



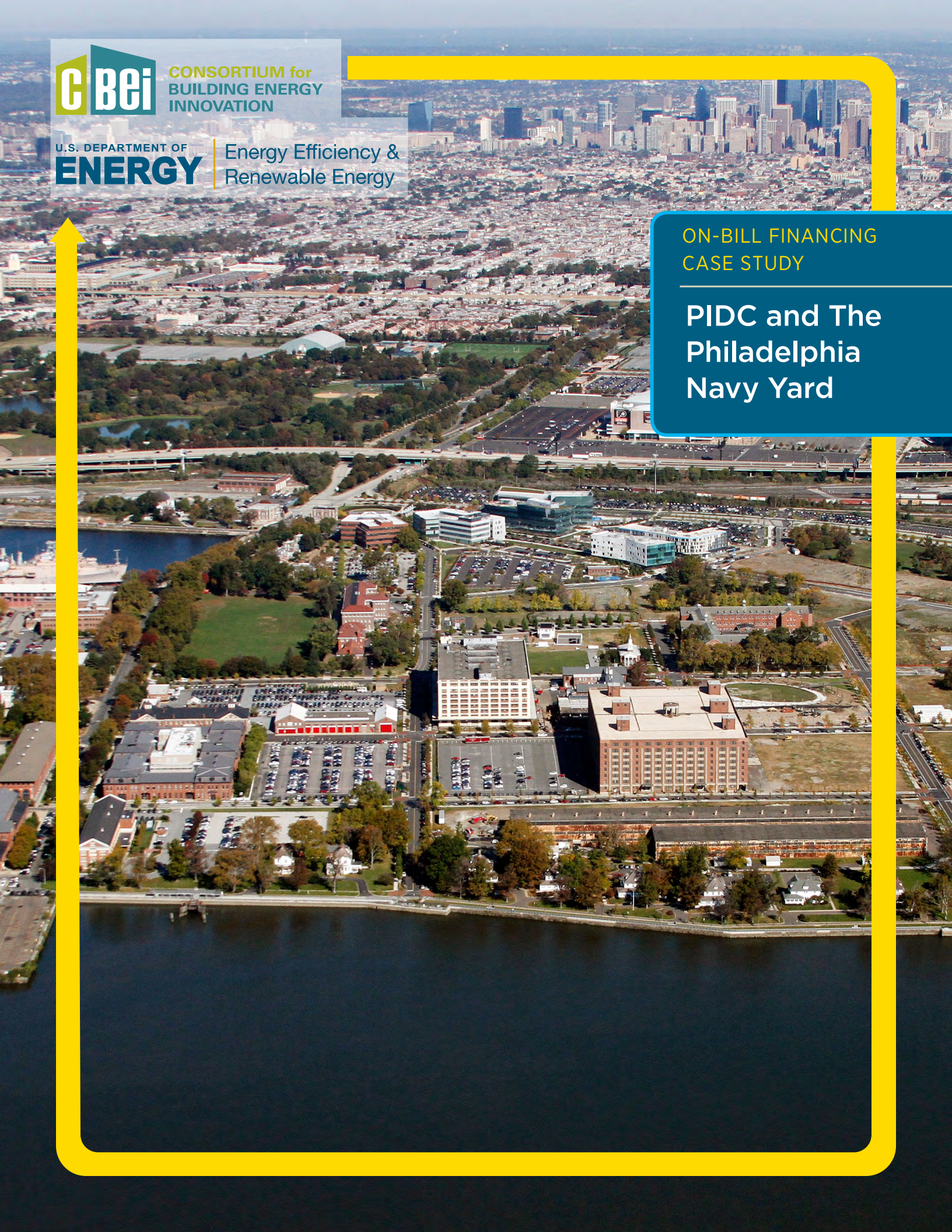
CONSORTIUM for
BUILDING ENERGY
INNOVATION

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

ON-BILL FINANCING
CASE STUDY

PIDC and The Philadelphia Navy Yard



INTRODUCTION

A significant challenge to deep energy retrofits in small- and medium-sized commercial buildings (SMSCB) is the availability of capital for the high up front cost of equipment.¹ Many of the tenants in SMSCBs are also small business owners, who prioritize use of capital for growing their businesses over funding energy efficient retrofits.² While the cost of energy to the SMSCB owners and tenants is a significant, on-going expense, and often a business case for energy efficiency upgrades can easily be demonstrated, the path to project implementation is not always simple.

In addition to access to capital, typical constraints or barriers to market, experienced by SMSCB owners and tenants include: current lease term, (i.e., the time period of occupancy covered under a contractual agreement between a tenant (lessee) and the legal owner of an asset (lessor); loan term options (e.g., period of time allotted to repay funds received); lender's interest rate, (e.g., fee tied to borrowed cash); and the potential disruptions to daily operations imposed by construction and maintenance.

Therefore, to incentivize investments in energy efficiency for SMSCB owners and tenants, the specifics of existing constraints must be understood, addressed and overcome if possible. On the flip-side, financing entities, be it governmental, utility or banking resources, are key constituents in the development of a program geared toward meeting a multitude of requirements, and where the funding vehicle is the integral component to implementation.

On-bill financing (OBF) helps to overcome these hurdles by making financing of energy efficiency measures more readily available. On-bill financing allows for capital cost recovery of energy efficiency improvements directly through the utility bill. The regular monthly payments are collected by the utility on the customer's bill until the costs of the improvements are recovered.³ Where payback is tied to the meter, rather than a loan to the owner or tenant, there are opportunities to have longer payback periods than can span leases, allowing for more substantive improvements and greater overall energy savings.

There are many examples of OBF programs across the

country. However, in a review of 32 programs offered to commercial customers across 23 states, few provide a capital cost payback period longer than three years and none allow for debt to be tied to the meter, i.e., structured as on-bill tariff versus line-item billing (LIB) or an on-bill loan, as defined by the State and Local Energy Efficiency Action Network (SEE Action).⁴ The commercial sector has a large appetite for this type of innovative OBF structure. SEE Action provides a detailed review of this on-bill tariff concept in their May 2014 publication by the Financing Solutions Working Group (excerpt below):

An on-bill tariff is a charge that is associated with the utility meter rather than a debt of the consumer or property. The tariff structure is similar to an on-bill loan with disconnection in that non-payment of financing charges may lead to utility service termination. However, tying the charge to the utility meter is specifically designed to accomplish three key objectives: (1) automatic transfer of the tariff between consumers; (2) survival in foreclosure of a first mortgage on the property; and (3) off-balance sheet treatment for non-residential participants. This structure is a relatively recent innovation and is being hailed by some as a "game changer" because of its potential to deliver robust security and overcome a range of barriers to EE beyond up-front costs. However, uncertainty remains about the extent to which the structure will effectively achieve the three objectives described above—and what impacts a tariff will have on consumer adoption.⁵

SEE Action reported on 30 different OBF programs, 22 of which targeted residential customers, and eight (27%) targeted commercial customers. Additionally, SEE Action identified that 99% (by dollar amount) and 77% (by number of programs), deployed a billing structure with no attachment to the meter, e.g., LIB and on-bill loans. Thus, demonstration opportunities for on-bill tariff structures, where the payback is attached to the meter, are necessary to expand this approach nationally.

¹ SMSCB is defined by the Consortium for Building energy Innovation (CBEI), as commercial buildings having less than 250K square feet of floorspace.

² New Approaches to support Energy Efficiency Investments. Consortium for Building Energy Innovation (2013, July 13). Retrieved from <http://research.cbei.psu.edu/research-digest-reports/on-bill-finance>

³ On-Bill Financing Programs. Natural Resource Defense Council. (2013, July) Retrieved from <http://www.nrdc.org/energy/on-bill-financing-programs/>

⁴ Financing Energy Improvements on Utility Bills: Market Updates and Key Program Design Considerations for Policymakers and Administrators. SEE Action, Financing Solutions Working Group. DOE/EE-1100, (2014, May).

THE NAVY YARD PHILADELPHIA

The Navy Yard Philadelphia (TNY) has been developed into a diverse commercial campus over the past 14 years. One thousand acres, over 80% of the property, was transferred to the PIDC by the U.S. Navy in 2000. Today, the growing commercial/manufacturing business community is home to 145 companies, with over 11,500 employees, occupying about 7 million square feet of new and renovated buildings. TNY's impressive historic quarters, engineering and shipyard structures, which were constructed over a 100-year period beginning in 1874, have been joined by newly constructed buildings started in 2003. These structures now serve a wide variety of commercial and industrial users, as well as the continuing Naval engineering, manufacturing and research presence.⁴ In the future, high density residential dwellings will be added to the site.

TNY is not just a burgeoning commercial real estate hub; it contains a unique independent, non-regulated electricity grid. The Navy Yard Electric Utility (TNYEU) operates one of the largest non-municipal distribution systems in the nation by measure of area served, energy consumption, and magnitude of demand. PECO Energy Company (PECO), the local utility, delivers power to TNY, and TNYEU delivers the power to TNY tenants through TNY's electric grid, and bills them for the services provided. TNYEU's Energy Master Plan (EMP) was developed to prepare for demand growth as a result of continued development. The EMP has among its goals reduction in electric usage at TNY by 20% by 2022 as compared to a baseline load growth scenario. The EMP calls for this to be accomplished through collaborative energy efficiency, and reduction in peak demand by approximately 20% through implementation of demand management, demand response and the energy efficiency measures. To meet these 10-year

EMP goals, TNYEU has created a strategy that will help mitigate the growth in energy consumption and demand caused by the TNY economic development activities, while also increasing TNY's on-site electric generation capacity. This strategy will effectively reduce strain on the external PECO and regional grids while helping to power the newly construction and newly refurbished buildings, and to provide energy choices to TNY's building owners and tenants.

TNYEU is very interested in making energy efficiency retrofits easier for TNY's building owners and tenants to implement, and thus support its energy reduction goal. However, many of the owners and tenants, in spite of their strong interest in reducing energy costs, lack access to capital or are using their balance sheet to support and grow their businesses. Also, for many of the potential customers of an OBF program, there is a desire to keep their monthly energy bills cost-neutral, and preferably lower. Establishing an OBF program that promotes greater investment in energy reduction and ties the payments to the building meter has been deemed an attractive financing solution. This project has been designed to build out an OBF program that will be appealing to the building owners and tenants at TNY.



⁴ "Financial Products repaid on a consumer's utility bill...can be divided into three categories: Line Item Billing (LIB) - no disconnection, no meter attachment; On-bill loan (or lease) with Disconnection - disconnection allowed, no meter attachment; On-bill tariff - disconnection allowed, meter attached." Retrieved from https://www4.eere.energy.gov/seeaction/system/files/documents/onbill_financing.pdf, pg.46)

⁵ SEE Action, Financing Solutions Working Group, Financing Energy Improvements on Utility Bills: Market Updates and Key Program Design Considerations for Policymakers and Administrators, DOE/EE-1100, May 2014, at 22-23. Retrieved from <https://www4.eere.energy.gov/seeaction/publication/financing-energy-improvements-utility-bills-market-updates-and-key-program-design>.

⁶ A Campus Built for Business Growth. The Navy Yard, Philadelphia Industrial Development Corporation. Retrieved from <http://www.navyyard.org/about-the-campus/>

ON-BILL FINANCING (OBF) PROGRAMS

Through OBF programs, utilities are able to help customers invest in energy efficiency improvements, such as adding insulation to the existing envelope, upgrading lighting equipment, or retrofitting a heating, ventilation, and air-conditioning (HVAC) system to operate more efficiently. These improvements can reduce operating expense, increase asset value, and deliver efficiency to the utility.

Each OBF program must be adapted to the unique legal and regulatory frameworks of the region in which it is applied. OBF programs are administered by a mixture of entities including: utilities, energy service companies, nonprofit organizations; and in some cases, economic and community development offices, financial institutions, or financial services providers.

The modified underwriting employed in OBF programs takes into account bill payment history, creating the potential for traditionally credit-constrained customers to gain access to financing. Because customers tend to prioritize their utility bill payments, default rates on OBF programs average less than 2 percent. Such low default rates have the potential to attract third-party lenders, indicating a high potential for scalability.⁸

An OBF program is a particularly promising tool for several reasons. Consumers typically have extensive experience making utility bill payments and understand the potential threat of termination of utility services for non-payment. With lower default rates, OBF programs may have promise in driving consumer adoption of energy improvements by both expanding the number of consumers that can qualify for financing and delivering more attractive (e.g., lower interest rate, longer loan term) financing than would otherwise be available. Figure 1 summarizes these benefits.

The PIDC team reviewed over 53 OBF programs. Of these programs, 32 address commercial buildings and the remainder focus on residential buildings) Approximately one-third of the commercial programs reviewed offer programs specifically to small businesses, i.e. commercial utility accounts meeting the ownership or consumption requirements for small business in their respective service territory. Of these small business programs, most required capital cost payback within two to three years, though a few allow up to five years. These programs offered interest

rates ranging from 0% - 6%. The lowest interest rates were facilitated by utility buy-downs and higher rates corresponded to larger projects and longer paybacks. No commercial building programs identified were employing on-bill tariffs.

Figure 1. Summary of On-Bill Financing Benefits⁹

- Loans are typically structured so that the cost savings from efficiency measures is applied to paying off the loan amount so that the customer utility bill is either unaffected or reduced.
- Eligibility is expanded to borrowers who do not meet traditional loan criteria because history of utility bill payment is the typical screening mechanism. Utility bill nonpayment rates are typically very low, because most building owners/tenants prioritize utility payments, and often non-payment may result in shut off of utility service.
- Payments are made on a bill that borrowers already pay, which removes the barrier of having to take on another, separate monthly bill.
- With the tariff method of on-bill financing the bill is attached to the meter so that when a customer moves, the next customer at that meter continues to repay the financing.
- On-bill tariffs are one of the few financing options that address the split incentive issue for rental properties where the tenant pays the utility bill.
- Default rates for on-bill are very low, which makes private capital investment attractive for financial institutions

The Pennsylvania Public Utility Commission (PA PUC) and PECO have both expressed keen interest in TNY's OBF pilot program. In 2012, the PA PUC directed its staff to initiate a working group "to investigate best practices from other states and identify working models of on-bill financing and on-bill repayment that address the concerns of the utilities, consumer interest groups and other interested stakeholders."⁹ The PA PUC further directed that "the goal of the working group will be to determine the feasibility of the inclusion of on-bill financing and on-bill repayment programs and to identify potential options for customers to obtain low-cost financing for energy efficiency projects to

⁷ New Approaches to support Energy Efficiency Investments. Consortium for Building Energy Innovation (2013, July 13). Retrieved from <http://research.cbei.psu.edu/research-digest-reports/on-bill-finance>

⁸ Building Energy Efficiency in Philadelphia: Current Landscape and Recommendations for Increasing Energy Efficiency Investments in Philadelphia's Housing Stock. The City of Philadelphia. 2012. Retrieved from <http://www.phila.gov/green/pdfs/Energy%20Efficiency%20Demand%20Study.pdf>

⁹ Energy Efficiency and Conservation Program, Implementation Order at Docket Nos. M-2012-2289411 and M-2008-2069887. (2012, August 3)

meet the needs of Pennsylvania consumers.”¹⁰ The working group issued its report in October 2013, which set forth among the next steps the need for an EDC to petition the PA PUC for approval to implement an OBF Program.¹¹ The PA PUC has identified several issues that have arisen in OBF programs implementation by the EDCs, among them:

- **Difficulty in developing a model that successfully matched energy improvement projects (efficiency enhancements, conservation, weatherization, etc.) with willing partners to finance the projects;**
- **Ensuring that the savings achieved by the financed projects match or exceed the financing terms offered by the utility; and**
- **Difficulty in modifying terms and conditions to see if such modifications would improve the programs from both the customer and utility perspectives, given both the breadth and scope of proposed projects.**

PECO participated in the PA PUC’s working group. That utility’s interest in TNY’s OBF pilot program involves obtaining valuable insight and lessons learned in connection with a resolving a number of issues, including:

- **Implementing costly infrastructure changes;**
- **Sufficient customer acceptance;**
- **No leverage for cases in default;**
- **What is the appropriate length of financing;**
- **Effort needed to manage and monitor;**
- **Benefits of on-bill financing options vs. customer direct financing;**
- **Establishing the optimal interest rate for acceptance; and**
- **Concern about type of customers who would prefer on-bill financing.**



¹⁰ Energy Efficiency and Conservation Program, Implementation Order at Docket Nos. M-2012-2289411 and M-2008-2069887. (2012, August 3)

¹¹ PA PUC, The On-Bill Financing Working Group Staff Report, Docket No. M-2012-2289411, (2013, October 31)

THE NAVY YARD’S OBF PILOT PROGRAM

To create an OBF pilot program at TNY, PIDC reviewed the current state of development of other OBF programs around the country to take advantage of the lessons learned in those programs. PIDC reviewed the building type, use and owner/tenant relationship of all buildings on TNY and then developed a framework likely to meet the needs of the diverse TNY population. The process thus far has involved:

- A synthesis of tariff and billing structures from existing programs;
- Characterization of potential customers by: building type, estimated energy use and tenant/owner relationship;
- Creation of a framework for the OBF pilot program, which meets the needs of the majority of TNYEU customers;
- Development of an owners/tenants engagement strategy;
- Engaged the PA PUC and PECO as interested

parties to learn from program development;

- Development of templates for stakeholder engagement materials;
- Provide and present program structure to a diverse subset of owners and tenants to gain feedback; and
- Finalized the approach and obtained verbal commitments from three TNYEU customers (building owners and tenants) to participate in the next phase of developing the OBF pilot program, which will be to finance and conduct retrofits in two buildings.

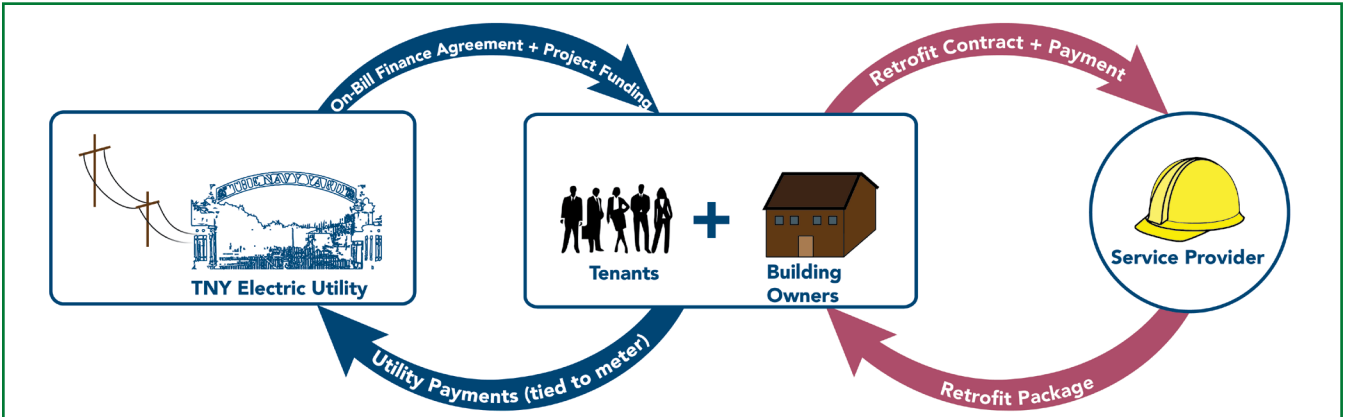
TNY OBF Pilot Program Approach

Based on the comparison of the portfolio of building owners and tenants at TNY and TNYEU’s goal to facilitate deep energy retrofits, PIDC developed an approach that would allow for as much flexibility as possible in the program to ensure that owners and tenants have a diverse set of measures to choose from for their buildings. Figure 2 describes the main elements of the program and Figure 3 depicts how an OBF pilot program would be structured.

Figure 2. TNY OBF Pilot Program Key Elements

CHARACTERISTIC	PILOT	JUSTIFICATION
Funding Source	TNYEU	TNYEU will use available TNYEU capital for the program Current demand not expected to be sufficient to seek third party financing (i.e., not ripe for on-bill repayment) Use current TNYEU customer credit assessment
Payment Responsibility	Tariff (tied to meter)	Treated as a utility charge and not as debt of the customer/property Allowing retrofit costs to be tied to the meter will allow for deeper retrofits (high cost) and payback beyond the lease term
Default Actions	Disconnection	Disconnection already in place for accounts with TNYEU
Allowed Measures	Multiple Efficiency	Objective is to achieve deep retrofits, requiring multiple measures May expand to renewables and water in the future
PECO Incentives	Yes	Collected from PECO by TNYEU and applied to account
Building Type	Commercial and Industrial	Opportunities exist within the TNY to support deep retrofits in both building types

Figure 3. On-Bill Finance Pilot Program Process



To make a clearer case to TNY's building owners and tenants on how the program would work, the PIDC team conducted walk-through reviews of two buildings on TNY and identified potential energy conservation measures (ECMs) to create example retrofit packages. The team then compared predicted savings to current energy use to determine overall annual savings for each building and the expected savings to the building occupant (owner or tenant) responsible for paying the TNYEU utility bill. For these analyses, the interest applied to service the debt was 3.5%, the shared savings pass-through was 75%, and the repayment term was 10 years. In the Building A, the retrofit would result in 34% demand reduction, which translates to an average of \$877 per month of savings that would go to service the debt and \$295 per month savings on the utility bill realized by the building occupant. In Building B, the retrofit would result in 39% demand reduction, which translates to an average of \$2,970 per

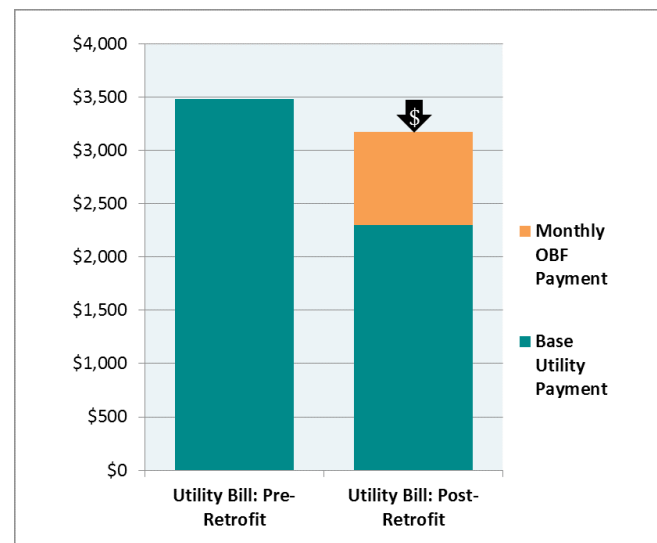
month of savings that would go to service the debt and \$1,459 per month savings on the utility bill realized by the building occupant. The savings calculated do not include cost avoidance (e.g., projected cost avoided in maintenance of existing lighting when they are replaced with LEDs). This cost avoidance ranged from \$2400 - \$18,000 annually. The overview of the retrofit packages and resulting savings are shown in Figure 4.

The OBF pilot program framework and examples were developed into briefing materials to present to a select set of building owners and tenants at TNY to show them how the OBF pilot program works (utility payment, retrofit project funding, retrofit contract and payment), and the associated energy efficiency benefits accrued (decreased operating expense, increased rental rates, increased net revenue, increased market value). The purpose of briefing building owners and tenants was to solicit feedback on the approach and determine interest in the program to understand scale for TNYEU.

Figure 4. Example Retrofit Savings

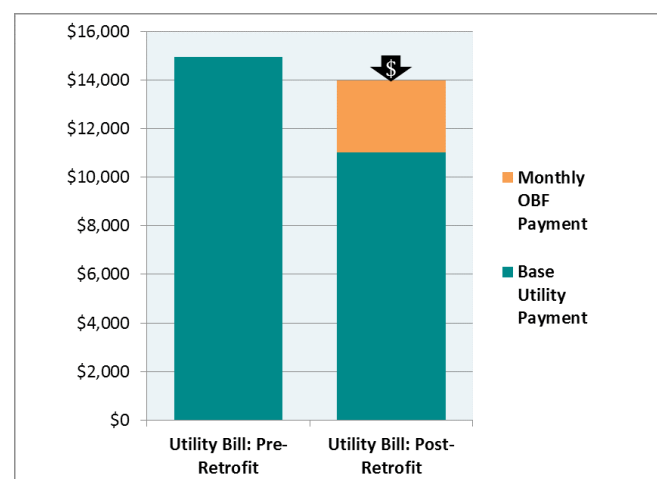
BUILDING A - SIMPLE RETROFIT

- Interior lighting replacements: Halogen Pars and T8s to LED
- Install 24 occupancy sensors to control
- Perform retro-commissioning to restore HVAC control capability
- Install building management system to reduce overall electric use
- Estimated Energy Savings: 34% Electric, 38% Gas
- Annual Savings: \$14,166



BUILDING B - DEEPER RETROFIT

- Interior lighting replacements: Halogen MR16s, T5, and T8 to LED
- Exterior lighting replacements: Metal Halides to LED
- Replace AHU supply fan VFD drives
- Replace exhaust fan VFD drives
- Implementing a Building Automation System
- Estimated Energy Savings: 40% Electric, 42% Gas
- Annual Savings: \$70,025



OBF Pilot Program Participant Selection

The PIDC team reviewed all bill-paying customers of TNYEU to identify a subset that would be representative of TNY building owners and tenants, and thus potential participants in TNY's OBF pilot program. The comprehensive analysis was based on identifying key program and participant characteristics.

1. **Building stock characterization was determined by:**
 - a. **use type - industrial, office, research, data center, and warehouse.**
 - a. **Building age, past upgrades and age of existing equipment (if known)**
 - a. **Energy use intensity, i.e., electricity consumption per square foot of floorspace in operation**
2. **Ownership characterization was identified based on the primary decision maker, whether it is the building owner or tenant. This relationship becomes important to evaluate offering a split incentive, and the potential impact on overall OBF program interest. Energy use intensity was also considered because of the diversity of operations on TNY. The industrial buildings have much higher consumption than the office buildings.**

The team selected 31 customers of TNYEU to contact who provided a range of conditions as outlined above to interview and obtain feedback on the OBF pilot program. Ten customers expressed an interest in the OBF program. The outreach process was critical to ensuring that the customers could talk openly about their business plans (e.g., objectives, goals for expansion), which may directly affect future energy use and their financial situation in broad terms (e.g., need for access to additional capital).

Customer Feedback

TNYEU customers considered as potential participants in TNY's OBF pilot program were categorized as either industrial or commercial, as well as either owner-occupied or single tenant-occupied, leasing from a third party building owner. Further, the PIDC team discussed potential energy retrofit options, which ranged from lighting fixture upgrades to fuel-switching for electric peak-load reduction.

TNYEU customers briefed were open about their interests and reservations with an OBF program. A majority of those interviewed expressed interest in the program, regardless of building and ownership characterization. Customers explained that, while their businesses are strong, capital availability is tight and reserved for business growth; therefore, having access to low-interest capital that is off- balance sheet

to them is very desirable. Several customers also noted that energy efficiency fits with their corporate sustainability goals, and that it is another driving factor in program participation. Most that expressed interest would like to see more details on how the program will be implemented before they agree to participate, and three verbally committed to begin the process, in collaboration with TNYEU's further development of the OBF pilot program.

One industrial customer expressed low interest in the program, noting that its largest loads are process-oriented and business operations make it challenging to create a business case for retrofits of these systems.

The customer engagement also yielded a set of



attributes that would make the OBF pilot program more attractive. Customers wanted to be able to choose from a broad suite of technologies and retrofit options, which TNYEU had already intended.

In third party ownership cases, tenant-lessees were concerned about being able to proceed with retrofits if the building owner was not interested. The team interviewed a real estate investment trust (REIT), which explained that it is under the impression that current policies implemented by the trust it manages prohibits utilizing an on-bill tariff approach to tenant repayment of capital improvements.

CONCLUSION

The key goals of the initial phase of the OBF pilot program at TNYE were to: 1) develop a new OBF program for the TNYE, as informed by research of existing programs across the country and by synthesizing stakeholder feedback; 2) identify financially viable energy efficiency retrofit projects for customers of TNYE, and present a program concept to building owners and tenants, in order to gauge the level of interest for pursuing the retrofits under an on-bill tariff approach; and 3) refine the set of outreach materials to best facilitate an OBF program based on feedback from all stakeholders engaged, (e.g., utilities, building owners, customers, industry experts).

Of the TNYE customers approached to participate in the OBF pilot program, three indicated strong interest in the program for identified retrofits. Of those interested, each had a slightly different driver for engaging in OBF (e.g., need for access to capital, aligns with sustainability goals). The biggest takeaway from the interviews is that the overall proposed structure of the OBF pilot program fits the customers' collective needs and therefore no major changes were needed to the OBF pilot program framework.

PIDC and the project team will be moving into the

pre-deployment phase for the OBF pilot program based on the outcomes of this initial testing phase. The pre-deployment phase will detail the process and documentation required to conduct the TNYE customer outreach, retrofit underwriting evaluation, contracting, billing, and measurement and verification stages of the OBF pilot program.

The PIDC team will continue to build out TNY's OBF pilot program in the pre-deployment phase of the project. In addition to continuing to develop the rigorous process and materials definition, the team will focus on the selected, previously identified TNY building owners and tenants for increased engagement and scope determination. The team will also expand its dialog to stakeholders on a regional and national level, for the purpose of building a body of knowledge and best practices for OBF program-supported energy efficiency retrofits.





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