

Final Report  
on  
Energy Efficiency Incentives

Prepared for  
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Environment, Economy, Development and Sustainability Capstone

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# **1. Executive Summary**

The purpose of this research was to identify successful energy efficiency incentives that could be used by the City of Columbus in its goal to reduce greenhouse gas emissions. This was achieved by assembling five case studies, including a baseline analysis of incentives and programs Columbus already has in place. We then utilized the results from these case studies to create a recommendation package for Columbus' energy efficiency action plan.

Case studies included in this report focus on New York, Chicago, Cincinnati, Toledo, and our Columbus baseline. These cities were chosen based on two goals in our research: to research cities that were the best at implementing energy efficient programs (New York City and Chicago) and to research cities that were similar to size and demographic as Columbus (Cincinnati and Toledo). These cities were chosen because they were evaluated by the American Council for an Energy Efficient Economy (ACEEE), and their score was higher than that of Columbus. The only exception was the city of Toledo, which was chosen because of its highly successful Property Assessed Clean Energy (PACE) program.

The ACEEE Scorecard was fundamental in determining these cities. This scorecard is based off the ACEEE State and Local Policy Database, which “includes comprehensive information on energy efficiency policies currently implemented at the state and local level.” (ACEEE.org 2014) The database is updated at least once a year, and tracks policy across government, utilities, transportation, buildings, combined heat and power, and appliance standards. This information is collected and analyzed by the ACEEE staff and assigned a resulting score and rank.

While constructing these recommendations, the scope of the project was expanded to include incentives for energy efficiency improvements other than tax abatements. While tax

abatements can be a great incentive for the taxpayer, it lowers tax revenue from property taxes which can cut funding for other projects or programs. We also looked into funding projects with energy efficiency goals, local laws established by the city, community outreach strategies, among others. Many of these successful programs were identified for their high performance in the ACEEE scorecard.

The findings of the research led to the development of a series of recommendations geared towards improving energy efficient adoption in the city. First, the City of Columbus should add an option for abatement for achieving Leadership in Energy and Environmental Design (LEED) certification or other energy efficiency standards for new construction and renovation of commercial or multi-unit residential buildings to the existing Community Reinvestment Area (CRA) established by the City. We also found that the low adoption rate of energy efficient tax abatements and other programs is due to a lack of education or community outreach. Programs should be established that allow the community to know and understand how to take advantage of these opportunities in order increase adoption rates and make a larger impact on reducing greenhouse gas emissions.

## **2. Introduction**

This final research report addresses the City of Columbus Analysis of Greenhouse Gas Reduction Objectives in Columbus Green Memo III. Specifically, we will address Energy Efficiency Tax Abatements under Objective B.1: Reduce energy consumption community-wide by 20% (as measured on a per capita basis) over next 5 years. With support from Erin Miller, Environmental Steward for the City of Columbus, we expanded the scope of this project to include not only tax abatements, but all economic incentives targeting energy efficiency for the city.

The goal of our research was to provide the City of Columbus with favorable economic incentives for energy efficiency. In order to achieve this goal, we established five objectives:

1. Columbus Baseline Case Study
2. Chicago Case Study
3. New York City Case Study
4. Cincinnati Case Study
5. Toledo Case Study

After careful research and analysis of these case studies, we were able to construct a set of actions that the City of Columbus could enact to achieve their goal a part of Green Memo III.

Below is a description of the methods and results of this research.

## **3. Research Methods**

Our method for conducting this research was to split up the work by case studies to each group member. Each group member was assigned a city, and was responsible for evaluating successful energy efficiency programs in that city. For Columbus, a baseline was established to

find out what Columbus was already doing, and where they had gaps that could be improved upon.

For each study, we collected their rating in the ACEEE scorecard as well as examples of successful programs as described on the ACEEE website. We also utilized city websites to collect details on the programs implemented. We were able to contact Mark Lundine, the Economic Development Administrator and Lee Hennick, the TIF Coordinator for Columbus. Our first meeting with Mark provided an overview of what his office does, how tax abatements work and their benefits and drawbacks, and what other green incentive options Columbus has, such as the Green Columbus Fund. He was then able to introduce us to Lee Hennick who was very helpful in our research of the PACE program. We were also able to talk with Laura Brunner, the President and CEO of the Port of Greater Cincinnati Development Authority. Our conversation with Laura provided firsthand insights into the city's successful Community Reinvestment Area abatement program as well as some general feedback on Cincinnati's recently-launched PACE program.

#### **4. Case Study Research Results**

In choosing our case studies, Erin Miller, the City of Columbus's Environmental Steward, provided two suggestions for selecting cities for analysis. The first of which, given to us at our initial contact, was to look at cities with similar size and demographic. The second was to look into cities that have scored better on the ACEEE scorecard. With this in mind, we chose the following cities, which have provided key information in formulating our recommendations. Figure 1 describes the results of the ACEEE scorecard evaluation.

City	Overall Score	Overall Ranking	Local Government Operations	Community - wide Initiatives	Building Policies	Energy & Water Utilities
<b>Out of:</b>	100	34	15	19	29	18
<u>New York City</u>	69.75	3	10.5	9	22	15.25
<u>Chicago</u>	54.75	9	10.75	8	12	13.5
<u>Cincinnati</u>	39.75	N/A	6.25	6	8	10.5
<u>Columbus</u>	38.5	19	11.25	2	4.5	11.75

Figure 1: This table shows the overall score reported by the ACEEE scorecard as well as the four categories that provided useful information for this topic.

#### **4.1. Columbus**

Columbus ranks nineteenth on the ACEEE scorecard out of thirty-four cities. Overall, the city has a good base of policies and incentives that can be built upon to improve the city’s energy efficiency. The best score Columbus received was in the local government operations category, in which they rank second overall. Many sectors of the city, however, did not perform as well, according to the ACEEE metric. For example, Columbus did not score favorably in the buildings category. Some components that were lacking in this category include: third party review testing that is mandatory for building code compliance, requirements of commercial or residential building energy audits, and mandatory or voluntary programs to encourage building benchmarking (ACEEE.org, Columbus). However, there are some programs that are consistent with other top energy efficient cities. These include the grants for LEED certification offered through the Green Columbus Fund, the Columbus Energy Challenge, and the requirement for residential housing projects that receive city funding to be built to AWARE standards

(ACEEE.org, Columbus). AWARE stands for: **A**ccessible, **W**ater Conservation, **A**ir Quality, **R**esource Conscious, and **E**nergy Efficient.

The Green Columbus Fund is an excellent tool that is consistent with best practices in other cities. The Green Columbus Fund is a reimbursement grant program that uses financial incentives to encourage sustainable development and redevelopment. The funds may be used in redeveloping Brownfield sites or to pay for LEED certifications. For Brownfields, grant funding is capped at \$200,000 per project for environmental assessments and acquisition. And for LEED certifications, the Green Columbus Fund will reimburse 100% of the cost of the LEED certification which range from about \$2,750-\$27,500 depending on the size of the building and the scope of the LEED review (USGBC, LEED Cert. Fees). There is also a requirement to achieve at least 8 of 12 credits in the desired building category and incentives for achieving more (City of Columbus, Green Columbus Fund Program Description).

Another useful tool that Columbus can utilize is the Columbus-Franklin County Finance Authority. As can be seen in Figure 2, the FCFA provides a number of financing options for energy efficiency projects, whether it be retrofits, energy production projects, or distribution technologies, through the Columbus Region Energy Fund.

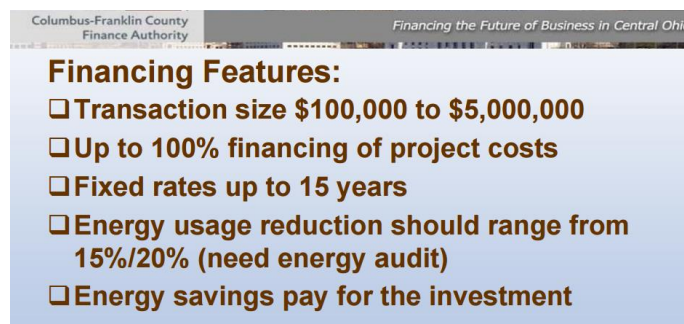


Figure 2: Criteria for FCFA financing and the economic and energy impacts seen in Columbus to date by these types of investments



There was another program in place, the Energy Efficiency & Conservation Block Grant program, which had a significant impact on Columbus. Over \$7 million was provided as funding, creating or retaining at least 80 jobs while preventing 9,718 metric tons of CO<sub>2</sub>e emissions and saving 14,271 mWh of electricity. Unfortunately, it has recently expired, but it was used to implement eight projects. These were used to reduce expenses from energy usage while educating the community about the importance of reducing energy consumption. It also allowed the establishment of an Energy Efficiency Revolving Loan Program to provide low-interest loans to private businesses for energy efficiency upgrades. Through its partnership with Mid-Ohio Regional Planning Commission, 60 low-income (150% of the federal poverty level) households received energy audits and efficiency retrofit upgrades.

#### **4.2. New York City**

New York City was the third highest ranked city on the ACEEE scorecard. New York City implemented tax abatement legislation in 2013 (available through March 15, 2018) to provide a one-year tax relief of \$4.50 per square foot of green roofs, up to \$100,000 of the buildings tax liability. However, most of New York City's focus in regards to energy efficiency has been largely a command and control approach by implementing Local Laws targeting in the municipal sector, such as public lighting and public buildings, or buildings receiving public funding. (ACEEE.org)

For instance, the Local Law 1 of 2007 required that "City-owned facilities with a peak electricity demand of 500 kW or greater are to be reviewed every five years to assess the potential for cogeneration and natural gas-based distributed generation projects at such facilities." (ACEEE.org) Campus buildings were a part of this assessment as well. The city issued Local Laws in 2009 that governed fleet procurement and sustainability. They required the

purchase of the most fuel efficient vehicles and idling policies for city vehicles other than emergency vehicles and buses. New York City also announced to replace 250,000 standard street light fixtures in NYC with energy efficient LED lights by 2017. Under Local Law 86 of 2005 and Local Law 119 of 2005, the city targeted new construction, building additions, and large reconstructions of existing buildings of city-funded projects. These laws required projects receiving over a certain level of funding to achieve LEED certified or LEED silver. The city is also required to follow Federal Energy Management Program standards of energy efficiency when purchasing energy-using products. Local Law 84 of 2009 required benchmarking results to be reported for all city buildings that are more than 10,000 square feet owned by the city or where the city pays most or the entire annual energy bill. This helps establish which public buildings need to undergo retrofits. These are just a few of the many Local Laws that allow New York City to take control of energy efficiency in the municipality. (ACEEE.org)

In addition to policies and tax abatements, New York has a community engagement program called GreeNYC. This program provides resources and organizes events for New Yorkers to help them use less energy and reduce their own carbon footprint. This coincides with the City's PlaNYC, which has a goal of reducing greenhouse gas emissions by 30% by 2030. The city also established the New York City Energy Efficiency Corporation to help implement and advance the goals in PlaNYC through catalyzing an energy efficiency retrofit financing market for private building owners, local government operations, and community-wide projects. Regular GHG and benchmark reporting measure the progress of these initiatives. (NYC.gov)

New York City's enforcement of energy efficiency through the Local Laws and community involvement have made it a top ranking city, and will be a great city to keep an eye on as Columbus moves forward with their own efforts.

### **4.3. Chicago**

Chicago was ranked as the ninth city on the ACEEE scorecard. While the city did have a tax abatement in place for the implementation of energy efficiency technology, the program expired in 2013. Because of this, we focused on the two major actions for energy efficiency in the city, Retrofit Chicago and Smart Grid Legislation. Both of these actions contributed to the 13.5 score Chicago received in the Energy & Water Utilities category. Chicago did better than Columbus in this category, where Columbus only received an 11.75.

Retrofit Chicago has already seen some major success. Since the start of the Residential Partnership in 2012, which unites non-profit groups and utility companies to connect residents to energy retrofit contractors, it has achieved more than \$7 million in savings and a 15% reduction in the 16,000 retrofitted homes, with more than 100,000 homes receiving free efficiency products. The Commercial Buildings Initiative includes 50 buildings that have pledged to reduce energy use by 20% over 5 years. Current participants have achieved a 7% reduction in energy usage as well as an annual costs savings of \$2.5 million, which is equivalent to removing 5,800 cars' worth of greenhouse gas emissions. The municipal buildings retrofit program uses private investments to accelerate retrofits for 60 city buildings. These include libraries, police stations, community centers and other buildings unique to the city. This program has already been awarded the Midwest Energy Efficiency Alliance's 2015 Inspiring Efficiency Impact Award (Municipal). The Chicago Infrastructure Trust and its partners, secured \$12.8 million to finance these buildings estimate \$1.4 million in energy cost savings and an 18% reduction in energy usage across all buildings upon completion (Retrofit Chicago). These programs are "marketed by both city staff and non-profit partners through neighborhood outreach and engagement, including

community workshops, educational materials, and online resources (ACEEE.org).” This program is a great example for Columbus as they go forward with a retrofit program of their own.

The Smart Grid Legislation, financed by a \$2.6 billion increase in consumer rates over 10 years, is expected to not only create savings for households but also create thousands of jobs (Smart Grid). This would include installing smart meters in almost 4 million homes and businesses that are serviced by Commonwealth Edison (ComEd). ComEd pledges greater reliability in the form of fewer outages and quicker power restoration during outages.

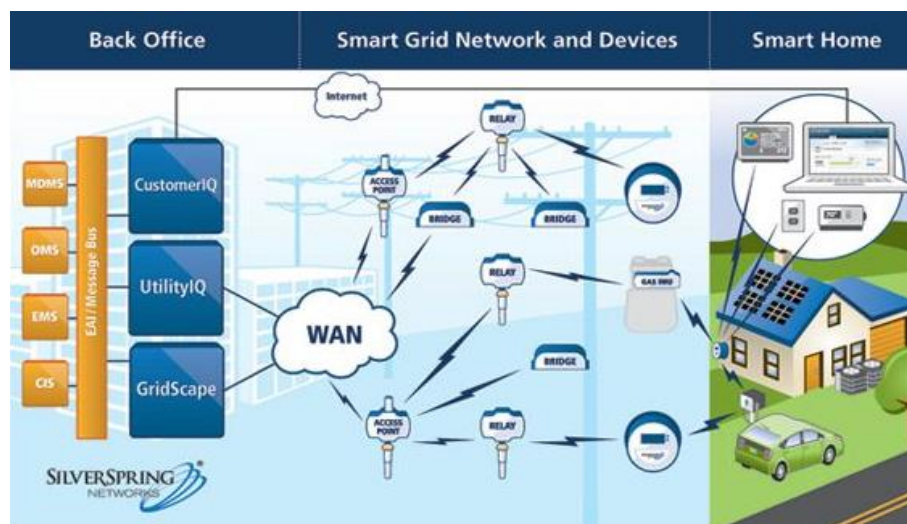


Figure 3. This image shows how the Smart Grid would make monitoring energy use easier for both the provider and consumer.

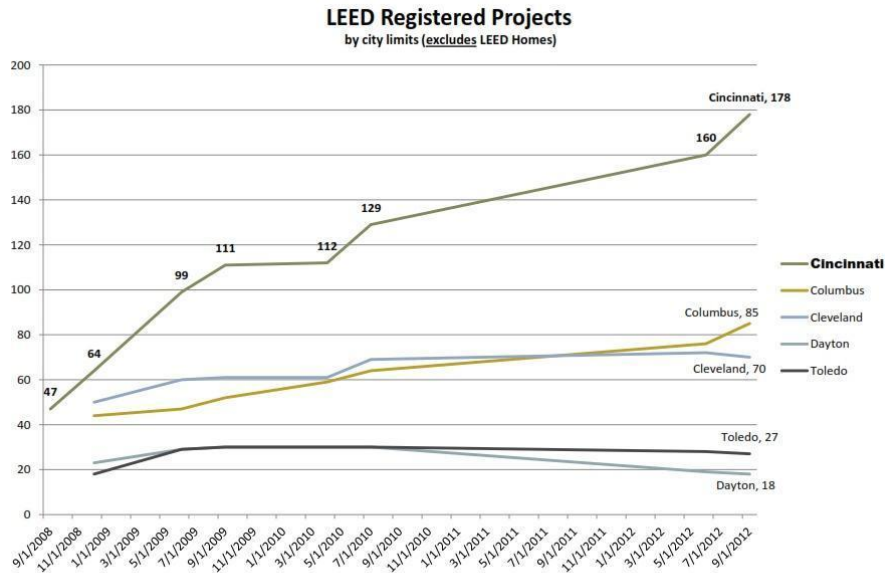
However, this has been a controversial subject in the city. In the past two years alone, rate increases have totaled more than \$580 million, which amounts to about \$8 per month to the average electric bill. Additionally, recent legislation is allowing a two year extension which could lead to rate increases annually that otherwise would have expired in 2017(Wernau, 2014). It seems, though, that there is a light at the end of the tunnel. After installing 540,000 meters last year with a plan to install 1 million more this year, ComEd will actually be lowering the energy price by about 5% starting June 1. This amounts to about \$2 due to lower energy costs, with

another dollar decrease in January when new delivery rates begin. In total, this will drop the average bill to drop from \$90 to \$87. With another 2.5 million to install, the project is expected to be completed by 2018 (Daniels, 2015). It remains to be seen if rates will once again increase or continue to decrease and what the true amount of savings and jobs created will be. The city continues its city-wide outreach on smart meters and energy efficiency at community events and service centers (ACEEE.org, 2014). Because of the costs of this program, we recommend that Columbus hold off on a project like this until technologies become more efficient and less costly.

#### **4.4. Cincinnati**

Cincinnati did not receive a ranking on the ACEEE scorecard for reasons undisclosed by the ACEEE website, but the city still managed to outperform Columbus in several key categories. Their community-wide initiatives received 6 out of 10 points compared to 2 out of 10 for Columbus. Their building policies, helped in large part by the city's successful tax abatement program for green buildings, received an 8 out of 29 compared to 4.5 out of 29 for Columbus.

Though Cincinnati's scores pale in comparison to New York and Chicago, the devil is in the details. Sharing similar demographics and the same state laws, the city's achievements were deemed valuable for their ease of possible replication and implementation in Columbus. Of primary interest is Cincinnati's tax abatement program for LEED-certified buildings that has been attached to the city's Community Reinvestment Area (CRA). The program offers an automatic 100% abatement of property taxes for all new construction or renovations that are *at least* LEED certified. The incentive has played a key role in driving green construction, helping the city to achieve the highest number of LEED-registered projects in the state of Ohio. This program has also led to both a reduction in energy usage and energy costs (Lajeunesse, 2009).



ALL DATA PROVIDED BY USGBC AND/OR GBCI - ALL GRAPHS AND ANALYSIS BY emersion DESIGN

Figure 4. The chart above illustrates Cincinnati’s widening lead in the number of LEED registered projects in Ohio from 2008 to 2012, in large part due to the city’s attractive tax abatement program.

#### **4.5. Toledo**

Toledo has yet to be chosen for evaluation by ACEEE since it is outside the 34 most populous US cities. However, after receiving a recommendation by members of the Council of Development Finance Agencies, our major focus within Toledo was the Better Buildings Northwest Ohio program funded by PACE Equity. Better Buildings provides financing for energy efficient building improvements for both residential and commercial buildings (U.S. Department of Energy, 2014). Better Buildings Northwest Ohio offers energy efficient improvements through lightning, HVAC systems, commercial kitchen equipment, chillers, boilers, and more. From July 1, 2010 through September 30, 2013 Better Buildings has an estimated cost savings of \$1,396,773 and estimated kWh of electricity savings of 7,637,176 (U.S. Department of Energy, 2014). Better Buildings Northwest Ohio largely benefited commercial buildings with 67 commercial building upgrades out of 193 assessments from July 1, 2010 through September, 30 2013; residential buildings had a total of 1,078 assessments and 0

upgrades in the same time period (U.S. Department of Energy, 2014). \$10,500,000 of the grant received from the Better Buildings program was allocated towards a commercial revolving loan fund and loan loss with the rest allocated in the following manner, 37% for labor and material expenses associated with upgrades or assessments, 59% for other program expenses associated with overhead, and 4% was left for marketing and outreach (U.S. Department of Energy, 2014). Information gathered from Toledo’s Better Buildings PACE program shows the potential PACE could have within Columbus, through the offered energy efficiency upgrades, energy savings, cost savings, and job creation. This program also provides Columbus with an example on how to effectively utilize the grant funding to achieve maximum results.

<b>Estimated Annual Energy Savings (Through 9/30/13)</b>	
<b>kWh Electricity</b>	<b>7,637,176</b>
<b>Therms Natural Gas</b>	<b>90,926</b>
<b>Gallons of Oil</b>	<b>0</b>
<b>Gallons of Propane</b>	<b>591</b>
<b>Total Estimated MMBTU Savings (Source Energy)<sup>8</sup></b>	<b>97,680</b>
<b>Total Estimated Energy Cost Savings</b>	<b>\$1,396,773</b>

Figure 5. The figure above shows the estimated cost and energy savings for the Toledo through September 30, 2013.

## **5. Recommendations**

Given the baseline analysis of Columbus and the information we have gathered through our research, we formulated two recommendations. Due to the nature of this topic, we are not suggesting the creation of a new program or incentive, as any new incentives would require funding that the city may not have. For this reason, we instead focus on steps that were taken in other cities that were successful but at little to no cost to the city.

## 5.1 Recommendation 1: Adaptation of Community Reinvestment

### Area

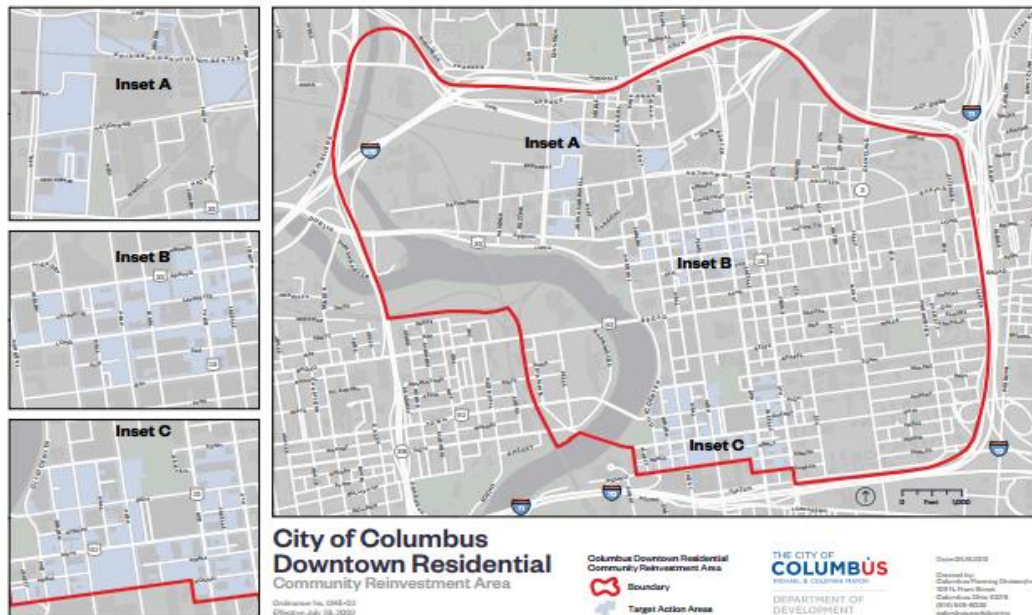


Figure 6. The figure above is the existing Community Reinvestment Area in Columbus.

Cincinnati originally had a Community Reinvestment Area (CRA) similar to that already established in Columbus. However, the city passed an ordinance that added an option for LEED certification to their CRA (Ordinance). Given the marked difference between the number of LEED certified buildings in Cincinnati vs Columbus, 178 to 85 in September of 2012, it seems warranted that Columbus should follow suit if they seek to improve energy efficiency in their buildings. This would require passing an ordinance similar to that found in Cincinnati. When coupled with the Green Columbus Fund, savings from LEED certification for those who participate could be significant both before and after development. If the city would like to focus more on energy efficiency than what is required by LEED, they could also choose to require compliance with the Architecture 2030 Challenge. This requires buildings to meet energy



reductions through energy efficient design strategies before transitioning from fossil fuels to renewable energy sources (Architecture).

## **5.2 Recommendation 2: Get the Word Out**

Despite the considerable promise energy efficient technologies offer for reducing financial costs and environmental damages, adoption is not to the degree that would be expected. Marketing of the incentives available to consumers and businesses as well as the benefits of implementing these technologies can increase the adoption rate. A first step to consider is community outreach and education about taking advantage of the Green Columbus fund, a possible tax abatement or the soon to be implemented PACE program. Residents and businesses should also be educated about other opportunities, such as the Columbus Energy Challenge and the Better Buildings Challenge. Energy usage and cost savings should be reported from buildings that have either utilized the incentives or taken part in such programs, such as the Better Buildings report (Hilton).



Figure 6. This image shows the energy and cost savings this building has reached after completion of the project. Publicizing this information will make this information can energy efficiency more attractive to consumers.

There are a number of ways Columbus can do this along with community outreach and education. For instance, Better Buildings uses both LinkedIn and Twitter to advertise both opportunities and successes. Another way to inform possible adopters is to become a part of the Investor Confidence Project (ICP). ICP enables “a marketplace for building owners, project developers, finance and energy service providers, insurers, utilities, and a growing number of public programs and utilities to trade in standardized energy efficiency programs.” By aligning future or possibly current programs and incentives in Columbus with ICP’s Energy Performance Protocols (ICP Primer), a wider range of individuals will have information about and confidence in them, making the adoption rate higher. More in depth information about taking part in this project is available at <http://www.eepperformance.org/>.

## **6. Conclusions**

### **6.1. Property Assessed Clean Energy**

Through communication with Lee Hennick, we learned that Columbus was soon to implement a PACE program. Because of this, while we praise the program as a part of Columbus’s actions, we did not specifically include this program in our recommendations. Instead, we formulated some best practices from information gathered from successful programs such as those in Toledo and Cincinnati. These include consulting with the banks in the area to gauge their agreement with the first lien policy for PACE financing and focusing on commercial projects due to a lower risk of defaulting on a mortgage. Revolving loan funds were often set up within PACE programs and proved helpful by financing the program, paying administrative costs, and covering loan defaults. However, upon our initial presentation to the class and Erin Miller, we received feedback that Columbus was already taking these steps. We were told that the banks did not need to be consulted and that the Columbus-Franklin County Finance

Authority has set up a revolving loan fund. That being said, the fact that Columbus has a PACE program up and ready to launch is very promising. As we can see from Toledo and Cincinnati, it has been a very successful tool in improving energy efficiency; we expect to see similar success as Columbus moves forward with their launch.

## **6.2. ACEEE Best Practices**

The ACEEE Scorecard has used its rankings to compile best practices for each category. Since Columbus did so poorly in the buildings category, basing their actions to improve energy efficiency of buildings will help them improve. The general best practices are listed below.

### **BUILDINGS GENERAL BEST PRACTICES**

- Ensure all new commercial and residential buildings meet the latest building energy codes.
- Encourage commercial and residential building owners to rate, or benchmark, the energy use of their buildings and share that information with tenants and the real estate community.
- Provide incentives to builders for energy-efficient construction, and require private buildings to improve energy efficiency.
- Support the development of a local building energy efficiency workforce, and establish energy saving programs to spur demand for services.

More importantly, ACEEE has listed the most important areas of improvement for the entire cities energy efficiency efforts. It is noteworthy that efforts for expanding building energy code compliance efforts are in both the best practices and areas of improvement for Columbus. This tells that along with marketing available incentives, Columbus should also focus on improving its number of buildings that are not up to code.

### **AREAS FOR IMPROVEMENT FOR COLUMBUS**

- Establish community-wide energy-saving goals.
- Expand building energy code compliance efforts.
- Adopt an urban heat island mitigation strategy and policies encouraging cool roofs.

### **6.3. The Energy Efficiency Gap**

Energy-efficient technologies offer considerable promise for reducing the financial costs and environmental damages associated with energy use, but these technologies appear not to be adopted by consumers and businesses to the degree that would apparently be justified, even on a purely financial basis (Gerarden, Newell, Stavins, 1). There are a number of reasons that businesses and residents are not adopting energy efficient technologies that the document delves into great depth about. First, there is a conflict of interest between the tenant and landowner. The landowner is the one that is paying for the improvements, but he is not able to recoup all of the benefits and even takes on additional liabilities. Although, he does receive the benefits of increased land value, those are marginalized by the increased taxes he has to pay on it. Furthermore, he leaves the gains in cheaper utility bills to the tenant. Another common factor associated with the energy gap is uncertainty about future energy prices. With increasing supply of natural gas available in the US, cost of heating is expected to decrease which would decrease the net benefit of energy efficient technologies.

Energy efficient technologies are also an unattractive investment if businesses are only looking to maximize profits. They typically have a very long payback period coupled with a high interest rate with third party financing (Gerarden, Newell, Stavins, 29). A final factor that discourages people from adopting energy efficient technologies is the option value. When a firm is faced with making such an irreversible decision, they need to consider the possibility that there are great gains in technology during the life of the upgrade that may allow competition to get a leg up. This thought process will often delay energy efficiency investments (Gerarden, Newell, Stavins, 39).

## **7. Final Conclusion**

Overall, we believe Columbus has a solid foundation of energy efficiency incentives, one which does not require any additional expansion. Due to the apparent energy efficiency gap, we do not feel it is necessary to spend much money on increasing available incentives. We encourage Columbus to market what it has in place including utilizing the PACE program as much as possible. Furthermore, based on ACEEE recommendations, we would like to see Columbus improve building code compliance for energy. As Columbus continues its journey towards sustainability, we hope to be able to come back to this question and see that the demand for energy efficiency incentives is strong due to a similarly strong culture of sustainable building.

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## Appendix

- 1) ACEEE City Energy Efficiency Scorecard, Columbus, OH Overview (2014)  
<http://database.aceee.org/city/columbus-oh>. This data was taken from the ACEEE website, specifically the overview of Columbus, OH energy efficiency. The webpage provides highpoints of each category: local government operations, community-wide initiatives, buildings policies, energy and water utilities, and transportation. I extracted the city's scores in each category as well as strong points and areas that are lacking for local government operations and buildings policies.
- 2) United State Green Building Council, *LEED Certification Fees*.  
<http://www.usgbc.org/cert-guide/fees>. The data I extracted from this website was the LEED certification fees for each category. I used the range of baseline certification fees (those without expedited review) to report what grant the Green Columbus Fund is expected to offer.