

# **Better Buildings Neighborhood Program: BetterBuildings Lowell**

Award Number: DE-EE0003572

BBNP Name: BetterBuildings Lowell

Project Title: BetterBuildings Lowell BLEU Program

Director/Principle Investigator: Adam Baacke

Team Members: Tom Heslin, Project Manager / Todd Woekel, Construction Manager / Phil Ferriera, Housing & Energy Program Manager

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

The information contained in this report may be shared, used or disclosed to the general public without expressed consent from the City of Lowell, MA.

## **Executive Summary**

The City of Lowell set four goals at the beginning of the Better Buildings Neighborhood Program:

1. *Improve the Downtown Historic Park District's Carbon Footprint*
2. *Develop a sustainable and replicable model for energy efficiency in historic buildings*
3. *Create and retain jobs*
4. *Promote multi-stakeholder partnerships*

The City of Lowell, MA was awarded \$5 million in May 2010 to conduct energy efficiency retrofits within the downtown National Historical Park (NHP). The City's target was to complete retrofits in 200,000 square feet of commercial space and create 280 jobs, while adhering to the strict historical preservation regulations that govern the NHP.

The development of a model for energy efficiency in historic buildings was successfully accomplished. BetterBuildings Lowell's success in energy efficiency in historic buildings was due to the simplicity of the program. We relied strongly on the replacement of antiquated HVAC systems and air sealing and a handful of talented energy auditors and contractors. BetterBuildings Lowell was unique for the Better Buildings Neighborhood Program because it was the only program that focused solely on commercial properties. BetterBuildings Lowell did target multi-family properties, which were reported as commercial, but the majority of the building types and uses were commercial. Property types targeted were restaurants, office buildings, museums, sections of larger buildings, mixed use buildings, and multifamily buildings. This unique fabric of building type and use allows for a deeper understanding to how different properties use energy.

Because of the National Historical Park designation of downtown Lowell, being able to implement energy efficiency projects within a highly regulated historical district also provided valuable research and precedent proving energy efficiency projects can be successfully completed in historical districts and historical buildings. Our program was very successful in working with the local Historic Board, which has jurisdiction in the NHP. The Historic Board was cooperative with any exterior renovations as long as they were not changing the existing aesthetics of the property. If we were replacing a rooftop condenser it needed to be placed where the existing rooftop condenser was located. Receiving proper approval from the Historic Board for any external energy conservation measures was known by all the participating contractors.

One area of the retrofits that was contentious regarded venting of the new HVAC equipment. Installing external stacks was not allowed so the contractors had to negotiate with the Historic Board regarding the proper way to vent the equipment that met the needs mechanically and aesthetically. Overall BetterBuildings Lowell was successful at implementing energy and cost saving measures into 31 commercial properties located within the NHP. The 31 retrofits had 1,554,768 square feet of commercial and multifamily housing and a total predicted energy savings exceeding 22,869 a year. Overall the City of

Lowell achieved its target goals and is satisfied with the accomplishments of the BetterBuildings program. The City will continue to pursue energy efficient programs and projects.

Program Overview	
Total projects	31
Total Sqft	1,554,768
BBNP energy loans	\$ 872,359
Energy savings estimate (Mbtu)	22,869
Cost savings estimate/yr	\$ 476,796
Jobs created	375

### **Final Technical Report**

In order to best describe the elements of the BetterBuildings Lowell program this section will be laid out in the order of an energy efficiency project. First, we needed properties to take advantage of the program. Very early in the program, before Tom Heslin was Project Manager, commercial property owners with properties within the Lowell's National Historical Park were asked if they would be interested participating in a BetterBuildings Lowell Energy Upgrade (BLEU) Project, energy efficiency program. This data was collected on a long hand form.

A pilot program was conducted with the help of National Grid, an energy auditor and a commercial property. There was a meeting for property owners to attend, there were no attendees. In order to drive demand the project manager relied strongly on word of mouth and direct marketing techniques. An important factor in the driving demand was the Construction Manager. Because of the nature of the Construction Manager's work he was in contact with many downtown commercial property owners. He would inform the owners of our program and get them in contact with the project manager. This is how a lot of projects began.

Another useful marketing technique was simply informing property owners or developers that were contacting the Lowell Department of Planning and Development that this funding source was available. We landed a lot of the larger more capital intensive projects through this technique. Those projects assisted with getting large portions of our funding out. Once we had our projects ready for a project we set up the energy audit.

Square Feet	
Total NHP	9,537,056
Total BBNP	1,554,768
% Retrofitted	16

Originally BetterBuildings Lowell planned on using the local utility, National Grid, for all of the energy audits but the partnership never came to fruition. In the early stages of the program National Grid did

assist with a pilot program audit and marketing material. Once we were directing participating BetterBuildings Lowell property owners to seek the free energy audits from National Grid we were informed that National Grid was often failing to provide an energy audit report or even appear for the audit.

Another challenge we faced with the utility energy audit programs was that they performed separate gas and electric audits and the audits were subcontracted to separate engineering firms. The confusion and frustration that emerged from the utility audit process caused BetterBuildings Lowell to provide a reimbursable energy audit from a private engineering firm or energy auditor. This technique proved to be a challenge in itself and we came to recognize that there is a gap in the energy auditing market. BetterBuildings Lowell went about the energy audits in a unique way. We set up a walk-thru for the auditors and engineers to walk through the project property to get a better idea as to what would go into the energy audit and get some initial ideas for the suggested energy measures needed to reach a 15% savings. These techniques for the energy audit walk-thru also allowed become aware of the large spectrum of sophistication and cost associated with energy audits. Initially we were asking for an ASHRAE Level 2 energy audit, but later determined that such a sophisticated audit was not necessary for all properties. The audits though often very useful regarding energy savings predictions can be burdensome and costly for some projects. On occasional projects, particularly projects that required limited energy conservation measures, we received just as valid energy savings predictions from a contractor. Once the project had an audit or some form of predicted energy savings we bid the project.

Energy Use of BBNP District		
	Baseline (kWh)	Predicted Savings (kWh)
Electricity	6,802,542	1,633,049
Natural Gas	16,367,101	4,934,432
Oil	247,479	185,011
Total	23,417,122	6,752,492

Energy Audit Costs	
Total Energy Audit	\$ 102,622.00
Average Cost	\$ 3,420.73
Cost / SQFT	\$ 0.14

BetterBuildings Lowell followed the public bidding procedures that are required under Massachusetts General Law. There were never any major snafus regarding our bidding, though it could be stressful at time with deadlines and what not. Once we had a strong base of contractors interested in the program, contractors were recruited to the program in similar fashion as the property owners, and we were awarding many of the projects to a handful of contractors. All the contractors involved in the program were very cooperative and helpful with the work to be completed.

Because BetterBuildings Lowell operated out of the City of Lowell Department of Planning & Development the Program was able to access an existing pool of contractors that had worked with the City in the past. This allowed the Program to have a strong base of contractors that was fortified by the additional contractors that saw the publicly advertised request for proposals in the newspapers and public bidding websites. Developing a pool of qualified contractors to bid on the projects was a successful aspect of the BetterBuildings Lowell workforce development.

Once the bids were received BetterBuildings Lowell was able to break down the project cost. The initial model of the BetterBuildings Lowell BLEU Project was 1/3 BLEU Grant, 1/3 Loan from the Lowell Development Financial Corporation (LDFC), 1/3 Owner Match. Initial uptake of this financing model was slow; therefore BetterBuildings Lowell implemented the Summer Special starting in September 2011. The Summer Special provided a greater incentive for properties to participate in the program by providing up to \$60,000 of BLEU Grant funds without any Owner Match or LDFC Loan. This incentive attracted many of the properties that participated in the BetterBuildings Lowell BLEU Program. The energy loan created with the LDFC in order to augment the BLEU Projects was a highly successful collaboration with local lenders. The LDFC energy loan was created by the City and the LDFC to provide a revolving loan fund that offered 10 year loans at 3% fixed interest rates. The City has partnered with the LDFC in similar ventures in the past. The LDFC consists of 10 local and national banks, each providing a percentage of the funds, totaling \$1.7 million, that make up the loan pool. The City provided \$1 million for the revolving loan fund and \$540 thousand for the loan loss reserve.

<b>BLEU Project Financing</b>	
Total BLEU Grant	\$ 2,685,845.77
Average BLEU Grant	\$ 89,528.19

Total LDFC Loan	\$ 872,359.15
Average LDFC Loan	\$ 29,078.64

Total Owner Match	\$ 12,162,636.17
Average Owner Match	\$ 405,421.21

Total Project Cost	\$ 15,720,841.09
Average Project Cost	\$ 524,028.04
Project Cost / Sqft	\$ 33.14

Upon the completion of the bidding process the work was able to be completed. Due to the nature of the BetterBuildings Lowell program each project varied in energy conservation measures and length of time for installation. There were few problems that arose during the implementation of the BLEU Projects. This is due to the nature of the projects and having well qualified contractors doing the energy retrofit installations. Property owners that participated in BetterBuildings Lowell have reported a good overall experience. Many property owners used the program to complete renovations that they would

not have been able to complete without the subsidy. The property owners were grateful for this opportunity to modernize their property without too much financial strain on their part.

The most enlightening element of the BetterBuildings Lowell program is that energy efficiency retrofits in historic buildings or districts are the same as energy efficiency retrofits in no historic buildings or districts. The same or at least very similar problems and solutions exist. An energy efficiency retrofit that will likely see the greatest ROI will involve HVAC upgrades and air sealing. For the most part HVAC upgrades are located inside of buildings. Any external upgrades will need approval of the historic preservation governing body but should be approved. Air sealing is a simple and inexpensive energy conservation measure and should be included in all energy efficiency projects.

### **Accomplishments**

*SOPQ Objective 1: Improve the Downtown Historic Park District's carbon footprint*

**Target:** 8,800,000 Kwh reductions in 3 year

**Actual:** Predicted from energy audits 6,752,492 (76% of target savings). The actual savings will not be known until all projects' energy use has been successfully tracked for one year following the installation of the energy efficiency measures.

*SOPQ Objective 2: Develop a sustainable and replicable model for energy efficiency in historic buildings*

**Target:** Debunk the perception that energy efficiency cannot be achieved in historic buildings

**Actual:** BetterBuildings Lowell has been able to develop a sustainable model for historic buildings and will continue to fund projects using the LDFC Energy Loan Fund.

*SOPQ Objective 3: Create and retain jobs*

**Target:** 280 jobs in 3 years

**Actual:** 375 jobs in 3 years (1,183 hrs/job avg.). The jobs created by BetterBuildings Lowell were in the administration of the grant and with the contractors that completed the retrofits.

*SOPQ Objective 4: Promote multi-stakeholder partnerships*

**Target:** Partner with LDFC, National Historic Park, National Grid, UMass Lowell, Lowell Historic Board, local unions, local businesses and property owners throughout the historic district

**Actual:** Partnerships with the LDFC, National Historic Park, Lowell Historic Board, local businesses and property owners throughout the historic district flourished. BetterBuildings Lowell struggled to make a lasting partnership with National Grid, UMass Lowell and local unions.

### **Grant to Lowell Development and Financial Corporation**

The LDFC has created accounts through which they will manage the loan program. The City of Lowell has granted the LDFC 1.7million dollars to distribute as 10-yr. 3% interest loans. The first project proposal will go in front of the LDFC early in Q2 2011. There were two projects that have been approved for the LDFC Loan thus far. The LDFC has approved 2 loans in 2011 Q3 and there are many more in the pipeline.

The LDFC continues to process loans for the BetterBuildings Lowell Program. Both the BetterBuildings funds and the LDF funds remain available to commercial property owners within Lowell city limits.

### **Hire a Project Manager**

A project manager was hired and a team of City of Lowell staff were given responsibility regarding the program as well. The project manager and the team assembled successfully completed all tasks set out by DOE.

### **Direct Grant Program**

The Direct Grant Program was the most successful aspect of the BetterBuildings Lowell program. Since May 2010 BetterBuildings Lowell has invested \$2.5 million of direct grants into the National Historical Park energy upgrades. The direct grant investment was the stimulus for the creation of 375 jobs.

### **Partner with National Grid**

The partnership with National Grid never came to be as the City had initially anticipated. Initially the City hoped National Grid would provide free energy audits. There was a lot of confusion between the City, National Grid and property owners regarding the scheduling and completion of the energy audits. The City determined that bringing in outside energy auditors would be the most efficient way to get the audits completed. The City and the program participants did take advantage of any available incentives and rebates from National Grid.

### **Partner with UMass Lowell**

The partnership with UMass Lowell never happened. There never was a valid need for their services. The data set that was compiled was sufficiently handled by the Project Manager and the data tracking was automated via Wego Wise energy tracking software.

### **Marketing and Public Relations**

The BetterBuildings Lowell program was easily marketable and was successful in gaining traction and getting projects completed on time. The use of direct market techniques such as mailings and word of mouth were the most successful components of all BetterBuildings.

### **Project Management & Reporting**

The project management of the program was completed primarily by the project manager but the City of Lowell did utilize the expertise of the construction manager, housing program manager.

### **Program Implementation Post Grant Period**



The Direct Grant program has been completed but the LDFC Energy Loan continues to exist with the LDFC and has expanded to the whole City of Lowell. The loan terms remain 3% interest for 10 years and are available to commercial and multifamily property owners. The

### **Challenges**

BetterBuildings Lowell did experience some challenges in particularly at the beginning of the program. As stated earlier the initial uptake of the program was slow and it did not truly pick up until the Summer Special was initiated in the summer of 2011. Once the Summer Special began we saw a drastic increase in interested projects. Another Challenge BetterBuildings Lowell faced early on was creating a strong relationship with the utility National Grid. Initially National Grid was to provide BetterBuildings Lowell with free comprehensive energy audits for all commercial properties interested in the program. We attempted to run the program this way for nearly one year. The challenges that arose with this model were many.

National Grid provides energy audits to commercial properties but they are not comprehensive. A commercial property owner can get an electric energy audit, the utility will go through the property and audit the electric consumption, primarily lighting. A commercial property can also receive a gas energy audit; the utility will go through the property and audit the gas consumption, primarily heating. A property owner cannot receive an electric and gas audit in one audit they must be separate. On top of the audits being separate the engineering contractors that National Grid has contracted with are different depending on what kind of energy audit the property is receiving. If a property does successfully receive an audit through National Grid an audit report is not guaranteed. There were multiple properties that participated in the BetterBuildings Lowell Program and did not receive an audit report for the audit they received.

There were also many challenges with partnering with the utility due to the bureaucratic structure of a large energy corporation and constant changes in the management and contacts BetterBuildings Lowell had made. In order to circumvent these challenges BetterBuildings Lowell provided funding for an energy audit that was required to provide a baseline for the BLEU Project. In order to receive the funding the property owner would have to pay for the audit out of pocket and then be reimbursed by BetterBuildings Lowell upon the completion of their BLEU Project.

### **Program Sustainability Plans**

The City of Lowell will continue its efforts to reduce the energy consumption in downtown through the LDFC's Energy Loan Program for commercial properties. The City has also expanded the energy loan program to commercial properties outside of the downtown neighborhood. It is our goal to eventually get the downtown neighborhood to Net Zero electricity use. In addition to the LDFC energy loan program the City is currently seeking approval from the Massachusetts Department of Environmental Resources (DOER) to become an aggregator of electricity. Becoming a community with municipal

aggregated electricity will allow Lowell to receive energy efficiency funding from the local rate payers. Once the City begins to receive the energy efficiency funds it will then begin implementing a City run energy efficiency program for the citizens and rate payers of Lowell. The LDFC energy loan funded by BetterBuildings and the consortium of banks will remain available and there are currently three projects in the pipeline. The loan fund has proven to be successful because of its low interest rate and being available to commercial properties.

### **Verification of Data**

The City of Lowell has contracted with Wego Wise for measurement and verification of data. Wego Wise is web based energy tracking software often used by property management companies to monitor their properties energy use. The partnership between Wego Wise and Better Buildings Lowell is unique because BetterBuildings Lowell is a program of commercial properties; Wego Wise is generally used for multifamily properties. Wego Wise is a valuable tool because it has allowed BetterBuildings Lowell to track the energy data after the retrofit without having to collect the energy data every month. The information that is required for the data to be collected is an online account with the local utility and the login username and password. Once all that information is inputted Wego Wise collects the monthly energy data automatically. The tool has been very successful in the multifamily sector and they are beginning to expand to the commercial sector. Eventually the City of Lowell and Wego Wise may partner in a City wide energy tracking program for residential properties as well.

BetterBuildings Lowell is also continuing the BBNIS summary data verification with Navigant Consultants. Their services have been helpful regarding the synthesis of our data and making coherent for the public.

### **Developed Products**

BetterBuildings Lowell does have a website on the City webpage and will continue to implement energy efficiency projects throughout the city using the LDFC Energy Loan funds. There have been multiple presentations regarding BetterBuildings Lowell including with the Northern Middlesex Council of Governments, United States Green Building Commission, MA Chapter and the National Historical Park. All of these relationships will be maintained for future projects.