utility see actual energy savings as being a valuable resource?
    a. How about in the future where AMI could enable real-time energy savings and greater predictability/reliability of these savings?
    b. Is there value in testing actual EE savings to preparation for this?

8. What information would you be most interested in for the study to capture as it conducts its interviews and looks at energy use compared to energy performance targets?

Appendix C: Summary of Participant Data Analyses

Summary of Participant Data Analyses

Building	New Const or Existing	Area Before (SF)	Area After (SF)	EUI Goal (if new constr.)	New Construct. Project Baseline EUI	EUI Before	EUI After	Electric Before (KBTU)	Electric After (KBTU)	NG Before (KBTU)	NG After (KBTU)
Building 1 (Residential)	Existing	53,893	56,463	-	-	**139.25**	**66.55**	848,963	943,259	6,655,565	2,814,116
Building 2 (Residential)	Existing	468,817	468,817	-	-	227.07	112.15	5,582,449.8	3,518,065.3	6655565.2	2814116.5
Building 3 (Recreation)	New	0	16,459	66	148	-	**61.634**	-	409,228	-	605,292
Building 4 (Recreation)	New	0	41,155	54	75	-	54.55	-	1,828,172	-	416,990
Building 5 (Training)	New	0	40,250	44	-	-	65.93	-	1,281,029.7	-	1,787,234.6
Building 6 (Office)	Existing	95,000	95,000	-	-	63.66	51.65	4,566,222	3,425,153	0	0
Building 7 (Office)	Existing	680,000	680,000	-	-	61.9	60.51	18,508,316	16,990,265	0	0
Building 8 (Residential)	Existing	142,000	156,000	-	-	**125.56**	**112.16**	98,860.55	83,897.56	8,230,114.7	7,661,363.1
Building 9 (Residential)	New			"M90 south 131 M91 East 120"		-		-		-	
Building 10 (Office)	Existing	500,000	500,000	-	-	46.39	38.77	19,080,582	15,267,609	4,115,450	4,115,450

Summary of Participant Data Analyses, Cont. (with district energy)

Building	Steam Before (KBTU)	Steam After (KBTU)	Chilled Water Before (KBTU)	Chilled Water After (KBTU)
Building 1 (Residential)	-	-	-	-
Building 2 (Residential)	-	-	-	-
Building 3 (Recreation)	-	-	-	-
Building 4 (Recreation)	-	-	-	-
Building 5 (Training)	-	-	-	-
Building 6 (Office)	1,270,307	1,310,749	420,555	300,006
Building 7 (Office)	14,101,134	14,406,332	9,484,016	9,751,349
Building 8 (Residential)	-	-	-	-
Building 9 (Residential)	- -	-	-	-
		-	-	-
Building 10 (Office)	-	-	-	-

Appendix D: Detailed Methodology for Pre-Post Meter Data Analysis

For the building owners and operators that existing buildings, the energy savings were calculated based on the annual usage differences between before and after the building renovation. To get fair energy saving numbers, monthly utility bills for both before and after were required and weather normalized using TMY3 data. This energy saving calculation was done for each fuel separately and the savings were added up to get the total savings for each site. For fuels used for building heating or cooling, the weather normalization was calculated using linear regressions with change points between metered data and HDD/CDD (heating degree days/cooling degree days) values calculated with outdoor air temperature from NOAA database. We required at least one year of metered data for those fuel usages; for fuels that were used for other loads that existed consistently through the year (e.g., electricity for lighting only), the weather normalization was based on flat average of monthly usages, so at least 4 months of data were required.

For new buildings, the energy savings were the differences between calculated baseline EUIs (energy use intensity) and the actual building EUIs. The actual building EUIs were calculated the same way as for the existing buildings. The baseline EUIs were calculated by averaging EUIs of selected buildings with the same usage type from our benchmarking database. The benchmarking database was set up by downloading the most recently published years of building benchmarking data from cities in similar climate zones as those that are found in Minnesota. These cities included Minneapolis, Boston, New York City, and Chicago. Climate zones and adopted local building codes were also documented for each respective city. Finally, the benchmarking data for each city was filtered to leave building type, year constructed (2012 and newer), occupancy (as available), energy use intensity, weather normalized energy use intensity, and ENERG Y STAR Score. Since the database buildings are within different climate zones and were built in different years under different version of ASHARE 90.1 standards, the EUIs were adjusted based on their climate zones and ASHRAE 90.1 standard versions before used for baseline calculation. The climate zone adjustments were done by normalizing the heating and cooling usages based on HDD/CDD between Minneapolis and database building cities. The heating and cooling usages for each building were estimated based on the end use percentage of DOE prototype building models. The ASHRAE 90.1 standard version adjustments were done based on the saving percentage for each building type between different standard versions listed in the technical support documents published by PNNL.

Appendix E: Focus Group Meeting Notes

- Introductions:
  - Julie: Thanks for inviting BOMA, already in PFP, EAIS program
  - Xcel interested in PfP for demand response;
    - Peak Participation Program

- 5–6 said they've heard of PFP

- What's missing from the Target Market

  - ENERGY STAR Score would help as well as the trend

  - Having dialogue with the engineers — this is the next level of the efficiency. Engineers are the right people to have the table.
    - REQUIRE: Have engineers at the table
    - REQUIRE: BAS — this is what helps you verify

  - If you make a change, did you see that you saved?

  - Most people look at the payback period: look at rebate, ROI, then what the savings goal is

  - Goal is tied to a bonus of my chief engineer for Julie Samuelson — this is for corporate real estate

  - There are less building engineers that understand the systems — nobody wants to do the job. It's really hard to find people. Dunwoody only graduated one. Common sense is what you can't teach.

  - Sub meters: all large buildings are not easy to install sub meters. This gives shame factor.

  - Savings go back to CAM fees — having less CAM fees makes your property more valuable.

  - Some engineers talk daily with the owners and manage

  - Good BAS system with good PM program
    - Preventative Maintenance
    - Some utilities actually have programs that do this

  - People may have goals, but do you have resources to implement these? Some buildings don't have the management buy in to make sure there is the time to make sure you prove the savings

- Have you ever been an owner of the building you operated?
  - Brookfield Property
  - Varies how long you will stay with a property
  - Good property managers look at the building as if you own the asset
  - Easier for third-party investor — the engineer is the constant in the building usually

  - 80% or higher treat assets like their own — but if they have such large portfolios all they can do is put out fires
  - Building pride decides decision; larger assets have that mentality because the asset requires that. Smaller manufacturing assets are fire fighting
  - Industrial portfolios have five-year lease, no concept of long term investments

- Occupancy — large investors have sustainability goals; 100K sq. ft. is small and likely doesn't have BAS system

- OTHER BLDG USE TYPES: Retail mall, office, parking ramp, restaurants are also managed

- When would you sign up for PFP?

- Program Design Considerations:

  - What is the frequency of payment you've seen?
    - Quarterly — a little more pressure
    - Monthly would still be great — but very short

  - When to sign up:
    - Obviously after any big project (chillers)
    - Like the Kilowatt Crackdown — other programs that go on can make you want to go deeper as a high performance building

- Pay for performance affects operating budget — capital budget vs. O & M
  - Engineers: I can't do my job unless the manager lets them. It can be hard to convince them sometimes, but other times the managers are very on board.
  - BAS run reports that prove savings. PM reports. Utility reports that they give managers that have ten years of history that show savings.
  - Changing every pump and motors, fans having VFDs. Doing a performance study to see what they're saving. Electronic steam and chiller valves. Superiors will want performance reports on what will happen — internal verification. This stuff starts at the top.

- Codes and Standards push technology to become more efficient — you will see rebates going away. Utilities shifting to are you running this right. Really hard for utilities to do this.

- Julie: Installed all these measurement equipment, but engineers didn't know what they were looking at or how to look at it
  - EIS program

- Looking at energy use over years you can realize new budgets for energy spend that are lower and more accurate

- ENGINEERS KNOW HISTORY

- Would a tool that feeds you that information be helpful

  - If he can trust the data — some of the companies are not accurate and they don't give it until 2 months later

  - Would love real time data
  - Tool like this could be great for smaller buildings or don't have an onsite engineer; an overlay tool would be helpful
  - Electricity + outside air temp and humidity are the only two things you need to look at (or gas)
    - Weather Normalizing your own data
  - Marquette towers + other towers have engineers, but those that don't have onsite engineers would be a great fit for a tool that weather normalize weather — anything less than 500K sqft.
  - Might need a data interpreter for the data for the decision makers and those that don't know what that means

- Ever Green — billing is still a manual process even though their meters are minute data. Charges will probably never be automated in the next 5–10 years. Even working on a portal
  - Not a barrier, because buildings know that the lower the energy the lower their cost will be

- Interview takeaways to date
  - Don't necessarily agree that upfront incentives aren't essential. Upfront can push a project off the edge.
  - Custom rebates drive the project forward — the decreased payback period
  - The culture in this state is that if you do an energy project there is a rebate, and if you don't have one, you better find it.
  - City's aren't competent to enforce codes — plug loads are why you would do PFP
  - Don't think our state is at the point for new programs — don't want this program to take away CIP dollars from smaller buildings for the sake of helping the large, high performing building
  - What % is taking advantage of this performance program in states that have this?
  - Legislative: Have to save kWh — can't do load shifting and batteries, etc.

- Characterization:
  - Pay back requirements:
    - No formal one
    - 3–5 years at the longest,
    - 18 months or less is no brainer
    - 12 months is no brainer — don't even ask
    - $ threshold based on size - $1 per sq. ft. vs .10 $ per sq. ft.
      - But this varies by building size
  - What % of capital budget is that threshold?
    - Doesn't come in to play
  - Have a stated continual 4% consumption reduction year over year — Julie
    - Dollar that she spends comes from a separate bucket
    - Shared Key Performance Indicator with the investor

        - Unfortunately, doesn't normalize for occupancy

    - Operating expenses go to tenant — capital expenses are taken by owner. Also, savings for operating savings go back to tenant.
        - A good energy savings program mitigates tax increases and wage increases

    - IF you have a building that is 60% occupied — they will look at lowering expenses to attract tenants

    - 50–60 cents per square foot — will look at something that will offset that initial cost or phase the project so that you don't have that huge impact

    - Owner's goals are important — if EE is one of them that allow capital expenses to be justified. Investors sometimes don't like to do this because they will never realize the savings

    - Tenants are asking all the time for EE to save energy — even to report back to their managers.

- ENERGY SAVING GOALs? Regularly or when making an improvement

    - Julie does quarterly and annual report KPIs get paid more if she reaches those energy goals

    - Wells Fargo used to have not stated, but slightly expected to share some savings. New owner might have new goals… Engineers have some influence because they have all the data.
        - Depends on relationship between engineers and owner. Don't do projects unless that project has a savings goal.
        - Every year for the past 15 years their electric use has gone down and so have their bills

    - Owners might find a goal too far in the weeds — would rather just keep expenses flat or decrease

- Do you believe your building has potential to be more efficiently?
    - Yes, incrementally
    - Engineers think: you're doing this to me, I don't want to do this, but real time energy monitoring isn't a huge impact but does show potential. They think their building is so efficient.
    - Another dashboard is overwhelming, frustrating, and no time to check. Going to trust your own calculations more than a dashboard.

- What metrics are required to make a project go?

    - ROI & Payback

    - IRR for some clients

    - "It's the right thing to do" — morality — this doesn't need to have data
        - Motion sensors — payback not there but was a good project to do

        - Not even hooked up to BAS
        - Didn't get rebate cause variable output — can't prove how much you saved

- Scenarios:

    - A: Partial Traditional Rebate + PFP Operations
        - Case specific
        - If it's something an engineer has done before, then yes. Less likely otherwise.
        - Utility would select the incentive period?
            - Could be negotiated
        - MV — How does this work?
            - Especially for smaller improvements because hard to notice
            - Utility would have to have some degree of confidence that you can save
        - Xcel has been super conservative with their custom rebates. 20%–30%. But has had really good monitoring afterward — Tony knows he's doing much better.
        - Would have to be very confident that he would save. One custom rebate he got — there are so many variables you can't control that can make this very tricky.
        - Xcel would help you if you're getting off track
        - This is an opportunity to disprove the custom rebate assumptions if you can prove the greater savings

    - B: PFP operations only — no risk

- Thoughts:
    - Calculated person — don't gamble.
    - Would take the guaranteed money and still run the building efficiently.
    - Might take the risk if you can shrink a payback, but wouldn't even do a seven-year payback.
    - If just a year difference in payback, probably would go with guaranteed payback
    - Julie views this as free, because the deemed savings is already expected to happen, this is what you get above and beyond
    - ESCOs like Egan — these will really help them

- Closing Question

    - A tool that allows for smaller buildings to look at that showed WN EUI

    - Century College is the only college that still runs a program for Building Operators
        - No high schoolers going in to these programs

- Takeaways
    - Yes, interested in piloting
    - IF there's an opportunity to be more efficient and to save, they will look at this.
    - Wouldn't wait for a trigger event to participate — would do just for operations.
    - Due diligence for program enrollment.

Appendix F: Survey Questions

Program Provider Survey (in other markets)

1. What is the name of your commercial pay for performance offering?
2. What is your name and email address?
3. What is your affiliation with this program?
4. What is the level of maturity for this offering?
    a. Pilot
    b. Program
5. What year was the first year of the pilot or program offering (for whatever was delivered first)?
6. What utility is this pay for performance program associated with?
7. Do you work for the utility or are you a vendor/program provider staff?
8. Which of the following types of improvements or activities are allowed to count toward energy savings under your commercial pay for performance program?
    a. Whole-building energy savings
    b. Equipment improvements only
    c. Operational changes only
    d. Behavioral changes only
    e. Equipment upgrades and operational changes only (b and c)
    f. Other (write in)
9. Is your program offered to existing building customers, new construction customers, or both?
    a. Existing building customers
    b. New construction customers
    c. Both
10. Who is the recipient of the incentives in your pay for performance program?
    a. Directly to the customer
    b. Directly to an energy service company or program provider (existing buildings)
    c. Directly to the design team and construction company (new construction projects)
    d. A combination of customers and providers (a + b or c)
    e. Other (write in)
11. For programs designed to incentivize a third-party provider, what is the incentive structure? Select all that apply:
    a. Linear $/kWh saved
    b. Linear $/kW saved
    c. Time-of-use energy or demand savings
    d. Tiered financial incentive that is slightly higher based on the tier of savings reached
    e. Access to marketing benefits or *preferred/provider contractor* lists
    f. Other (write in)

The next six questions revolve around program benefits.

12. In your own words, briefly discuss the driver(s) for developing and offering your pay for performance program?

13. Why do customers participate in the pay for performance offering? Rank your top three or four answers (including any write-ins that you might add):
    a. To save on paperwork that comes from using multiple rebate programs
    b. The opportunity to receive a larger financial incentive than the standard up-front rebate
    c. Because they gain access to other benefits or tools
    d. Because it helps them verify that they are receiving the anticipated savings from capital improvements
    e. It helps them advance their culture of high-performance operations
    f. It aligns with benchmarking goals or corporate sustainable goals
    g. Other (write in)
    h. Other (write in)
14. What evidence informed your answer to the previous question?
15. From the utility perspective, what is the primary value of your pay for performance program? Select what you see are the top three benefits:
    a. Customer choice
    b. Deeper, greater energy savings
    c. More efficient, cheaper energy savings
    d. Demand (kW) savings
    e. Deeper customer relationship & sense of customer service
    f. Helps meet policy goals
    g. Helps meet possible performance-based regulation goals for the utility
    h. Filling a demand from program providers (e.g., ESCOs)
16. Does the program offer any tools or resources as a benefit to customers for participating?
    a. Access to a dashboard with hourly or dialing energy consumption
    b. Access to a dashboard showing estimated energy savings associated with capital improvements or performance goals (e.g., goals EUI for the year)
    c. Additional access to a customer account representative
    d. Access to specific building operator trainings
17. Compared to standard rebate offerings, do customers have the potential to receive a greater incentive (in terms of net present value) when accounting for the fact that an incentive will be received over time instead of upfront?

The following questions are asked to understand the eligible or target markets as well as program methods and design features.

18. What size of buildings do you target/require?
    a. Larger than 25,000 SF
    b. Larger than 50,000 SF
    c. Larger than 100,000 SF
    d. Larger than 150,000 SF
    e. Determined based on energy consumption
    f. Determined based on demand
    g. Other (write in)

19. (Optional) If you selected (e) or (f) in response to the previous question, what is the annual energy consumption or demand of the customers you are targeted/allowing to participate?
    a. Fill in number, and select units
20. What is the minimum energy savings that a customer must be planning to obtain to participate in the program (as a % of total energy consumption or electric energy use)?
    a. 5%
    b. 10%
    c. 15%
    d. 20%
    e. This is not a requirement for participation
21. Are participants required to have AMR or AMI?
    a. Yes, AMI
    b. Yes, AMR or AMI
    c. Not required, though most do have AMI
    d. Not required and most do not have AMI

22. For existing building customers, what method(s) of energy savings verification do you use? Select all those that apply:
    a. On-site verification of equipment installation
    b. Bill analysis with weather normalization for pre and post data
    c. Bill analysis with weather and occupancy normalization for pre and post data
    d. Bill analysis with weather and occupancy normalization and irregular operations analysis for pre and post data
    e. Energy modeling for anticipated energy savings as a baseline for expected savings for comparison to actual energy savings
    f. Other (write in)
    g. This program is not available to existing buildings/customers

23. What is your baseline methodology for new construction participants? Select all those that apply:
    a. Use an energy model to dynamically measure energy consumption against (weather normalized)
    b. Use an energy model to generate an EUI to measure the actual EUI against (weather normalized)
    c. Use energy code for the year the building was constructed as the baseline
    d. Create a composite baseline using actual energy consumption data from buildings in the same climate zone, built under the same energy code, and similar in type (i.e., use and size)
    e. Other (write in)
    f. This program is not available to new construction buildings/customers

24. How many customers do you aim to deliver this program or pilot to this year or next year? If you do not have an official target, list how many you anticipate you will serve this year.

25. Approximately, what is your program's total annual operating budget?

26. How many FTEs work on this offering (specifically for the utility mentioned in *question #3*)?

27. What are the average annual energy savings claimed per participant/customer? *Ideally this would be based on an average year or the most recent year of information.*

28. (Optional) To the extent that you calculate the *Societal Cost* of this utility offering, what is the Societal Cost ratio based on implementation, not anticipated costs and benefits? If you have this information for more than one year, the range of ratios you have experienced would be helpful.

The remaining questions are looking for your expert input on program value and challenges.

29. For those participating in the pay for performance program considered in this survey, do you believe the program is reaping deeper energy savings than would be gained through standard rebate offerings?
30. Why? What evidence do you have of this?

31. What are the greatest challenges to implementing your pay for performance offering?
    a. The accuracy of verified energy savings
    b. Getting time-based energy savings (kW)
    c. Keeping implementation costs low
    d. Incentive structuring
    e. Marketing & recruitment
    f. Customer engagement and tools
    g. Other (write in)