

Enabling Energy Efficiency in Rental Housing

Overcoming the Split Incentives Barrier

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EXECUTIVE SUMMARY

Energy efficiency is routinely highlighted as the most cost-effective way to conserve energy and reduce the production of greenhouse gases. However, there are multiple barriers that prevent investments in cost-effective energy-efficient technologies from taking place. These barriers are even more pronounced in rental housing, due to the fact that property owners have no direct financial incentive to make investments in energy saving measures for which they do not pay energy costs. This barrier is known as the “split incentives” barrier, and has proven to be extremely challenging to address.

In this report, we focus on four policy options that offer potential to address the issue of split incentives to investment in energy efficient technology in rental housing in the 7 county metro area:

- 1) **Rebates** for energy efficient upgrades;
- 2) **Benchmarking**, a local ordinance that would require rating the energy use of rental housing and mandatory efficiency upgrades for inefficient buildings;
- 3) **On-Bill** or utility financing of energy efficient upgrades by tenants; and
- 4) **Green Leases**, an addendum to a lease agreement that allows property owners to bill tenants a finance charge for energy efficiency upgrades that reduce the utility bills that tenants pay.

We report the results of surveys of two key stakeholder groups directly involved in this issue, property owners and tenants, to determine their perspectives on these four policy options.

Specifically, we focus on the potential energy and cost savings from the replacement of old, inefficient refrigerators with new, energy-efficient refrigerators. Refrigerators are the largest single end-user of electricity in rental housing (20 percent), and are present in 100

percent of rental housing (EIA, 2005). The rental housing market represents 25 percent of all housing units in Minnesota, and 28 percent of all housing units in the Twin Cities, totaling approximately 303,000 units in the 7-county metro. Twenty three percent of the refrigerators in rental housing in the Twin Cities are 10 years of age or older, with significant potential for energy savings from replacement (EIA, 2005). The potential energy savings from replacing these 70,000 refrigerators (that are 10 years of age or older) with new, Energy-Star qualified refrigerators exceeds 36 gigawatt hours per year, with aggregate energy cost savings of \$3.7 million per year to consumers.

Both property owners and tenants in the 7 county metro generally preferred On-Bill Financing to the other options. Green Leases were viewed more positively by tenants than property owners, who expressed a concern about the amount of administrative time required to implement a Green Lease program. Benchmarking was the least desirable option, likely due to the fact that the program we presented to property owners would require mandatory upgrades for inefficient buildings. However, this disapproval of benchmarking evaporated when owners were offered significant rebates (of up to 80 percent) to offset the cost of mandatory upgrades. Finally, most property owners had positive attitudes towards rebates in theory, as long as the time and effort required to apply for and process rebates is minimal.

Based on these opinions, we identified three themes that serve as guidelines for the design of programs serving this market: Time, Trust, and Transparency. Finally, we present three options for policy makers to improve the performance of Conservation Improvement Programs in rental housing.

- Option I: A pilot PAYS-based On-Bill Financing Program for appliance upgrades serving rental housing.
- Option II: Customized CIP programs targeting large rental property owners, including rebates for replacement of old, inefficient refrigerators.
- Option III: Mandate public energy use disclosure for apartment buildings.

Of these options, Option II is the most politically feasible, and would likely offer much lower transaction costs than other residential CIP conservation efforts.

INTRODUCTION

Energy efficiency is routinely highlighted as the most cost effective option to reduce the growth in electric demand, since many energy efficient technologies return more in cost savings than their capital cost (McKinsey & Company, 2009). However, there are multiple barriers that prevent investment in these cost-effective, energy-efficient technologies. When considering rental housing, the most challenging and least addressed barrier is commonly known as “split incentives.” These barriers arise due to the fact that property owners have no direct financial incentive to make investments in energy saving measures for which they do not pay energy costs (Williams, 2008).

In this report, we focus on four policy options that offer potential to address the issue of split incentives to investment in energy efficient technology in rental housing in the Twin Cities Metro. We report the results of surveys of two key stakeholder groups involved in this issue, property owners and tenants, to determine their perspectives on these four policy options. Specifically, we focus on the potential energy and cost savings from the replacement of old, inefficient refrigerators with new, energy-efficient refrigerators.

BACKGROUND

ENERGY CONSERVATION LEGISLATION IN MINNESOTA

Energy conservation in Minnesota is driven by two statutes. The first, Minnesota's Conservation Improvement Statute 216b.241, requires public utilities in the state to set aside a portion of their revenues to fund energy conservation programs, known as Conservation Improvement Programs (CIPs) (Legislative Auditor, 2005). The second statute, the Next Generation Energy Act (NGEA) passed in 2007, requires Minnesota utilities to achieve annual energy savings equal to 1.5 percent of annual retail energy sales of electricity and natural gas. Minnesota utilities attempt to achieve these energy savings largely through their CIP funds. The utilities use these conservation funds to provide financial incentives, such as rebates or low-interest loans, to their customers towards the purchase of energy-saving technologies or building improvements. The funds can also be used for other conservation efforts that have an indirect impact on energy conservation, such as subsidized energy audits or consumer education (Legislative Auditor, 2005).

Energy efficiency upgrades in residential buildings are one of the most cost-effective ways to achieve the 1.5 percent energy savings goal established under NGEA. However, realizing energy savings in residential buildings has proven more costly and challenging than energy savings in commercial and industrial buildings. Indeed, the majority of energy savings that Minnesota's utilities have achieved so far to meet the goals established under NGEA have come from commercial and industrial customers (see Figure 1) (Legislative Auditor, 2005).

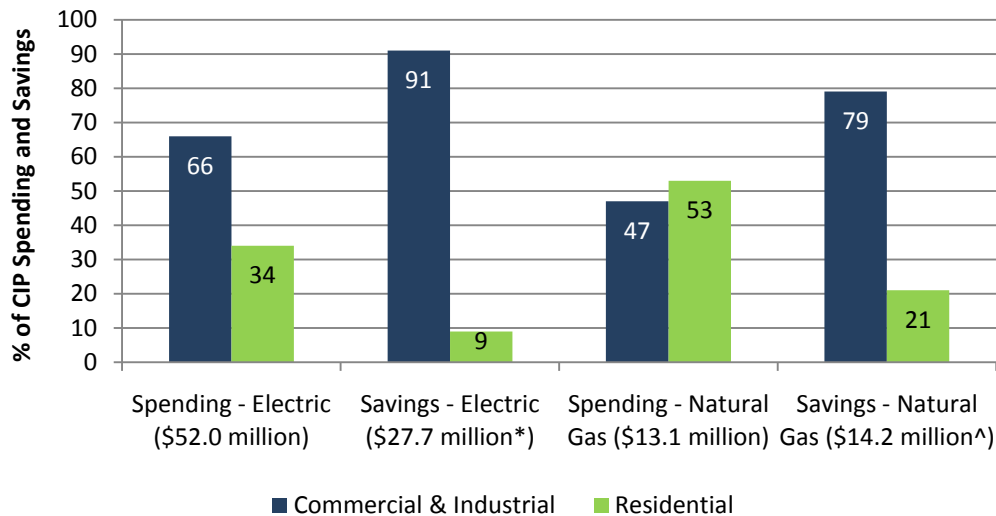


Figure 1: Minnesota CIP Spending Versus Energy Savings by Customer Class, 2003

Cooperative and municipal utilities not included. *380 million kilowatt-hours saved, using EIA average (for residential, commercial and industrial sectors) retail price of electricity to ultimate customers in 2003 of \$0.0729/kilowatt-hour (EIA, 2011). ^1.78 million Mcf (thousand cubic feet) saved, using EIA annual average price (for residential, commercial and industrial sources) in 2003 for natural gas of \$7.97/Mcf (EIA, 2011).

SOURCES: Evaluation Report: Energy Conservation Improvement Program, Office of the Legislative Auditor, January 2005, Report No. 05-04; Energy Information Administration: Average Retail Price of Electricity to Ultimate Consumer by End-Use Sector, Table 7.4, April 2011; Energy Information Administration: Natural Gas Prices, March, 2011.

MARKET BARRIERS TO ENERGY EFFICIENCY

Energy savings in the residential sector have been difficult to achieve because of two significant barriers that prevent many of these investments from taking place: the upfront capital costs and the dispersion of costs, benefits, and solutions. Although many energy efficiency upgrades are very cost effective, the upfront capital costs required represent significant investments for individuals who may lack access to credit, particularly in tough economic times, or who choose to use limited discretionary spending for other things. The initial costs to add insulation, replace an old boiler, or buy an energy-efficient appliance are usually several times the energy cost savings realized over time (Kriger & Dorsi, 2004). The

second significant barrier to energy efficiency upgrades is the dispersion of costs, benefits and solutions. Potential energy efficiency improvements can be found in millions of buildings using billions of different devices (McKinsey & Company, 2009). It is very difficult for one or several government agencies, private companies, or non-profit organizations to develop widespread solutions on a broad, cross-sector scale.

While these two distinct barriers to upgrades apply to all areas of energy efficiency potential, they are compounded in the U.S. rental housing sector by a third barrier known as “split incentives.” Split incentives in rental housing arise from the fact that property owners have no direct financial incentive to make investments in energy saving measures for which they do not pay energy costs (Williams, 2008). For example, the higher upfront cost of an Energy Star appliance represents a significant barrier to efficiency investments. Because the tenant realizes the benefits of an energy efficient appliance through lower energy bills, the property owner’s best economic choice will be to purchase the cheapest appliance available.

One form of energy use in rental housing that is particularly susceptible to the split incentives dilemma is electricity. Almost all rental units are billed individually for electricity, because this use is largely determined by individual tenant behavior through the use of televisions, computers, etc. However, some electrical appliances that are provided by the property owner run solely on electricity, the most prominent being the refrigerator. In fact, refrigerators are the largest single end-user of electricity in rental housing, consuming 20% of the total end-use electricity used (EIA, 2005). Refrigerators are present in 100 percent of rental housing, run continually while the rental unit is occupied, and experience no significant seasonal fluctuations in their rate of energy use. For all of the above reasons, refrigerators

serve as a useful case study to explore policy options to overcome barriers to energy efficiency upgrades in rental housing.

TENANTS AND PROPERTY OWNERS IN THE 7 COUNTY METRO

We focused on the residential rental housing market in the 7 county metropolitan area of the Twin Cities¹. According to survey data taken through 2009, over 518,000 of the total occupied housing units in Minnesota, or roughly 25%, are occupied by renting tenants. Furthermore, of those 518,000 rental units in Minnesota, over 303,000, or roughly 59%, are located in the 7 county metropolitan area (see Figure 2) (American Community Survey, 2009).

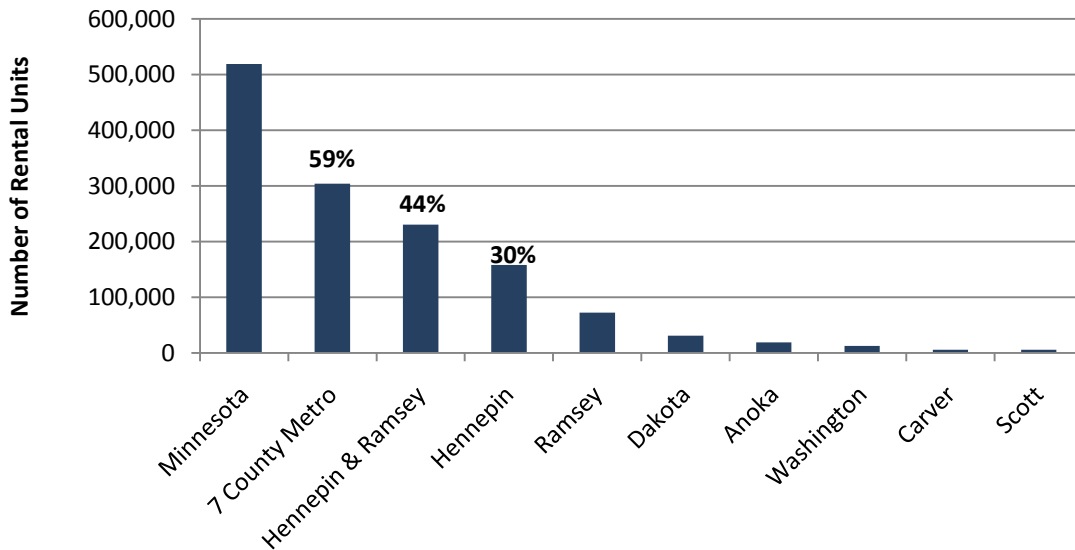


Figure 2 – Rental Housing in the 7 County Metro

SOURCE: 2005-2009 American Community Survey – U.S. Census Bureau

¹ 7 county metro consists of Hennepin, Ramsey, Dakota, Anoka, Washington, Carver and Scott counties.

In addition, Hennepin and Ramsey counties represent 44% of the renter-occupied units in the state of Minnesota, and Hennepin County alone has 30% of all the rental units in Minnesota. So although the recommendations we provide at the conclusion of this paper could be applied on a state-wide level, a smaller pilot program based in Hennepin County could still have a strong impact on the residential rental housing sector in Minnesota.

In the 7 county metro area, there are three significant on-the-ground stakeholders involved in the split incentives dilemma in the rental housing sector: public utilities, property owners and tenants². The CIP statute and NGEA discussed above have created an environment in which public utilities in Minnesota have strong incentives to increase energy efficiency and reduce energy consumption. This research, therefore, focuses primarily on programs that aim to overcome the split incentives barrier that exists between property owners and tenants in the 7 county metro. The data we have analyzed indicates that energy and cost savings potential exist so that both property owners and tenants benefit from overcoming the split incentives barrier regarding refrigerators in rental housing units.

We interviewed 15 property owners in the 7 county metro to learn the factors that are important to them when replacing refrigerators. These property owners control over 17,000 units, representing roughly 5.6 percent of the total number of rental units in the Twin Cities area. We also interviewed tenants to learn the factors that are important to them when choosing an apartment. Finally, we asked both parties their opinions on the programs examined to determine their feasibility among these two significant stakeholders (see

² Depending on the scale, scope and aspect of the split incentives dilemma one examines, other stakeholders may include state and local government, program financiers such as banks, appliance distributors, and organizations that implement energy efficiency programs. However, we focus on the three major stakeholders indicated.

appendices A and B for questionnaire templates). Our focus in this study, therefore, is on energy efficiency programs aimed at overcoming the split incentives barrier for refrigerators in the 7 county metro rental housing sector, and specifically as the programs relate to property owners and tenants.

PROGRAM OPTIONS

In this study we examine four program options intended to overcome the split incentives barrier, and assess their feasibility and potential for success in the 7 county metro:

- Rebates
- Benchmarking (with mandatory efficiency upgrades)
- On-Bill Financing
- Green Leases

Since rebates and a benchmarking program would not affect tenants directly and would be largely invisible to them, tenants were only asked their opinions of on-bill financing and green leases. Property owners were questioned about all four policy options.

REBATES

Cash rebates for energy efficient products have been a mainstay of Conservation Improvement Programs in Minnesota. For example, most electric utilities in Minnesota offer rebates for major home appliances, such as refrigerators, dishwashers, and washing machines, while Minnesota's gas utilities offer rebates for major gas appliances, such as furnaces, boilers and water heaters (North Carolina Solar Center, 2011). While there are CIP programs targeting

space and water heating systems in multifamily housing, the energy costs associated with these systems are often paid by property owners, and therefore not affected by the split incentives issue. There are no conservation programs in Minnesota targeting major energy-consuming appliances affected by the issue of split incentives in multifamily housing.

Our study explored a package of rebates targeting these major appliances in apartment housing affected by the split incentives problem: refrigerators, dishwashers, and washing machines. The rebate package we considered was modeled after a rebate program offered by Xcel Energy for new home construction that offers home builders a rebate of \$500 for the installation of an Energy Star refrigerator, dishwasher, washing machine, and at least 20 compact florescent lights (North Carolina Solar Center, 2011). Property owners were asked whether the offer of a bundled rebate of \$300 for the purchase of an Energy Star refrigerator, dishwasher, and clothes washer, or a \$100 rebate per major appliance would “motivate them to replace their old appliances right away?”

BENCHMARKING

Benchmarking is the collection and comparison of a building’s current energy use, or energy use over time, with that of similar buildings or a model of potential energy use using a building standard such as Energy Star or the International Energy Code (Brink, 2010).

Comparable buildings are based on size, building type, age, heating type, etc. Benchmarking can be done by analyzing utility bills to produce a simple metric such as energy use per square foot, or via inspection and/or energy modeling.

Benchmarking programs can take many forms, ranging from voluntary programs facilitated by streamlined utility reporting of energy use and costs, to mandatory programs that

require both public disclosure of energy use information as well as mandatory energy audits and energy efficiency upgrades. In most cases where audits and energy efficiency upgrades are mandatory, some form of technical and/or financial assistance is offered to building owners (Brink, 2010).

Minnesota already requires benchmarking of public buildings. Legislation passed in 2001 requires the Department of Administration to collect energy use information and to develop conservation plans for public buildings based on this information. The law led to the Buildings, Benchmarking, and Beyond (B3) project, which has benchmarked some 5,000 public buildings in the state (Brink, 2010).

In Texas, the Austin City Council adopted an Energy Conservation Audit and Disclosure (ECAD) Ordinance to improve the energy efficiency of buildings in Austin, including multifamily buildings (Austin Energy, 2010). The ordinance requires mandatory energy audits and energy use disclosure of all buildings in Austin that receive electricity from Austin Energy, the local municipal utility. The ordinance also mandates energy conservation upgrades to buildings that are found to be “high energy use properties,” defined as buildings that use more than 150 percent of the average energy use per square foot by multifamily properties in the Austin Energy service area (Austin Energy, 2010). Austin Energy offers rebates of up to 80 percent to offset the cost of these upgrades. We used Austin’s ECAD Ordinance as a model for the benchmarking program we presented to property owners to solicit their opinions of a mandatory benchmarking program.

ON-BILL FINANCING

Utility-based “on-bill” financing programs finance energy efficiency improvements such as insulation or efficient heating and cooling systems through “surcharges” or “tariffs” on the utility bill. Utility customers repay the cost of these improvements through an amortized payment on their utility bills. We selected a specific on-bill financing program design, the Pay As You Save (PAYS®) model developed by Harlan Lachman and Paul Cillo of the Energy Efficiency Institute, as a model for the program we presented to property owners and tenants (Fuller, 2009).

The PAYS® model has three distinct features that offer the potential to overcome the split incentives barrier. First, surcharges are attached to the meter, not the individual customer, and so stay with the property. Second, the program allows for disconnection of service to the individual account holder for non-payment of the surcharge (or their utility bill in general). Finally, the amount of the surcharge is set so that a customer’s monthly energy cost savings from the efficiency upgrade exceed the monthly finance charge (Cillo & Lachman, 1999). The model assumes that this surcharge is set at 75 percent of monthly cost savings. These three features address the first-cost barrier, as well as concerns about whether the energy efficiency investments will pay for themselves, and whether the person or entity making such investments will see a return on their investment.

Midwest Energy, a small electric and natural gas cooperative in central and western Kansas that serves 40,000 customers, offers the only PAYS®-based on-bill financing program in the U.S. that serves residential customers (Fuller, 2009). The Midwest Energy program is known as “How\$mart.” To qualify for the program, utility customers only need to be current

on their Midwest Energy bill; they do not undergo a credit check. Midwest Energy provides in-house energy auditing services, which identify measures to improve efficiency that fit within the program’s savings-to-invest ratio requirements (Midwest Energy, Inc., 2010). The How\$mart program sets the monthly surcharge at 90 percent of projected monthly energy savings (Midwest Energy, Inc., 2010).

Although major home appliances are not eligible for financing in the How\$mart program, the replacement of refrigerators more than 10 years old fits well within the PAYS model, given the requirement that monthly energy cost savings exceed finance charges (see Figure 3). For example, the monthly energy cost savings from replacing a 15 year old refrigerator with a new Energy Star refrigerator exceeds the monthly finance charge as long as the refrigerator is financed over 7 years or more³.

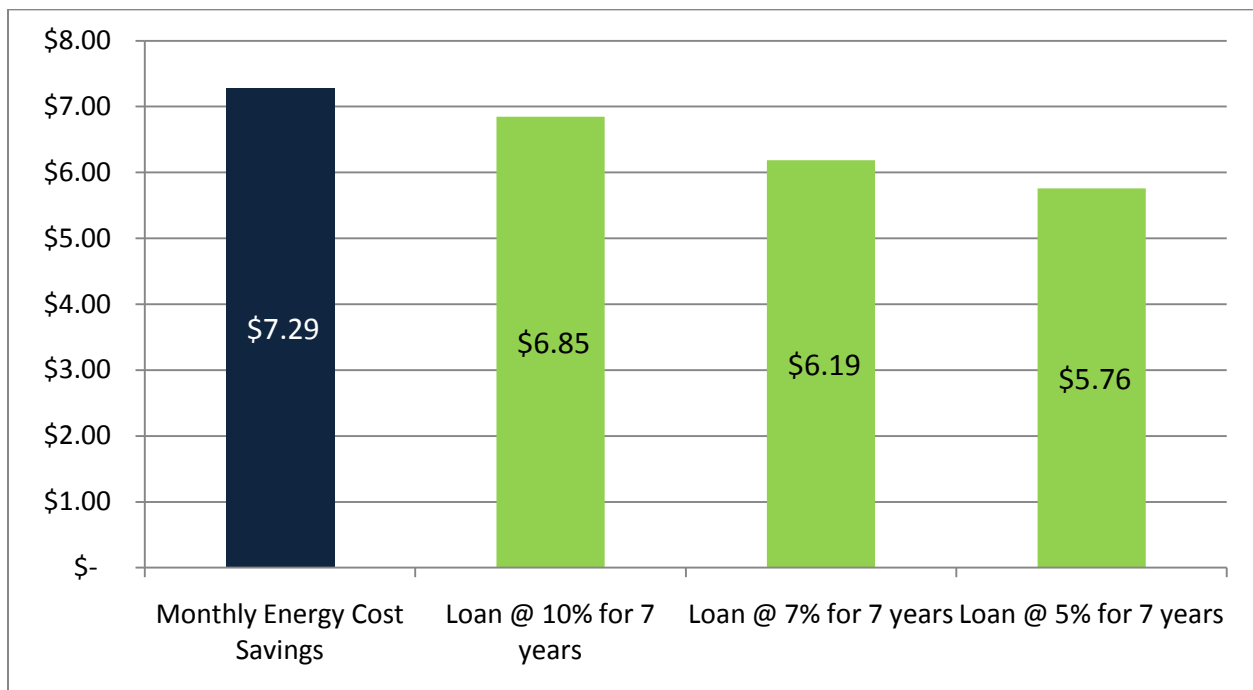


Figure 3: Monthly Energy Cost Savings versus Sample On-Bill Finance Charges from Refrigerator Replacement

³ Seven years is half the appliance industry’s accepted “lifetime” of 14 years for a new refrigerator.

Note: Assumes replacement of a 15 year old refrigerator (Kenmore model 2539333010) with a new Energy Star refrigerator (Frigidaire model LFHT1713LW).

Preliminary analysis also shows that the replacement of old, inefficient clothes washers will fit within the economic parameters of a PAYS-style on-bill financing program due to the dramatic water and electric savings.

Our study sought opinions regarding an on-bill financing program from both property owners and tenants, since both parties would have to be involved in and would be affected by such a program if used to finance new, efficient appliances affected by the split incentives barrier. We explained a hypothetical program modeled after the Midwest Energy HowSmart program, and asked owners and tenants their level of interest in taking advantage of an on-bill financing program from their utility. Both parties were also asked what concerns they would have about an on-bill financing program.

GREEN LEASES

A “Green Lease” is a lease clause or separate agreement that allows a property owner to raise the rent to finance energy efficiency improvements to an apartment, such as new appliances or insulation, that lower energy costs for tenants (Williams, 2008). Like the PAYS system, the green lease model assumes that energy cost savings should exceed finance charges, and should be set at a percentage of monthly energy cost savings to the tenant, typically 75 to 90 percent of monthly cost savings. The goal of the strategy is to align the financial incentives of property owners and tenants. Theoretically, the property owner benefits since major appliances and other improvements to the property are explicitly financed by the tenant,

increasing the property owner's profit. The tenants also benefit, assuming that energy savings actually exceed the monthly rent increase (Williams, 2008).

We found no evidence of the green lease concept being applied to rental housing in a specific program in the U.S. We sought opinions from tenants and property owners on a green lease model based upon the financial assumptions described above, assuming that the lease program would be designed so that any monthly finance charges added to the rent would be no more than 75 to 90 percent of monthly energy cost savings. In both the on-bill financing and green lease programs, we assume that the monthly surcharge or rent increase would expire after the energy efficiency improvement was paid in full.

METHODOLOGY

The purpose of the survey was to gain preliminary insights into stakeholder perspectives on the four policy options we analyzed, and to lay the ground work for composing a structured questionnaire that would allow for qualitative and quantitative analysis in the future. We developed a questionnaire for use in semi-structured interviews of two key stakeholder groups: tenants and property owners. The tenant questionnaire focused on tenants' opinions of the two policy options that would be apparent to them if implemented: On-bill financing and green leases. Since neither rebates nor benchmarking would involve tenants directly, their opinion was not sought on these matters. The tenants were also asked what factors they considered when choosing an apartment, their estimated monthly energy costs, and whether those costs were significant to them.

The property owner questionnaire focused on owners' opinions on all four policy options considered, but also on their decision making process regarding when to replace refrigerators and what product features were important to them when they made that decision. All interviews were conducted face-to-face: we conducted 35 interviews with tenants, and 15 interviews with rental property owners representing over 17,000 rental housing units, roughly 5.6 percent of all rental units in the 7-county metro area (see appendices A and B for questionnaire templates).

We adopted the system used by the Minnesota Multi Housing Association to classify property owners by number of units owned: **small owners** have from 5 to 20 units; **medium owners** have from 21 to 100 units; and **large owners** have 100 units or more. Our goal was to interview a relatively equal mix of property owners from each size classification, based upon the assumption that the decision-making process for owners in each size class may differ.

Interview candidates for property owners were found initially through an internet search for apartment vacancies in the 7 county metro, followed by phone calls to the management companies indicated in the advertisements. This resulted in eight interviews with large property owners, including three interviews with companies who managed over 3,000 units each (7000, 3900, and 3500 units respectively). In order to get a balanced mix of property owners, we attended a meeting sponsored by the Minnesota Multi Housing Association for their small and medium owner groups. Networking at this meeting resulted in seven more interviews with small and medium-sized property owners. In total, we conducted 15 interviews with representation from small, medium, and large property owners (see Table 1).

Property Owner Size Class	Number of units owned/managed	Number of property owners interviewed	Number of units represented
Small Owners	5 - 20 units	5 interviews	59 units
Medium Owners	21 - 100 units	2 interviews	50 units
Large Owners	100+ units	8 interviews	17,017 units
TOTAL:	---	15 interviews	17,126 units*

Table 1: Property Owners Interviewed by Size Classification

Source: 2011 Property Owner Survey. *These interviews represent roughly 5.6 percent of all rental housing units in the 7 county metro area.

During interviews with property owners, we asked if they would allow us to interview tenants of their properties in order to match and compare tenant opinions with those of their corresponding property owners. Two property owners allowed this, and 25 interviews were conducted through this method. However, due to strong resistance to this process by some property owners, not enough tenant opinions could be gathered to legitimately compare corresponding opinions. Therefore, the additional 10 tenant interviews were conducted with peers at the Humphrey School of Public Affairs who live in rental housing. These subjects responded to a blanket email to all Humphrey School students advertising the need for participation in this study.

Numerical data was drawn from multiple sources to calculate an estimate of the energy savings potential from replacing old refrigerators with new, Energy Star-rated refrigerators. The size of the rental housing market in the Twin Cities metropolitan area was estimated from the 2009 American Community Survey (American Community Survey, 2009). Data on two key characteristics of the stock of refrigerators in the rental housing market that affect energy consumption (refrigerator size and age) were drawn from the 2005 Residential Energy Consumption Survey (RECS) (EIA, 2005). The American Community Survey estimates of the rental housing population in the 7 county metro area were factored with the RECS data on refrigerator characteristics to produce an estimate of the refrigerator stock within each category. Average energy use was calculated for each size/age class using Weatherization Assistance, an energy modeling software program developed by the Department of Energy that contains an extensive database of refrigerator models, listing the size, age, and energy use of each model (DOE, 2009). Electricity cost savings were calculated using Xcel Energy residential rates for West St. Paul, including all taxes and surcharges, equaling \$0.1019 per kWh.

ENERGY EFFICIENCY POTENTIAL FROM REFRIGERATOR REPLACEMENT

Refrigerators are the largest single end-user of electricity in rental housing (20 percent), and are present in 100 percent of rental housing (EIA, 2005). Furthermore, refrigerators represent one of the most cost effective investment measures to improve energy efficiency in residential housing (See Figure 4) (McKinsey & Company, 2009).

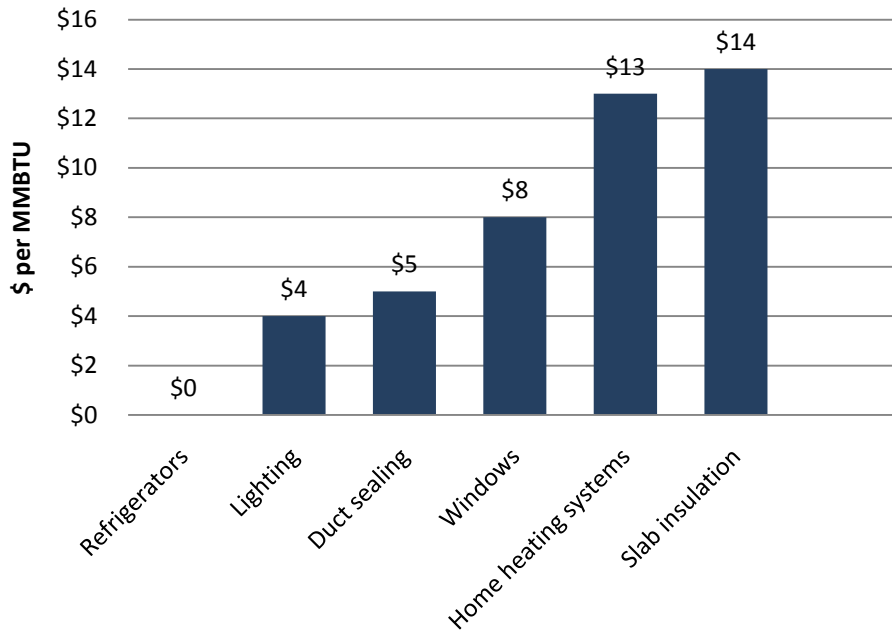


Figure 4: Annualized Cost of Home Energy-Efficiency Investments, per MMBTU

SOURCE: McKinsey & Company, *Unlocking Energy Efficiency in the US Economy*, 2009.

Refrigerator energy consumption depends primarily upon the age and size of the model, as well as the type:

- ✓ Manual defrost models use 50 percent less energy than models with automatic defrost.
- ✓ Top freezer models use 13 percent less energy than side-by-side models (Consumer Energy Center, 2011).

The average refrigerator in an apartment today is an automatic defrost, 15 to 18 cubic foot, top-and-bottom configuration refrigerator between 5-9 years of age (EIA, 2005). However, according to EIA, approximately 37 percent of refrigerators in apartments are more than 10 years old, and only 13 percent report having an Energy Star labeled refrigerator. Annual electric consumption of refrigerators increases significantly with age (see Figure 5).

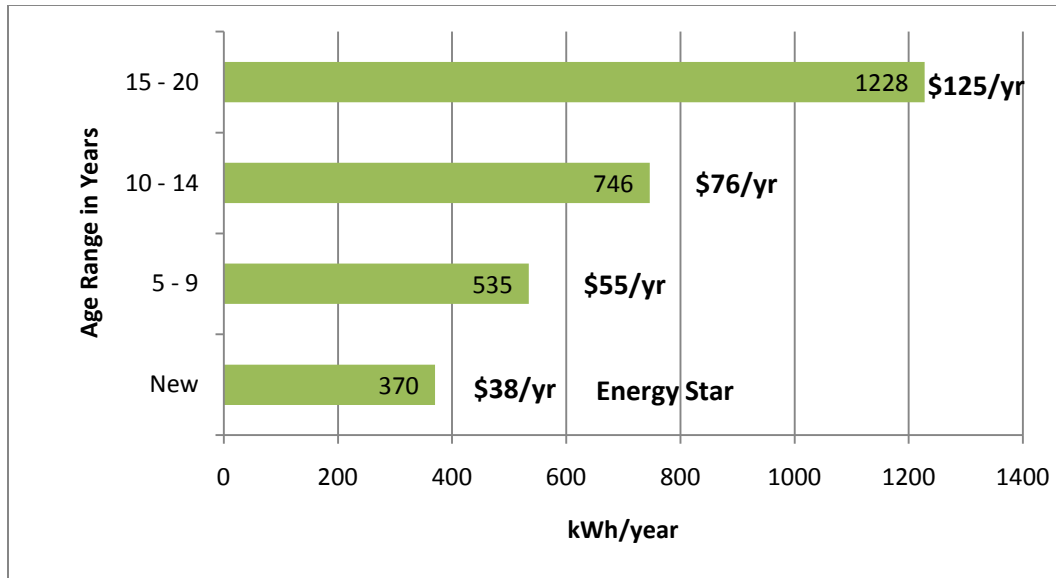


Figure 5: Annual Refrigerator Energy Use by Age, 15-18 ft² Top-Freezer Model
 SOURCE: EIA, Residential Energy Consumption Survey, 2005

Refrigerator energy efficiency has improved significantly in the past 15 years. Replacing older refrigerators with new, energy efficient models offers the promise of significant electric load reduction. For example, replacing a 15 year old refrigerator with a new Energy Star model will reduce refrigerator electric consumption by 70 percent, from an average of 1228 kWh/year to 370 kWh/year for an average-sized refrigerator. Annual energy costs savings would equal roughly \$85 per refrigerator replaced, and monthly energy cost savings (\$7.29) would exceed finance charges even if the new refrigerators were financed at 10 percent interest over 7 years (\$6.85 per month).

Throughout the 7 county metro area, the energy savings potential is likewise impressive. Replacing all of the old refrigerators in rental housing in the metro area with Energy Star rated refrigerators could save roughly 37 gigawatt hours per year, with potential electricity cost

savings to renters of \$3.8 million dollars collectively. The net present value of these electricity savings over the average life of a new refrigerator exceeds \$27 million dollars (see Table 2).

	Energy Savings (GWh/yr)	Energy Cost Savings \$ (millions)	Electric Load Reduction (MWh)
Cumulative Annual Savings	36.853	\$3.8	4.2
Savings over Estimated Lifetime*	515.694	\$27.1	

Table 2: Potential Savings for Replacement of Refrigerators 10 Years Old or Older, 7 County Twin Cities Metro Area

*The EPA assumes the estimated lifetime of a new refrigerator is 14 years, based upon data reported by the appliance industry in Appliance Magazine. SOURCE: 2005 RECS data, EIA, authors calculations. Note: Calculations based upon refrigerator electricity consumption data derived from Weatherization Assistant (DOE) software, EPA, and 2005 RECS data.

It is important to note, however, that this represents *potential* savings. Achieving a large percentage of this potential will require a significant investment of resources and effort, in terms of policy innovation, marketing and outreach. However, the authors assumed no funding for such efforts from the federal or state government, only financial resources already required by Minnesota law under the Conservation Improvement Statute.

SURVEY RESULTS: TENANT AND PROPERTY OWNER RESPONSES

Tenants do not consider energy efficiency or energy costs when choosing an apartment. When asked what factors were important when considering an apartment, over 85% of the tenants interviewed listed rental price and location as the two most important factors. Energy

costs were not a top priority for any of the tenants surveyed, and ranked second for only one out of the 35 tenants we interviewed (see Figure 6).

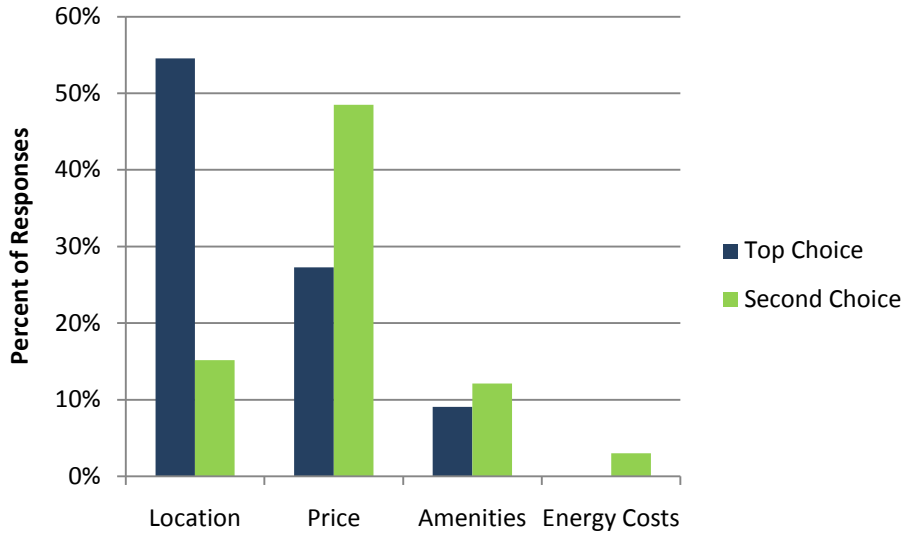


Figure 6: Factors Tenants Consider in Choice of Apartment

SOURCE: 2011 Tenant Survey

Nonetheless, tenants who pay both gas and electric bills did express concern about energy costs after moving into their apartments. For tenants who pay both gas and electric, average monthly energy costs reported was roughly \$120. Nearly 60 percent of these tenants identified energy costs as a significant expense (see Figure 7), and expressed an interest in programs that would help them lower their energy costs. However, for tenants who pay only electric bills, average monthly energy costs reported were slightly over \$30, and none of these tenants identified energy costs as a significant expense.

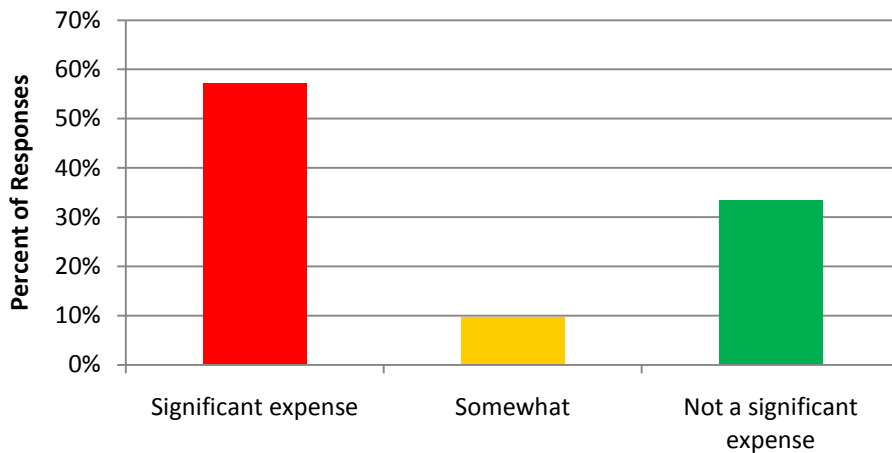


Figure 7: Tenants Paying Gas and Electric Bills for Whom Energy Costs Are a Significant Expense

SOURCE: 2011 Tenant Survey

For their part, property owners consistently ranked price and size as the two most important factors when purchasing a new refrigerator. The energy efficiency of the refrigerator was a top priority for only one property owner out of 15. However, two property owners indicated that they purchased Energy Star products when replacing old refrigerators. In addition, property owners expressed an interest in upgrading their stock of appliances, provided the benefit-cost analysis would be advantageous.

Both property owners and tenants in the 7 county metro generally preferred the On-Bill Financing program to the other options (see Figure 8). Green Leases were viewed more positively by tenants than property owners, who expressed a concern about the administrative time required to implement a Green Lease program. The benchmarking option we presented was the least desirable program to property owners, who in general expressed feeling over-regulated. This disapproval is likely due to the fact that the benchmarking option we presented

would require mandatory upgrades. However, this disapproval of benchmarking evaporated when the program was coupled with significant rebates of up to 80 percent to offset the cost of mandatory upgrades. Finally, most property owners had positive attitudes towards rebates in theory, as long as the time and effort required to find, apply for and process the rebates is minimal.

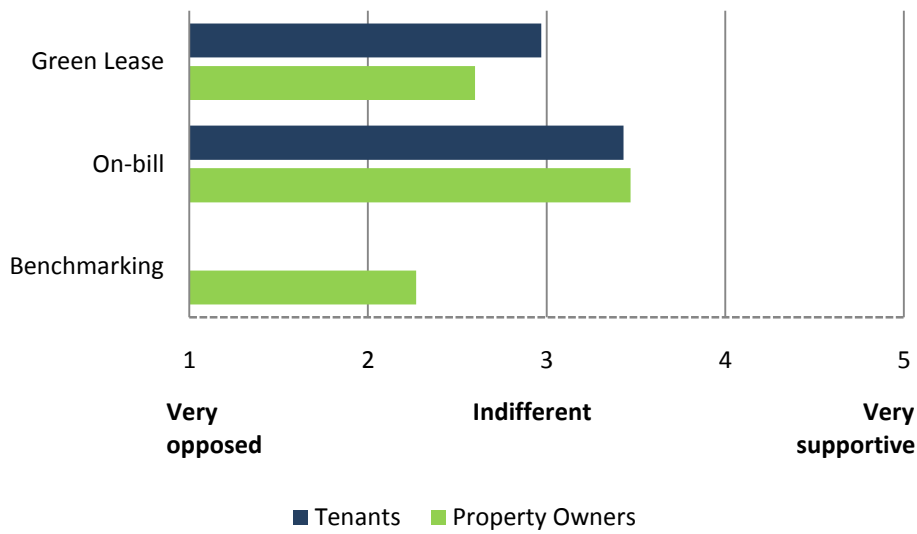


Figure 8: Tenant and Property Owner Attitudes to Policy Options

SOURCE: 2011 Tenant and Property Owner Surveys

Regardless of their program preference, several themes in the responses from tenants and property owners arose throughout the interview process - indicating factors that matter most to both groups. We have compiled these sentiments into three general categories, and present them as the 3 *T's* – *Time, Trust and Transparency*. These are intended to be a guideline of important considerations when constructing an energy efficiency program in the rental housing sector.

A GUIDE TO TENANT AND PROPERTY OWNER OPINIONS: THE 3 T'S

TIME & TIMING

Tenants and property owners were nearly unanimous in stating that any support for a program hinges on its simplicity from start to finish. For example, tenants indicated that their support for or interest in an on-bill financing program would drop dramatically if the paperwork required to participate took up more than 2 hours of their time. Similarly, comments from property owners indicated that negative past experiences with utilities regarding rebate programs raised a significant barrier to interest in future rebate programs. For example, one property owner told how nearly 43 hours of employee time was spent to get a \$400 rebate for a \$100,000 boiler system – a poor investment of resources from the owner's perspective. In some cases where the rebate process was seen as smooth and hassle-free, property owners had a specific contact person or representative at the utility who made the rebate process quick and easy.

Property owners see utilities as already having elaborate billing systems in place to handle the additional administrative procedures necessary for on-bill financing, and therefore are willing to let the utility company do the bulk of this administrative work while they enjoy the benefits. However, for both rebate and on-bill financing programs, where communication and cooperation between property owners and utilities are imperative, ease of program initiation and participation will be crucial to ensure uptake by stakeholders who consider their time to be valuable.

The timing of a potential efficiency program is also important. When the program is available is vital to a program's success from both a tenant and property owner perspective. Tenants expressed more interest in both the on-bill and green lease programs if they were implemented either when they moved in or when their lease was renegotiated. Interest fell slightly if unscheduled lease renegotiations were required. In addition, nearly all the property owners we interviewed resisted the idea of hassling current tenants with new utility charges or rent increases. Again, owners were much more open to programs if they were implemented during tenant turnover or lease renegotiation.

A particularly crucial aspect of program timing for property owners is when the appliance is replaced. All the property owners we interviewed stated that they replace refrigerators on an as-needed basis. Oftentimes this is when a refrigerator breaks, but numerous property owners stated that they will repair old refrigerators before replacing them with new models if it is the cheaper option. Interest remained high in on-bill, green lease and rebate programs if they could be utilized when refrigerators break. However, many property owners indicated that without significant rebate support (in the neighborhood of 50 percent of cost), these programs would not persuade them to replace older, but still functioning refrigerators right away. Ensuring that replacement programs benefit tenants and property owners when their interest is highest will be important for the success of any future programs.

TRUST

When discussing the on-bill and green lease programs with tenants and property owners, it became clear that distrust between the two parties – and of the public utilities – is an

issue that could affect the success of either option. Tenants consider utilities to be a relatively neutral third party, and assume that the utility would more accurately estimate projected energy savings and administer the financing charges more equitably in an on-bill financing program. In contrast, opposition to the green lease program from tenants revolved around a lack of trust that landlords would accurately estimate monthly energy savings and fairly bill them the correct monthly finance charge for a new refrigerator. However, some tenants showed a similar lack of trust of the public utilities. These tenants preferred the green lease program because of the already established connection with their landlords. Finally, while many property owners were willing to let utility companies conduct much of the administrative work in the on-bill program, some also expressed distrust in the interests and intentions of the utility company, preferring to do the work themselves. In particular, the large property owners that possess the capabilities to finance the green lease program themselves expressed interest in implementing the program in-house and obtaining their own energy use figures for their units.

In the case of mistrust of other parties, involvement of a neutral third party was suggested to ensure proper and accurate compliance within the program guidelines. This involvement could simply include utility companies in the on-bill program, or could be provided by an energy services corporation, a non-profit organization, or state-run agency. Regardless of how or whether a third part becomes involved, our third 'T', Transparency, can provide significant means to overcome trust barriers in efficiency programs.

TRANSPARENCY

The interviews we conducted illuminate the need for transparency in programs that required relations between tenants, property owners and utilities. In the on-bill and green lease programs, educating tenants about the program was cited as crucial to encourage participation by both tenants and property owners. This means ensuring that tenants know the details of each program, can easily see or know their energy savings and monthly charges, and understand the purpose of the program. Nearly every tenant expressed concern about who would determine the energy savings of a new refrigerator, and how these predicted savings would be estimated. Tenant concerns regarding exploitation by either property owners or utilities can be overcome by establishing transparency in the implementation and execution of these programs.

RECOMMENDATIONS

OPTION 1: DEVELOP AND IMPLEMENT CUSTOMIZED REBATE PROGRAMS FOR LARGE RENTAL PROPERTY OWNERS

As indicated earlier, Minnesota utilities have had much less success achieving energy savings in the residential sector versus the commercial and industrial sectors. Although aggregate energy consumption in the residential sector is high, decision-making is highly dispersed, resulting in much higher costs for CIP administration, marketing, etc. In addition, benefit-cost guidelines for CIP programs issued by the Minnesota Department of Commerce

restrict the types of energy efficient technologies, including appliances such as refrigerators, that are eligible for CIP funding (Legislative Auditor, 2005).

However, utilities in Minnesota and throughout the country offer customized conservation programs to commercial and industrial customers that cater to the specific needs of companies in those markets (North Carolina Solar Center, 2011). Therefore, the first option we recommend is a program that approaches large rental property owners as commercial entities and offers them customized conservation programs. This program would act as a liaison between large property owners and their utilities to determine the financial and energy savings requirements for a customized rebate or technical assistance package.

Our research to identify potential participants from the large property owner category (100+ units) revealed that only 12 companies own or manage 10 percent of the rental housing units in the Twin Cities (over 30,000 units)⁴. We estimate that replacing all the old refrigerators (10 years of age or older) in these apartments with new, Energy Star refrigerators would save roughly 3,700 megawatt hours per year, for a total of roughly 52 gigawatt hours over the estimated life of the refrigerators. The total estimated cost savings to customers from replacement of this stock of refrigerators would be approximately \$370,000 per year. We estimate that the public investment from CIP funds required to motivate early replacement with new Energy Star refrigerators at \$1.4 million.⁵ This investment translates into a cost

⁴ We were unable to find comprehensive data on the market concentration of the rental housing market in the Twin Cities. This preliminary finding suggests the need for a comprehensive assessment of the rental housing market to identify the 50-100 largest property owners.

⁵ Property owners indicated that rebates of at least 50 percent would motivate them to replace old refrigerators immediately, rather than wait until they fail, which is the standard practice.

\$0.027 per kWh saved. Significant energy savings may also be realized for other appliances in these rental properties that could be bundled together in customized rebate programs.

Nearly all of the customized rebate programs offered by utilities require detailed energy savings predictions and complicated application processes with short deadlines. For example, the Custom Incentive Application for Business Customers for the Moorhead Public Service Utility requires scheduled visits and follow-up evaluations from the utility, repeated submissions of energy savings predictions and evaluations that require information provided by the utility, and a 90-day deadline to submit paperwork (see Appendix D). Given the results of our property owner survey, this time-consuming process may deter many property owners from pursuing a rebate program such as this. An intermediate entity that works with both property owners and utilities could alleviate the time burden on property owners and make customized rebates more appealing to them.

In addition, through our interviews with property owners, we found that incentive programs that do not directly benefit property owners economically are not attractive to many large property owners. One large property owner (over 7000 units) resisted energy efficiency upgrades that did not provide an adequate return on investment (ROI) for the company. If existing rebate programs do not meet these ROI requirements, large property owners will not pursue these rebate options. However, customized rebate programs can make it more likely that a large property owner's perspective is understood and their investment criteria are met.

However, we identified several concerns that should be examined before pursuing a rebate liaison program as described above:

- 1) How much would the involvement of a third party increase the cost of customized rebate programs?
- 2) Are utilities willing to negotiate with property owners through a third party?
- 3) How much of the cost for energy efficient appliances would rebates have to cover to get property owners to update old, but still functioning, appliances right away?

None of these concerns present fatal flaws for a customized rebate program. Further research and evidence from existing customized rebate programs can ensure that these concerns are addressed.

Developing and implementing a customized rebate program for large property owners offers significant potential energy savings at lower transaction costs than existing residential CIPs. The political feasibility of this option is relatively high, since large property owners and their trade association, the Minnesota Multifamily Housing Association, are likely to support the idea strongly. As utilities struggle to meet the energy conservation targets established under NGEA for their residential customers, we believe it is likely that utility support will be easy to win over as well. However, our research was not able to identify any publicly accessible source of market concentration data for large property owners in Minnesota. Thus, besides research on the concerns mentioned above, it would be essential to identify the 50-100 largest rental property owners in the state to target this program effectively.

OPTION 2: REQUIRE ENERGY COST DISCLOSURE FOR RENTAL HOUSING

The inattention to energy costs and energy efficiency among tenants that we interviewed represents a significant part of the split incentives barrier in the rental housing sector. While programs such as On-Bill Financing and Green Leases seek to create economic incentives for property owners to implement energy efficiency upgrades, increasing renters' awareness of energy costs may also facilitate these upgrades. If renters placed significant market pressure on property owners for lower energy costs, property owners would have economic incentives to reduce energy use without the need for large rebate programs or shared savings plans. Our third recommended option is to require energy use disclosure for rental units in order to publicize this living expense to potential renters. This recommendation draws from the benchmarking work done by Fresh Energy in a soon to be published report by Annika Brink, and we add our own opinions on a potential program based on observations in this study.

Although architects or energy engineers may find energy use metrics such as thousands of Btus per square foot intelligible, most potential renters only want to know what their monthly energy costs are likely to be. Therefore, we recommend basing an energy cost disclosure program for rental housing on average monthly energy costs for the utilities that the tenant would pay. Average monthly energy costs for an individual rental unit can be obtained from the utility providing that service. Although monthly energy costs for an individual rental unit can vary depending on the habits and behavior of a given tenant and on seasonal energy

use changes, extending the time period used to get the average monthly costs to 3 years or more may help even out behavioral and seasonal fluctuations.

In addition, we recommend making energy use and cost disclosure mandatory *prior to* the lease-signing of the rental unit. One of the reasons tenants are inattentive to energy costs is because these costs are not apparent in rental advertisements or lease applications, and sometimes are not communicated even after signing the lease. Some tenants who reported significantly high energy costs stated that the energy costs in their current apartments were unexpectedly higher than their previous residence, and one tenant expressed the desire to move out because of surprisingly high energy costs. If these energy costs were readily visible in rental advertisements, communicated through lease agreements, or promoted through some sort of “energy star” label for efficient rental units, energy costs could play a greater role in tenants’ decisions, and those decisions could have a powerful influence on energy efficiency in the rental sector.

In fact, several property owners we interviewed recognized the potential for market competitiveness to drive investment in energy efficient technologies. Two large property owners (over 3000 units) indicated willingness to participate in a benchmarking program because the data, if it were made public, would show them where they stand compared to other property owners. These owners expressed the belief that public disclosure could create competition in the rental sector as property owners strive to have lower energy costs than their competitors. Furthermore, one property owner stated that energy efficient appliances would be particularly marketable against similar competitors holding “all else equal” in the rental unit.

That is, given similar rent pricing, location, and other amenities in a rental unit that are *already* advertised to potential renters, energy star appliances or low energy costs would be a positive selling point. Making these energy costs public to tenants at the outset of their apartment search would create incentives for property owners to invest in energy efficient appliances or other energy efficiency upgrades. Furthermore, this recommendation could be implemented as a complement to Option 1, as a mechanism to motivate large property owners to participate in a customized rebate program.

However, there are legal barriers to implementing mandatory energy disclosure in the rental process that will have to be addressed to make this option a reality. These barriers center on the privacy of account information associated with the previous tenant or tenants, even if such information is released anonymously. In addition, utilities have resisted moves to mandate energy cost disclosure. Finally, the rental housing industry has successfully resisted efforts to mandate more stringent disclosure in the past. Thus, it remains uncertain how politically feasible this more limited energy cost disclosure requirement would be.

OPTION 3: PILOT A PAYS-STYLE ON-BILL FINANCING PROGRAM FOR APPLIANCE UPGRADES SERVING RENTAL HOUSING

The features of a PAYS-style on-bill financing program can effectively address the issue of split incentives that affects refrigerators (and other major appliances) in rental housing. As a review, the key features of a PAYS-based program include:

- 1) A finance charge, or tariff, assigned to a meter location, not an individual customer;
- 2) Billing and payment on the utility bill with disconnection for non-payment;
- 3) Certification that products are appropriate and savings estimates exceed payments.

Our property owner survey indicated that a rebate would have to exceed roughly 50 percent of the replacement cost of a new refrigerator to accelerate the replacement of old refrigerators affected by the split incentives inherent in rental housing. Evidence suggests that PAYS-style on-bill financing programs could reduce the need for such subsidies dramatically while still enabling efficiency investments (Cillo & Lachman, 2005).

However, experience with on-bill financing programs indicates that programs forced upon unwilling utilities have failed (Fuller, 2009). Furthermore, each individual utility’s concerns regarding a potential on-bill program must be addressed. To assess these concerns, a Utility Questionnaire was designed and emailed to all 7 major Minnesota public utilities (see Appendix C). Responses were received from two utilities: Xcel Energy and Otter Tail Power. In addition, extensive conversations with a representative of CenterPoint Energy clarified their perspective of on-bill financing as well.

Otter Tail Power expressed moderately strong support for an on-bill financing program in response to our questionnaire, likely because they already run what they call an “on-bill” financing program. However, it is important to note that Otter Tail’s program, called DollarSmart Financing, differs from the PAYS model in several key ways:

PAYS-Based Program	Otter Tail's DollarSmart Financing
No upfront payment	20% upfront payment
No credit check or liens	Credit check required, 12 month good utility payment history, loans over \$5,000 secured
Debt obligation transfers to new tenant/owner	Balance due in full upon termination of electric service or sale of property

In addition, the maximum loan term in the DollarSmart Financing program is 5 years, less than 50 percent of the expected life of most major appliances and too short a time frame to allow monthly energy cost savings to exceed the monthly finance charge. Most importantly, home appliances and multifamily properties are ineligible for financing.

Xcel Energy expressed a neutral position on on-bill financing. However, CenterPoint Energy expressed strong opposition to an on-bill financing program in their service area. Thus, of the three public utilities that responded to our survey, Otter Tail Power may be the best candidate for a pilot PAYS-style On-Bill Financing Program for appliance upgrades serving rental housing. However, we recommend a comprehensive survey of Minnesota's public utilities and municipal cooperatives to determine if other utilities may also be receptive to this option.

In addition, the responses to our Utility Questionnaire identified the following three concerns about the impact of an on-bill financing program on the utilities:

- 1) The cost to make changes to a utility's billing system;
- 2) The source of funding for efficiency projects;
- 3) The financial risk to the utilities if defaults on the "loans" to customers are high.

Unfortunately, there are a limited number of existing on-bill financing programs from which to draw lessons. Anecdotal evidence from existing and piloted on-bill financing programs in North America allows us to offer a brief commentary on program design options to address these concerns. (See Appendix E.) However, the time and scope allotted to this research did not allow a thorough investigation into these options. Further research to address these concerns is recommended as a first step before efforts to pursue this option are undertaken.

Finally, additional concerns arose during our research that remain to be addressed regarding a pilot On-Bill Financing Program. These concerns include:

- 1) Which party chooses the appliance, the property owner, tenant, or the utility?
- 2) If the account goes into default, can the utility repossess the appliance?
- 3) Home appliances have typically been excluded from loan programs because of appliances' portability.

However, none of these concerns appear to be fatal flaws. Considering the first, all three entities would most likely be involved to some extent. The property owner would likely have to sign off on the product chosen, and the utility could simply require a minimum efficiency rating, such as Energy Star compliant. The legal issues surround the second concern are beyond the authors expertise. Finally, although an appliance such as a refrigerator is theoretically portable, as long as the agreement involved specified that the appliance was ultimately the property of the property owner, it seems unlikely that this potential portability would be an issue.

CONCLUSIONS

This study provides insight on how the split incentives barrier affects energy efficiency upgrades in rental housing in the Twin Cities, and advises Fresh Energy on how various program designs might address this barrier. The *potential* energy savings from replacing the roughly 70,000 ten-year-old or older refrigerators in the Twin Cities rental housing stock with new Energy Star refrigerators equals approximately 37 gigawatt hours per year. The potential cost savings to consumers equals roughly \$3.8 million per year. Realizing this potential will require

significant policy innovation to overcome the split incentives barrier that currently creates disincentives for these investments.

The survey data we accumulated gives preliminary, qualitative insight into how property owners and tenants make energy-related decisions in the rental housing sector. To obtain statistically significant data regarding property owner and tenant opinions, future quantitative survey work must be done on a much larger scale. Some of the key areas in need of further research include (1) a market characterization study of the rental housing sector that identifies the 50-100 largest property owners in Minnesota, (2) what statutory changes would need to be made to facilitate the sharing of utility bill history for an energy cost disclosure program, and (3) research that addresses the three main concerns utilities' expressed about on-bill financing. (For a complete list of future research needs, see Table 2.)

Based on interviews with property owners and tenants and the quantitative analysis in the study, we formulated 3 program options that Fresh Energy can pursue to overcome the split incentives barrier as it applies to refrigerators, home appliances in general, and overall energy efficiency efforts. In the short term, the option that has the most potential to address the split incentives barrier is to develop and implement customized CIPs targeting large rental property owners as commercial accounts. In the long term, mandatory energy cost disclosure for rental housing and an on-bill financing program that includes appliances in rental housing offers significant potential to enable energy efficiency investments in rental housing. (For more on the political and administrative feasibility implications, levels of cost effectiveness, and projected impact of each option on the split incentives barrier, see Table 3.) Depending on the

current goals and capabilities available to Fresh Energy, one or more of these options may offer more potential for success than the others.

OPTION	Political Feasibility	Administrative Feasibility	Cost Effectiveness	Potential Impact	Future Research
Customized Rebates for Large Property Owners	High – Utilities and property owners likely to support; potentially little political action required.	Moderate – 3 rd party liaison limits administrative costs for utilities and property owners, but 3 rd party currently does not exist.	Moderate – Minimizes costs by tailoring rebates to specific needs of utilities and property owners, but 3 rd party may increase overall cost of the program.	High – Focus on large property owners with highest market impact potential.	<ul style="list-style-type: none"> - Utility support - Additional cost of 3rd party - Rental market characterization
Mandatory Energy Cost Disclosure	Unknown – Property owners and realtors historically have opposed; potential legal barriers.	Moderate – Utilities have data on hand; but potential difficulty transferring data to property owners.	High – Utilities already have data on hand; little investment required.	Unknown – Publicized energy costs may not change tenant behavior or choice.	<ul style="list-style-type: none"> - Property owner and realtor support - Impact on tenant behavior - Ease of data transfer from utility to property owners
PAYS-style On-Bill Pilot	Moderate – Utilities may oppose; property owners may support; potential legal barriers.	High – Utility companies already have complex billing systems in place.	Unknown – Depends on loan financing details and administrative costs for utilities.	Moderate – Appliance replacement at little to no cost to property owners and tenants; but some dispersion of impact.	<ul style="list-style-type: none"> - Utility and property owner support - Administrative cost to utilities - Legal implications of appliance ownership

Table 2 – Recommended Program Options – Enabling Energy Efficiency in Rental Housing – John Mitchell & Will Nissen – May 9, 2011

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APPENDIX

APPENDIX A: PROPERTY OWNER/MANAGER QUESTIONNAIRE

ID #: _____ Date: _____ Time: _____

1. How many units do you own/manage? In how many different apt complexes? In what neighborhood, city or region? Do you know roughly the average age of your buildings?
2. What percentage of your operating costs is for utilities for which you are responsible?
3. What major appliances do you have in your units? (i.e. Refrigerators, Dishwashers, Washing machines)

Refrigerator Questions

4. When (how often) do you replace the refrigerators in your units?
5. Can you please list and rank the factors you consider when you are deciding what product to purchase?
6. Do you know the model that you chose?
7. Do you buy Energy Star refrigerators?
8. Can you share with me the cost of the refrigerator(s) that you purchase?
 - a. \$200-300
 - b. \$300-400
 - c. \$400-500
 - d. \$500-600
9. What is the cost of the washing machines you purchase
10. Do you know the model (washing machine) that you chose?
11. Do you buy Energy Star washing machines?
12. Who are your suppliers/distributers for appliances?
13. Is your decision making process the same for the other major appliances? If not, can you please explain how they differ?
14. Xcel Energy has a rebate program for new home construction that offers builders a rebate of several hundred dollars for the installation of an Energy Star refrigerator, dishwasher, and washing machine in their new homes.
 - a. If your utility offered you a rebate of \$300-400 for the replacement of your old appliances with new Energy Star appliances (refrigerator, dishwasher, washing machine,) or \$100 per major appliance, would that motivate you to replace old appliances right away?
 - b. If no, why not?
 - c. How much would the rebate have to be to motivate you to buy Energy Star appliances?

d. What concerns, if any, would you have about a policy such as this?

15. The City of Austin, Texas has an ordinance that requires energy audits of all multifamily buildings. Based on those audits, the energy consumption of multifamily buildings are “benchmarked” i.e. compared with other multifamily buildings,) and buildings that are classified as high energy-users (> 150% of the average per square foot for multifamily buildings in their area) are required to complete upgrades to lower their energy use to 110% of the average.

a. Please indicate your support or opposition to a local policy that required you to upgrade your appliances (such as refrigerators or dishwashers) if the energy consumption of your units was above the average?

Supportive vs. Opposed
Very Moderate Indifferent Moderately Very

b. The Austin program provides rebates of up to 80% of the cost of those upgrades. Would that change your attitude toward a program such as this?

c. What concerns, if any, would you have about a policy such as this?

16. On-bill financing programs allow utility customers to finance energy efficiency improvements with a finance charge (tariff) on their utility bill. It has 3 distinct features: the charges are attached to the meter, not the individual customer and so stay with the property; the program allows for disconnection of service to the individual account holder for non-payment; and monthly energy cost savings have to exceed monthly charges.

a. How interested would you be in taking advantage of a program from your utility that allowed your tenants to replace current electrical appliances (i.e. refrigerator or dishwasher) with high-efficiency appliances for a modest cost to you per unit (say ½ your typical replacement cost) with the tenant paying the difference with a charge on their monthly utility bill?

Interested vs. Disinterested
Very Moderate Indifferent Moderately Very

b. How about if the tenant paid the full cost with a charge on their monthly utility bill?

c. Would this motivate you to replace older equipment sooner than the status quo?

d. What concerns, if any, would you have about a program such as this?

APPENDIX B: TENANT QUESTIONNAIRE

ID #: _____ Date: _____ Time: _____

Tenant Identifier: _____

- 1) Can you please list and rank the importance of the top five factors you considered when choosing this apartment?
 - a. location
 - b. price
 - c. amenities (please list)
 - d. energy costs
 - e. other
- 2) What energy bills do you pay? (gas or electric) Is hot water included in your rent?
- 3) How much you pay per month for energy costs?
 - a. How significant an expense is that for you?
- 4) What major appliances do you have in your apartment: dishwasher, washer and dryer, furnace, hot water heater, air conditioner?
- 5) (On-bill) If your utility offered you the opportunity to upgrade the appliances in your apt with new, energy efficient appliances via a charge on your utility bill that would equal no more than 75% of the savings on your monthly electric bill, how interested would you be in taking advantage of a program such as this? (Example 1: monthly savings = \$20 and monthly charge = \$15.) (Example 2: The average refrigerator costs about \$10/month to run, and the charge to finance it on your electric bill would be no more than \$7.50/month.)

Interested	vs.	Disinterested		
Very	Moderate	Indifferent	Moderately	Very

 - a. (If yes) If it required roughly 2 (?) hours of your time for all the paperwork, would you still be willing to do it?
 - b. If it required 5 hours of your time?
 - c. (If no) Why not?
 - d. What concerns, if any would you about a program like this?
- 6) (Green Lease) If your landlord offered you the opportunity to upgrade the appliances in your apt with new, energy efficient appliances via a small increase to your rent that would be less than the savings on your monthly electric bill, how interested would you be in taking advantage of a program such as this? (Example: monthly savings = \$20 and monthly charge = \$15.) (Example 2: The average refrigerator costs about \$10/month to run, and the charge to finance it added to your rent would be no more than \$7.50/month.)

Interested vs. Disinterested
Very Moderate Indifferent Moderately Very

- a. (If yes) If your landlord required you to sign an addendum to your lease that allowed the landlord to add this charge to your rent, would you still be willing to do it?
 - b. (If no) Why not?
 - c. What concerns, if any would you about a program like this?
- 7) Refrigerator make: _____ model #: _____
manufacture date: _____

APPENDIX C: UTILITY QUESTIONNAIRE

We are investigating policy mechanisms to overcome the split incentives barrier to energy efficiency in multifamily rental housing. These barriers arise due to the fact that properties owners have no direct financial incentive to purchase more efficient but more expensive products, such as Energy Star refrigerators or compact fluorescent lighting, for which they do not pay energy costs.

We are considering the following four policy options, and would like your utilities perspective on these options.

Option 1: Rebates

Xcel Energy has a rebate program for new home construction that offers builders a rebate of \$500 for the installation of an Energy Star refrigerator, dishwasher, washing machine, and at least 20 cfls in their new homes.

An option we have brainstormed would be a \$100 rebate per major appliance for property owners who replace old appliances with new, Energy Star appliances (refrigerators, dishwashers, or washing machines,) and a \$2 rebate per cfl (up to a limit of 10-20).

Please indicate how interested your utility would be in implementing this option if our research indicates it would be effective at encouraging property owners in Minnesota to replace old appliances with more efficient models.

Interested				vs.				Disinterested	
Very	Moderate			Indifferent		Moderately		Very	
5	4	3	2	1	-1	-2	-3	-4-	-5

Several properties owners we have interviewed experienced frustration trying to take advantage of existing utility rebate programs for energy efficiency upgrades to their properties. Many of these individuals indicated that their experience led them to forgo future efforts to pursue incentives from the same utility.

- a) Has your utility done any studies to assess how user-friendly customers perceive your rebate programs to be?
- b) Is there anything that your organization would like to know about how to make these programs more user-friendly?

Success of a program such as this would require marketing and outreach to these property owners.

- a) What resources, if any, do you believe your utility would be willing to offer to support these efforts?

Option 2: Benchmarking

The City of Austin, Texas has an ordinance that requires energy audits of all multifamily buildings. Based on those audits, the energy consumption of multifamily buildings are “benchmarked” i.e. compared with other multifamily buildings,) and buildings that are classified as high energy-users (> 150% of the average per square foot for multifamily buildings in their area) are required to complete upgrades to lower their energy use to 110% of the average.

Please indicate whether your utility would support or oppose a local government ordinance such as this if our research indicates it would be effective at encouraging property owners to replace old appliances right away with new, energy efficient models, rather than wait for them to fail, as is the common practice. We ask that you indicate likely support or opposition to two separate elements of this policy

- 1) The requirement that all multifamily properties be audited and their energy use are benchmarked.

Supportive				vs.	Opposed					
Very	Moderate			Indifferent	Moderately		Very			
5	4	3	2	1	-1	-2	-3	-4-	-5	

- 2) The requirement that high energy-users be required to complete upgrades to lower their energy use.

Supportive				vs.	Opposed					
Very	Moderate			Indifferent	Moderately		Very			
5	4	3	2	1	-1	-2	-3	-4-	-5	

This program would require energy audits of all multifamily buildings in a particular locality.

- a) Do you currently offer multifamily property owners subsidized energy audits as you do for single family home owners?
- b) If not, do you believe your utility would likely be willing to offer subsidies for audits to “benchmark” their buildings as required under such a policy?

Austin Energy has significant in-house technical expertise that they have leveraged to help property owners comply with the requirement to reduce energy usage of buildings benchmarked as “high-users.”

- a) What kind of technical expertise, if any, does your utility have to help multifamily rental property owners comply with a policy such as this?

The Austin, Texas program is supported by significant rebates (as high as 80 percent) for eligible efficiency investments from the municipal utility, Austin Energy.

- a) What level of rebates, if any, do you believe your utility would likely be willing to offer to property owners in conjunction with a policy such as this?
- b) What concerns, if any, do you believe your utility would have a policy such as this?

Option 3: On-Bill Financing

On –bill, or utility, financing programs offer utility customers the opportunity to finance energy efficiency improvements to their properties via a finance charge (often referred to as a tariff) added to the customers’ utility bill. The concept has 3 distinct features: the charges are attached to the meter, not the individual customer and so stay with the property; the program allows for disconnection of service to the individual account holder for non-payment; and monthly energy cost savings have to exceed monthly charges. (The specific model we are considering is known as the Pay As You Save (PAYS) model, developed by the Energy Efficiency Institute.)

Please indicate whether your utility *in general* supports or opposes the concept of on-bill financing:

Supportive				vs.	Opposed				
Very	Moderate			Indifferent	Moderately	Very			
5	4	3	2	1	-1	-2	-3	-4-	-5

The source of capital for an on-bill financing program can come from a variety of sources. If funds came from a public benefit charge fund or other public sources, would your utility likely support or oppose the idea:

Supportive				vs.	Opposed				
Very	Moderate			Indifferent	Moderately	Very			
5	4	3	2	1	-1	-2	-3	-4-	-5

If your utility opposes the on-bill financing, please explain the primary reasons for that opposition.

Option 4: Green Lease

A “Green Lease” is an agreement between a property owner and tenants that allows the property owner to bill tenants a monthly fee to finance energy efficiency improvements to the apartments for utilities that the tenant pays, such as a new refrigerator, which would save the tenant money on their monthly electric or gas bill. The standard assumption is that the monthly finance charge to tenants should be no more than 75% of their monthly energy savings.

To encourage property owners to establish a program such as this, we have considered a utility sponsored rebate of \$50 to \$100 per old appliance replaced with an energy efficient appliance.

Please indicate whether your utility would likely support or oppose giving rebates for this purpose:

Supportive				vs.	Opposed				
Very	Moderate			Indifferent	Moderately		Very		
5	4	3	2	1	-1	-2	-3	-4-	-5

Are there any concerns your utility would have about this idea?

Summary Questions

Of these options, which do you believe shows the most promise?

Why? Please be as specific as possible

Are there regulatory issues that we may not be aware of which would significantly affect the implementation of any of these ideas?

APPENDIX E: EVIDENCE ADDRESSING MAJOR UTILITY CONCERNS WITH ON-BILL FINANCING

To review, there were three major concerns expressed in response to our Utility

Questionnaire:

- 1) The cost to make changes to a utility's billing system;
- 2) The source of funding for efficiency projects;
- 3) The financial risk to the utilities if defaults on the "loans" to customers are high.

Anecdotal evidence from existing and piloted on-bill financing programs in North America allows us to offer a brief commentary on program design options to address these concerns.

One local utility representative interviewed suggested that the cost to make changes to their billing system would be prohibitive. Lacking any industry expertise in utility billing systems, we are unable to evaluate this claim. However, a representative from Manitoba Hydro, an electric utility in Canada that offers the largest on-bill financing program (in terms of volume of loans and percentage of customers served) in North America, reports that no changes needed to be made to their billing system to implement their on-bill financing program (Johnson, 2011) (Fuller, 2009).

The source of capital for an on-bill financing program can come from a variety of sources, such as financial institutions, internal utility funds, state or local government funds, or from an existing public benefit charge fund. For example, Manitoba Hydro uses internal general revenue funds for their loan program, while Midwest Energy uses a 50-50 mix of internal general revenue funds and funds from the Kansas Housing Resources Corporation, a state housing finance fund (Fuller, 2009). In Minnesota, CIP funding to meet the minimum spending requirement could theoretically be utilized for an on-bill financing program.

Given that the loans in a PAYS-based on-bill financing program are unsecured and credit is granted based solely on utility-bill payment history, utilities have grounds for concern that a high rate of defaults on loans could create financial problems. We were able to find data on default rates from two on-bill financing programs: Canada's Manitoba Hydro and Arkansas' First Electric Cooperative. The data from Manitoba Hydro is perhaps the most salient due to the high volume of loans processed: Manitoba Hydro had a default rate of only 0.2 percent on over 22,000 loans worth just over \$100 million from 2008 through 2010 (Johnson, 2011). First Electric Cooperative had a higher default rate of just under 1 percent, but the program only issued 7 loans worth \$77,000 in 2007 (Fuller, 2009). For comparison, recent default rates for auto loans has been around 2 percent, while the default rates for first-time mortgages has ranged between 3 and 5 percent (Morris, 2010). Nonetheless, options exist to protect against even this low level of defaults. Property Assessed Clean Energy (PACE) programs have dealt with the issue of defaults by creating reserve funds to cover losses due to default, thereby protecting the rating of the bonds issued to fund these programs (PACE 101). Likewise, a reserve fund could be established to protect the credit rating of a public utility implementing an on-bill financing program in Minnesota.