Lab
Electricity Innovation Lab
ROCKY MOUNTAIN INSTITUTE

INTEGRATED UTILITY SERVICES

A NEW BUSINESS MODEL FOR FORT COLLINS UTILITIES

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WHAT IS e-Lab?

The Electricity Innovation Lab (e-Lab) brings together thought leaders and decision makers from across the U.S. electricity sector to address critical institutional, regulatory, business, economic, and technical barriers to the economic deployment of distributed resources. In particular, e-Lab works to answer three key questions:

- How can we understand and effectively communicate the costs and benefits of distributed resources as part of the electricity system and create greater grid flexibility?
- How can we harmonize regulatory frameworks, pricing structures, and business models of utilities and distributed resource developers for greatest benefit to customers and society as a whole?
- How can we accelerate the pace of economic distributed resource adoption?

A multi-year "change lab," e-Lab regularly convenes its members to identify, test, and spread practical solutions to the challenges inherent in these questions. e-Lab has member meetings, coupled with ongoing project work, facilitated and supported by Rocky Mountain Institute.

e-Lab meetings allow members to share learnings, best practices, and analysis results; collaborate around key issues or needs; and conduct deep-dives into research and analysis findings.

For more information about e-Lab, please visit: http://www.rmi.org/eLab.

e-Lab is a joint collaboration, convened by RMI, with participation from stakeholders across the electricity industry. e-Lab is not a consensus organization, and the views expressed in this document are not intended to represent those of any individual e-Lab member or supporting organization.

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COURTESY OF CITY OF FORT COLLINS

EXECUTIVE SUMMARY

Fort Collins Utilities, along with other local stakeholders, has developed an implementation strategy to help meet the city's greenhouse gas reduction goals. The utility would like to develop a new business model to help customers access a broader range of energy services—including efficiency improvements, distributed renewable energy options, and demand response—offered as a bundled package of integrated utility services (IUS). To accelerate customer adoption, Fort Collins Utilities will roll out a new IUS default option for customers, financed on the utility bill and designed to save customers money from the first day of use.

RMI's analysis of the IUS model's impact on the residential sector indicates that it:

- Is within the capabilities of Fort Collins Utilities, and can be built in a capital-light way that is scaled up over time;
- Could support achieving up to 90% of the emissions reductions articulated in the *Stepping Up* report for the residential buildings sector;
- Could generate additional net utility income, which can be used to offset distributed resource grid integration costs (if any), used to pay Platte River Power Authority (PRPA) or others for lost revenue or stranded assets, etc.;
- Will catalyze increased investment in Fort Collins, improve housing stock, and increase residents' health and comfort.

Fort Collins Utilities is well positioned to be a leader in pioneering this new model, with a successful track record in delivering affordable, reliable electricity and high rates of energy efficiency and solar adoption. Among its strengths, Fort Collins Utilities brings an extremely high level of customer trust, a highly successful existing set of programs in energy efficiency and solar, an active contractor training program, and a productive partnership with PRPA (its generating partner) and the city council. With this strong track record and considerable strengths, Fort Collins Utilities is an ideal utility to demonstrate the capabilities of this new service offering.

THE PILOT

Before rolling out a new utility business model to the entire community, Fort Collins Utilities is launching a pilot project. The IUS pilot will conduct market research around a suite of offerings and services that aim to:

- Increase levels of customer adoption of energy efficiency retrofits and renewables necessary to reach greenhouse gas emissions reduction goals;
- Increase consumer education while streamlining the often complex and uncoordinated process involved in pursuing energy efficiency retrofits or renewables;
- Raise awareness among vendors, builders, and installers to ensure they can respond to the significant increases in customer adoption of energy efficiency and renewables;
- Demonstrate a new business model that is robust in changing consumer behavior, including higher adoption levels of distributed generation and efficiency.

The pilot results will be used to refine a customer adoption strategy for Fort Collins Utilities and test the infrastructure necessary to install and manage accelerated levels of distributed renewable generation and energy efficiency analyzed in this report. Furthermore, the pilot will provide a model for other utilities and cities around the nation interested in providing clean, reliable electricity to their customers while stabilizing their own utility business models.

The pilot project will test:

- Customer demand and interest in integrated energy efficiency improvements, on-bill financing, single-point-of-contact sales and installations, and maintenance;
- High levels of customer engagement, including personalized communications and propensity analysis to enhance customization;
- A seamlessly integrated sales-to-installation process;
- The on-bill finance structure necessary for service/tariff/financing options;
- Consumer preferences around energy efficiency savings reporting.

This testing will help identify:

- The resources and infrastructure required for Fort Collins Utilities to act as the facilitator of an integrated service offering in order to scale these services to the entire Fort Collins community;
- The team and expertise required along the solar and energy efficiency value chains to implement such a business model (e.g., financiers, sales force, hardware and software manufacturers, installers, ESCOs, measurement and verification providers);
- Opportunities for innovations in product and service offerings that can stimulate the local economy and fill the utility's sales pipeline.

The contents of this report provide a concrete rationale, from both the customer and utility perspectives, on the value of pursuing the IUS business model and refining it through a real-world pilot (see Figure 1).

FIGURE 1: **PILOT ACTIVITIES**

Bringing an integrated set of offerings to customers with minimal transaction costs requires a different operational structure than Fort Collins Utilities currently has, and will need to be developed over time. It will require working with contractors more closely, assessing customer end-use patterns and housing stock in new and more detailed ways, and guiding customers through a much more holistic way of viewing residential energy use. This is one reason why a pilot followed by a scaled rollout is likely the best way to proceed.

The following report details design recommendations and analysis from Rocky Mountain Institute in support of the Colorado Clean Energy Cluster's FortZED effort, which aims to create a zero-energy district in Fort Collins. It reflects the collective efforts of Fort Collins Utilities, the Colorado Clean Energy Cluster (CCEC), RMI's e-Lab network, and the Brendle Group.

COURTESY CITY OF FORT COLLINS

OVERVIEW AND VALUE PROPOSITION

01

OVERVIEW AND VALUE PROPOSITION

CONTEXT AND INTRODUCTION

The *Stepping Up* report by Rocky Mountain Institute (RMI) showed that the city of Fort Collins can cost-effectively reduce greenhouse gas emissions to 80% below 2000 levels by 2030, a two-decade acceleration from the City's original 2050 goal. Recently, the Fort Collins city council voted unanimously to plan for this future, and requested that City staff introduce initiatives that tackle the city's largest sources of emissions.

Fort Collins Utilities has a key role to play helping the city achieve its accelerated emissions reduction goal while designing creative solutions to meet changing customer needs. At the same time, by becoming a provider of integrated behind-the-meter services, the utility has an opportunity to diversify and stabilize its revenue base.

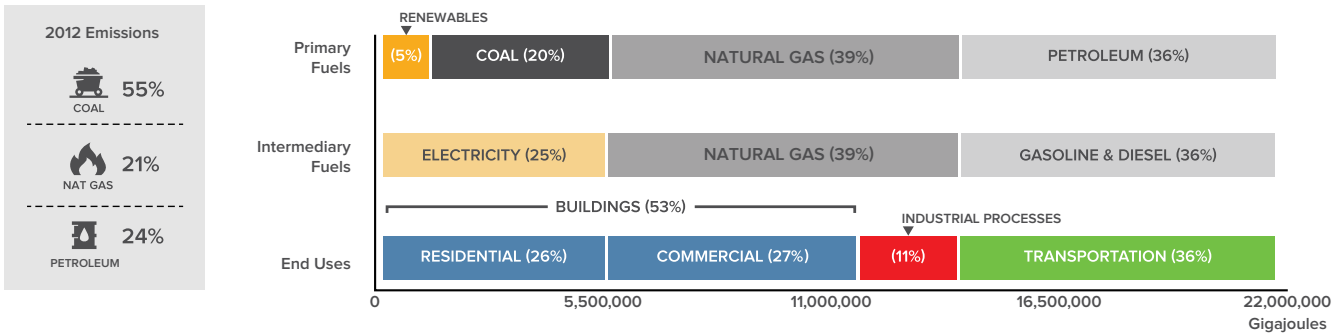
Some utilities, such as RWE in Germany, are looking at transitioning to energy services models, but these primarily focus on larger customers. Fort Collins, on the other hand, is an ideal place to pioneer an energy services model for smaller customers, including residential and small-commercial.

Residential and small-commercial customers represent 98% of Fort Collins Utilities' accounts,[1] and those same groups account for 43–50+% of overall utility energy consumption (see Figure 2). Fort Collins Utilities is a primary connection between the City and these crucial customers—the residents and businesses that occupy the city's buildings.

This combination of significant aggregate energy consumption and large numbers of widely distributed accounts, all with slightly different physical characteristics and customer motivations, means that residential and small-commercial customers present a large and difficult-to-reach efficiency and (in some cases) renewable energy market. Yet the opportunity is large. Our analysis shows that energy consumption in buildings can be cost-effectively reduced by more than 31% and that over time distributed solar photovoltaics (PV) can reasonably supply 25% of Fort Collins's energy (see Figure 3). Accessing this market, and capturing associated significant energy efficiency savings, is the focus of the IUS model described here.

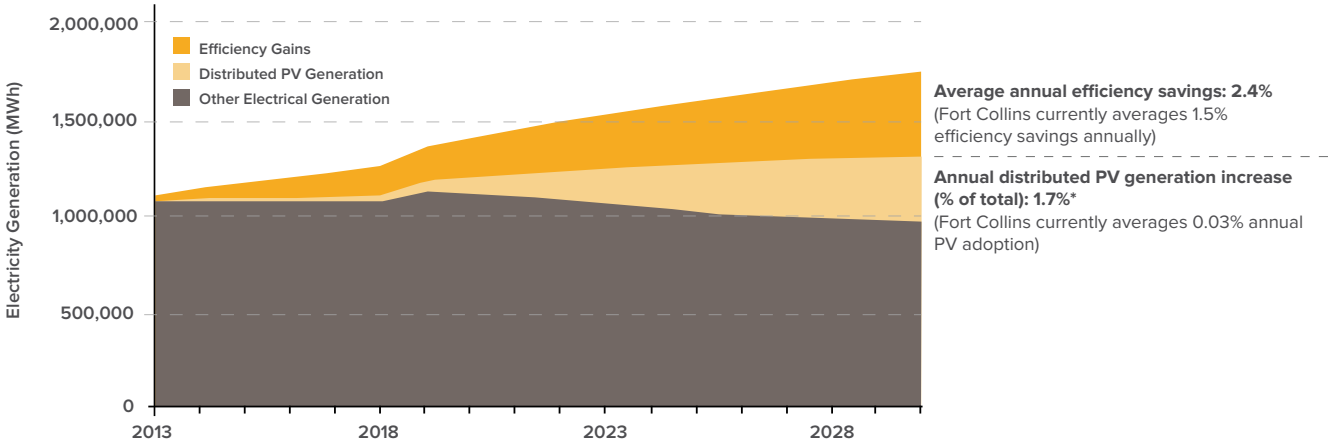
[1] All residential rate classes plus the GS rate class (commercial with no peak demand charges).

FIGURE 2: **ENERGY CONSUMPTION AND EMISSIONS IN FORT COLLINS**



Source: "FC GHG and RE Data 2005-2012.xls"; City of Fort Collins, 2012. "Community Greenhouse Gas Emissions Inventory Quality Management Plan 2005-2011," City of Fort Collins, Environmental Services, October 2012. Available at http://www.fcgov.com/climateprotection/FC GHG Quality Management Plan

FIGURE 3: **FUTURE ENERGY EFFICIENCY AND DISTRIBUTED SOLAR PV IN FORT COLLINS**



Note: A combined-cycle gas turbine comes online in 2019

*Adoption of PV typically follows an S-curve, the annual rate provided here is a linear average over that curve and yearly targets should exceed this value during be less in the early and later years of this scenario and should exceed this value in the interim years

THE INTEGRATED UTILITY SERVICES BUSINESS MODEL

The options for achieving Fort Collins's goals range from those that have a high degree of Fort Collins Utilities involvement in procurement and management of renewables and efficiency to those that have very little additional involvement. Figure 4 describes the pros and cons of the extreme points of this range and articulates the rationale for focusing on a hybrid IUS model.

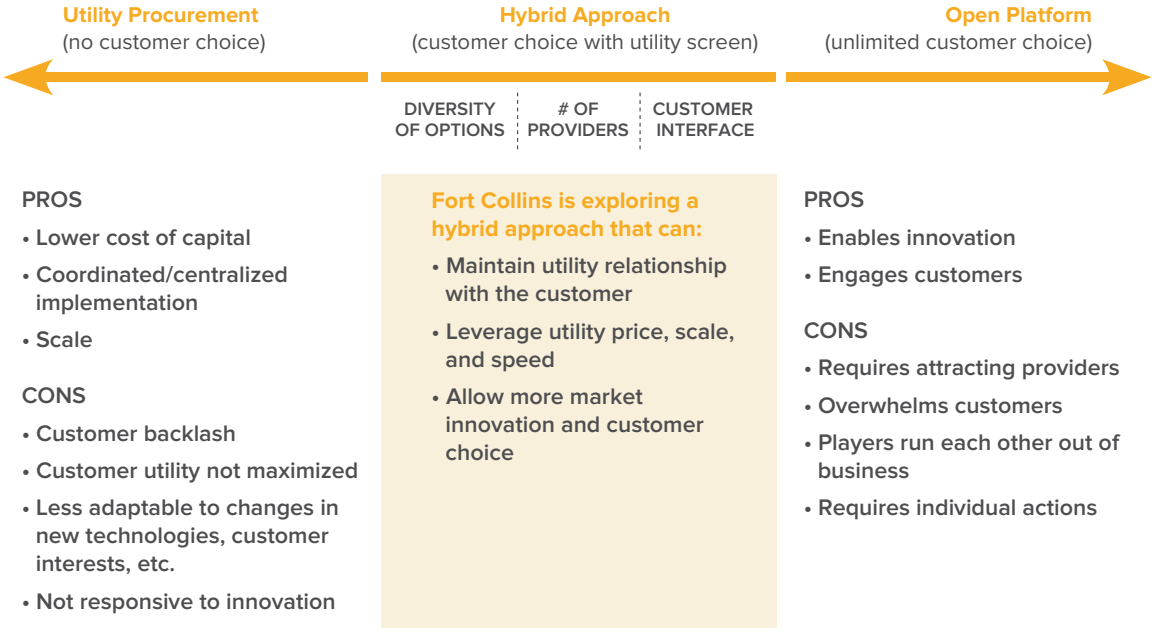
More rapid customer adoption of distributed energy resources has long faced barriers such as large initial investment relative to savings (i.e., extended payback periods), lack of information, complex or arduous customer processes for rebates and installations, and utility business models that penalize load erosion.

The IUS model we propose seeks to address many of these barriers by including the following attributes:

- A new IUS model will not supplant but rather augment Fort Collins Utilities' traditional role as a distribution utility;

COURTESY OF VISIT FORT COLLINS. COPYRIGHT RYAN BURKE.

FIGURE 4: **RANGE OF FORT COLLINS UTILITY INVOLVEMENT**



- Fort Collins Utilities net income has the potential to increase with growing adoption of efficiency and renewables versus a business-as-usual case;
- Customers will have the option to finance upfront costs for services provided;
- Customers continue to pay traditional energy and demand charges and fees for remaining central generation needs;
- All customers are enrolled in a basic, net-present-value-positive package of energy efficiency measures and solar PV (either on-site systems or community solar) unless they opt out;
- Customers will be assessed a fee (structured as a tariff, service charge, or on-bill loan depending on final design)[2] for the basic package that will be less than or equal to the expected energy and demand savings the package generates, ensuring that customer bills do not increase;
- Depending on the financing options available and customer preferences, either the customer or Fort Collins Utilities or a third-party financier will retain ownership over the efficiency measures and distributed generation;
- The fee (with the exception of the on-bill loan option) will be structured in a way that shouldn't create an additional burden for property buyers or sellers at the time of sale (e.g., no title clouding and default transfer at sale for programs that reduce the overall utility bill);
- Customers will have the option to opt in to a number of premium offerings that include measures that provide value beyond their energy efficiency savings (e.g., new windows, EV charging, HVAC, etc.) for a service charge that may increase their monthly bill;

[2] This can be a traditional on-bill tariff charge or an energy service charge (described in detail later).

- Fort Collins Utilities will assist customers in obtaining incentives that may be available for certain measures;
- Depending on the financing option chosen, credit losses will be minimized through the use of underwriting criteria and/or service termination for payment default;
- The delivery mechanism for the IUS model will be structured to enable easy customer participation (e.g., by having a single point of contact for a given customer, minimizing number of disruptive site visits, etc.).

The IUS model is somewhat unique in its intense focus on residential and small-commercial customers with an energy services approach. Residential customers are usually targeted through measure rebates (both direct to customers and midstream to retailers) in traditional utility programs, and relatively few utility savings are achieved through direct install and retrofit efforts. This is true because generating large amounts of savings through residential customers is often challenging.

To access the residential and small-commercial market the IUS model increases integration of product offerings and services to improve ease of delivery to customers and to leverage the combined economics of packaging measures together (more-expensive measures can be offset by less-expensive measures). Also, the costs of energy audits and any acquisition costs can be reduced through using multiple measures at one time rather than through a piecemeal approach. The increased integration facilitates a comprehensive and seamless approach that aims to improve customer adoption and minimize opt outs. This approach should also bring significant synergies and increased customer savings (e.g., building envelope improvements can reduce air conditioning needs beyond the savings that would result from simply using a more efficient, but larger, air conditioning unit).

THE VALUE PROPOSITION OF A NEW UTILITY BUSINESS MODEL

In addition to helping a community achieve accelerated greenhouse gas emissions reduction goals, a new utility business model that promotes distributed energy resources provides several sources of value for a community and for the utility.

Community Value

There is significant value in the IUS model beyond enabling greenhouse gas emission reductions, including:

- Mitigating the risk of consumers “going it alone” to develop distributed resources, therefore ensuring continued reliability;
- Creating jobs as more contractors are needed to install efficiency measures and distributed solar PV systems;
- Bringing more awareness and cohesion to a fragmented construction industry;
- Allowing for the implementation of the greenhouse gas reduction plan to change over time with minimal expense;
- Freeing up land that could be used for other community benefits;
- Achieving net-zero-energy goals associated with zero-energy districts;
- Shifting capital expenditure from outside to inside the city boundaries.

Value to Fort Collins Utilities

The primary value of the IUS business model to the utility is improving the customer's experience while ensuring the utility's continued relevance in a rapidly changing world. Large utilities in Europe are working now to adjust their business models. For example, RWE, the second-largest utility in Germany, recently announced that it is moving away from being a developer and owner of large, centralized power plants and into a role in which it helps manage and integrate renewables into the grid. All because "the massive erosion of wholesale prices caused by the growth of German photovoltaics constitutes a serious problem for RWE which may even threaten the company's survival."[iii] In the U.S., independent power producer NRG's CEO opened the company's annual report with a letter stating:

There is no energy company that relates to the American energy consumer by offering a comprehensive or seamless solution to the individual's energy needs... that connects the consumer with their own energy generating potential... that enables the consumer to make their own energy choices... that the consumer can partner with to combat global warming without compromising the prosperous "plugged-in" modern lifestyle that we all aspire to... NRG is not that energy company either, but we are doing everything in our power to head in that direction... as fast as we can.

Fort Collins Utilities, by adopting the IUS business model, can join companies such as NRG to "enable, connect, relate with, and empower" its consumers, all while preserving the utility's own financial viability. Furthermore, if the world moves even more toward distributed generation plus storage the IUS model would mitigate risk and fit with such a future.

Specific values to Fort Collins Utilities include:

- Diversified revenue stream that allows the utility to hedge against potential disruptions to its primary revenue source of electricity sales (e.g., changing regulations, declining overall demand);
- Ability to offer lower-carbon energy options that support the City's climate goals;
- Build a much deeper relationship with customers that can provide the foundation for future growth opportunities (e.g., fiber or data services, EV services);
- A tighter integration between utilities cost drivers (e.g., high cost peaks) and behind-the-meter energy use;
- Much better understanding of how customers use energy;
- Ability to serve customers with diverse energy needs (e.g., selective investments in reliability for small-commercial customers);
- Overall increase in revenue from the ability to a) provide services that reduce currently non-billed energy costs (e.g., natural gas and transport fuels) and b) offer premium services (e.g., efficient appliances, selective reliability investments);
- Ability to make selective investments in distributed resources that defer or eliminate the need for costly distribution investments.

REPORT STRUCTURE

The following chapters explain the program design and how it should be administered, define the structural elements of the program, explain the economics associated with the integrated utility services model from a customer and utility perspective, describe a customer acquisition model that ensures lasting success, detail possible program delivery elements with recommendations for those that hold the most promise, and quantify the benefits of the IUS model for the City of Fort Collins.

PROGRAM DESIGN AND ADMINISTRATION

02

PROGRAM DESIGN AND ADMINISTRATION

INTRODUCTION

While the economics of an IUS business model are essential to determining the program's viability, the majority of its success will be determined by how it is structured and administered. Most utility programs attempt to optimize a broad set of variables such as attractiveness to customers, desired utility and City outcomes, City and utility resource constraints, elected officials' political mandates, business leaders' need for economic viability and opportunity, and overall community values. These variables must be understood and addressed explicitly in program design and administration to ensure adoption and buy-in from stakeholders who will be critical to IUS implementation.

The IUS structure aims to balance these variables by ensuring:

- Pursuit of efficiency and renewables is as convenient as possible for customers;
- The low cost of capital and appropriately long financing terms necessary to maintain customers' finances and enable Fort Collins Utilities to stabilize its revenue with high levels of distributed energy resource investment;
- City and business interests see the program as a net positive to their politics and economy.

DESIGN PROCESS AND PRINCIPLES

The Design Team

A core design team of subject matter and community experts developed the overarching framework of the IUS design. This team included representatives from the Colorado Clean Energy Cluster (CCEC), Fort Collins Utilities, and Rocky Mountain Institute (RMI), with regular guidance from RMI's e-Lab members.[3] Particular attention was paid to the City's goals and customer attractiveness because of the unique requirements of a residential energy services model. Many team members were involved in previous local efforts, including FortZED e-Lab design charrettes.

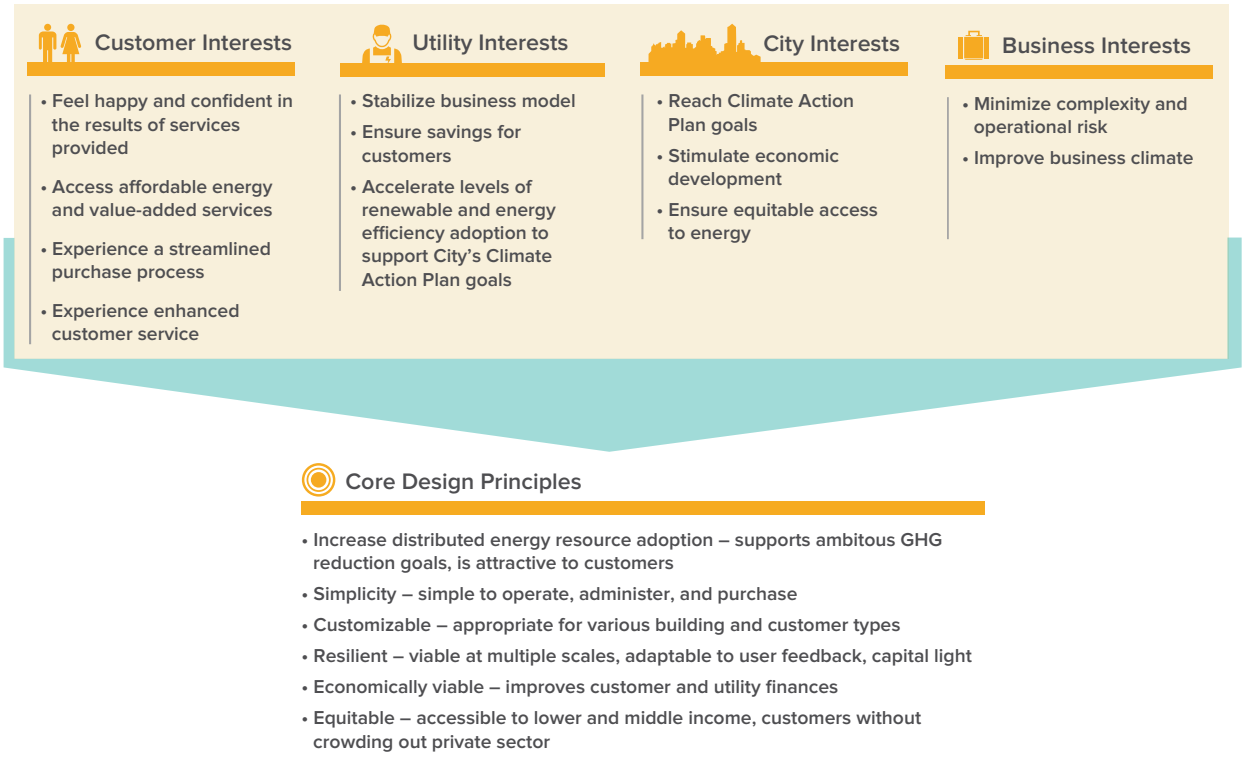
The Design Process

The design team convened several workshops to envision the ideal program and leveraged subject matter experts to quickly identify an appropriate program structure. The ideal in this case is an optimization over several criteria (see Figure 5), and may differ from choices made by other utilities. Nevertheless, these recommendations should aid any utility in developing a residential energy services model.

These design principles can be executed with varying degrees of utility involvement, and some utilities will likely want to internalize IUS capabilities while others will want to contract them out. To aid that decision, this chapter describes the role of the program administrator in detail. Recommendations on program structural elements—including marketing and sales, financing, operations, and overall program strategy—can be found in Appendix B.

[3] e-Lab is a group of experts from across the utility value chain that RMI convenes regularly to identify and address the most pressing issues in the power sector.

FIGURE 5: **CORE DESIGN CRITERIA AND PRINCIPLES**



PROGRAM ADMINISTRATION

Introduction

Traditional utility efficiency and demand-response programs are executed as a set of individual, standalone programs. The utility, government agencies, private enterprises, and/or nonprofits can administer these programs. The administrator is responsible for the program's general oversight, connecting all the pieces and maintaining a holistic view of how they should operate together. Program administration must ensure a variety of activities are conducted and managed (see Table 1), many of which can be and are typically subcontracted.

Program administration can vary along a spectrum of high to low utility involvement (e.g., some programs are run completely inside a utility, others like Efficiency Vermont are completely outsourced with a performance contract). Simultaneously, the legal structure of the administration can take several forms, including a private third party, a government agency, the utility, and a hybrid of these models. Each has its pros and cons. A detailed discussion of these legal structures can be found in Appendix A.

TABLE 1: **PROGRAM ADMINISTRATOR RESPONSIBILITIES***

PROGRAM FUNCTION	RESPONSIBILITIES
General Administration and Coordination	• Manage overall budget for portfolio of programs • Manage contracts with all primary contractors • Maintain centralized information system for reports to regulators, legislators, advisory groups, etc.
Program Development, Planning, and Budgeting	• Prepare initial technical and/or market reports necessary for program strategies and initial program designs • Facilitate development of public planning process • Prepare general program descriptions and budgets for regulatory approval
Program Administration and Management	• Prepare detailed program designs and propose changes based on experience to date • Hire and manage staff and /or subcontractors for program implementation • Design and implement quality assurance standards and tracking protocols • Review and approval of invoices
Program Delivery and Implementation	• Promote and market programs • Develop and implement program services • Develop energy-efficient projects at specific sites • Develop measurement and verification (M&V) procedures and/or conduct M&V to determine performance-based administration fees or incentives
Program Assessment and Evaluation	• Assess program impacts and/or cost effectiveness • Evaluate effectiveness of program processes and administration

* Framework based on "Who Should Administer Energy-Efficiency Programs?" by Carl Blumstein, Charles Goldman, and Galen Barbose. Center for the Study of Energy Markets, University of California Energy Institute, University of California-Berkeley. 2003.

Recommended Structure

Given that the IUS is a holistic approach to customer engagement and resource management, we recommend that the utility stay involved as the lead administrator, but also work heavily with third-party home performance integrators (see Figure 6). This structure will leverage the strength of the utility's existing relationship with customers while enabling efficient and focused sales and installation management. Performance-based incentives for integrators would also help align interests among customers, the utility, and the integrators.

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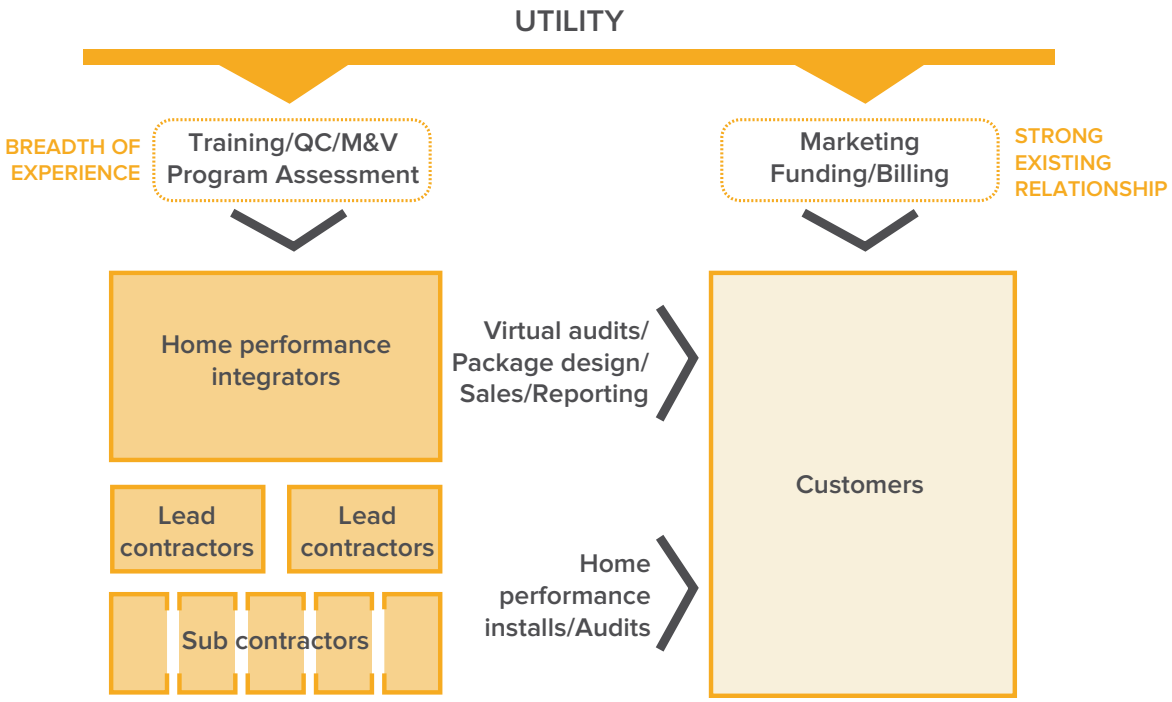
FIGURE 6: **RECOMMENDED PROGRAM ADMINISTRATION STRUCTURE**



ECONOMICS

03

COURTESY OF CITY OF FORT COLLINS

ECONOMICS

INTRODUCTION

Utilities considering a move into energy services must consider an important question: Is it a business that can be operated in a financially sustainable manner? For energy services business lines targeting large commercial and industrial companies, the answer appears to be yes. This is evidenced by recent announcements by large utilities and also by the burgeoning ESCO industry, which is providing comparable services on a standalone basis. However, for businesses targeting residential and small-commercial customers, we did not see a clear answer initially.

On one hand, efficiency savings opportunities are often much greater in residential customer segments, where many opportunities have not been looked at systematically, versus larger business customers, many of whom can afford a dedicated energy manager and might view reducing energy costs as a strategic advantage. This higher potential savings opportunity is negated by high customer acquisition costs for efficiency interventions, potentially higher fixed costs per intervention, and a much smaller monthly bill against which to find customer savings and replacement revenues for the utility.

Given this uncertainty around the basic economics of the opportunity, yet its high potential for transformative impact in Fort Collins and similar cities, we conducted an economic assessment of the business opportunity for the residential customer segment (with an expectation of parallel conclusions for the small-commercial segment) to better understand the parameters required to ensure a mutually beneficial program. A successful program needs to meet three economic criteria:

1. ***Reduces costs to customers:*** A fully financed program should be able to offer a basic package that reduces costs for the customer. Even if many customers opt for higher-end offerings that increase their overall bill, it is critical that this program be capable of delivering bill savings to customers through a basic program.
2. ***Self-sustaining:*** The program, at scale, should be able to cover its full costs without additional subsidies.
3. ***Net-income contribution:*** The program should generate net income for the utility that contributes to critical services like distribution system maintenance as well as the utility's obligations to the City. This includes maintaining the 6% charge on revenue, or payment in lieu of taxes (PILOT), that Fort Collins Utilities collects for the City (thus, this program would contribute to an important City revenue base), as well as continuing to contribute to the fixed costs of the utility.

In order to determine if a program could meet these economic criteria we looked at three general categories of cost that would exist for a fully scaled program:

1. ***Intervention costs:*** The full costs of the measures being installed in homes, including labor, materials, and contractor overhead
2. ***Program costs:*** The additional overhead of running the IUS program—customer acquisition costs, and distribution maintenance costs that would otherwise be covered solely through electricity charges[4]
3. ***Financing costs:*** Since this program assumes on-bill repayment for all interventions, the cost of capital is a critical component to the overall costs of the interventions and the bill impacts customers will see

For simplicity we only evaluated rolling out the IUS in single-family homes in Fort Collins.

FINDINGS

The following sections describe the critical outputs from our analysis based on the overall energy efficiency potential for the building stock in Fort Collins,[5] a segmentation of that building stock,[6] and a potential list of interventions and their savings potential,[7] which each inform an overall bill-level *pro forma* for a typical customer, as well as the overall economics from the utility's perspective. Finally, we look at the overall cost per negawatt (i.e., efficiency) and compare it to alternative utility programs.

Efficiency, Energy, and Economic Potential

From our recent report on possible energy pathways for Fort Collins, *Stepping Up: Benefits and Costs of Accelerating Fort Collins' Energy and Climate Goals*, we know that the city holds great potential for both distributed generation and distributed efficiency.

Efficiency Potential

In the *Stepping Up* report we assume that Fort Collins Utilities can realize energy efficiency savings at a rate of 2.4% of annual sales each year through 2030 (consistent with best-practice energy efficiency programs in the United States). Given this, Fort Collins could reduce building energy consumption by 31% relative to a business-as-usual scenario.[8] This 31% reduction translates to a 1,255 GWh reduction in electricity consumption and a 4,310,000 MMBtu reduction in natural gas consumption. Electricity savings come from a 417 GWh reduction in residential electricity consumption, 779 GWh in commercial consumption, and 58 GWh in industrial consumption. Natural gas savings are associated with a 1,796,000 MMBtu reduction in the residential sector, a 1,830,000 MMBtu reduction in the commercial sector, and a 683,000 MMBtu reduction in the industrial sector.

Distributed Energy Potential

Using the *Stepping Up* 2030 future scenario to define Fort Collins' desired energy mix, roughly 312 MW of distributed PV (out of 778 MW of new installed capacity) will need to be built to meet the City's accelerated greenhouse gas emissions reduction goals. These distributed resources can be installed across the residential, commercial, and industrial

[4] Distribution system contributions are at 1.5 cents/negawatt using estimates from public filings, although this can be adjusted up or down as appropriate to ensure stable operations.

[5] As defined in RMI's *Stepping Up* report.

[6] Based on American Communities Survey 2006–2010 averages.

[7] Using Lawrence Berkeley National Laboratory savings data with capital expenditure data from a variety of sources, including the National Renewable Energy Laboratory and TopTenUSA.org.

[8] The business-as-usual scenario assumes a 19% increase in building-sector energy consumption, which is based upon a 1.9% per year population growth rate and continued energy efficiency adoption of 0.5% of sales annually.

sectors. We believe it is realistic for the IUS to realize roughly 195 MW of the 312 MW needed to achieve the *Stepping Up* future scenario.

Economic Potential

The total capital cost[9] of meeting the distributed energy and efficiency potentials is somewhere between $725 million[10] and $900 million through 2030. The exact figure will depend on the future costs of energy efficiency and renewables technology and on how well Fort Collins Utilities can negotiate and procure solar and efficiency measures on behalf of its costumers. After discussions with various solar installers we believe it is realistic for Fort Collins to secure solar at ~$2.42 per Watt. Because these programs are fundamentally designed to save customers money, and because interventions can be financed primarily using third-party capital, we expect that very little of this cost would be born directly by the utility, likely just administration, overhead, and existing rebate program costs. However, these numbers are important for two reasons: 1) this is a large enough investment to draw the interest and investment of third-party partners and program administrators, and 2) this represents a significant investment in Fort Collins that should lead to material benefits in terms of jobs and economic growth.

Segmentation of Building Stock

We focused on the residential sector, again looking at single-family homes, as it was a priority area for Fort Collins Utilities and has the most challenging economics. We believe a successful residential program can be used to develop a small-commercial program. Within the residential sector, we identified three major build-out periods of Fort Collins building stock and thus three primary housing ages/types. We analyzed the typical economics and efficiency potential for each.[11]

Pre-1945: The commercial downtown, in particular, contains a number of older buildings built before 1945. These homes, often Victorian in style, are larger and most have been remodeled at least once. They typically have two stories, a conditioned basement, 2,200–2,500 square feet of living space, and central gas furnace heating. We estimate there are over 5,200 of these homes, with an average estimated energy bill of $1,260 per year.

1945–1980: This category is dominated by homes built during the 1970s. These homes tend to be larger (3,400 square feet and above for two-story homes), and while many have been remodeled, initial builds were often not efficient. We estimate that there are over 19,000 of these homes, with an average estimated energy bill of $1,330 per year.

Post-1980: Newer homes in Fort Collins tend to be more efficient, but are larger (many 4,000 square feet and larger) and on the periphery of town or in new neighborhoods, which requires a larger transportation footprint. Like the other segments, they have central gas heating. We estimate over 31,000 of these homes, with an average estimated energy bill of $1,400 per year.

Detailed Interventions, Value Potential, and Customer Bill Impact

We looked at many typical efficiency measures for each housing class, and then estimated which ones would be appropriate for a sample house from each housing segment. We then created a basic offering that could be delivered with negligible impact on the customer bill and a premium offering that could raise the bill slightly but would add additional value to the customer beyond energy efficiency savings. We addressed the balance of a home's consumption with rooftop or community solar.

[9] These are full capital costs for efficiency measures, not incremental capital costs.

[10] This consists of roughly $225 million of energy-efficiency measures and $500 million of distributed solar PV.

[11] Fort Collins Utilities has also requested from their contracted analytical resource a more granular segmentation. Early results suggest that our analysis, based on three less-granular segments, comes to similar conclusions as the more granular segmentation.

Separate analysis with the NREL PV WATTS tool suggests that, with no incremental customer acquisition costs and utility ownership at lower cost of capital, as well as bulk purchasing, solar could be delivered at close to the marginal customer electricity rate of $0.08 per kWh. Given this, we assumed no bill impact for solar and treated it the same as traditional power from Fort Collins Utilities. There would be additional distribution costs and the need to buy additional firming resources to support such a large investment in distributed solar. We did not explicitly model these costs but additional net income from the IUS could be used to cover them (this is discussed in the utility economics section later).

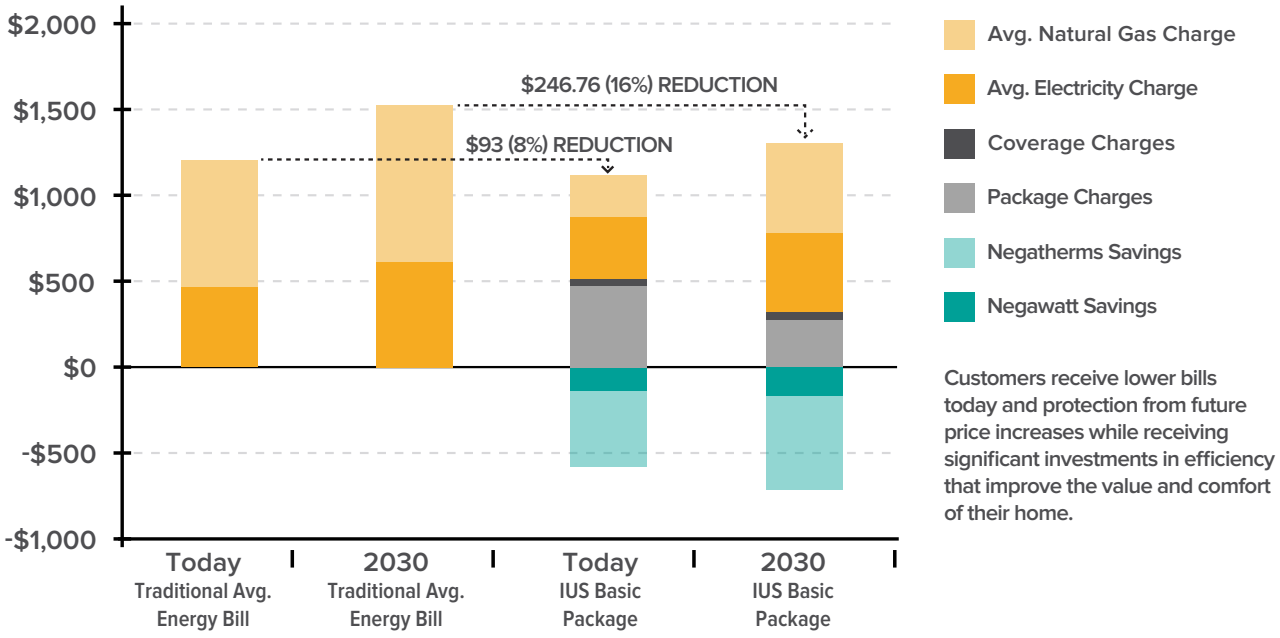
Furthermore, we assumed each home installs a semi-standard solar PV system (e.g., current analysis assumes a 5 kW system). The size of the systems installed can be scaled fairly easily to match home energy use and existing regulation, without a significant impact on costs.

An example of the economic impacts on an average pre-1945 home is shown in Figure 7 (other examples in appendix). A detailed sample measures bill can be found in Appendix A.

Utility and Partner Economics in 2030 at Scale—Costs, Revenue, and Net Income

While this program will initially start at a small scale, it will need to grow quickly to meet Fort Collins's aggressive goals. By 2030, or when the program reaches full scale if sooner, the program will incur substantial fixed costs, erode previous electricity revenue that was devoted to utility operating costs, and impact Fort Collins Utilities' core business. This section evaluates the utility costs and potential for stabilizing net income.

FIGURE 7: **AVERAGE ANNUAL ENERGY BILL: PRE-1945 SINGLE-FAMILY HOME***



*Assumes 1.6% escalation rate

Programmatic Fixed Costs

We estimate that a residential program of this size would incur ~$775,000 of additional fixed costs each year. Ideally, the program would be rolled out to small-commercial customers who would incur the balance. The fixed costs fall into the categories described in Table 2.

In our modeling we assume a 4% cost of capital for the utility, with a 6% cost of capital for customers. Off-balance sheet (third-party-deployed capital), we assume the utility charges a 2% fee for loan servicing.

TABLE 2: **FIXED COST COMPONENTS**

STAGES	ELEMENTS	ACTIONS
Implementation	Program Administration	Program administration office
	Procurement	Warehousing and logistics, contract negotiations
	Marketing	Pure marketing with external firm
		Community organizing
	Sales	Sales force
		Sales reporting
	Installation	Package assembly
		Delivery
		Installation program manager
	IT Troubleshooting	Help desk and call center
Follow-through	Customer Service	Troubleshooting support
		Sales call center
	Quality Control	Inspection and audits - hardware
		Inspection and audits - installation
		Community identification of improvement opportunities
	Payments	Billing
		Payment to contractors
		Any performance payments
	Adaptive Program Management	Evaluate savings estimates
		Revise study with Fort Collins Utilities
		Field measurement
		Analysis
		Report and recommendation

Revenue and Net Income

At scale, the IUS model would target at least a 60% adoption rate of the basic package, as well as a 10% additional adoption of premium offerings. Depending on the program's financing structure, Fort Collins Utilities' annual revenues could see an impact ranging from a $2 million decrease to a $4 million increase, by 2030. Net income will increase by at least $1 million. Table 3 shows the profit and loss statement for the residential component of Fort Collins Utilities' overall operations in a business-as-usual (BAU) case and in the IUS case for both on-balance sheet (i.e., utility financed) and off-balance sheet (i.e., third-party financed) scenarios. We recommend Fort Collins Utilities pursue some blend of on- and off-balance-sheet financing to optimize revenues while managing its liabilities.

TABLE 3: **BUSINESS-AS-USUAL VS. IUS PROFIT AND LOSS: OFF- AND ON-BALANCE SHEETS**

OFF-BALANCE SHEET – 2030†	BAU	IUS	CHANGE
Residential Energy Consumption (kWh/yr)	344,988,297	271,637,757	-73,350,540
Participating Meters	55,772	39,040	
FCU SINGLE-FAMILY HOME ANNUAL REVENUE			
Traditional Electricity Revenue	$30,798,744	$24,887,885	-$5,910,860
IUS Package Fee Revenues*	NA	$1,874,001	$1,874,001
IUS Coverage Charges	NA	$1,940,308	$1,940,308
Total Annual Revenue	**$30,798,744**	**$28,702,194**	**-$2,096,550**
FCU SINGLE-FAMILY HOME COSTS			
Fixed Costs	-$9,030,426	-$9,030,426	$0
PRPA Energy Charge	-$12,272,191	-$9,662,909	$2,609,282
PRPA Demand Charge Proxy	-$5,095,321	-$4,011,967	$1,083,354
Additional IUS Overhead Cost	NA	-$775,697	-$775,697
Interest Payments+	NA	$0	$0
Taxes and Equivalents	-$1,847,925	-$1,722,132	
Total Annual Cost	**-$28,245,863**	**-$25,203,130**	**$3,042,733**
ADJUSTED INCOME	**$2,552,882**	**$3,499,064**	**$946,182**
Income from IUS	NA	$2,809,754	
Income from Traditional Electricity	$2,552,882	$689,310	
Percentage from IUS	NA	80%	
Percentage from Traditional Electricity	100%	20%	
Adjusted Income/Revenue	8%	12%	

Traditional revenue falls

But is offset by package processing fee revenues

And additional charges to cover additional costs

Fixed costs are the same

Energy and demand charges fall

New programs cost money

* This analysis only includes energy efficiency (no solar) as a multitude of solar options will be offered ranging from utility financed, utility owned, or thrid-party owned. Total credit to be expended by 2030 for energy efficiency is roughly $225 million in this scenario, with approximately $120 million of credit outstanding by 2030.

† Beginning of 2030

ON-BALANCE SHEET – 2030†			
	BAU	**IUS**	**CHANGE**
Residential Energy Consumption (kWh/yr)	344,988,297	271,637,757	-73,350,540
Participating Meters	55,772	39,040	
FCU SINGLE-FAMILY HOME ANNUAL REVENUE			
Traditional Electricity Revenue	$30,798,744	$24,887,885	-$5,910,860
IUS Package Fee Revenues^	NA	$8,085,067	$8,085,067
IUS Coverage Charges	NA	$1,940,308	$1,940,308
Total Annual Revenue	**$30,798,744**	**$34,913,260**	**$4,114,515**
FCU SINGLE-FAMILY HOME COSTS			
Fixed Costs	-$9,030,426	-$9,030,426	$0
PRPA Energy Charge	-$12,272,191	-$9,662,909	$2,609,282
PRPA Demand Charge Proxy	-$5,095,321	-$4,011,967	$1,083,354
Additional IUS Overhead Cost*	NA	-$775,697	-$775,697
Interest Payments+	NA	-$5,184,451	-$5,184,451
Taxes and Equivalents	-$1,847,925	-$2,094,796	-$246,871
Total Annual Cost	**-$28,245,863**	**-$30,760,245**	**-$2,514,383**
ADJUSTED INCOME	**$2,552,882**	**$4,153,014**	**$1,600,132**
Income from IUS	NA	$2,809,754	
Income from Traditional Electricity	$2,552,882	$689,310	
Percentage from IUS	NA	80%	
Percentage from Traditional Electricity	100%	20%	
Profit Margin	8%	12%	

† Beginning of 2030

OVERALL VALUE

Our modeling suggests that this program can:

- Be executed with savings to customer bills;
- Generate new revenue for Fort Collins Utilities;
- Contribute to fixed and utility operating costs;
- Help customers contribute to city-wide emissions reduction goals.

By expanding into new areas, such as growing the premium offering or exploring opportunities not shown here (Fort Collins Utilities is currently exploring fiber optic cable), the utility can expand its presence even further, using these basic offerings as a platform for continued service provision.

At the same time, a program like this helps diversify Fort Collins Utilities' business away from primarily fossil-fuel-generated electricity sales, a model increasingly at odds with the City's climate goals. This program also provides protection against uncontrolled revenue erosion from customer-initiated solar and efficiency programs.

We estimate that, at scale, emissions reductions will be substantial, delivering over 90% of the savings that is required from conventional residential building efficiency outlined in the *Stepping Up* report, as well as deploying more than 60% of the distributed solar that is required to meet the City's goals.

CUSTOMER ADOPTION

04

CUSTOMER ADOPTION

INTRODUCTION

Achieving Fort Collins's greenhouse gas reduction targets will require the city to reshape its energy use, which will take the effort of the city's most important resource: its residents. Fort Collins Utilities' customers must change how they use, produce, and save energy. In other words, the challenge facing the City of Fort Collins and Fort Collins Utilities is to transform customer adoption, moving the community from low levels of adoption to almost universal adoption of distributed energy resources. Although our models assume a more conservative 60–70% adoption rate, we feel it is critical to start with a goal of near-100% adoption when designing the program.

CUSTOMER ADOPTION—A GENERAL FRAMEWORK

A successful customer adoption program focused on distributed energy resources should address some, if not all, of the stages in the customer-adoption process: awareness, interest, evaluation, adoption, and referral. In addition, the program should consider three other essential program elements: design, community engagement, and marketing/sales (see Table 4). Importantly, it serves as a jumping off point to further articulate and evaluate—using behavioral science concepts and findings as well as original market research—an efficient and effective approach to widespread customer adoption of distributed energy resources on a citywide scale in Fort Collins.

Behavioral Science and Customer Adoption

Many Americans already experience behavioral science strategies without even knowing it. For example, the roll out of auto-enrollment retirement plans, in which employees had to opt out if they did not want to participate, saw plan participation soar.[ii]

This shift comes from simply altering the structure and default option of a choice, not taking that choice away, and leveraging some knowledge about the psychology of decision making.

Today, we can similarly apply behavioral science to customer distributed energy resource adoption choices. For example, if putting in new insulation saves money, why doesn't every homeowner call their local contractor and have it done today? We are far from the rational utility-maximizers idealized by economists, and we make choices based on a wide variety of factors.[iii] Therefore, understanding how we make decisions, process information, and evaluate choices can provide important insight into how utilities and communities can increase customer adoption of energy efficiency and distributed generation.

Factors that Influence Customer Choice

The context in which humans make decisions—the choice environment—can dramatically influence decision making, so how we structure choices matters.[iv] Choice architecture includes two key elements: what to present to decision makers (e.g., customers) and how to present it.[v] While we like to think we make decisions based on facts, the context for those facts matters as much or more than the facts themselves.[vi] For example, individuals are more likely to reduce energy use when presented with information about their energy consumption relative to their neighbors. In addition, in the energy sector, experimental evidence suggests that framing impacts a wide range of customer preferences and actions, from choosing more-efficient but also more-expensive appliances,[vii] to turning on fans instead of using air conditioners.[viii]

Recommendations to Boost Adoption

Based on key elements of behavioral science research, four general concepts can help guide Fort Collins Utilities in developing programs that promote customer adoption:

TABLE 4: **CUSTOMER ADOPTION STAGES**

A successful program must touch on all stages of customer adoption

A successful program needs to carefully consider:

	AWARENESS	INTEREST	EVALUATION	ADOPTION	REFERRAL
Program Design	Targeting based on specific characteristics (e.g. capacity constrained customers) *Example: Marshfield Energy Challenge*	Pre-packaged options and limited choices *Example: Marshfield Energy Challenge* On-bill financing (possibly net-zero) *Example: New London Resources Project* Rewards, prizes, and competition *Example: Energy Smackdown*	Free Audits *Example: Bonneville Power Administration*	Opt-in as a default Reports / real-time feedback *Examples: Jasper Energy Efficiency Program, Opower* Utilize pledges / goals as commitment device	Use early adopters as passive examples and active volunteers *Example: Long Island Green Homes*
Community Engagement	Targeting based on location or demographic characteristics *Example: Twin Cities One Stop Program* Leverage the power of local leaders to spread information and serve as examples *Example: Take Charge Challenge*	Create and use existing networks: contractors, retailers, cities, community groups, etc... *Example: Keystone's Home Energy Loan Program* Engage the community in program design & implementation *Example: Hood River Conservation Project*	Direct peer-to-peer interactions and discussions between early adopters and prospective adopters *Example: Hood River Conservation Project*	Group sign-ups: have people in a neighborhood sign up for the program together as a group *Example: Sustainable Works*	Leverage the power of local leaders to spread information and serve as examples *Example: Take Charge Challenge*
Marketing & Sales	Targeting a specific audience & framing the message *Example: Houston's Home Energy Efficiency Program*	Reach out to people multiple times or utilize multiple venues of advertising to reinforce the message *Example: Houston's Home Energy Efficiency Program*	Free Audits *Example: Bonneville Power Administration* In-person conversations with potential customers *Example: Vermont Community Energy Mobilization Project*	Energy concierge to hold a customers hand through the decision, and therefore increase the chance that they buy *Example: Populus LLC (Energy Advisers)*	Referral bonus – for the referrer, the referee, or both. *Example: Sungevity*

- **Give customers an easy option:** Make auto-enrollment a priority and help customers by vetting ALL the options, narrowing choices, and providing clear recommendations.
- **Provide program relevance today:** Give customers public recognition, a sense of belonging, and clear information on near-term impacts of interventions.
- **Create a sense of opportunity and ownership:** Communicate in a way that creates ownership and entitlement: clean air, comfort, and affordable energy are City commitments to citizens that should not be taken away.
- **Leverage the power of community influence:** Facilitate the involvement and mobilization of social networks, both virtual and on the ground (e.g., neighborhood associations, Chamber of Commerce, etc.).
- **Maintain customer dialogue post-installation:** By seeking feedback, necessary program modifications can be identified and any problems can be discovered quickly.

These concepts provide a framework to help address some of the key hurdles to increased adoption. RMI and Fort Collins Utilities used these concepts in developing and evaluating the IUS model.

EVALUATING THE IUS MODEL FROM A CUSTOMER PERSPECTIVE

For a small municipal utility, Fort Collins Utilities has already amassed an impressive array of programs to overcome key barriers to distributed energy resource adoption, many leveraging the aforementioned behavioral science concepts. Fort Collins Utilities partners with Opower to provide all residential customers with online energy reports. Expanding on the power of information, Fort Collins Utilities has replaced almost all the city's mechanical water and electric meters with advanced electronic meters that enable two-way communication and will allow all customers to more easily track their electricity use.

FIGURE 8: **NET ANNUAL ENERGY EFFICIENCY SAVINGS IN FORT COLLINS**

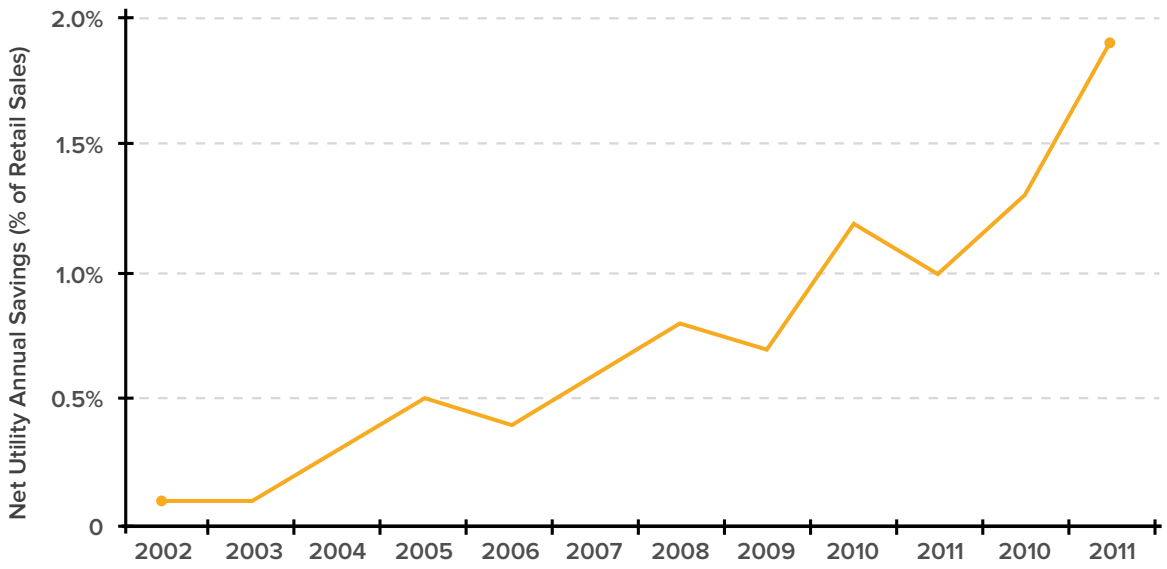
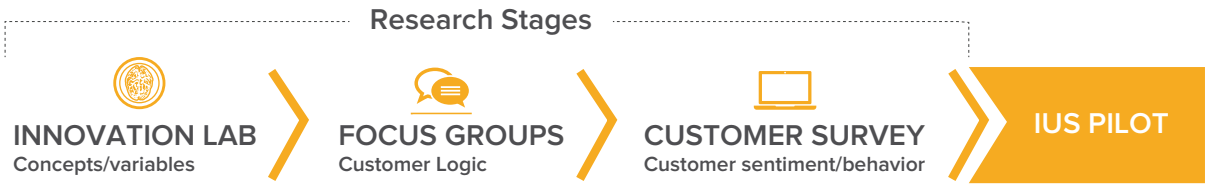


FIGURE 9: **DEVELOPING AND TESTING THE IUS MODEL**



This, combined with multiple other distributed energy resource programs, including a nascent on-bill financing program, has been successful in generating significant energy efficiency savings (see Figure 8).[ix]

Given the success of its existing programs and understanding the importance of behavioral levers in increasing customer adoption to unprecedented levels, Fort Collins Utilities and RMI engaged in three complementary efforts to formulate and test important customer-facing elements of the IUS model (see Figure 9).
The progressively narrowing research approach—moving from articulating key concepts and variables to a detailed customer survey experiment—provides a platform and key insights to implement a successful and informative pilot program of an alternative utility business model that overcomes key customer-based obstacles.

TABLE 5: **KEY CUSTOMER-BASED OBSTACLES TO WIDESPREAD ADOPTION**

BARRIER	DESCRIPTION

Communication	• Energy bills typically do not have significant relevance in consumers' lives to lead to action.
	  • Energy savings reports are a platform to build on.
	• Even the best programs often use technical language or target only one audience.
	  • Communication needs to come from a trusted source, be grounded in local context, and have inclusive language to speak to all customers.

Ease	• Most energy programs are at best, inconvenient, and at worst, complicated and invasive.
	  • Adoption needs to be as frictionless as possible.
	• Expensive actions can make widespread adoption difficult.
	  • Pay as you save can overcome this barrier.

Adaptive	• People and the world around them shift constantly, yet most efficiency programs are static. • A program would need to be data driven and adaptable, with a range of choice architectures.
Self-Perpetuation	• Most programs end at adoption, and so require constant marketing efforts to sustain impact. • Continuous, rather than one off, engagement is potentially integral to enhanced adoption.
Political/Market Risk	• Many programs create winners and losers; the losers can kill a program politically or crowd it out of the market. • Managing this risk is imperative to a program achieving 100% adoption.

Innovation Lab

In October 2013, Fort Collins Utilities, RMI, and e-Lab members met to identify the major challenges to widespread customer adoption of distributed energy resources and energy efficiency in Fort Collins (see Table 5).[x]

The ideas and recommendations that emerged from the e-Lab workshop lay out the framework for a new customer-centered utility business model that is agile and innovative, but capable of scaling rapidly. Building on this conceptual work, the next step in the research and evaluation process was testing core elements of the IUS—elements specifically designed to address some of these key obstacles—among Fort Collins Utilities customers.

Focus Groups

After e-Lab, we explored customer thinking around IUS. The first step in this process involved convening two small focus groups of Fort Collins Utilities customers. Led by Populus, LLC, a respected and innovative provider of energy efficiency advisory services, the focus groups explored the key concepts of auto-enrollment, permutations of on-bill financing (e.g., loans, leases, and service charges), and expanded and alternative services (e.g., solar, furnace financing/service, electronics financing/service, etc.). The discussions uncovered underlying concerns of customers, such as long-term resale issues of homes with leased equipment (e.g., solar panels, furnaces, etc.), costs, and flexibility to keep up with the pace of technological advancement. Importantly, the focus groups also revealed information gaps among customers, openness to alternative financing and service models, and high levels of trust in Fort Collins Utilities. Table 5 summarizes the key takeaways from the focus groups.

Given the feedback and insights from customers during the focus groups, there were a number of important areas that emerged for further evaluation:

- Perspectives/attitudes around auto-enrollment
- Openness to alternatives to traditional ownership
- Balance of choice vs. pre-determined packages
- Perspectives/attitudes toward different financing options
- Understanding different market segments in Fort Collins (renters/owners, commercial/residential)
- Customer motivations, such as environmental, economic considerations
- Message framing (e.g., goal-based packages vs. measures)

Customer Surveys

Focus groups are a fantastic research tool to better understand customer thinking and behavior, but they have limitations. Because the groups only involve a few individuals and detailed conversations, they are an excellent mechanism to explore and understand what customers perceive as driving their thinking or behavior. In that way, they serve to initially test concepts and identify important questions or ideas, which can then be evaluated among a more representative, larger customer sample.

To test the key questions emerging from the focus groups, as well as obtain more representative information concerning utility customer attitudes, we are in the process of conducting a survey of Fort Collins' 68,000 utility customers. The survey is designed to provide insight into key areas of the IUS and expand upon the information gleaned from the focus groups. The survey is structured to directly address the core elements of IUS and uses different analytical tools (e.g., experimental design, anchoring vignettes, etc.) to assess customer perspectives, choices, and behaviors. The results from the survey

TABLE 6: **FOCUS GROUP TAKEAWAYS**

TOPIC	SUMMARY
Integrated Utility Services	• There is a high degree of comfort with the idea of Fort Collins Utilities (FCU) providing additional offerings focused around energy efficiency and distributed generation (EE/DG). • However, even where there was a high level of trust, quality assurance and transparency are important to maintain that trust. • There is a strong sense among focus groups that it is the responsibility of the utility to "do the right thing" environmentally and customers are prepared to "partner" with the utility in that effort, provided the arrangement is financially reasonable.
Automatic Enrollment for Efficiency Upgrades	• A default option with basic energy efficiency measures did not raise any significant concerns among participants. • Although this reflects views of only a few customers, it does suggest that auto-enrollment has great potential and, with an opt-out option, still provides people with adequate choice. It also means FCU has a unique opportunity to pilot a default program, solidify existing trust and confidence of customers, and leverage that work into deeper and more impactful EE/DG investments (ratcheting up approach).
Financial Models & Ownership	• Different financial models generated confusion and there is a clear need to provide people with education and options surrounding ownership. Multiple participants indicated that leasing/loans/service charges provide a unique opportunity for people to invest in EE/DG who would not have the financial means to do so independently. • While some participants initially expressed a clear preference for ownership of equipment and systems, they were more likely to consider alternative ownership options for unfamiliar equipment that they are not used to owning, especially when that equipment requires maintenance (such as solar PV). • From these initial focus groups there is evidence that education and messaging around lifetime costs, maintenance risks and diminishing equipment value may be able to shift preference away from an ownership model.
Packaging of Energy Upgrades	• From these initial focus groups, it is likely that customers will desire high degrees of customization, calling into question the idea of having a few packages to choose from. • Packages may be useful in grouping measures that are most able to assist customers in meeting unique goals, but the idea of a per-package cost and per-package benefit generates strong confusion and perhaps unnecessary resistance. • There are some technologies (primarily WiFi-enabled devices) that generate emotional resistance, even amongst a motivated and educated group of participants.
Customer Experience	• Participants expressed a desire for a streamlined process with one point of contact to assist them in the implementation phase. • This group of motivated customers valued the convenience of a streamlined approach that narrows the choices available, but gives them options around measures and providers.

will provide important information to help Fort Collins Utilities refine the model proposed here and implement a successful and informative pilot. The analysis of the survey and the results will be available as an online appendix.

RECOMMENDATIONS

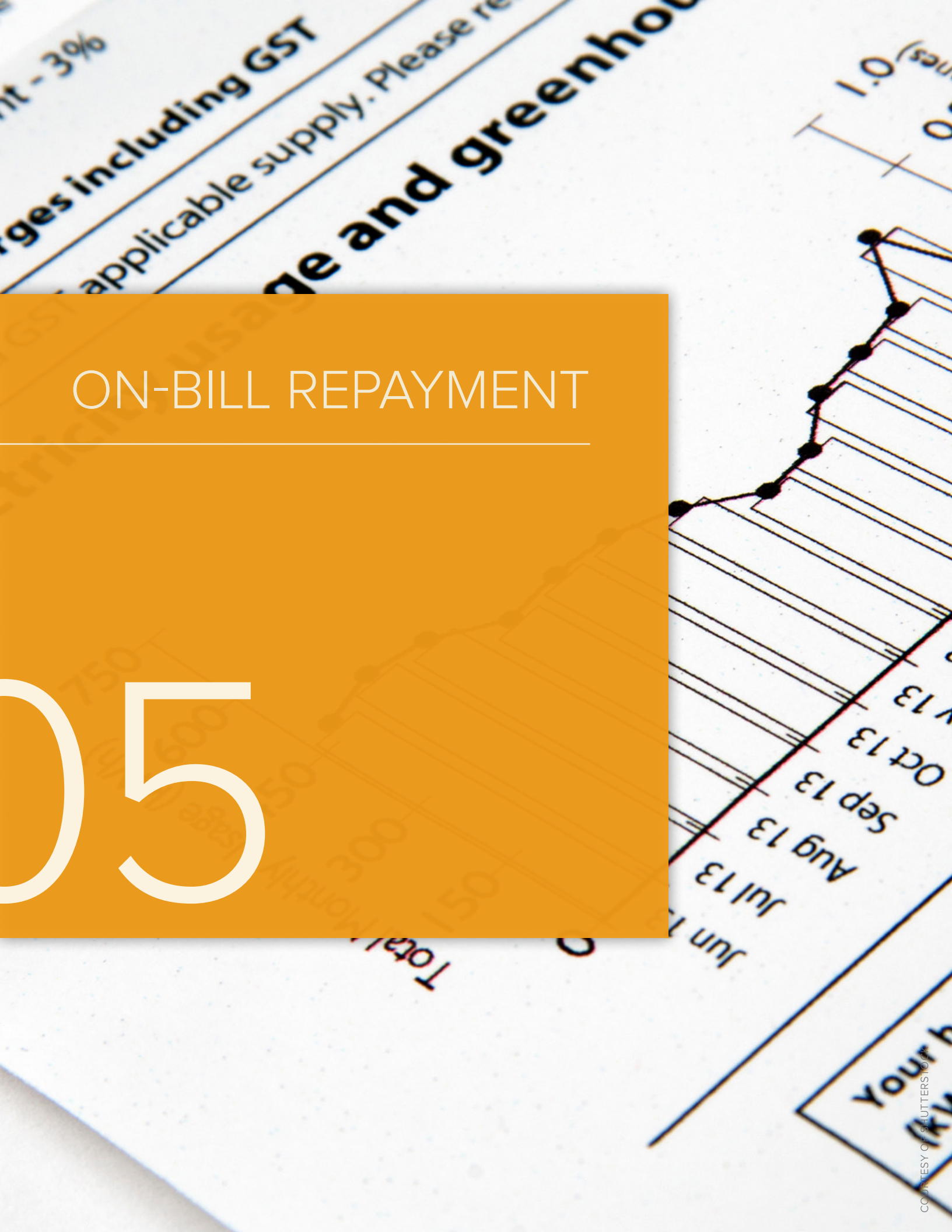
Fort Collins Utilities' progress to date promoting distributed energy resource adoption is substantial for a small municipal utility. That said, both the City of Fort Collins and Fort Collins Utilities would like to achieve near-universal levels of customer adoption in the next 15 years. The IUS model is designed to create thriving utilities in a world where every resident produces some if not all of their own energy and energy consumption diminishes because of the extensive efficiency measures adopted by property owners, renters, and businesses. Yet, how does a community move from relatively low levels of customer adoption to almost-universal adoption? Doing so requires eliminating or at least providing a way around the key economic and psychological hurdles to customer adoption. Building on existing successful programs as well as behavioral science research, our Fort Collins-specific market research suggests the following elements will be important factors in a successful model that transforms customer adoption:

- ***Ensure programs can learn and are data driven***—Collect robust information from participants and use regular feedback to test alternative approaches across different demographic groups.
- ***Strive for "customer-ized" programs combined with auto-enrollment***—Apply auto-enrollment across different market segments, while giving 'customer-ized' options around bundled services/products. Customer-ized programs would be both customer-centric and highly customized offerings.
- ***Provide customers with tailored choices***—Develop clear guidance and recommendations around products, services, and finance that facilitate easier customer choice.
- ***Help customers see how they're making a difference while showing them clearly how they are saving money***—Link individual adoption decisions and progress with overall community goals. Clearly show customer savings at every opportunity.
- ***Develop community-based programs***—Leverage existing networks and connections to test a community-driven approach in certain neighborhoods, while collecting information on how social networks help programs spread quickly.
- ***Educate customers around finance and ownership***—Develop clear and concise language around financing that customers readily understand.
- ***Streamline delivery***—Utilize an integrator to help customers navigate distributed energy resources. Make integrators available at times convenient to customers (such as before and after normal work hours).
- ***Make the model flexible***—Allow the ability to incorporate additional industry or technological developments.

So far, our work around IUS has been conceptual, exploratory, and research driven. However, the next and perhaps most important step is putting these ideas and models to work in Fort Collins. To do that will require piloting the program among a small group of customers in different neighborhoods throughout Fort Collins. Specific recommendations for the IUS pilot are found in Chapter 6.

ON-BILL REPAYMENT

05



COURTESY OF SHUTTERSTOCK

ON-BILL REPAYMENT

INTRODUCTION

A key component of dramatically increasing the adoption of energy efficiency resources is mitigating, through financing, the upfront capital cost for measures that will generate savings over time. A structure that allows anyone to invest in energy efficiency savings that generate a return over time expands the reach of programs to those who may not have sufficient resources and facilitates greater investment in deep savings. Financing is also critical for the utility to access capital necessary to deliver this program. In this paper, financing refers to financial contracts in the most general terms unless otherwise noted (i.e., it includes leases, service charges, loans, etc.). We've focused our financing research and analysis on residential customers because they are traditionally underserved by distributed energy resource (DER) financing providers and there are numerous financing options available to large commercial and industrial customers.

In the context of the IUS, financing plays a role in the relationship between the utility and the customer—the front end—and securing institutional financing to fund the overall program—the back end. Next we describe the financing of these two aspects using a similar structure. Within these two categories we first discuss today's typical model, then emerging models, and finally the future model that we believe is needed to best support the IUS concept.

FRONT-END FINANCING

Ensuring that customers have access to energy and value-added services, feel happy and confident with the results and process associated with the service provided, experience a streamlined process, and have the option for no upfront costs or lump sums are core design principles. The structure of front-end financing plays an important role in adhering to these core design principles. For example, if the front-end financing is similar to what most people go through in buying a house—credit checks, exhaustive documentation of assets, providing pay stubs, etc.—the process would not be streamlined and customer satisfaction would likely be low. Conversely, if no financing is provided, the ability to provide energy efficiency or distributed renewables with no upfront costs would be difficult. Some form of financing is necessary for the IUS model to work.

We present three different categories of front-end financing: a) today's typical finance models, b) today's cutting edge models, and c) the future model we propose for Fort Collins Utilities. All of the forms described below involve repayment or payment through a utility bill rather than a separate payment mechanism. This form of finance is generally known as on-bill repayment.

The promise of on-bill repayment is that it allows more people to invest in energy efficiency and other DERs, and that those who provide funding for these investments can do so with great confidence in repayment or payment because paying utility bills is a high priority for customers.[xi] In cases where the utility has the power to discontinue service due to lack of payment, the perceived risk of the financing is further reduced. Finally, the ease with which customers can participate should lead to higher participation rates.

It is important to note that specific terms mean specific things to different parties in the DER finance world, and there is not a particularly strong consensus on which terms mean what. For clarity, we try to define exactly what we mean by the specific terms we use.

Today's Typical Models

There are two on-bill repayment models that are common today—on-bill loans and on-bill tariffs. We define on-bill loans as being tied directly to an individual or entity. We define an on-bill tariff as a financing mechanism that is tied to physical property or an electric power meter.

On-bill loans typically target small-commercial and industrial customers, although there are some residential programs.[xii] These programs operate much like a standard consumer loan. They typically involve a detailed credit screen and are often not transferable or difficult to transfer. The difficulty in transferring an on-bill loan means that it usually must be paid off when the home or business owner moves (in some cases the loan follows the borrower). These complications also make it difficult for renters to take advantage of on-bill loan programs. Depending on specific regulations and specific program structures, on-bill loans may be subject to consumer lending laws and may not be able to leverage turn-off ability,[12] which may add additional burden to utility administrators.[xiii] These are essentially conventional loan products, often secured by a home lien, that happen to use the utility bill for repayment.

Tariff is a term that describes rates and charges associated with a utility bill. Typical on-bill tariff programs are loans that are tied to physical property rather than an individual or company. Many programs also limit the scope of investment such that the savings associated with the DER are greater than the additional on-bill payment. In theory this makes it easier both to transfer the obligation to a new owner when the property is sold and for renters to participate. In reality, the ease of transferability varies tremendously depending on how the program is structured. For example, if a program administrator requires a comprehensive credit screen (either because their funding source demands it or because their internal finance officers chose to include it) then transfer of the obligation may be cumbersome, or delay the sale of the property or setup of a new rental lease agreement. Further, depending on the structure of the program, an on-bill tariff may cloud property title in a similar way to loans, adding additional hassle to the transfer process and limiting one of the chief benefits associated with the tariff structure.

We believe that a primary indicator of on-bill tariff program success is the ease of initiation and the ease of transferability—many of today's on-bill tariff programs have neither, resulting in low participation rates.

Today's Emerging On-Bill Tariff Models

We focus on on-bill tariff models here because we believe that the complexity and application burden of on-bill loan programs limits their ability to scale. As mentioned earlier, tariffs are charges associated with the utility bill, and have the potential for two large advantages: 1) they do not require the customer to incur debt, which allows for different credit dynamics, easier initiation, and easier transferability, and 2) they can be customized to reach customers that are not eligible for debt products, such as low-income tenants and renters, by relying on meter payment history and turn-off ability to provide security. Today's emerging models are similar to established on-bill tariff models in that they involve financing tied to property or the meter and typically limit the scope of the program to DER investments in which the savings are greater than the additional on-bill charge. The differences are that they seek radical simplicity in the application procedure, and that transfer or closing of the obligation upon time of move is designed to be easy.

The radical simplicity of the application is tied, in large part, to the funding source for the program. Giving lenders comfort with performing minimal due

[12] The ability for the utility to stop providing electricity to a customer who is delinquent.

diligence (e.g., minimal credit checks and application procedures) is discussed in detail in the back-end section that follows. To replace the security that is usually provided with these credit checks, a utility is often more involved in facilitating tariff repayment, using meter payment history and turn-off ability to ensure payment, and aggregating across customers to provide their capital providers with more stability.

Creating simple transfer or closing procedures is more difficult, especially if the savings from DERs do not cover the additional bill charge. This is why most programs constrain the scope of DER investment. Some programs, such as Midwest Energy's, register their on-bill financed projects with the county, which then notifies potential buyers of the obligation. Written disclosure of the obligation must be signed to ensure transfer within 30 days of the sale of the property or the original owner is responsible for paying off the obligation. Other programs, such as a nascent Hawaii program, may automatically transfer the obligation as long as the new owner is notified.[xiv]

While these programs are a significant step forward and adhere to many of our recommended program design principles, their long-term success is yet to be determined, especially in the renter market.

The Future Model We Need—Charge for Energy Services

An additional on-bill repayment component needed for the Fort Collins Utilities IUS model isn't really a finance model at all. Rather, it would be a new utility revenue model in which customers pay for the service afforded by DERs rather than paying for and owning the hardware outright. In an energy services model, screening would still be tied to the meter and the utility would retain turn-off ability, but the utility would own the asset. Consumers would simply pay the utility for the service of the hardware or resources such as a new and highly efficient refrigerator, renewable power generated by a utility-owned solar array on their roof, or an efficient furnace. It is important to note that this model would not supplant a highly streamlined on-bill tariff model, but accompany it as another option. This model would be similar to many consumer products analogs, such as home security systems, cell phones, cable modems, and DVRs, as well as third-party owned solar PPAs. As focus group discussions revealed, some customers may feel more comfortable owning all the equipment in their home and elect not to use the service charge option. To reach all target customers and achieve aggressive goals, the utility will need to provide a variety of options to meet different customer goals.

The transferability of an energy service charge faces similar challenges as emerging on-bill tariff models. Many of the opportunities to simplify transfer or closing out of service contracts are similar. Fort Collins Utilities could work with the county assessor to register the service contract and develop systems to notify potential owners. If formal transfer of the service contract was recorded (perhaps through a streamlined online portal), the new owner would assume it. If not, the original owner would be responsible for closing the service agreement, a similar arrangement that many home security providers use. In the rental market, the landlord would likely need to approve renters entering into the service contract and would likely be responsible for notifying future tenants about the service agreement.

Table 7 summarizes the various on-bill repayment front-end options and highlights the recommended on-bill tariff and energy service charge options we recommend Fort Collins Utilities pursue in the IUS model. Customers will always have the option to make a cash purchase (and potentially fund with, for example, a bank loan) and should have the option to make a down payment if desired.

TABLE 7: **ON-BILL FINANCE FRONT-END OPTIONS**

ON-BILL FINANCING	ON-BILL TARIFF	ENERGY SERVICE CHARGE
• Capital buy-down with down payment floor	• No upfront capital required	• No upfront capital required
• Loan application required	• Streamlined application	• Streamlined application
• Credit screen	• Screening tied to meter payment history	• Screening tied to meter payment history
• Eligible for additional rebates	• Eligible for additional rebates	• Not eligible for rebates
• Eligible for state and federal tax incentives	• Eligible for state and federal tax incentives	• Not eligible for state or federal tax incentives
• Customer owns assets	• Customer owns assets	• Utility owns assets
• Obligation must be closed upon sale or exit of property	• Obligation can be transferred upon sale or exit of property	• No transfer of obligation, early termination fee
RECOURSE		
• Service termination	• Service termination	• Service termination
• Collection agency	• Collection agency	• Collection agency
• Credit reporting	• Credit reporting	• Credit reporting

On-bill tariffs and energy service charges are the primary mechanisms to lower upfront costs in IUS

BACK-END FINANCING

The back end of financing DERs involves securing capital to finance any one of the front-end options just described. This capital can come from a range and/or combination of sources, including traditional utility program funds and public or private financiers. Next we describe the typical models for today's on-bill finance programs, current emerging models, and the options that could be well suited to the Fort Collins Utilities' IUS model.

Today's Typical Models

Many of today's on-bill finance programs are funded directly through utility program budgets, public grant funding such as the American Recovery and Reinvestment Act and public loan funds, or special entities such as community development financial institutions (CDFIs) that are designed to help those who have difficulty accessing traditional sources of capital. In cases where the utility offers loan-based capital, the utility facilitates the connection between the customer and the lender and collects payments, but the loan is held by the original lender. Fort Collins Utilities' current on-bill program uses Energy Smart Partners, a subsidiary of Funding Partners, a local CDFI, to provide qualification and loan-closing services but the utility provides capital.

The primary limitation of today's typical sources of capital for on-bill finance programs is their ability to scale. Grant funding is neither guaranteed nor regular. Public loan funds are somewhat subject to the whims of the legislature and may not have the longevity required to sustain year-on-year expansion of on-bill finance programs. The Fort Collins Utilities/CDFI program may not have sufficient resources to provide funding for large programs and support a host of other financial products aimed at ensuring lower-middle income access to capital.

Emerging Models

Emerging models for funding on-bill finance programs are trying to address the issue of scaling by accessing a broader set of capital sources. Developing programs that fund on-bill finance using private lenders is a promising opportunity to bring greater scale. In these models, the utility typically administers an on-bill finance program on the front end and the back end involves connecting individual customers with individual lenders in a standard way that may appear seamless from the customer perspective. This allows for consistent messaging leveraging the longstanding customer-utility relationship while outsourcing origination and loan management as well as mitigating impacts to a utility's balance sheet.

Utilities can leverage program funding or grants to create more appealing rates for their programs by establishing a loan loss reserve, by buying down interest rates, or by combining existing funds with private sources to target different market segments that lenders may be unwilling to provide capital for. Furthermore, the utility may leverage traditional rebates to reduce the initial capital expense of measures to further reduce payment amounts. The use of private lenders may influence the front-end design of on-bill finance programs. For example, local or state laws and policies may affect the program's ability to turn off service if private lenders are involved. Private lenders may also require certain additional underwriting criteria in their programs.

While large private financial institutions would bring scale to on-bill finance programs, it is unlikely they would be interested in participating without significant aggregation of residential and small-commercial customers—each transaction would be too small to spur their interest. Without aggregation smaller-scale community banks would more likely be the key partners in these emerging funding models.

The Future Model We Need

To achieve the scale Fort Collins Utilities needs and to accommodate the energy service charge described earlier, Fort Collins Utilities must pursue a new back-end funding model to complement existing funding sources. The model we propose looks more like the utility raising capital for a new business offering than a utility connecting customers to lenders and administering the program. This brings funding to scale because the utility, instead of individual customers, would be borrowing funds. It also gives Fort Collins Utilities more control over the structure of the front-end program because the money is "theirs" (i.e., it enables the energy service charge).

The funding that Fort Collins Utilities pursues will likely come from a private lender and will ideally be a line of credit rather than a lump-sum loan. The line of credit will allow Fort Collins Utilities to bring the program to scale over time while avoiding the interest expense of underutilized capital (should there be less participation in early years of the program). Fort Collins Utilities may need to establish a loan loss reserve fund or other credit enhancement using another source of funding to satisfy lenders. We recommend this be established using program funds or additional grants as a reserve to lower the overall risk to outside investors.

PILOT GOALS AND PRINCIPLES

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PILOT GOALS AND PRINCIPLES

INTRODUCTION

The IUS model will be piloted in an estimated 200–300 homes across Fort Collins. The pilot will entail selling and installing an integrated package of energy efficiency and solar funded through emerging and new on-bill repayment mechanisms and executed by a third-party administrator. Testing the new ways of engaging and serving consumers articulated in this report are critical pilot goals. This testing will allow Fort Collins Utilities to refine the IUS model before a potential larger citywide rollout of the program.

Objectives

In addition to testing the overall IUS model, the pilot has five main objectives:

1. Uptake—test market demand for integrated packages
2. Efficiency—prove out increased energy efficiency savings relative to current programs
3. Financial viability—test the economics for the consumer and the utility
4. Efficacy—establish and test program processes for a larger city rollout
5. Customer satisfaction—understand Fort Collins Utilities customer reactions to the IUS model

Recommended metrics to assess each objective are listed in Table 8.

Scope

Market research variables to be tested

Pending findings from the ongoing market research customer survey, we recommend testing the following variables in the pilot:

- Perspectives/attitudes around auto-enrollment
- Openness to alternatives to traditional ownership
- Balance of choice vs. pre-determined packages
- Perspectives/attitudes toward different financing options
- Understanding different market segments in Fort Collins (renters/owners, commercial/residential)
- Customer motivations, such as environmental, economic considerations

Understanding how customer preference changes over the course of the pilot will inform the design of a broader IUS rollout.

Duration

The planned pilot launch is early 2015. Marketing and recruitment will be conducted over the course of a three-month period.

TABLE 8: **PILOT PROGRAM OBJECTIVES AND METRICS**

	METRIC
Uptake	Package adoption rates
Efficiency	kWh saved versus current program kWh savings, therms saved
Profitability	Bill neutrality and utility margin replacement
Efficacy	Administrative cost per energy unit saved
Customer Satisfaction	Percent of pilot participants who hold a favorable impression of the new model at the conclusion of the pilot

PILOT ACTIVITIES

Marketing

The pilot will launch with a marketing campaign notifying citizens of the new suite of offerings the utility will provide. This will entail both passive and active marketing strategies. Active marketing will only be conducted in the pilot region, while passive approaches will use traditional and social media. Pilot consumers will also receive a notification with their bill that they will be enrolled in the new default (opt-out) basic package and will be contacted by a customer service agent to coordinate the installation process and answer any questions they may have about the program.

Customer Engagement

All pilot customers will be contacted by phone to schedule their install date. During the course of this conversation sales representatives will provide a concierge-like service to all customers enabling optional upgrades to premium packages. Customers who wish to opt out of the new default or optional upgrades will be asked to answer a quick survey to gain insight into their choice to not participate.

Installation

Installers will be dispatched at pre-selected times from which customers can choose. These times will be established for each package type in order to minimize visits to each customer and to use contractor time efficiently. Once on site, crews will conduct a holistic audit (potentially to include water as well) in order to confirm predetermined measures are appropriate for the building. After the audit they will immediately perform the appropriate installations associated with each package type. A variety of materials will need to be on hand for crews to adaptively install appropriate measures. Finally, should a customer wish to upgrade packages upon arrival of the installation crew, a new installation date must be determined for the appropriate package type. The installer must then upgrade the customer's package choice in the central sales system and flag that an audit has already been performed with a set of recommended measures.

Quality Control, Measurement and Verification, and Reporting

Once measures have been installed, Fort Collins Utilities will continue to provide information to customers through current methods like Opower reporting, as well as additional information that communicates savings estimates on monthly bills. Savings may be shown on a normalized basis to take into account the seasonality of energy consumption, which might otherwise cause large variations in month-to-month savings. Natural gas savings will be estimated by Fort Collins Utilities models and reported through a separate report included with monthly bills. Real-time electricity use will continue to be available to customers through Fort Collins Utilities' online tracking platform.

Three months after final installations are made, Fort Collins Utilities will send all pilot participants a survey about their experience with the program. This survey will cover initial communication with sales staff, the installation experience, reporting and savings understanding, and satisfaction with short-term program outcomes.

Fort Collins Utilities will randomly conduct a number of audits across building and package types to ensure installation quality as it currently does with its qualified rebate contractors. Simultaneously it will be responsible for conducting verification of program savings for both electricity and natural gas.

PILOT PLANNING ACTIVITIES

Based on the core program elements of the business model, the design team identified a set of activities required to launch and deliver a meaningful pilot. Two critical tasks will further enable Fort Collins Utilities to launch a more robust test run of the IUS model: 1) hire a third-party administrator before the pilot launch to ensure that customers have one touch-point under the Fort Collins Utilities brand, and 2) create the recommended on-bill repayment products for customer repayment (private capital is likely unnecessary for the pilot) to meet the needs of different market segments.

Next, we list specific actions that support the pilot launch. Some of these activities have been completed or are currently under way.

On-bill Repayment

Completed activities

- Design recommended on-bill repayment structures.
- Conduct community outreach necessary for stakeholder buy in.
- Seek input from financial institution partners interested in financing programs beyond the pilot.

Remaining activities

- Secure necessary funding for legal and administrative resources needed for implementation.
- Seek outside council, if necessary, to assess potential regulatory obstacles and develop solutions that enable proposed on-bill financing.
- Review proposed business model with municipal advisory boards.
- Set up rate structure codes for service charges for the pilot.
- Arrange for contingencies should recommended on-bill financing face opposition.
    - Work with Fort Collins Utilities to waive origination fees
    - Reduce current financing rates and terms
    - Simplify current financing application

Package Offering Development

Completed activities

- Finish market research, economics, and buildings analysis.

Remaining activities

- Identify pilot specifics:
    - Building stock
    - Measures and technologies
    - Measure costs
    - Market segments
- Finalize integrated packages for specific building stock and market segments.

Marketing

Completed activities

- Initiate internal discussions to explore communication and approaches to minimize customer confusion re: other utility programs.

Remaining activities

- Develop specific communication campaigns and protocol.

Sales and customer service

Remaining activities

- Draft sale and customer experience guide for customer contact points.
- Conduct customer experience training with third-party administrator and utility customer service reps.

Partnership planning

Remaining activities

- Execute central negotiations for solar and efficiency products.
- Set up system to incorporate rebates into package costs.
- Establish durable goods partnerships for procuring selected measures.

Reporting, QC, and M&V

Completed activities

- Use existing utility services to conduct QC and M&V.
- Use existing third-party reporting to convey electricity savings.

Remaining activities

- Develop process for securing customer consent for Fort Collins Utilities to request Xcel natural gas data—perhaps similar to Clean Energy Colorado.
- Develop analytic tools for using Xcel natural gas data to report savings to customers.

Figure 10 summarizes the recommended timing of general pilot planning activities.

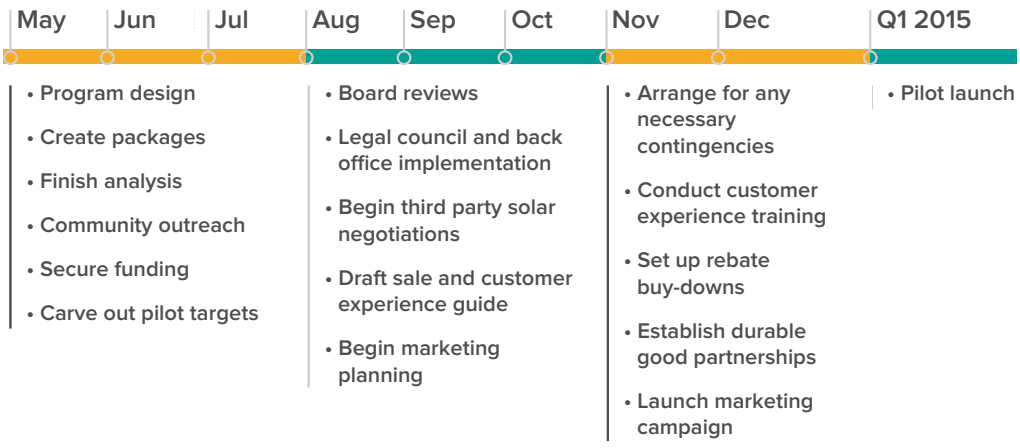
POST-PILOT ACTIVITIES

Upon completion of the pilot a host of actions must ensue in order to roll out the IUS model to the broader community. Lessons learned and the true potential of the program to help the City meet accelerated GHG reduction goals must be understood. Adaptive management of the program as well as understanding the implications for centralized resource development by the utility will no doubt be an outcome of the pilot. But assuming the utility's hypothesis around adoption barriers and sales strategies is correct, the following activities must be completed before launching a broader-scale program:

- Analyze tested variables and document learnings from pilot
- Identify gaps and design solutions
- Create and secure program capital structure
- Create natural gas savings reporting process
- Amplify program enthusiasm and begin citywide marketing campaign

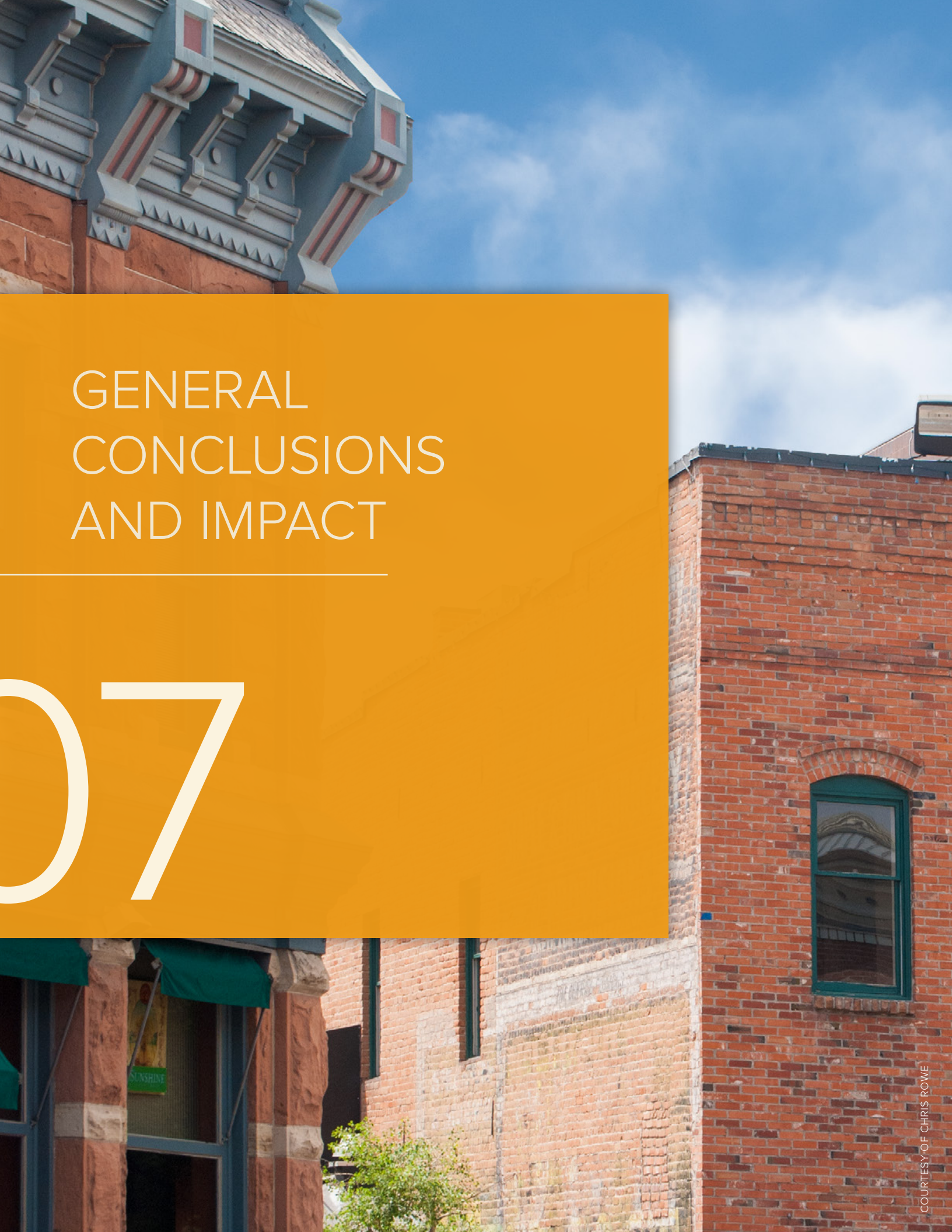
From here expanding measures as well as system- and community-wide benefit offerings can continue. This evolution could include offerings such as electric vehicles and charging stations, and demand response.

FIGURE 10: **TIMING OF PILOT PLANNING ACTIVITIES**



GENERAL CONCLUSIONS AND IMPACT

07



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GENERAL CONCLUSIONS AND IMPACT

The overall benefits of achieving Fort Collins's accelerated greenhouse gas reduction goals are well articulated in RMI's *Stepping Up* report. The specific benefits of the actions that Fort Collins Utilities can take to support Fort Collins's goals are quantified below and describe significant value above and beyond maintaining Fort Collins Utilities' relevance in a rapidly changing utility paradigm.

If the degrees of adoption and savings modeled in our analysis are achieved, Fort Collins Utilities will generate 1,015,998 MWh of energy efficiency savings annually by 2030, which will move the city 80% of the way towards its electric efficiency potential and 40% of the way toward its total efficiency potential. It will also help customers access 195 MW of distributed renewable generation capacity by 2030. These savings will keep $26.5 million in the pockets of residents annually (an average of $680 per residential customer per year). From a utility perspective, the savings generated annually by the IUS model have the potential to reduce costs associated with energy and demand by $2.6 million and $1 million respectively by 2030.

In addition to increasing efficiency and saving money, Fort Collins Utilities' actions can reduce Fort Collins's greenhouse gas emissions by 542,000 metric tons per year. These reductions are 32% of what RMI showed was possible across all sectors (electricity, buildings, transportation) in the *Stepping Up* report, and 90% of what is predicted for the residential buildings sector.

APPENDIX A

PROGRAM ADMINISTRATOR CONTRACT AND LEGAL STRUCTURES

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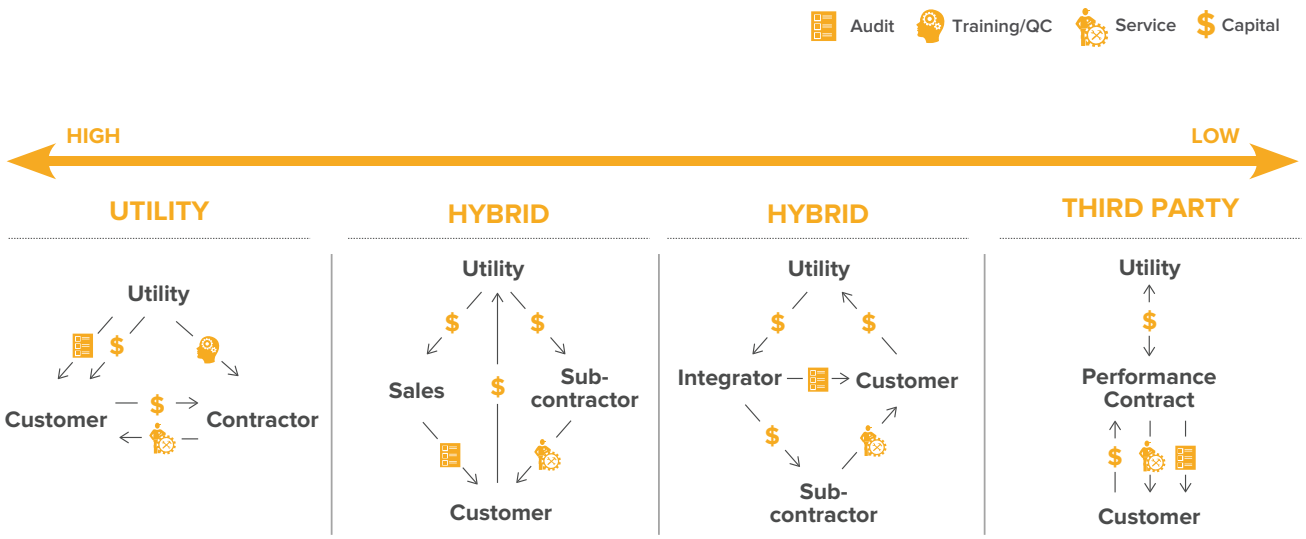
APPENDIX A

PROGRAM ADMINISTRATOR CONTRACT AND LEGAL STRUCTURES

The nature and the structure of the program administrator can vary along a spectrum of high to low utility involvement.

FIGURE 11: **PROGRAM ADMINISTRATION – DEGREE OF UTILITY INVOLVEMENT**



- No RFPs or contract management required
- Contractor directly advises customer
- Audit process has high implications for conversion
- Tweaks on existing programs, rebates remain

- Utility manages all RFPs and contracts
- Sales agency advises client
- Audit process has high implications for conversion
- Rebates folded into package pricing

- Utility manages 1 RFP
- Integrator advises client
- Audit process streamlined to increase conversion
- Programs overhauled

Note:

Private sector integrator can potentially capture ITC and MACRS reducing financing costs

- Utility manages 1 RFP
- Performance contractor advises client
- Audit process streamlined to increase conversion
- Programs overhauled

Note:

- Reduces legal exposure for utility
- Some variation of this could be used in previous model

Best-in-class practice:
Efficiency Vermont's 2.9% incentive payment has been very successful, driving some of the highest U.S. EE adoption rates

The legal structure of the administrator can take several forms, including a private third party, a government agency, the utility, and a hybrid of these models. Each has its pros and cons as described Table 9.

TABLE 9: **PROS AND CONS OF PROGRAM ADMINISTRATION LEGAL STRUCTURES**

	↑ PROS	↓ CONS	OTHER IMPORTANT CONSIDERATIONS
UTILITY	• Strongest existing relationship with the customer • Technical and administrative experience of utility staff • Well developed regulatory channels for oversight and accountability • Have established infrastructure and network with market participants	• Financial disincentive to pursue energy efficiency • Potential and perceived conflict of interest with customer • Service territory boundaries reduce potential to capture economies of scale • When funding tied to rate cases can be contentious	• Creating an advisory committee can prevent issues around stakeholder engagement and create buy-in for programming • Advisory committee requires establishing governance processes
HYBRID (2 or more admins)	• Allows each oversight body to focus very specifically on addressing a local priority such as service to low income customers, market transformation, etc.	• Communication issues can diminish benefits of separate entities. Having some sort of process or structure in place to address this issue can help	
THIRD PARTY	• Structure and mission can be strongly aligned with policy goals • Ability to create lean admin • High probability of attracting qualified staff	• Institution building requires time, political will and resources • Only appropriate if funding resources available for an extended period of time • Funds susceptible to government re-direction	• The city council of the District of Columbia created a new structure for EE admin in DC known as a sustainable energy utility (SEU) funded primarily through bonds. The contract to manage the SEU has gone to the Vermont Energy Investment Corp (same entity managing Efficiency Vermont)
GOVERNMENTAL	• Agency objectives generally compatible with program goals	• Must ramp up subject matter knowledge • Procurement requirements can limit best-value selection • May face challenges attracting the best staff • Greater political and bureaucratic exposure • Funds susceptible to government re-direction • Not as nimble to a changing market	

TABLE 10: **SAMPLE MEASURES BILL**

Building Stock	Pre 1945
Housing Stock	5,218
Basic Adoption %	60%

Customer Summary	**Monthly Cash Flow Impact**
Basic Package Cash Flow Impact	**$7.79**

Basic Package	**CapEx Total**	**Monthly Financing**	**Annual kWh Savings**	**Annual Therm Savings**	**Mo. Elec Savings ($)**	**Mo. Gas Savings ($)**	**Total Customer Mo. Savings**
% Savings			27.3%	59.9%			
	$4,251	-$36	1,652	681	$11	$36	$11.63

Electricity	**Solar System Size (kW)**	**Avg Annual kWh generated**	**Orig. An. Elec Demand (kWh)**	**Utility owned ($/mo)**
	5	6625	6,045	$0.081
LCOE Solar				$29.51

Energy Efficiency Measures	**Duration**	**CapEx Total**	**Monthly Financing**	**Annual kWh Savings**	**Annual Therm Savings**	**Mo. Elec Savings ($)**	**Mo. Gas Savings ($)**	**Customer Monthly Savings**	
Lighting Std. Fixt to LED	15	$250	-$2.11	1,021		$6.86		$4.75	✓
Water Heater Blanket	15	$20	-$0.17		22		$1.19	$1.02	✓
Smart Thermostat	15	$250	-$2.11	117	160	$0.79	$8.55	$7.23	✓
Home Specific Analysis	15	$100	-$0.84			$0.00		-$0.84	✓
Smart Power Strip	15	$32	-$0.27	329		$2.20		$1.93	✓
Air Leakage Seal	15	$850	-$7.17	68	91	$0.46	$4.86	-$1.85	✓
Roof Insulation	15	$929	-$7.84	117	91	$0.78	$4.88	-$2.17	✓
Furnace	15	$1,100	-$9.28		216		$11.54	$2.26	✓
Water Heating	15	$720	-$6.08		101		$5.38	-$0.69	✓
Cooling	15	$860	-$7.26	193		$1.30		-$5.96	X
Refrigerator + Freezer	15	$1,000	-$8.44	473		$3.18		-$5.26	(P)
Dishwasher	15	$810	-$6.84	65		$0.44		-$6.40	(P)
Basement Wall Insulation	15	$2,008	-$16.94	117	152	$0.79	$8.14	-$8.02	X
Wall Insulation	15	$3,585	-$30.26	107	95	$0.72	$5.10	-$24.44	X
CRT TV to LCD	15	$420	-$3.54	294		$1.97		-$1.57	X
Windows	15	$1,296	-$10.94	88	19	$0.59	$1.03	-$9.31	X
Clothes Washer	15	$1,400	-$11.81	333		$2.24		-$9.57	X
Desktop PC to Laptop PC	15	$645	-$5.44	329		$2.21		-$3.24	X

FCU Coverage Charges	**Fixed Cost Coverage Charge ($/kWh)**	**Overhead Coverage Charge ($/mo)**	**Fixed Cost Coverage Charge ($/mo)**	**Total Mo. Charge Fort Collins**
Basic Package	-$0.016	-$1.66	-$2.19	-$3.84

In the Sample Measures Bill in Table 10, the checked boxes to the right of the figure indicate which measures are included in the basic package, the (P) indicates measures that are in the premium package, and the X indicates measures that are not included. In this case, a customer would receive lighting, thermostat, power strip, and building envelope improvements, as well as an efficient water heater and furnace in the basic package. All measures were amortized over the same duration.

A smart thermostat, part of the basic package, costs $250, which is financed at a 6% rate for a monthly payment of $2.11, and saves $0.79 on the monthly electricity bill and $7.23 on the monthly gas bill. Together, the measures in the basic package achieve $11.63 of electricity and natural gas savings for a customer every month. Our modeling evaluated the need for additional IUS charges to contribute to Fort Collins Utilities' lost fixed cost revenue (beyond the $4.75 fixed charge already imposed and remaining) adding an additional charge of $0.016/kWh saved as well as a program overhead charge.[17] The final customer bill impact for the average pre-1945 home came out to a bill reduction of $7.79 holding behavioral patterns in the home constant.

[17] Estimating the required distribution maintenance contributions for a negawatt, as opposed to a delivered kilowatt, is challenging. Here we estimate 1.6 cents/negawatt based on public filings, but it should be noted that this is less than Fort Collins Utilities' current total adder for delivered kilowatts of 2.6 cents.

APPENDIX B

PROGRAM STRUCTURAL ELEMENTS

COURTESY OF CHRIS ROWE

APPENDIX B
PROGRAM STRUCTURAL ELEMENTS

The elements described here include the major operational attributes of the IUS program, including sales and marketing, financing, operations, and program strategy.

SALES AND MARKETING

Product Design

There are many ways to package offerings that include efficiency, distributed generation, and value-added services into specific products. We identified integrated packages (versus unbundled offerings) as the ideal design for product offerings. Integration is attractive for two reasons: 1) simplicity of sales, explanation, and delivery, and 2) the ability to systematically affect the consumer's energy consumption.

Recommended Structure

We crafted an initial set of packages designed to appeal to specific customer segments. We recommend offering a default basic package and a limited number of premium packages that offer additional services and savings. The Basic Package is a default (opt-out) offering designed to create efficiency savings. This package will cater to customers whose main priority is reducing costs. Optional opt-in premium packages may or may not lead to bill increases but include more emphasis on outcomes such as improved comfort, more attractive home furnishings and fixtures, resilience, etc. As customers' desired set of outcomes change, these packages can continue to evolve. Understanding these changing dynamics and adapting to them will be a critical piece of ongoing analysis and is described in Program Strategy below.

Gaps and Solutions

At present Fort Collins Utilities manages an unbundled set of product offerings. Fortunately, a third party has already been hired to understand customer propensities to purchase certain product bundles as well as the combinations necessary to make the economics of a package attractive to the consumer and viable for the utility. A continued public-private partnership will enable the utility to ensure products meet consumer demand even when resource constrained. Meanwhile, maintaining the utility as the sales point will leverage the existing relationship and trust between Fort Collins Utilities and its customers.

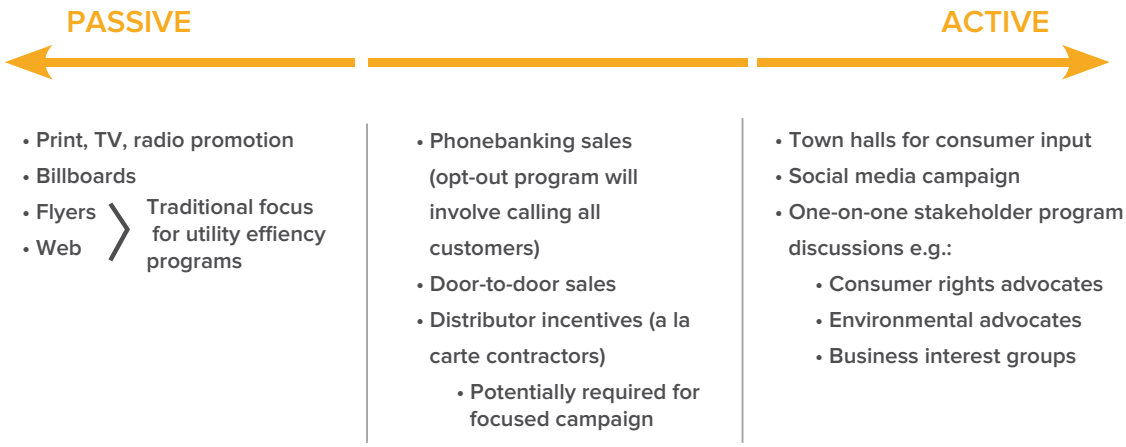
Promotion

Promotion historically refers to how a business markets and communicates its products in order to stimulate sales. This can include everything from TV, radio, or print commercials to distributor incentive campaigns that drive sales. In the context of the IUS, promotion refers not only to the need to market and sell a new set of utility product offerings, but also to preparing the community for a new relationship with its utility.

Recommended Structure

After discussions with various program administration and industry experts, it became increasingly clear that launching a new product offering without adequate customer and stakeholder engagement could severely compromise the program's success. Therefore the program's promotional efforts will seek to educate, create awareness, and promote community involvement around the program while ensuring any crucial customer feedback, confusion, or concerns are addressed before launch. This promotional effort should combine various methods along a spectrum of passive to active approaches (see Figure 12).

FIGURE 12: **SPECTRUM OF CUSTOMER ENGAGEMENT: PASSIVE TO ACTIVE PROMOTION**



Gaps and Solutions

Traditional utility approaches to marketing have predominantly been passive. New service providers have developed new models to boost customer adoption of renewables and energy efficiency. Some work at a more grassroots level using local champions and social capital to gamify campaigns over a bounded timeframe. Others use a concierge approach, hand-holding customers along the way and helping guide them through the complex decision-making energy efficiency retrofit and solar installation process. Using this approach companies such as Populous have seen a 70% conversion rate.[xv] Leveraging organizations such as these, among others, will help move the program's promotional approach to a more active one that drives demand. Simultaneously, actively communicating with specific market segments can promote waves of adoption that create critical mass and adoption tipping points while reducing complexity.

Intake

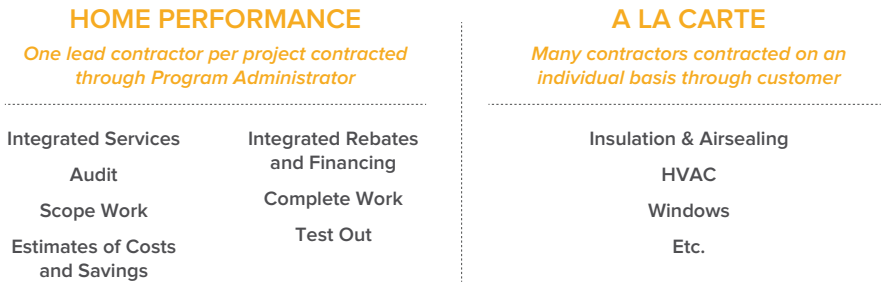
Customer intake is one of the most critical aspects of the sale of any product. Because of this, interacting with a potential consumer and converting that interaction into a sale is a vast and wide area of study in marketing. Many traditional utility energy efficiency and solar programs offer financial incentives to lure consumers but this passive approach has produced customer adoption levels that are not adequate for addressing most cities' greenhouse gas reduction targets. Therefore, we propose a more active customer engagement strategy—specifically the default (opt-out) Basic Package offering for all customers. Setting the default option is a powerful way to change behavior, as a growing body of research suggests.

Recommended Structure

Engaging customers by knowing as much as possible about their housing stock and desired set of outcomes (for example, through propensity modeling, which builds predictive models of likelihood to purchase certain goods and services given certain demographic and value characteristics) and data analysis are required precursors to driving high conversion rates (i.e., low opt-out rates) for the Basic Package.

We recommend increasing uptake by applying a default opt-out Basic Package to all customers. While the opt-out approach will drive increased customer adoption and the majority of customer intake will be initiated by this program element, subsequent interactions with consumers will be funneled through two channels. The first is through traditional contractor-driven referrals for program rebates (a la carte offerings). The second is through an integrated offering that would be promoted to customers in a similar way to initial contact with the Basic Package. We recommend that the service offering be contracted through the IUS integrator and its contractor network (see Figure 13). But a la carte contractors should be incentivized to refer customers to the Home Performance program to take advantage of deeper energy efficiency retrofit oppertunities.

FIGURE 13: **TWO CHANNELS FOR CUSTOMER INTAKE**



Throughout the intake process (first initiated during scheduling for the Basic Package measures installation) and in subsequent interactions, customers should be engaged regarding the set of outcomes they desire (e.g., converting a useless room over the garage to a comfortable living space) as opposed to specific measures (e.g., roof and wall insulation). Sales representatives must be fluent in communicating the comfort, health, and safety benefits of all measures in a given package. Furthermore, customers who choose to opt out of the default Basic Package provide an opportunity to gather valuable information that can be used to better understand opt-out dynamics and to modify the program to further increase participation and retention rates.

After sales, traditional programs have several dropout points, including audits, contractor selection, and incentive paperwork. These steps in the installation process can be streamlined through:

- Analysis of building stock prior to sales interactions;
- Light-touch audits delivered by a customer service representative;
- Pre-selection of contractors; and
- Elimination of paperwork through a streamlined application at the initiation of the process.

Gaps and Solutions

Fort Collins Utilities-trained contractors primarily handle about half of current projects. These contractors often have an incentive to promote their own interests, which typically revolve around single-measure projects (e.g., insulation, HVAC, or windows). Consequently, conversion rates from single-measure types to deeper retrofits have been limited from this source. We recommend centralizing customer intake through use of default options that are coordinated with active promotion. This, combined with streamlining customer dropout points, will help boost customer intake and conversion to higher-value offerings significantly.

FINANCING

Financing is discussed in depth in Chapter 5. Here, we present the key elements of financing the IUS model from a customer and utility perspective.

Customer

While some consumers have the outright capital to invest in distributed energy resources, for many, overcoming the upfront capital costs associated with investing in distributed energy resources has proven a large barrier to adoption, especially in the residential sector. Minimizing the need for significant capital investment through some form of financing is a key method for overcoming this barrier. One proposed solution has been financing facilitated by the utility and collected through its existing billing structure. This system is generally known as on-bill financing.

The main priorities of an on-bill program are to optimize attractiveness and equitability. Some levers to enhance attractiveness include no money down, credit against the meter (an on-bill tariff), minimization of paperwork and encumbrances, and an ability to articulate value (savings and additional features). Fort Collins Utilities has already established an on-bill financing program and we feel this option should be maintained but enhanced. We also evaluated two additional on-bill payment structures that maintain the flexibility for customizable offerings and facilitate package-based products—an on-bill tariff (where the customer owns the assets with financing tied to the meter) and an on-bill energy service charge (where the utility owns the assets). These two additional structures are described in more detail in Chapter 5.

Recommended Structure

We recommend maintaining multiple options for repayment, as different customers will have different financial needs.

Each on-bill finance option presents a work-around to many of the obstacles customers potentially face when accessing financing. For example, homeowners may wish to significantly lower their long-run capital investment by accessing state or federal rebate programs and on-bill financing at a low interest rate that enables them to do this with limited money down. Also, many lower-middle income consumers do not have enough tax liability to access incentives for solar and need mechanisms that enable little money down with no impact to their monthly cash flow. Renters are another market segment that has been difficult to target. Those who are sub-metered can utilize an on-bill program to improve their home amenities and energy use. Each of these market segments has different ownership and investment needs and therefore calls for different forms of funding. Mitigating default risk to reduce the cost of capital will require the utility to provide some form of credit enhancement as well as the ability to terminate service. A loan loss reserve or interest rate buy down could serve this purpose across funding mechanisms.

Gaps and Solutions

At present Fort Collins Utilities combines billing for all four of its departments: water, wastewater, electric, and storm water. Therefore, all four services are netted against payments and credits (overpayments) and are simply applied to the next billing cycle's charges. Furthermore, service termination can only be enforced if billing is conducted through Fort Collins Utilities.

Utility

Both the IUS program structure and the sources of capital the utility pursues to finance the programs will determine the affordability of the service offerings and therefore the program viability. The main priorities for utility financing are securing low-cost capital and having the ability to finance integrated investments over appropriate terms.

Recommended Structure

We recommend Fort Collins Utilities maintain its existing on-bill financing program with certain tweaks to its current deployment. For affluent customers, using cash that would otherwise sit in a low-interest bank account would enable them to accrue more savings, more quickly, increasing their return on investment. Accordingly, we do not want to discourage these customers from making any upfront or early capital buy downs. At the same time, the current Fort Collins Utilities interest rate, application process, and application fees must be overhauled in order to make economic sense for these types of consumers. Fort Collins Utilities should lower its interest rate, eliminate the application fee, and streamline the application process.

For the on-bill tariff and energy service charge, we envision Fort Collins Utilities administering these funds while capitalizing them through a combination of municipal bonds and private capital, pooled in a special-purpose vehicle that will operate like a revolving line of credit for the utility. This structure will lower the utility's financing costs, as funds are only borrowed as requested by consumers. In order to further lower financing costs, seeking federal and state grants as well as philanthropic dollars to create some form of credit enhancement, whether as a loan loss reserve or interest rate buy down, is highly recommended. Lastly, an option to buy down the capital required for any upgrades should be highly visible and encouraged. This will mitigate risk in investors' eyes by demonstrating consumers have some "skin in the game" while simultaneously accelerating accrued savings to the consumer.

In the case of the energy service charge model, the capital Fort Collins Utilities pursues is on its own behalf. The utility bears the risk of non-payment, which directly affects Fort Collins Utilities' credit rating and therefore its cost of capital. Adding new product offerings where the utility owns the assets will require the utility to more actively manage its balance sheet. The non-traditional nature of these new distributed resources (negawatts of saved energy from efficient appliances and envelope upgrades, and kilowatts of generation from distributed renewables) will potentially increase the scrutiny of investors. As such, Fort Collins Utilities will need to show competent execution and returns through the pilot to secure the best terms and oversight when seeking outside capital.

Gaps and Solutions

A combination of funding solutions will be necessary to raise the capital required to perform the level of deep efficiency retrofits with distributed generation needed for Fort Collins to reach accelerated greenhouse gas reduction goals. For example, maintaining third-party solar financing with the option for the utility to buy out after a period of time could bring economies of scale to the solar portion of the integrated package. Creating a special-purpose vehicle to consolidate private, public, and philanthropic investments will further enable more rapid capital deployment, credit enhancement mechanisms, and provide a platform for additional community emissions reduction financing programs.

OPERATIONS

Bringing an integrated set of offerings to customers with minimal transaction costs requires a different operational structure than Fort Collins Utilities currently has. It will require contractors to be able to holistically assess the homes and make integrated recommendations to customers speaking to their needs and desires while understanding how a building is a system where specific retrofit measures can have significant cost-cutting impacts on other upgrades to a home (e.g., improving the air tightness of the building enables smaller HVAC systems to be installed and therefore reduces HVAC costs). Managing the subcontracting process to enable a seamless experience for the customer will be a large part of this. The activities of training, installation, and quality control and reporting must all reinforce this experience.

Training

A set of contractors will need to be created in Fort Collins who have the capability to diagnose and install a fully integrated set of offerings (the heart of the IUS) while another set of contractors will continue to be able to install one-off measures that meet Fort Collins Utilities' quality control standard (e.g., a customer just needs a new heater, and he or she wants to capture the utility rebate for an efficient one).

Recommended Structure

Trainings for home performance measures should be centrally managed by the utility. An integrated approach to making upgrades to a home will be required, and establishing and teaching such an approach is a role the utility is well positioned to fill. Simultaneously, the integrators can provide a set of recommended home performance contractors to customers who have undergone this unique training and/or comply with established utility standards. These trainings should train contractors to evaluate buildings in a holistic way with an eye to reducing energy and water use in a building while addressing the needs of the consumer. Fort Collins Utilities should continue to offer its traditional rebate and incentive training for contractors to offer consumers access to these incentives when installing a la carte measures.

Gaps and Solutions

Many contractors, while having undergone Fort Collins Utilities' installation training, are not necessarily driving more meaningful improvements to their customers' building stock. Thus we recommend the home performance integrator use subcontractors who have gone through the utility's training program, ensuring local contractors are benefitting from both the home performance and traditional a la carte program while creating an incentive for contractors to promote the utility's home performance program.

Install

As mentioned previously, having contractors that understand how to implement the integrated nature of a home performance package will be integral to reducing touch points and enabling customer ease with the program. Installs are where the rubber meets the road and they determine subsequent customer satisfaction and trust in the program.

Recommended Structure

Having a limited set of contractors oversee home performance package installs serves several critical functions, including: scale, quality, dollar cost averaging, performance guarantees, seamless integration with the utility, and a simpler customer experience. The lead contractors should be capable of assessing intervention needs in a holistic way and maximizing the deep efficiency saving potential of each install. After having undergone the home performance training provided by the utility they will have the authority to subcontract and manage Fort Collins Utilities-trained subcontractors for measure-by-measure installs. This would reduce the number of customer touch points leading to a more frictionless transaction for the customer. Subcontractor visits would need to be well coordinated and managed by the lead contractor in order to minimize the number of visits necessary to a property. Finally, the lead contractor would be responsible for test-in and test-out audits, which would include combustion safety and air leakage testing.

Gaps and Solutions

All home performance lead contractors could use a central procurement facility when performing package installs, and subcontract only to qualified subcontractors.

Quality Control, Monitoring and Verification, and Reporting

Any program that is founded upon enhancing energy efficiency savings while improving customer outcomes requires processes for ensuring quality, monitoring performance, and reporting these benefits to consumers. Each of these activities is integral to the others.

Recommended Structure

Fort Collins Utilities should play a critical role in tying together quality control (QC), measurement and verification (M&V), and reporting. Fort Collins Utilities has traditionally conducted QC activities in order to ensure rebate program contractors are delivering the quality of service necessary to generate savings. These same activities must be conducted to ensure the IUS program is fulfilling its intended purpose. While M&V typically has been used to ensure energy service company (ESCO) contract fulfillment and therefore ensure a certain cost of capital for the ESCO or for gauging utility progress toward mandated goals, in this context it would be simultaneously used to maintain investor confidence and to provide program discipline for the utility and the integrators. Additional quality control aspects of the program would include an equipment standards component, including install and customer experience.

The results and findings aggregated in these QC and M&V activities should directly inform customer energy use and savings reporting. Reporting should be comprehensive for both electricity and natural gas use and savings, as well as credit performance. Establishing comprehensive reporting will facilitate raising future capital to fund customer measures.

Gaps and Solutions

An ideal program reporting structure conveys costs and savings in tandem, but one of the most challenging aspects of reporting will be computing natural gas savings. Natural gas savings will often make up the largest

portion of savings in proposed packages. Fort Collins Utilities cannot collect natural gas data on behalf of Xcel Energy to streamline energy efficiency savings reporting without customer consent. We recommend that Fort Collins Utilities explore including securing customer consent to request natural gas data from Xcel as part of the early customer interactions. Several efficiency and distributed solar organizations in Colorado already do this. The difficulty will be in streamlining the translation of Xcel natural gas data to IUS-specific reporting structures.

PROGRAM STRATEGY

Any program Fort Collins Utilities pursues must be adaptive as new technologies, business models, and insights evolve in the energy efficiency and solar industries. Establishing a process for understanding these trends, as well as shifting consumer preference, is an activity most nimble businesses have in place.

Recommended Structure

We recommend Fort Collins Utilities create a team to regularly assess program data and research industry trends and emerging technologies so that the IUS model can be revised as needed by applying the original program design principles in the context of emerging trends. This will maintain the program's relevance and ability to meet consumers' demands while also supporting the financial viability of the program.

Gaps and Solutions

The ideal program requires having the expertise on hand or readily available to systematically and regularly reassess customer propensities for consuming various services and strategically plan for the introduction of new technologies. It also requires regular system improvement planning to ensure continued sales and energy efficiency savings for the program. We recommend streamlining data access procedures and procuring the necessary resources to create a nimble and savvy program to conduct the analysis described above.

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