

THE PHILADELPHIA ENERGY CAMPAIGN

A Ten Year, Neighborhood-Driven Program for



**GROWING
JOBS**



**STRENGTHENING
COMMUNITIES**



**CUTTING
ENERGY BILLS**

and

REDUCING PHILADELPHIA'S CARBON FOOTPRINT



PHILADELPHIA
ENERGY AUTHORITY



ABOUT THE PHILADELPHIA ENERGY AUTHORITY

The Philadelphia Energy Authority (PEA) was chartered under the Municipal Authorities Act in 2010, led by City Council President Darrell Clarke. PEA was formed to bring expertise and focus to the city's efforts to reduce energy consumption and expense.

PEA provides a neutral ground for transparent conversation regarding complex energy issues and serves five major functions:

- Serving as financial agent for capital energy projects and legally able to hold long term contracts (over 4 years) on behalf of the City, adding value with energy expertise and oversight
- Identifying, supporting, and facilitating the most cost effective and environmentally sound opportunities for the City to reduce energy use and expense
- Promoting and assisting the development of alternative sources of energy benefiting the development and retention of local workforce
- Educating the broader public, decision makers and leaders on energy related issues
- Convening city stakeholders to explore opportunities for: enhancing energy efficiency, obtaining clean, renewable and affordable energy supply, and reducing energy consumption

VISION

Philadelphia will serve as a national model for implementing energy strategies which improve the health of the community and local economy.

MISSION

Drive and support the development of long term energy projects, policy and educational programs in Philadelphia.

<http://www.philaenergy.org/>

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INTRODUCTION TO THE PHILADELPHIA ENERGY CAMPAIGN

In early October 2015, Philadelphia City Council President Darrell Clarke directed the Philadelphia Energy Authority (PEA) to develop a proposal for a significant job creation program related to energy efficiency and clean energy.

In 2016, PEA is launching the Philadelphia Energy Campaign, a 10-year, public-private partnership and job creation engine designed to leverage public and private financing for energy efficiency and clean energy projects focused on neighborhood-driven initiatives. This program will create jobs by growing public and private investment — \$1 billion over ten years — throughout Philadelphia's neighborhoods in building energy efficiency retrofits and distributed clean energy supply in the following four Philadelphia sectors:

- Municipal Buildings
- K-12 Schools
- Low-Income Homes and Apartments; and
- Small Business.

PEA has designed the Campaign to leverage public and private dollars and deploy them with private-sector best practices to reduce energy use and energy costs in the four Philadelphia sectors. The Campaign's activities will stimulate the creation of over 10,000 jobs, including many in energy efficiency and professional trades.¹

The scale is unprecedented but the model is straightforward — identifying ways to package/bundle and finance energy improvements that pay for themselves through savings over time. Energy and water bill savings are used to repay the financing, giving the building owner or tenant positive cash flow from the start of the project.

OUR VISION The Campaign's key goals are to:

1) GROW JOBS. The Campaign's goal is to create 10,000 jobs over 10 years. Energy conservation is job-intensive work that requires trained, skilled people and pays a livable wage. The Campaign creates direct jobs through the design and implementation of energy conservation measures, and indirect jobs through the energy bill savings. The Campaign will connect with workforce development programs and employers to ensure sufficient workers are being trained with the necessary skills. This is already a strength in the Philadelphia region.

2) STRENGTHEN COMMUNITIES. The Campaign will deliver energy retrofits to housing, community facilities and small businesses in neighborhoods throughout Philadelphia, ensuring the Campaign equitably benefits all Philadelphians. The Campaign will bring energy retrofits to 25,000 low-income homes and apartments and to 2,500 neighborhood small businesses.

These energy conservation investments will improve Philadelphia's supply of affordable healthy housing and keep generational homeowners in their homes. A large portion of the Campaign's municipal buildings will be recreation centers, libraries, police stations and firehouses that are disbursed throughout the City's neighborhoods. The Campaign will strengthen important public institutions and commercial businesses that are critical to healthy, resilient communities.

3) CUT ENERGY BILLS. The Campaign will help Philadelphians save approximately \$200 million a year in energy costs once all projects are completed by reducing the use of electricity, natural gas, steam, oil and water in buildings. Building energy experts have the tools and the products to reduce building energy use by 20% or more without any sacrifice of occupant comfort. New, highly efficient technologies for lighting, HVAC, building envelope, etc. are available and cost-effective. And for some energy hogs, the savings are even greater.

4) REDUCE CARBON EMISSIONS. By reducing Philadelphia's use of fossil fuels through energy conservation and the use of renewable energy, the Campaign will make a serious reduction in Philadelphia's carbon pollution. PEA's initial planning assumptions suggest a total Campaign impact of approximately 790,000 metric tons a year of carbon dioxide removed. Philadelphia is committed to stepping up to play its fair part in reducing and adapting to climate change.

KEY PRIORITIES

The Campaign acknowledges the good work that has been taking place on energy efficiency and renewable energy at the national, regional, state, city and nongovernmental levels in recent years. The Campaign builds on this work and has the following four key priorities:

- **The Campaign is focused on equity and Philadelphia communities.** It is an energy campaign for our citizens and their homes and their neighborhoods, not for the big office buildings of Center City. The local rec center, the branch library, the police station, the firehouse, the corner food store and the local restaurant — all will be recruited to receive energy retrofits. The Campaign will show that energy conservation and clean renewable energy benefit everyone. Fairness demands the benefits be equitably distributed to all citizens.

WHAT IS AN ESCO?

This report recommends that Philadelphia greatly expand its use of ESCOs as the business model for delivering energy retrofits to buildings, so what is an ESCO?

An ESCO or “energy services company” is a company that works with building owners to install Energy Conservation Measures (**ECMs**) to reduce energy use and utility bills. The ESCO performs the energy analysis and presents a plan to the building owner. The building owner and the ESCO then sign a long-term Energy Savings Agreement (**ESA**) that covers the terms of the project. Once the ESA is signed, the ESCO then pays for and installs the ECMs at no up-front cost to the owner. The monthly payments under the ESA are designed to be less than the monthly energy savings, so even when paying the ESA fee, the owner’s total operating expenses are less than they were prior to the energy retrofit.

And with the ESCO’s guarantee of energy savings and the Measurement and Verification (**M&V**) systems that are put in place to closely monitor building energy performance, the building owner is assured that its operating budget will benefit from the agreement throughout its term.

Under the ESCO business model, the ESCO, not the building owner, finances the project and repays the loan from the monthly ESA payments the ESCO receives from the building owner.

The most important feature of the ESCO business model is that the building owners do not need to make any up-front capital investments in the ECMs. In these days of tight budgets, many cost-effective capital investments are postponed year after year. The ESCO business model moves energy conservation projects from a capital cost to an operating cost. There is no up-front capital cost that needs to be shown on the building owner’s books because the ESA payments are considered an operating expense.

- **The Campaign is focused on cutting the energy bills of municipal government and K-12 schools.** The City and the School District spend approximately \$122 million a year to heat, cool; and operate their facilities. Cutting energy waste and reduce energy costs by 20% would save \$24 million a year, dollars which could be better spent by each on their critical mission, not on avoidable building operating costs. Every citizen of Philadelphia benefits when City and School District operating costs are reduced.
- **The Campaign is grounded in finance, but recognizes the need for creativity as we develop new models.** Many existing energy programs are grant-based, which makes scaling the impact difficult. The Campaign focuses on adapting effective private-sector models to the unique needs of the four sectors. At our core, we are a finance program that will call on Energy Services Companies (**ESCOs**) and other lenders to step up and deliver energy savings projects across all four sectors. We will work with participating ESCOs to turn their attention to the low-income residential and small business sectors, which are non-traditional targets for ESCOs and private capital. Though this will require some creativity, we have already begun engaging with key thought leaders across the region and are developing pilot models for testing.
- **The Campaign is at the appropriate scale.** Even over ten years, \$1 billion more than doubles the current spending on energy retrofits in the Campaign’s four sectors. This investment is what is required to create a lasting impact for Philadelphia. The Campaign understands that \$1 billion is a very strong start towards a huge potential market for cost-effective energy retrofits in Philadelphia’s buildings and homes. We know the savings are there because the energy waste is there — the data confirms this. The Campaign is a \$1 billion start that will drive energy conservation and clean distributed energy as standard operating procedure for companies and consumers.

This report is a vision for the Philadelphia Energy Campaign. Much work is needed in the coming months to define the program with the input of others. We will build upon the successes of the City, School District and organizations across the region, and will engage an expanding circle of partners to develop and implement programs for each sector. We estimate an initial planning and development period of six months to develop the Campaign’s specific components and prepare an implementation plan.

Projects will be phased and rolled out over the 10-year period as quickly as they can be developed. PEA will begin with a focus on City and School District projects, which will likely begin in FY2017, and will tackle low income residential and small business sectors next.

We invite citizens, businesses and organizations from across the region to join us in the Philadelphia Energy Campaign. There is plenty of work and opportunity for all.

THE THREE OVERARCHING TASKS OF THE CAMPAIGN

Before turning to the Campaign’s approach to the four sectors of investment, there are three overarching tasks that build the foundation for the Campaign’s specialized approach in each sector. These three tasks are:

1 NETWORK THE BUILDING ENERGY STAKEHOLDERS

PEA is well positioned to serve as facilitator for the building energy industry and other key building energy stakeholders in Philadelphia. PEA can be Philadelphia’s front door for energy projects, the first place where Philadelphia building owners and tenants go for information about energy retrofits and to be connected with the right people.

Philadelphia is home to companies, organizations, agencies and universities that have great building energy talents and skills. Philadelphia also has many existing programs to improve building energy efficiency. PEA believes the programs are usually quite good, but too often they are acting alone and not sharing data and information with each other. To transform the building energy market in Philadelphia and reach the \$1 billion scale envisioned by the Campaign, the companies, organizations, agencies, universities and individuals need to be better coordinated so synergies can be realized. Effectively networking these stakeholders will be PEA’s first task.

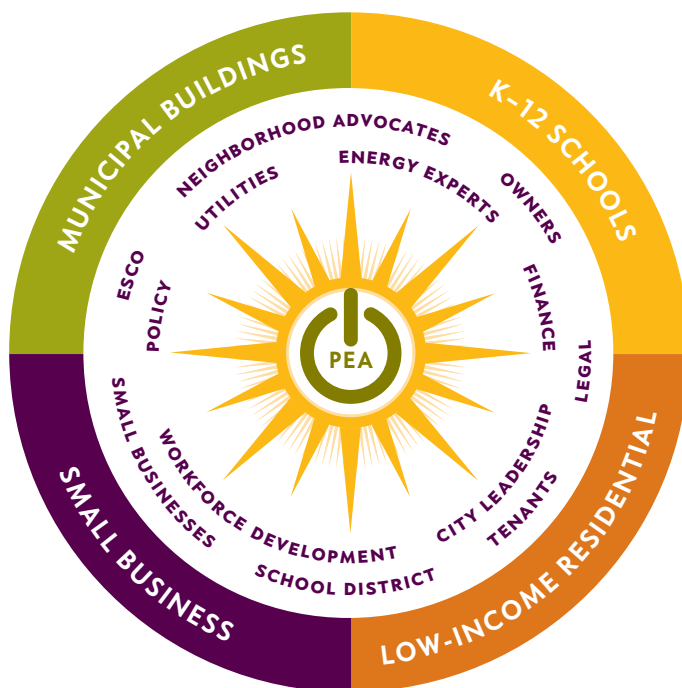
2 SUPPORT MARKET INFRASTRUCTURE TO GROW A \$1 BILLION PIPELINE OF ENERGY PROJECTS

The biggest challenge of the Campaign will be to facilitate growth over ten years of a \$1 billion pipeline of building energy conservation and clean distributed energy generation (such as solar photovoltaics (**PV**) or clean and efficient combined heat-and-power (**CHP**) projects). Some might think the biggest hurdle is financing, but the financial community disagrees. PEA believes that building market demand for energy improvements will be the Campaign’s biggest task. The Campaign will support the infrastructure needed to identify building energy projects that are both physically doable and financially sound. In particular, this will be important in reducing customer acquisition costs, consumer education, project scoping and more.

The market infrastructure that is needed for each of the Campaign’s four sectors varies because the buildings, owners and opportunities are different. The Municipal Building and K-12 School sectors are both large institutions with centralized decision making and very large portfolios (35 million square feet total) of buildings. Both institutions have sophisticated energy datasets for their facilities and a significant amount of research has already been completed by the Energy Office, the School District and a variety of consultants and organizations on specific energy conservation projects that could be done.

The Low-Income Residential and Small Business sectors present a very different situation. The buildings are generally small, so many properties would need to be aggregated to get a decent-sized portfolio. Some properties are owner-occupied, others are leased. And many owners or tenants may not be good credit risks and a challenge to underwrite.

One early task of the Campaign will be to attract the interest of qualified ESCOs and other lenders in these two sectors by helping reduce the ESCO’s customer acquisition costs by (1) supplying key energy usage data; (2) agreeing to simplified but reasonable energy audit tools to estimate energy savings; and (3) helping with the messaging.



The Campaign will raise capital to support the infrastructure needed for the public awareness and public education work and to reduce the customer acquisition costs so ESCOs and other energy companies are more likely to expand their services to smaller buildings. The Campaign will explore with the stakeholder groups such ideas as developing participating contractor or referral lists and using generic forms, contracts and other documents consistently for all projects.

3 BUILD THE CAPACITY TO FINANCE \$1 BILLION OF ENERGY PROJECTS

The Campaign will need to facilitate \$1 billion of financing for building energy efficiency and clean distributed generation. This level of financing is a significant increase from what is being financed today. At the heart of the Campaign's finance strategy will be two financial products: the energy savings agreement and bond financing. And for each of these, the Campaign will need to work to expand these tools to mid-size and smaller buildings through aggregation of multiple projects into transactions of a size that work for these tools. The Campaign will also explore commercial debt, commercial lease financing and other financial products when appropriate.

There are many financial products for financing energy retrofits, but all share the goal that the monthly energy savings exceed the monthly financing costs. This is most effectively done by extending the term of the financing period. The longest-term capital is available through bonds and this tool is being increasingly used for energy project finance. The City itself used bond finance to implement a large energy retrofit of the Quadplex project that made energy retrofits to the four major City office buildings in Center City. This project was completed in the summer of 2015. The Commonwealth's Guaranteed Energy Savings Act (**GESA**)² is a state law that allows entities to enter into these types of agreements. The programs and staff supporting and promoting GESA statewide recently experienced a hiatus, but are currently being revived. The Pennsylvania Sustainable Energy Finance Program (**PennSEF**)³ is a partnership of Pennsylvania Treasury Department and the Foundation for Renewable Energy and Environment (**FREE**), with financial support from the West Penn Power Sustainable Energy Fund, is expanding bond financing for energy projects in the "MUSH" sector (municipalities, universities, schools and hospitals).

Both GESA and PennSEF assist bond financing by prequalifying energy service companies and using standardized forms and contracts to reduce transaction costs and provide assurances to participating building owners that a neutral third-party is vetting the transactions.

Lease financing is another financial product that may make sense for some sectors. Small neighborhood food retail and food service businesses are often in leased space, but refrigeration equipment is a major capital expense well suited to lease financing. Refrigeration can account for half of the business's electricity use and new efficient alternatives are available. The greatest savings are from centralized refrigeration systems than combine all of the refrigeration units into a single system. All of these systems can be leased.

Some businesses may prefer commercial debt finance so they do not share the savings (and the risk) with an ESCO. The Campaign is prepared to help provide a range of financial products to satisfy the diverse needs of potential borrowers.

Aggregating small projects into larger portfolios is needed to attract ESCO interest and to justify the transaction costs of bond financing. A key role of the PEA will be to facilitate this aggregation. There are models for this aggregation approach. PennSEF is aggregating LED street lighting projects of 45 municipalities in southeastern Pennsylvania and selecting an ESCO to deliver the services to the entire group of local governments and to finance the work through bond financing. The Campaign will want to replicate this approach many times in each of the four sectors of the Campaign.

Another aspect of the effort will be to facilitate bridge financing so projects can obtain financing in a timely fashion and then implement their project without waiting until the appropriate volume of transactions has been assembled to take to the bond markets. Once the project was included in a bond or other capital raise, the bridge loan would be paid off.

And finally, the Campaign will explore with the stakeholders what forms of credit enhancement — loan loss reserves, loan guarantees, performance bonds, etc. — are most effective in reducing risk and lowering financing costs and what strategies are most effective for raising the capital needed for the enhancement.

THE CAMPAIGN'S FOUR SECTORS

1

MUNICIPAL BUILDINGS



Definition of the Sector

The Campaign defines “municipal buildings” as all of the buildings for which the City pays the utility bill. This includes a wide range of building types, from City Hall and the other the large municipal office buildings to the many small buildings including recreation centers, branch libraries, police stations and fire houses.

The City has excellent data about these buildings and its new utility billing and energy management platform provides the City with even more analytical capabilities.⁴ The Office of Sustainability’s 2015 energy benchmarking report⁵ provides a wealth of data about these buildings and their more than \$75 million a year of energy use. We know which buildings have the highest Energy Usage Intensity (**EUI**)⁶ and should be on the roster of buildings to be retrofitted.

Opportunities to Reduce Energy Use

The Campaign’s model for the municipal building sector is the City’s Quadplex project.⁷ Under the leadership of the Office of Sustainability and Energy Office, the City installed energy conservation measures in four municipal buildings: City Hall, the Municipal Office Building, the Criminal Justice Center and One Parkway Building.

PHILADELPHIA'S MUNICIPAL BUILDINGS AT A GLANCE

Number of Sites with Utilities: 1,955

Number of Buildings: 650–700

NON-TRANSPORTATION ENERGY USE: FY2014

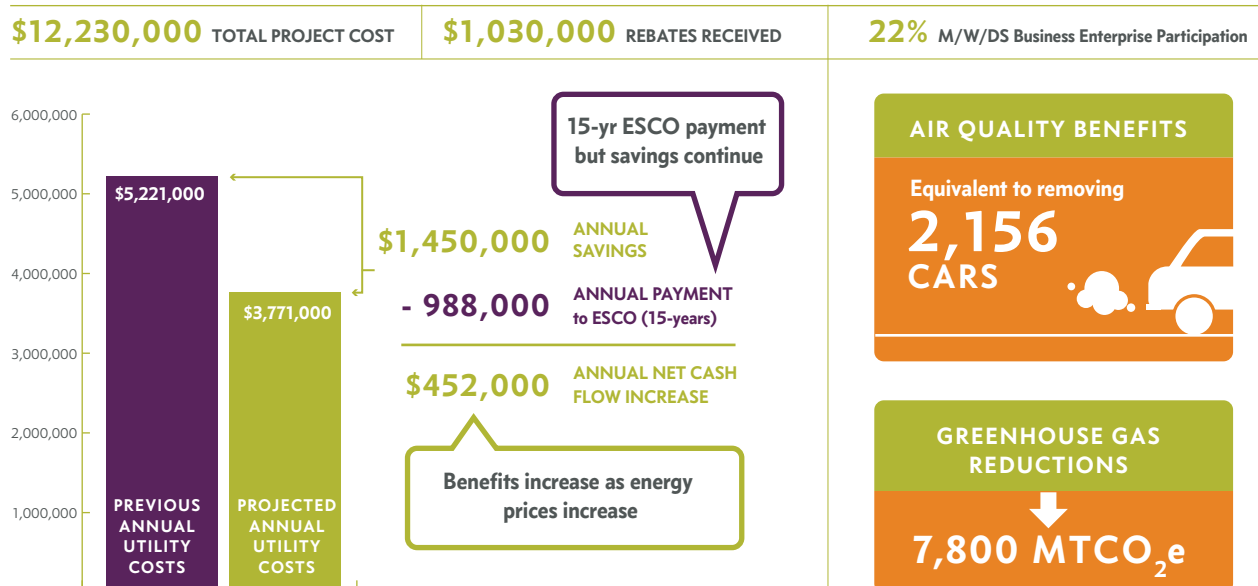
(All City Funds)

Energy	Dollars	MMBTUs
Electricity	\$60,293,709	2,399,566
Natural Gas	\$13,671,820	1,622,434
Steam	\$3,395,352	129,210
	\$77,360,881	4,151,210

Source: Philadelphia Energy Office

These four municipal buildings have a total of 2.25 million square feet and their energy usage was 12% of the City General Fund’s energy budget. The key numbers for the Quadplex project are shown below.

THE QUADPLEX PROJECT SNAPSHOT



The City implemented the following ECMs in the four buildings of the Quadplex project:

- Lighting fixture and lamp upgrades (LED and fluorescent), including the City Hall Clock Tower lighting
- Lighting controls and control systems
- Water conservation: low-flow plumbing fixtures (faucets, toilets, and urinals)
- Steam pipe and valve insulation
- High-efficiency boiler (dual fuel) for the Municipal Service Building
- Variable Frequency Drives on fans and pumps (in concourse and balance of buildings)
- Building energy control system upgrades with new set points, operating schedules and control strategies
- High-efficiency air filters for the concourse
- New exterior doors to reduce the time doors remain open and to provide tighter air sealing around the doors
- Other building envelope weatherization measures

The Campaign seeks to replicate this ESCO transaction into a succession of financing requests from energy projects seeking the longer-term financing possible with bond finance. The Campaign will work with the City, the Office of Sustainability, PennSEF and others to make bond financing available for municipal building retrofits. We will rely on the leadership of the Office of Sustainability to drive municipal projects.

The Campaign's recommended approach to municipal buildings builds on the City's experience with the Quadplex project and makes three significant modifications:

- The ESCO model will be expanded to include portfolios of medium and small buildings, not just the largest of the facilities;
- The Campaign will consider including solar photovoltaics (**PV**), combined heat-and-power (**CHP**) and other resilient clean distributed energy technologies; and
- We encourage the City to evaluate all financing options, including city bonds, PennSEF and private financing via the ESCOs. With the renewal of certain tax incentives that can be assigned, private financing may be more competitive than it has previously been. The ESCOs will be encouraged to work with the Campaign's effort to aggregate a sufficient number of energy projects into packages that can be presented to the bond markets and financed with long-term bond capital. The Campaign also envisions bridge financing so projects can be financed and implemented at the same time they join the growing queue of projects to build to the \$25–30 million threshold needed for bond financing to make good sense.

The Campaign will need strategies to overcome the following common barriers to implementing energy conservation projects in municipal buildings:

- City departments are not responsible for their own energy bills. There is usually no direct benefit to a department reducing its energy use. The City has piloted a program that financially incentivizes departmental behavior change. This program should be expanded to encourage additional retrofits and savings.
- The City faces competing interests and other priorities for City bonding capacity. Few if any ESCOs can access capital at the low rates of a City revenue bond, but when the City is unable to commit to use its own bonding authority for energy retrofit financing, then others need to secure the bonds needed to finance the projects.
- Tight personnel resources make it difficult to add the staff needed to manage a greatly expanded number of projects. Clearly, additional personnel will be required to supervise multiple large ESCO deals, which may not be feasible under existing City and School District budgets. Funding for staff (either internal or contracted) is required to independently supervise the work to identify, analyze, propose, negotiate and execute contracts that commit the City or the School District to make big payments under ESAs with very long terms.

The Campaign will work with the City and other stakeholders about how to most effectively support transactions in the municipal building sector. The Campaign's goal is an energy project financing mechanism that is transparent and accessible to building owners and tenants to finance sound and cost-effective retrofits.

COMMERCIAL & INDUSTRIAL SECTOR

The Office of Sustainability will continue to drive the market in the private sector with their initiatives targeting commercial and industrial buildings throughout Philadelphia. Through existing, innovative programs and policies like EnergyWorks and the City Benchmarking requirement, and new programs currently being developed, the Office of Sustainability will continue to be an important leader in reducing the entire city's energy use.

2

K-12 SCHOOLS



PHILADELPHIA'S K-12 SCHOOLS AT A GLANCE

Number of K-12 District Schools

218 **134,538 students**

Number of K-12 Charter Schools

83 **63,441 students**

Total area: (208 District Schools)

29,817,807 s.f.

Current annual energy bills:

\$44,898,954 **\$1.51/sf.**

Current annual energy use:

1,565,457,000 kBTUs

Energy usage intensity: kBTU/sf/yr



Source: Philadelphia School District

Definition of the Sector

The Campaign defines “K-12 schools” as all kindergarten through 12th grade schools for which the School District of Philadelphia pays the energy bills. This includes the 218 District schools (149 elementary schools, 16 middle schools and 53 high schools⁸) as well as 83 charter schools.⁹ It does not include parochial schools or other private or independent schools.

For the School District’s schools, the square footage is just shy of 30 million square feet and the energy bills are \$44.9 million a year. More numbers of BTUs and EUIs are in the text box to the left.

The Campaign’s goal for the School District is to help reduce energy use by 20% and channel the saved dollars back into educating students.

Opportunities to Reduce Energy Use

The School District of Philadelphia is now tracking energy consumption in all of its schools. Its energy data report tracks all utility costs and calculates EUI and ENERGY STAR scores for every building. The School District has implemented many low or no-cost programs that have had a significant impact on energy consumption already.

The Campaign will need to address the following barriers to reducing energy use in Philadelphia’s K-12 schools:

- 1) The budget crisis in the School District is all that is on most people’s agendas, not taking on new debt to spend more on the school buildings.
- 2) The accounting system of the School District creates separation between operating budgets and capital budgets so schools see no direct cost benefit from energy savings. Schools that cut their energy costs should be able to keep some of the energy savings to incentivize additional retrofits and savings.

The Campaign will host several stakeholder topic sessions for obtaining input from stakeholders about how to most effectively support energy efficiency projects in K-12 Schools.

3

LOW-INCOME RESIDENTIAL



Definition of the Sector

The Campaign defines the low-income residential sector as any residential buildings or units located in census tracts where 50% of the residents are at 80% or less of Area Median Income. The map of Philadelphia shows the portions of the City where 50% of the residents are at 80% or less of Area Median Income and the At A Glance table shows the number of housing units by type in these eligible census tracts.

This place-based definition is used by the U.S. Department of Housing and Urban Development and is the recommended approach for the U.S. Environmental Protection Agency’s Clean Energy Incentive Program, where the EPA asked interested persons to recommend a definition for low-income areas. It is important to have consistent definitions of the sector across multiple programs.

This definition is also easy to apply. A prospective applicant or an intake worker can check the address on PolicyMap®, the mapping tool from Reinvestment Fund, to learn instantly if the unit is in an eligible census tract. There is no need to verify family income, just the address.

The Low-Income Residential Sector will be open to both building owners and to tenants and for all housing configurations — single and multi-family.

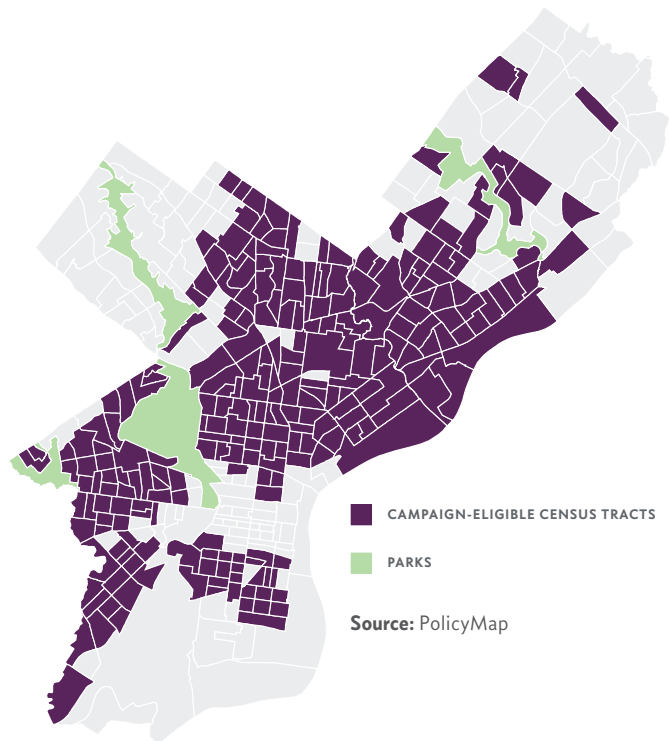
In this sector in particular, there are many active, effective programs — public, private and non-profit — that address key pieces of the puzzle for residential energy conservation and basic systems repair. We intend to work closely with the various programs and organizations to align our mission and capitalize on the resources already available.

PHILADELPHIA’S LOW-INCOME RESIDENTIAL AT A GLANCE

Total Housing Units in the Eligible Census Tracts		472,727
• Single-Family Detached Homes		30,847
• Single-Family Attached Homes (row homes)		310,468
• Single-Family Duplexes/Twins		43,263
• Small Multifamily Buildings (3-19 Units)		50,380
• Medium Multifamily Buildings (20-49 Units)		8,988
• Large Multifamily Buildings (50 or More Units)		27,628



Source: Energy Coordinating Agency



Opportunities to Reduce Energy Use

The Campaign's Low-Income Residential Program will have several components to address different ownership structures and portfolio size. The first housing model likely to see projects is in large multi-family residential buildings where the energy bills are not sub-metered to the tenants but included in the rent. These organizations (the Philadelphia Housing Authority) or businesses could obtain financing for their properties. The lack of sub-meters means the tenants do not have their own utility accounts and the energy is paid by the building owner, who would directly benefit from energy savings. Entities like this are like municipal buildings and K-12 Schools in that they can be assembled into portfolios that could be of interest to ESCOs.

The Philadelphia Housing Authority is selecting an ESCO to make energy retrofits to a large part of the PHA portfolio. The Campaign will work with PHA on this effort.

The next housing group is private rental housing that is owned by a landlord who could be the borrower. The Housing Choice Voucher Program (formerly Section 8) is an interesting challenge since, in many cases, tenants are responsible for their own bills and receive a stipend for utilities from HUD that is not related to actual utility use. We intend to work with the City and others to determine how to include these properties.

The third target is generational homeowners. They may own the house, but maintenance and energy upgrades compete with a lot of other priorities for scarce budget dollars.

The Campaign is setting a goal of retrofitting 25,000 units. This will sustain significant work in this sector.

The Campaign will need to address the common barriers to reducing energy use in low-income residential housing:

- 1) Owners face split incentives, where they make the capital investment but the tenants receive the energy savings. The Campaign needs to align the incentives so both owners and tenants benefit from energy retrofits.
- 2) Owners and tenants often have poor access to information and likely need assistance pulling together an energy project and obtaining financing. The public awareness and public education work discussed earlier is most needed by this sector, who often pays high energy costs because of poor housing stock, old, inefficient equipment and systems, often long past their useful lifetime.
- 3) Owners and tenants may be a poor credit risk. Financing will need some credit enhancement to keep loan costs reasonable. Aggregation of multiple low-income residential projects could face issues related to underwriting the credit risk of property.
- 4) The added complexity of multiple building owners makes organizing ESCO contracts and bond financing of portfolios difficult.

One program that serves as a model is EnergyFIT, operated by the Energy Coordinating Agency (**ECA**). EnergyFIT focused on a complete city block and addressed a wide variety of home needs, including basic systems repair — critical when working with older and poorly-maintained housing, mold remediation and humidity control, air sealing and building envelope work, lighting, appliances and more. They achieved energy savings of 25-40% per home and resolved long-standing maintenance and repair issues, creating a more resilient, healthy, stable block. EnergyFIT shows that integrating multiple assistance programs into a cohesive whole is important. A home repair program that replaces a roof should at the same time insulate the roof's capacity to the recommended levels.

In initial stakeholder conversations, we were struck by how many substantive programs currently exist in Philadelphia to serve these communities and how programs are currently being developed to continue to serve them even better. The Campaign should provide a resource for coordinating services and breaking down the barriers to working together, all while supporting these programs to scale up to create truly affordable existing housing stock in Philadelphia.

The Campaign will coordinate several stakeholder working groups to obtain input on how to most effectively support energy efficiency improvement to low-income residential homes and apartments.

4

SMALL BUSINESS



SMALL BUSINESS AT A GLANCE

NUMBER OF BUILDINGS: Restaurants: 10,406
15,275 Food stores: 4,869

Source: Consortium for Building Efficiency Innovation

Definition of the Sector

Small Business is defined as small retail establishments in neighborhoods that serve the local community. The Campaign is most interested in food retail and food service businesses — the corner food store and the neighborhood restaurant — for three reasons:

- 1) Their energy costs are so high that often utilities exceed rent as the largest monthly expense.
- 2) A single measure — commercial refrigeration — consumes half of the electricity stores or restaurants use in a month. Many of these food businesses are tenants, but they own their refrigeration equipment and would be served by an equipment lease finance product that would upgrade refrigeration systems with newer, more-efficient equipment that can reduce energy refrigeration costs by 10–30%. This would be an ideal energy conservation measure for this sector.
- 3) Because Philadelphia neighborhoods are not all served adequately by large grocery stores, corner stores and local restaurants are an important part of the local infrastructure, and can be one of the only places where residents can buy basic food and supplies. According to CBEI, there are 10,406 restaurants in Philadelphia and 4,869 neighborhood food stores. Their energy intensity is typically three to seven times the energy use of an office building.

MANUFACTURING OPPORTUNITY

We recognize that there is also likely to be a significant opportunity with small and medium-sized manufacturing facilities. These companies often have difficulty accessing energy financing and services. While the Campaign does not specifically address this sector yet, we intend to conduct additional research over the first 6 months as to how we can include these manufacturers in our program.

Opportunities to Reduce Energy Use

The fact that most of these neighborhood businesses lease their space means that tenants will be interested in equipment financing that allows them to finance a capital improvement — the new more energy-efficient equipment — through the energy savings and the operating budget. They will also be interested in short payback measures — HVAC controls, lighting (interior and exterior), exhaust control, etc.

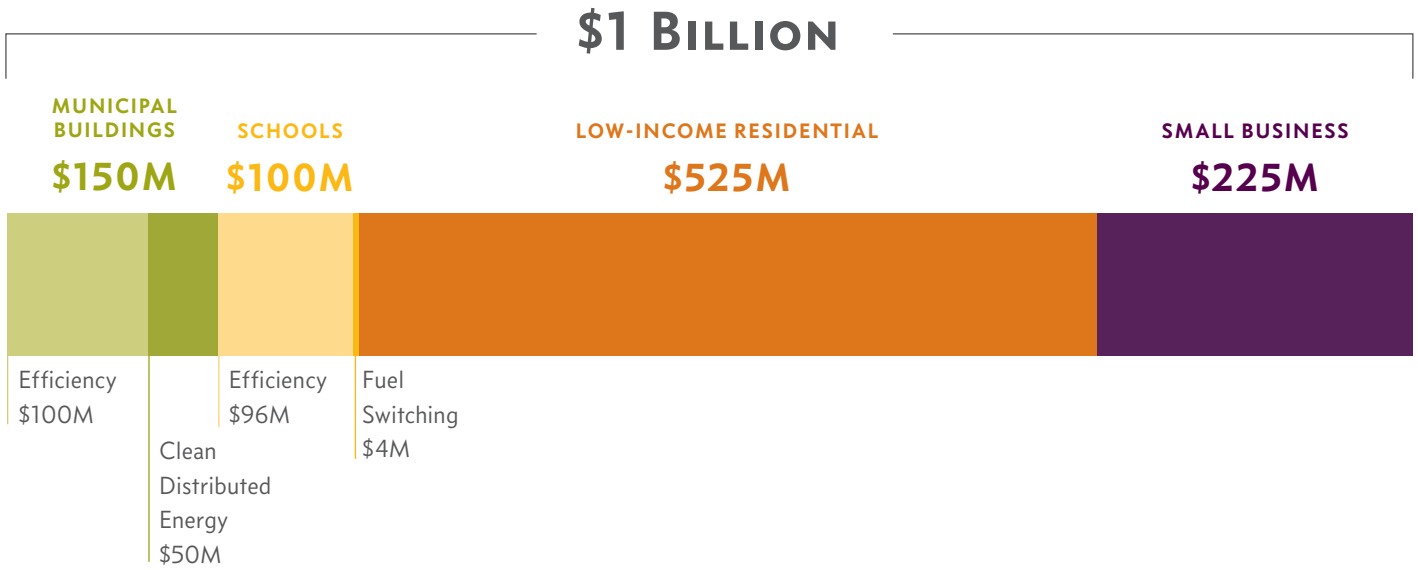
The Campaign will need to address the common barriers to reducing energy use in small neighborhood businesses:

- 1) Most small neighborhood businesses are tenants in buildings owned by others, raising the split incentive issue. The Campaign should strive to serve both the owners who want to make energy improvements to their building and the tenants who are most interested in investing in equipment they own (i.e. commercial refrigeration) or measures that have paybacks less than the remaining term on the lease (such as lighting or HVAC controls). The Campaign needs to connect tenants to equipment leasing.
- 2) The Small Business sector often has weak credit and very thin margins, giving a limited capacity to take on new debt.
- 3) Small food businesses rarely purchase high-performance commercial refrigeration equipment, choosing instead the lower up-front costs of widely-available used equipment.
- 4) Owners and small business tenants may have poor access to information and need assistance pulling together an energy project and in obtaining financing. Public awareness and education is very much needed by this sector, which often pays high energy costs because of refrigeration and other energy demands.
- 5) Owners and small business tenants are often a poor credit risk. Financing will need some credit enhancement to keep loan costs reasonable. Aggregation of multiple small business projects may falter over the need to underwrite credit risk of each borrower.
- 6) The added complexity of multiple small building owners makes organizing ESCO contracts and bond financing of portfolios difficult.

The Campaign will meet with stakeholders about financing energy retrofits to inform the program design that will come together over the next six months.

INITIAL INVESTMENT ESTIMATES

In order to validate market size and project feasibility and to properly estimate job creation, PEA created an estimated timeline, project size and phasing strategy for each sector. These numbers were validated by preliminary analysis completed by the City, private estimates from consultants and vendors based on experience and public information, conversations with key stakeholders, independent research and City utility data. For planning purposes, PEA estimates the likely project deal flow in each of the four sectors to be:

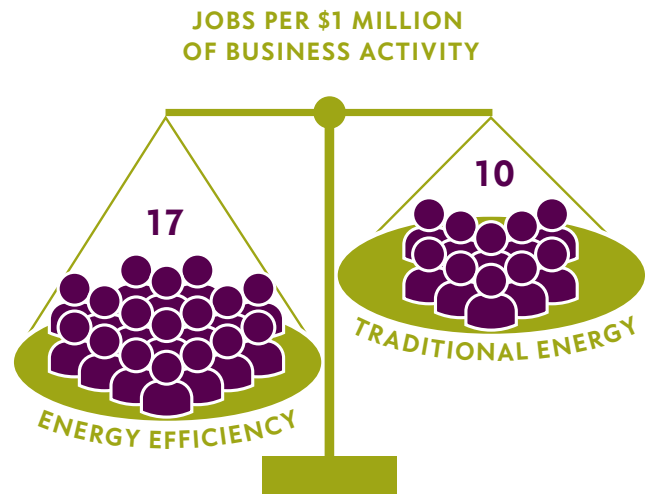


During the planning period, PEA will work with the Campaign’s stakeholders to refine these budget estimates.

THE CAMPAIGN’S ESTIMATE OF JOB IMPACTS

To estimate the Campaign’s job impacts, PEA used the methodology developed by the American Council for an Energy Efficient Economy (ACEEE). Their methodology estimates both Implementation jobs (the employment from the actual construction or implementation of the measures) and the Savings jobs (the employment caused by subsequent adjustments in spending patterns).¹⁰ For both the Implementation Jobs and Savings Jobs, the methodology predicts direct jobs¹¹, indirect jobs¹² and induced jobs.¹³ ACEEE was able to use Pennsylvania-specific data from 2011 in the jobs and economic impact modeling.

Based on this analysis, PEA estimates 11,158 net new jobs will be created over 10 years from the Pennsylvania Energy Campaign. During the Campaign’s development, PEA will be updating this figure as the program designs evolve.



NEXT STEPS — IMPLEMENTING THE CAMPAIGN

In the coming months, PEA will focus on the following tasks:

1 EXPAND STAKEHOLDER INVOLVEMENT

PEA held the Campaign's first stakeholder workshop on December 10, 2015. More than 60 participants from the private sector, non-profits, government, and beyond attended the half-day meeting. The interest in the Campaign was very high, as was the interest in continuing to work together on the Campaign.

In the coming six months, PEA will seek the input and expertise of an expanded network of stakeholders and that input will be sought in a series of workshops devoted to specific issues and topics.

2 SECURE START-UP FUNDING

In order to put together the research and planning required to design and implement the Campaign, PEA will prepare a Campaign development budget and will seek the needed funds both from the City budget and from outside sources.

As one example of this effort, PEA joined the Consortium for Building Energy Innovation (**CBEI**) in applying for U.S. Department of Energy (**DOE**) funding for piloting an energy retrofit program for the small food retail and service businesses. Upon reviewing the initial CBEI/PEA proposal, DOE invited the Philadelphia team to submit a full proposal.

3 CONDUCT NEEDED RESEARCH

PEA will continue to assemble the best data about the buildings in each of the four sectors, including their energy consumption and energy benchmarking scores. We will also continue to gather information about past and present energy programs and efforts, both in Philadelphia and in other cities and states that could serve as models.

4 DEVELOPING THE CAMPAIGN'S METRICS AND GOALS

Transparency and accountability will be critical to the Campaign. PEA must develop metrics for each of the four sectors that will track such data as number of buildings and square footage retrofitted, the cost of Energy Conservation Measures installed, the million BTUs (**MMBTUs**) and dollars of energy saved, the jobs created and supported, the environmental benefits, etc. The Campaign will need systems to collect this data and to share it with other participants in the Campaign.

5 IDENTIFYING AND INTERCONNECTING THE CAMPAIGN TEAM

The Campaign will require the focused effort of many entities which the Authority will identify and establish open communications. The Campaign will identify and establish relationships with allied energy programs and entities. A building owner participating in the Campaign must experience a seamless and easily-navigated portfolio of services, even if those services are offered by different entities. This requires a large referral system of energy experts and participating energy service companies, financial providers, contractors, workforce development and other programs and service providers. The Campaign will consider other ways of communicating with the Campaign's mailing list and with the public in general.

6 BUILDING THE CAMPAIGN'S FINANCIAL CAPACITY

The Campaign will:

- a) **Identify** standards and requirements for participating ESCOs and will enlist participating ESCOs.
- b) **Enlist** other providers of lease financing and commercial debt financing for Philadelphia energy projects.
- c) **Evaluate** the value of a loan loss reserve, loan guaranty or other credit enhancement on the cost of financing and secure financial support for such enhancement.
- d) **Develop** a bridge loan product and process so projects can be implemented when approved and not forced to wait for the bond financing.
- e) **Help** each of the four sectors evaluate energy opportunities, rank candidates and assemble portfolios of building retrofits for serious ESCO interest.
- f) **Research** other financial strategies, such as utility on-bill recovery of customer payments for their energy loan, Property Assessment for Clean Energy (PACE) financing, and other approaches and products.

7 DEVELOPING THE CAMPAIGN'S PUBLIC AWARENESS AND EDUCATION EFFORT

Once the larger projects of the Municipal Buildings and K-12 Schools are underway, the Campaign will join with other stakeholders to design and deploy a public awareness and public education campaign designed to make low-income families and small businesses aware of the value of building energy efficiency and clean distributed energy generation. The energy retrofit pipeline will be modest until people understand the value of paying attention to their building's energy use and taking steps to reduce energy waste.

The Campaign will require a clean, easy-to-navigate website that successfully provides visitors with quality information and educational materials on a variety of building energy topics. PEA will explore with the stakeholders how the Campaign might develop referral lists of participating energy auditors and energy modelers, contractors and professionals to help home and building owners get the help they need.

8 SUPPORTING SOUND POLICIES BY OTHERS

It is important to understand that the Campaign will not operate in a vacuum, but is either encouraged or discouraged by a number of policy decisions. The Campaign has neither the authority nor the responsibility for many of these policies, but the PEA should learn which policies have the most impact — positive and negative — on its projects and monitor the public policy debates of those influential policies. For example, Pennsylvania's building energy code is based on ASHRAE 90.1-2007 and not the 2010 or the 2013 updated versions of Standard 90.1.

Another important policy example is that the City's program of property tax relief for new construction could be offered only to properties that meet the 2013 international energy conservation code rather than Pennsylvania's out-of-date energy code. On these topics and others, PEA will speak out in the regulatory proceedings on behalf of the Campaign to share what it has learned and what it recommends.

REFERENCES

- 1 The methodologies for estimating the employment impacts of the Campaign's investment is discussed on page 12.
- 2 62 Pa.C.S. §§3751 – 3757. See https://www.google.com/url?q=http://www.portal.state.pa.us/portal/server.document/1427304/gcsgesacontract2014ed_pdf&sa=U&ved=0ahUKEwiCv-XctOXJAhVMKCYKHdXdCKwQFggEMAA&client=internal-uds-cse&usg=AFQjCNEX1W7gWBEUwwWtr38QPd-RJsXlyw.
- 3 See <http://freefutures.org/pennsef/about/>.
- 4 See <http://www.energycap.com/>
- 5 Available at <http://visualization.phillybuildingbenchmarking.com/#/>
- 6 EUI represents how much energy a building consumes per square foot per year and is expressed as thousand British Thermal Units per square foot per year ("kBtUs/sf/yr"). Knowing the EUI is the first step in evaluating the energy usage of a building.
- 7 See <http://www.phila.gov/green/PDFs/QuadplexCaseStudy.pdf>
- 8 See <http://www.philasd.org/about/#schools>
- 9 See <http://www.philasd.org/about/#charter-schools>
- 10 The adjustments in spending patterns creates jobs by shifting spending from the traditional energy generation and distribution industries (which have a lower labor intensity: roughly 10 jobs per \$1 million) to spending in all other industries (which have a higher labor intensity: roughly 17 jobs per \$1 million on average).
- 11 Direct jobs are the jobs generated from the actual project expenditure.
- 12 Indirect jobs are the jobs generated in the supply chain and supporting industries of an industry which make the materials used in the project.
- 13 Induced jobs are the jobs created elsewhere in the economy as increases in income from the direct project spending lead to additional increases in spending by workers and firms.

GLOSSARY OF TERMS

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE): ASHRAE is the author of many building energy codes, including ASHRAE Standard 90.1, the building energy code for all buildings other than low-rise residential buildings. <https://www.ashrae.org/>

British Thermal Units (BTUs) : A measure of energy, equivalent to the amount of heat needed to raise the temperature of one pound of water 1 degree Fahrenheit (1°F). One four-inch wooden kitchen match, fully burned, releases approximately 1 BTU. The BTU is a common yardstick for expressing the energy content of kilowatt-hours of electricity, cubic feet of natural gas, pounds of steam, gallons of heating oil, etc.

Building envelope: The exterior walls and roof of a building that separates the heated and cooled space of the building's interior from the exterior environment. The building envelope affects the heat loss and heat gain of the building, so air sealing to plug drafts, new insulation to reduce heat transfer, a white reflective roof to reduce summer heat gain and energy-efficient windows and exterior doors are all part of the building envelope and common energy retrofit measures.

Combined-Heat-and-Power (CHP): Also known as cogeneration, CHP systems generate both electricity and useful thermal energy in a single, integrated system. Heat that is normally wasted in conventional electricity generation is recovered as useful energy rather than being wasted. Standard electricity generation might recover only 35-40% of the energy content of the burned fuel, whereas CHP systems can be 80-85% efficient. The most common customer-sited CHP systems are natural gas-fired engines or microturbines.

Energy Audit: An examination of a building's energy and water use history and an analysis of the potential energy and water savings opportunities, including implementation costs and energy savings. ASHRAE recognizes three levels of energy audits: the ASHRAE Level 1 audit is a preliminary or screening audit; the ASHRAE Level 2 audit is an energy survey and analysis; and the ASHRAE Level 3 audit, also called an Investment Grade Audit or IGA, is a detailed analysis of capital-intensive modifications. The value of an energy audit is that it informs the building owner of the building's energy performance and identifies the Energy Conservation Measures (ECMs) appropriate for the building, including the installation cost and the resulting energy savings.

GLOSSARY OF TERMS

Energy Benchmarking: Energy benchmarking involves measuring a building's energy use and comparing it to the energy use of similar building and over time. Energy use is expressed as energy use per square foot per year (see EUI below). EnergySense - PGW's energy conservation program that helps customers reduce their gas usage by paying rebates for some gas conservation measures and equipment upgrades. <http://www.pgwenergysense.com/>.

Energy Conservation Measure (ECM): An ECM is any type of project conducted, or technology implemented, to reduce the consumption of energy in a building. Common ECMs address HVAC, HVAC controls, lighting, water heating, appliances, equipment and building envelope (air sealing, insulation, windows, roof, etc.).

Energy Savings Agreement (ESA): The long term contract between the building owner and the ESCO that creates pay-for-performance energy efficiency financing for your upgrade with no upfront cost. Through the ESA, the ESCO pays for 100% of development and construction costs. After a project is operational, customers take a portion of the realized savings from reduced energy consumption to make service payments to the ESCO. A related structure is the Energy Performance Contract.

Energy Service Company (ESCO): ESCOs are private companies that contract with private and public sector energy users to provide cost-effective energy conservation measures and retrofits. ESCOs have implemented significant comprehensive energy efficiency retrofit projects over the last three decades. The typical steps in an ESCO transaction include an energy audit, the negotiation of the Energy Savings Agreement, the financing and installation by the ESCO of the energy conservation measures and the monitoring and verification of energy use and energy savings.

EnergySmart: PECO's energy conservation program that helps customers reduce their electricity usage by paying rebates for electricity conservation measures and energy efficient equipment upgrades. <https://www.peco.com/SAVINGS/PROGRAMSANDREBATES/Pages/default.aspx>.

ENERGY STAR: A U.S. Environmental Protection Agency voluntary program that helps businesses and individuals save money through superior energy efficiency. ENERGY STAR has a wide variety of approaches to encourage more efficient buildings, including the Portfolio Manager benchmarking tool, the ENERGY STAR product and equipment certification and the recognition of the top 20% most efficient buildings. <https://www.energystar.gov/>

Energy Usage Intensity (EUI): A measure of a building's energy consumption, expressed as BTUs per square foot per year.

Greenworks: The City of Philadelphia's initiative, announced by Mayor Michael Nutter in 2009, to promote sustainability in Philadelphia's public sector and its citizens and businesses.

Municipalities, Universities, Schools and Hospitals (MUSH sector): The "MUSH" markets—municipal and state governments, universities and colleges, K-12 schools, and hospitals—have historically accounted for the lion's share of ESCO projects in the past, but the industry is now moving into smaller buildings.

Portfolio Manager: A web-based service by the U.S. Environmental Protection Agency that allows building owners to benchmark their energy use and compare that use to similar buildings. <http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>.

CONCLUSION

PEA thanks you for your interest in the Campaign and welcomes your participation. Please visit the PEA website — <http://www.philaenergy.org/>— to learn about stakeholder topic workshops and other Campaign events.

Please email energycampaign@philaenergy.org and let us know you are interested or to share your thoughts about a part of the Campaign.

We need and we thank you for your help and your involvement.

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