



“On-Bill Financing” for Energy Efficiency

Location: New Haven, Connecticut

Abstract: One of the challenges faced by building owners seeking to make energy efficiency upgrades is difficulty covering the up-front costs of the changes. “On-bill” financing is a strategy whereby a gas or electric utility finances these upgrades, with the building owner paying off the costs over time through an additional charge assessed on their monthly utility bill. Local authorities can establish these programs by working with their utility partners—or other public service agencies—to fund and administer on-bill financing programs, improving the prospects for investments in energy efficiency initiatives by small businesses and homeowners.

Highlights:

- Encourage private investments in energy efficiency improvements through the provision of low-cost or zero-interest short-term loans
- Provide a convenient method for small business and governmental customers to repay loans for energy efficiency from their regular operating budget
- Reduce private sector energy costs, improving local business profitability
- Reduce energy intensity of the economy and provide a new service with both public and private benefits
- Promote local “green” workforce development through support of the energy efficiency service sector

The Concept: Energy efficiency is widely regarded as the lowest-cost means of making existing energy supplies go further, reducing the need for investment in additional energy production capacity. One of the most significant challenges to increasing investment in energy efficiency upgrades to public and private sector buildings is the upfront capital cost of these projects. For small businesses, which normally have limited excess capital on hand, the initial investment required for these projects may be out of reach, forcing them to forego the benefits of more efficient—and profitable—operations. Similarly, government agencies may not have access to funds for capital improvement projects that would reduce their operating costs and free up more money for their core functions.

On-bill financing is an innovative approach that utilities can offer to help customers fund investments in energy efficiency improvements. On-bill financing provides energy customers with low- or interest-free financing for the purchase and installation of less energy intensive lighting, refrigeration, or space heating and cooling. The utility partner finances the project’s up-front capital costs, and the loan is then repaid through extra monthly installment charges on a customer’s bill, typically over a period of 2-5 years depending on the size of the loan and the



energy savings achieved. If the program is designed properly, customers should not see their bill increase, as the monthly loan payment is usually equal to or less than the cost savings achieved by the efficiency upgrades. Moreover, the payback period for the project should match the loan period, which means once the loan is repaid the customer's energy bill should decrease, with all savings going directly to the customer.

Goals & Objectives:

- Encourage investment in energy efficiency by overcoming the initial capital investment hurdle
- Modernize technology and reduce electric/gas usage in government facilities, industrial production, and commercial operations
- Help reduce the need for new investments in power generation facilities, refineries, and other energy production and delivery infrastructure

What Mayors Can Do: Mayors can work with the local authority's energy utility to develop an on-bill financing fund. If an on-bill financing program is established, mayors can set an example for the private sector by requiring government facilities to utilize on-bill financing to make energy efficiency improvements. Finally, mayors can help energy utilities publicize the financing service and educate the public and business community regarding the types of efficiency improvements that are eligible.

Key Stakeholders:

Electric utility – Provide capital for financing, staff and necessary information technology to administer program; collect monthly loan payments using their existing billing system.

Local authority managers – Demonstrate the effectiveness on-bill financing of energy efficiency projects by promoting its use for efficiency upgrades to local government buildings.

Industrial/commercial energy customers – Stand to benefit from access to inexpensive loans for energy efficiency improvements that reduce operating costs and free up capital for investment in other aspects of the business.

Energy efficiency technology vendors and installers – Will benefit from increased business in the provision of energy efficiency services; can assist customers in working with utility administrators to establish financing contracts.



**Detailed Case Study:
United Illuminating's On-Bill Financing Program**



In 2000, United Illuminating, an investor-owned utility that serves over 300,000 electric customers in the city of New Haven and other parts of southern Connecticut, began using an innovative approach to help small commercial and industrial electricity customers (with average peak demands of 150 kW or less) finance investments in new energy efficient technologies. Through its Small Business Energy Advantage program, United Illuminating has introduced on-bill financing to help small companies overcome the capital investment hurdle of energy efficiency projects.

United Illuminating's on-bill financing program provides rebates and interest-free loans to help customers fund energy saving improvements. The program draws on funding provided by the Connecticut Energy Efficiency Fund (CEEF), a 'public purpose' fund which raises money from all electricity customers in Connecticut via a monthly surcharge on their electric bill. The CEEF, created in 1998 by the Connecticut state legislature, seeks to: 1) advance the efficient use of energy, 2) reduce air pollution and other negative environmental impacts caused by power production; and 3) promote economic development through the provision of secure and affordable energy services. Typical efficiency projects supported by the CEEF include new refrigeration, lighting, insulation, or space heating and cooling systems.

The program works as follows: United Illuminating pays an outside auditor to visit a business to identify potential energy saving opportunities. The utility then uses the audit results to make recommendations on a range of energy saving improvements it can undertake to reduce usage and lower costs by 20-30%. If a customer wishes to move forward on a project, the utility calls on an energy contractor it has pre-qualified as capable of completing this work in a timely and high quality manner. In 2009 there were 14 firms in the utility's contractor pool. Each contractor agrees to abide by strict guidelines concerning materials, prices, labor, licensing, and the proper disposal of old lamps and ballasts.

Efficiency project costs, which typically average about \$6,000-\$8,000 but can range from \$1,000-\$60,000, are normally eligible for rebates offered through the Connecticut Energy Efficiency Fund. To incentivize participation, United Illuminating caps the rebate at 30-40% of the total project cost, covering the remaining 60-70% with zero-interest loans for customers meeting their eligibility requirements. The utility determines eligibility based exclusively on the



customer's bill-payment history and does not make additional credit-worthiness evaluations. Generally, to qualify for on-bill financing a customer must not have past due charges of more than 30 days. If the customer does not qualify for the loan, it cannot participate in the on-bill financing program.

After the contractor performs the efficiency improvements and submits its invoice, United Illuminating immediately pays the contractor for its services. Loan charges normally appear on the customer's bill approximately 30 days later. Participating customers then make monthly payments via their regular electricity bill, usually without seeing an increase in their monthly electricity expenditures. Loans last no longer than 36 months, corresponding to the typical cost recovery period for most efficiency projects. United Illuminating normally provides loan terms that ensure that the efficiency project provides immediate cost savings to the customer.

The following example illustrates how the program works. The example comes from a small business in Connecticut with an average peak monthly demand of 44 kW. To reduce its energy costs, the auditor recommended the building owner install high performance lighting, light-emitting diode (LED) exit signs, evaporator fan controls, door heater controls, and evaporator fan motor replacements (for refrigeration). Table 1 illustrates how on-bill financing can work.

Table 1: Small Business On-Bill Financing Example

Total Project Cost (with sales tax)	\$20,968
Existing State of Connecticut lighting upgrade rebate	- \$4,333
Existing State of Connecticut refrigeration upgrade rebate	- \$3,579
Net cost to customer	\$13,056
Estimated annual energy savings due to efficiency upgrades	\$8,315
Estimated monthly energy savings due to efficiency upgrades	\$693
Monthly On-Bill Loan Payment Options	
Option 1: 0% for 20 months	\$653 = Net savings \$40/month
Option 2: 0% for 27 months	\$493 = Net savings \$200/month

As soon as the customer repays the loan, it receives the full value of the energy savings produced by the efficiency upgrades, as much as \$693 per month.

More information about United Illuminating's Small Business Energy Advantage Program can be found at the following website:

<http://www.uinet.com/uinet/connect/UINet/Top+Navigator/Your+Business/UI+Products+%26+Services/Small+Biz+Energy+Adv./Incentives+for+lowering+Energy+Cost#financing>



Benefit/Cost Information: Over the 2000-2007 period, United Illuminating's On-Bill Financing program supported over 2,450 projects.¹ At a total cost of approximately US\$28 million, the utility estimates that these projects will save 670 million kWh over their lifetimes. In 2007 alone, the program resulted in a peak load reduction of approximately 2 MW. United Illuminating estimates that the average cost of achieving the energy savings created by its program has been approximately US\$0.22/kWh. Of this amount, approximately 72% accounts for the cost of the incentives provided to customers while 28% represents the cost of administering the program.² Of the US\$28 million invested in these efficiency projects, about US\$7 million was provided in rebates by the CEEF and US\$21 million provided by UI as zero-interest loans. Since 2000, only US\$200,000, or less than 1% of the total financing offered, has defaulted.

There are four key cost areas that need to be considered when implementing an on-bill financing program. First, an on-bill financing program requires an initial pool of funds to supply efficiency project loans. These funds can be collected either from normal energy utility operating revenues, as part of a utility's capital expenditure budget, or from a separate surcharge on all customers bills. Both of these methods involve costs to either the utility (the opportunity cost of diverting funds to this purpose) or consumers (increased rates due to the small surcharge on their monthly bill).

Although investments in energy efficiency decrease system demand and can reduce the need for utility investment in new power plants, some consider the use of utility revenues for financing projects to be inappropriate because the technology upgrades ultimately belong to the customer rather than the utility. The use of public purpose funds as the financing source avoids this problem by creating a separate dedicated funding stream.

Second, an on-bill financing program may require modifications to the program administrator's billing system to allow for the collection of additional fees on customer bills. The functionality of the program administrator's billing system should be assessed early in the program development process to estimate the cost of any necessary upgrades.

A third cost to take into consideration is increased staffing and administrative costs. The financier/program administrator must devote staff to running credit checks, approving loan agreements, carrying out and assessing engineering audits, accounting activities and handling customer service issues. In 2009, with a \$2.5 million budget of efficiency incentives and a goal of 10 million kWh saved, United Illuminating will maintain a staff of 2 full time employees and a pool of 14 contractors to perform the efficiency services. They also draw from the utility's accounting and other administrative departments for support.

¹ Telephone conversation with Dennis O'Connor, Small Business Program Administrator, United Illuminating, on February 20, 2009 and presentation by Mr. O'Connor for an E-Source web conference on May 22, 2008.

² "Response of Small Business California to the Administrative Law Judge's Ruling Soliciting Questions on Energy Efficiency Portfolio Composition and Development Rules and the Role of Advisory Groups," before the California Public Utilities Commission Rulemaking 06-04-010, July 23, 2007.



The program administrator should also have an effective system for tracking projects and verifying project performance. The utility developed its own system that allows contractors to access customer data and submit work proposals, and provides administrators with a means of tracking contractor work.

Finally, loan defaults are another important cost and risk area of the program since they represent pure financial losses. United Illuminating's program has kept defaults at less than 1% of funds expended, a situation the utility attributes to both its qualification requirements and a program design that encourages active customer "buy-in" to the merits of the efficiency upgrades.

Timeline: United Illuminating established its first energy efficiency on-bill financing program in 1993, after a year of development. Focused on implementing approximately 20 efficiency projects per year, the initial program had 3 efficiency contractors, an annual budget of \$200,000 and a goal of 300,000 kWh of annual savings. During this time the company developed ENERNET, its on-line project tracking system, and cultivated a pool of local efficiency contractors that it could draw from when it expanded its program. After 7 years of experimentation, United Illuminating greatly expanded its program in 2000, combining its zero-interest on-bill financing program with energy efficiency incentives for small business enterprises offered by the State of Connecticut.

Lessons Learned:

The lessons learned to date relate to both the program design and the day-to-day management. United Illuminating has found that these measures help to both minimize risk and ensure the highest possible energy savings for the funds expended on the program.

Program design

- On-bill financed projects should address a large percentage of the energy use in a facility to ensure that savings will be visible on the customer's energy bill. United Illuminating uses 20-30% savings as a general benchmark for determining if a project should move forward.
- Successful programs identify technologies that can be installed repeatedly across certain small business sectors as a way of ensuring high levels of participation.
- Program applications should be as streamlined as possible to avoid discouraging participation.
- To maximize long term cost savings, United Illuminating's program emphasizes upgrades that are not easily removed. For example, lighting system upgrades should be "hard wired", making them difficult to remove, unlike simpler approaches like the use of screw-in compact fluorescent light bulbs, which can be more prone to theft.



Program management

- Customer loan default is a major risk. Safeguards must be put in place to ensure that a high default rate does not adversely affect the utility or other entity providing the financing. Customer credit requirements for project financing are one way to do this and should be developed early and adhered to as closely as possible to avoid conflicts with participants over inconsistent criteria.
- The program administrator should have a project and program management system that allows it track each project and provides easy access to contractors for updates.
- The program must be adequately marketed and the benefits of energy efficiency advertised to attract participants. A consumer education and marketing effort must accompany the program to both inform customers of the availability of the loans and explain the energy efficiency value proposition.
- The regular billing system used for processing monthly energy charges must be expandable to handle the new loan charges. Not all billing systems are capable of such modifications, so it is important to assess the utility's billing system capability and the potential cost of upgrades early in the process.
- Energy meters should be installed for every account targeted by the program. For commercial accounts, time-of-use meters that measure both customer demand and energy usage across time periods are better than more simple meters that only measure usage. The data obtained from metering usage and demand is fundamental to determining what the savings potential might be for a given customer, verifying savings achieved through the program, and establishing how loans will be repaid. Effective metering will also allow program administrators to establish and verify program performance to both utility regulators and participating customers.

Is this policy right for your city?

In order to implement an on-bill financing program, there are several fundamental institutional and market-related conditions that must exist locally. These requirements cover regulatory and funding issues, ratemaking, and the development of a local workforce capable of identifying efficiency opportunities and implementing projects.

Regulatory requirements

- A source of capital funds for loans must be identified and secured. The national or regional regulator may have to direct the utility to establish a fund to support energy efficiency incentives and loans. This can be done either by allocating a portion of utility capital funds for efficiency investments or by establishing a dedicated public purpose surcharge to be paid by every ratepayer on a per kWh basis (or some combination of these two approaches). United Illuminating uses both public purpose funds collected from all electricity ratepayers and its own operating revenues to fund its program. However, other revenue streams could be used.



- Utilities may not have the proper incentives to encourage investments in energy efficiency, especially if reductions in energy usage result in utility revenue losses. Policymakers must ensure that the utilities/program administrators view energy efficiency as an important and appropriate responsibility, and establish the effective incentive mechanisms, or else the financing effort may fail.

Energy rate design

- Retail energy rates that reflect the full cost of service must exist to establish the proper incentives to encourage utilities and customers to make energy efficiency investments.

Local workforce development

- The success of the program hinges on the existence of a local pool of electrical contractors trained in energy efficiency services. The local authority should also examine the need for a citywide energy efficiency-training program. Such a program could spur the development of a community of local professionals capable of implementing efficiency projects.

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