

GREEN COMMUNITY COMPETITIVE GRANT PROGRAM

WINTER 2012

TOWN OF ANDOVER APPLICATION NARRATIVE

Project Name: Andover Building Efficiency Project  
Amount Requested: \$248,799  
Project Category: Energy Conservation/Energy Efficiency Measures  
Applicant: Town of Andover  
36 Bartlet Street  
Andover, MA 01810

**Purpose**

The Town of Andover’s Five Year Energy Reduction Plan included recommendations for thirteen Town and School buildings in Andover, Massachusetts with the goal of energy use reduction. Using this as a guide, the Town succeeded in implementing the top priority lighting upgrades at eleven of the thirteen locations. Electric consumption has dropped by over 10% because of these upgrades.

The focus in this new project is heating and cooling efficiency. Following the plan, we selected and prioritized projects at eight buildings toward this goal. Every efficiency measure in this Project was selected from our Five Year Energy Reduction Plan. The two major types of efficiency measures of this project are Retro-Commissioning (RCx) and Demand Control Ventilation (DCV).

Retro-Commissioning

Commissioning is the systematic process of ensuring that building systems are operating correctly for maximum efficiency. This process is undertaken when a building is constructed, however, periodic retro-commissioning can provide substantial savings. During RCx, building heating, ventilation and air conditioning systems and energy management controls undergo performance review and testing, and energy upgrades and management changes are implemented to maximize efficiency. Retro-commissioning in Andover will follow the guidelines published by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) and the United States Green Buildings Council (USGBC).

Demand Control Ventilation

Older ventilation systems were designed to deliver a fixed minimum volume of air to occupied spaces based on continuous use and at maximum occupancy in order to provide adequate air quality.

However, most meeting spaces and classrooms are not fully occupied continuously. A significant amount of heating and cooling savings can be realized by supplying the correct amount of ventilation to preserve indoor air quality based on actual occupancy. DCV uses Carbon Dioxide sensors, integrated with the air handling units to detect occupancy and temper the volume of fresh air required to maintaining a set CO<sub>2</sub> level. Each air handling unit would have a wall mounted CO<sub>2</sub> sensor, and the information would be used to properly regulate fresh air damper on each unit.

### **Benefits and Impact**

Based on the Andover Energy Reduction Plan, implementation of these measures at the eight buildings will result in an annual cost savings of \$163,668. With budgets strained and the demands of increasing costs of public education, suburban communities like Andover could equate this savings with additional teachers or the restoration of service cuts. Total energy consumption for the Town of Andover in FY2011 was 136,921 MMBTU's. According to our energy audits, implementation of this proposed Andover Building Efficiency Project will result in an annual reduction of 6,334 MMBTU's or 4.6%. This is the equivalent of 557 metric tons of Carbon emissions or a reduction equal to the annual Carbon load of 109 cars.

Apart from the financial and environmental benefits, this project will improve the comfort and quality of the heating and cooling systems for the occupants. The Plant and Facilities office often receives complaints of blowing air after rooms are at optimum temperature. Ventilation only when needed will eliminate this ongoing issue.

### **Timeline and Procurement Status**

Andover Plant and Facilities office has been actively meeting with RCx firms to determine the scope of the process and will be ready to begin implementation immediately. Sample proposals are currently under review. Temporal constraints are also a factor. DCV would need to be implemented at school buildings during the summer but all other buildings can be implemented immediately. There are no permits or other approvals required for the work to be initiated under this project scope, so no delays are expected. Andover is committed to following all procurement guidelines. Procurement has not begun on these measures to date. If funding is approved and a notice to proceed issued by July of 2012, this project could be completed by the end of Fiscal Year 2013, or June 30, 2013.

### **Funding**

Andover had found it difficult to fund the Energy Reduction Plan. The plan was developed in 2009, before the impact of the economic downturn was realized locally. Last year's difficult winter strained budgets and tax revenue has been lacking. All these factors in concert caused a delay in implementation of more energy conservation projects. We have continued to work at energy improvements but the

progress has been slower than expected. The Green Community Grant Program funding will accelerate our implementation efforts. No funds are requested to cover administrative costs. The Town of Andover will administer the grant through normal operating expenses and existing personnel.

The Town anticipates participation in this project by National Grid in the amount of \$60,928 in incentives. This is projected and not verified at this time. However, the Town of Andover has earmarked energy conservation funds available to fully fund any shortfall in this anticipated National Grid contribution.

Project Buildings by Priority

Listed below are the Project buildings in order of priority, including total project costs by building and savings expected. Whole building energy audits of each location are submitted with this application which support cost estimates and projected savings.

Green Communities Competitive Grant Program 2012: Town of Andover Building Efficiency Project

ANDOVER BUILDING EFFICIENCY PROJECT							
Priority	Project Name, Building Name, Measure Name	Funding Requested	Total Project Cost	Expected Utility Incentives	Projected Annual Cost Savings	Projected Annual Electricity Savings (kWh)	Projected Annual Natural Gas Savings (therms)
1	Public Safety Center: Retro-commissioning	\$11,825	\$21,500	\$9,675	\$29,949	70,680	13,211
	Public Safety Center: Building Air Sealing-Enclose Tower	\$2,700	\$2,700	\$0	\$1,057	0	661
2	Memorial Hall Library: Retro-commissioning	\$10,794	\$19,625	\$8,831	\$7,224	29,107	2,212
	Memorial Hall Library: Demand Control Ventilation	\$8,170	\$13,616	\$5,446	\$5,191	20,204	1,639
3	Town Offices: Retro-Commissioning	\$13,618	\$24,760	\$11,142	\$8,898	51,390	1,909
4	Andover High School: Retro-commissioning	\$17,866	\$32,520	\$14,634	\$14,475	54,975	4,214
	Andover High School: Demand Control Ventilation	\$86,426	\$97,626	\$11,200	\$64,158	214,187	20,983
5	West Elementary School: Retro-Commissioning	\$9,500	\$9,500	\$0	\$6,106	10,140	307
6	Sanborn Elementary School: Retro-Commissioning	\$5,000	\$5,000	\$0	\$2,079	3,461	102
7	West Middle School: Retro-Commissioning	\$11,000	\$11,000	\$0	\$4,659	5,913	216
	West Middle School: Demand Control Ventilation	\$66,000	\$66,000	\$0	\$17,809	1,174	1,032
8	Town House: Retro-commissioning	\$5,900	\$5,900	\$0	\$2,063	3,174	1,008
Totals		\$248,799	\$309,747	\$60,928	\$163,668	464,405	47,494

Building Energy Consumption

Listed below are Project buildings, in priority order, including FY2011 energy usage in kWh and therms. None of these buildings used heating oil in FY2011. Priorities were determined based on the payback and impact of the proposed measure, and the future plans for that particular building. Two buildings which are slated for replacement were immediately excluded.

Priority	Building	Funding Requested	Electricity		Natural Gas	
			FY2011 Usage (kWh)	Projected Annual Savings (kWh)	FY2011 Usage (therms)	Projected Annual Savings (therms)
1	Public Safety Center	\$14,525	744,900	70,680	52,074	13,872
2	Memorial Hall Library	\$18,964	625,600	49,311	23,745	3,851
3	Town Offices	\$13,618	612,466	51,390	24,169	1,909
4	Andover High School	\$104,292	2,004,743	269,162	132,586	25,197
5	West Elementary	\$9,500	443,400	10,140	69,511	307
6	Sanborn Elementary	\$5,000	201,360	3,461	32,029	102
7	West Middle School	\$77,000	343,440	7,087	65,969	1,248
8	Town House	\$5,900	62,280	3,174	9,834	1,008
	Totals	\$248,799	5,038,189	464,405	409,917	47,494
			Savings	9.2%		11.6%

### Outreach and Education

Andover High School will partner in this Project, and through education and outreach, will connect to the school and town community using its established student intern program.

#### Background

Andover High School supports two courses in which students can pursue individualized projects. In the Independent Project course, a student (any grade) works with a faculty advisor every other day for a single semester. In the Senior Exhibition course, a senior works with a faculty advisor either every other day or every day for the entire school year. The blocks (class periods) at AHS are 82 minutes long. Each year, Melanie Cutler and Mollie Shenker, Environmental Science Teachers at AHS work with several students on environment-related Independent or Senior Exhibition projects. Past projects include a waste-sorting and compost system in the AHS cafeteria, solar panel projects, and a project to convert a diesel-engine car to run on vegetable oil. Currently, a student is working on an Independent Project to reduce energy use at AHS. He is helping the school to organize The Biggest Loser Competition, a national energy-reduction competition sponsored by the Alliance for Climate Education. In this competition, which will occur over a 3 week period in May, he will train volunteers to measure energy use using a “kill-a-watt” meter and record energy-reduction results from behavioral changes. The student will analyze and publish results of the competition.

#### Andover Building Efficiency Project Partnership

During the next school year, 2012-2013, a student intern recruit will continue to work with community members and other town officials to help the town reduce energy use and costs, building on current efforts. This Green Community Project, if funded, will afford an excellent opportunity for the student(s)

to experience energy management in action. The intern will learn about retro-commissioning and demand control ventilation as it relates to energy use and have access to the Project Team to discuss expected energy savings and the philosophy used to prioritize and select energy saving measures. This intern will analyze energy management data with their advisor and our Project community volunteer, identify areas of significant energy use, and work to develop and implement plans for action. The student may begin the work of implementing and identifying low- and no-cost energy conservation measures throughout the school that could be mirrored at other locations in Town.

As the intern collects and analyzes town energy-use and energy-reduction data, he or she will write press releases and outreach to local news sources (Andover Townsman newspaper, Andover Community Cable Television, and the Andover High School student newspaper). The student will present results to Town officials along with a final report. All of this work requires no funding as it will be incorporated into the Andover High School existing student intern program.

#### Time Line

September 2012: Recruit 2012-2013 AHS Energy Intern (from existing Environmental Club students)

November 2012: 1<sup>st</sup> Press Release to publish progress of Andover's energy reduction efforts

January 2013: 2<sup>nd</sup> Press Release to publish progress of Andover's energy reduction efforts

April 2013: 3<sup>rd</sup> Press Release to publish progress of Andover's energy reduction efforts

June 2013: Final Report to publish progress of Andover's energy reduction efforts

#### **Project Team**

##### Construction:

Ralph Knight, MSME – Project Team Leader

Ralph Knight has been the Superintendent of Mechanical and Electrical at the Town of Andover Plant and Facilities Department for over 10 years, overseeing all maintenance and design of Town-wide Building Automation (BAS), heating, ventilation and air conditioning systems (HVAC). Ralph holds a master's degree in mechanical engineering and an MBA. Ralph will direct the Project Team. He will interview vendors, review and direct scope, select vendors, and schedule the project.

Dwayne Scruton – Project Team

Dwayne is the Working Foreman of Mechanical and Electrical at the Town of Andover with 15 years experience with Town-wide BAS, HVAC, Plumbing and Electrical. Dwayne is a Master-Unrestricted Sheet Metal Worker and has attended numerous training courses by Johnson Controls. Dwayne will serve as the primary site contact for the contractors and will work with them to implement energy management and equipment alterations. He will assure continuity of service for the school and coordinate efforts and manpower.

**Dave Ouellette – Project Team**

Dave is an HVAC Technician with the Town of Andover with 12 years experience maintaining and installing Town-wide BAS and HVAC systems, and has attended numerous training courses by Johnson Controls. Dave will work with implementation along with the contractors and the construction team.

Dwayne and Dave also hold several technical licenses, including Oil Burner Technician and Refrigeration. The Town of Andover Plant and Facilities Department also employs three full time electricians and a plumber, among other tradesmen, who may be called upon during this project if needs arise.

Finance and Administration:

**Maria Maggio – Project and Financial Oversight**

Maria Maggio is the Acting Director of Plant and Facilities Department. Maria has over 9 years at the Town of Andover overseeing and budgeting construction projects. She holds a master's in Computer Information Systems. Maria, as Department Head, approves all Plant and Facilities purchase and payments. She is also responsible for Town-wide utility tracking, budget projections and energy contracts.

**Janet Nicosia – Administrative Support**

Janet is a Records Clerk in the Plant and Facilities Office. She has over 8 years experience in accounts payable, utility tracking and assists in budgetary projections and reports. She is experienced in grant records management. She holds bachelors of Finance, and an MS Geo-Information Science.

Education and Community Outreach:

**Melanie Cutler – Project Outreach and Education Supervisor**

Melanie is an Andover High School Environmental Science and Biology teacher, and the Faculty Advisor to the student Environmental Club and to the Senior Exhibition Project. She has a MS in Environmental Science. Melanie will recruit and direct student outreach and education; and will be responsible for keeping our student volunteers on track with deadlines and deliverables.

**Anil Navkal –Education Community Volunteer.**

Anil is a member of the Andover Green Advisory Board. Anil will act as student mentor and volunteer. Anil holds Masters in Electrical Engineering and Computer Science. Anil also has 7.7KW solar installation system at his house producing 20KWh per day.

Potential Contractors:

The Town of Andover is interviewing several experienced building engineers to gain an understanding of the scope of services included in retro-commissioning. Information on the three vendors is summarized below. The scope of services will likely include specifications for demand control ventilation placement and settings, however, the installation of DCV will be performed by in house technicians.

B2Q Associates, Inc., North Andover, MA – B2Q completed several of the building audits used to create Andover’s Energy Reduction Plan. They specialize in building engineering design, commissioning for building efficiency. This contractor already has a working knowledge of Andover’s building systems.

RDK Engineers, Andover, MA – RDK has designed several projects in Andover in recent years, and specializes in building systems design and commissioning.

EnerNOC, Inc., Boston, MA – EnerNOC is a national commercial building systems and energy management engineering firm. Their firm has considerable experience in demand response nationally, and retro-commissioning in California, but has only recently started a retro-commissioning team locally. They may provide sophisticated computer modeling, however, the value added is yet to be determined.

**Town of Andover Five Year Energy Reduction Plan**

Andover conducted energy audits of all Town and School buildings in 2008-2009. These audits were used to create our Five Year Energy Reduction Plan. Working cooperatively with NGrid, the Town retrofitted lighting in most buildings. Partial funding for this project came from our prior Green Community Grant and subsidized National Grid loan programs. These lighting retrofit projects are highlighted in blue in the spreadsheet below, as well as some other measures that were undertaken in house which are also highlighted in blue.

Energy efficiency measures included in this grant request are highlighted in orange in the spreadsheet below. All proposed measures were identified in the Town’s original Energy Reduction Plan. Receiving this grant will help Andover make significant progress towards implementation of the plan.

Green Communities Competitive Grant Program 2012: Town of Andover Building Efficiency Project

Town of Andover Energy Reduction Plan		Projected Annual Savings MMBTU
Building	Action Item	
Andover High School	Lighting Upgrade	1,378
	Demand Control Ventilation	2,829
	Vending Machine Controls	55
	Kitchen Hood Controls	5
	BAS Recommissioning	609
	Low Cost Recommissioning	403
	Premium Motor Upgrade	4
Bancroft Elementary-to be replaced		0
Doherty Middle School	Lighting Upgrade	266
	Retro-Comissioning	27
High Plain/Wood Hill	Lighting Upgrade	106
	Motion Sensors	28
	Retro-Comissioning	50
	Variable Frequency Drives	94
Sanborn Elementary	Lighting Upgrade	230
	Motion Sensors	3
	Demand Control Ventilation	44
	Retro-Comissioning	22
Shawsheen Elementary-to be taken off-line		77
South Elementary	Lighting Upgrade	363
	Motion Sensors	11
	Retro-Comissioning	15
	Variable Frequency Drives	31
West Elementary	Lighting Upgrade	48
	Motion Sensors	10
	Demand Control Ventilation	85
	Retro-Comissioning	65
	Variable Frequency Drives	169
West Middle	Lighting Upgrade	355
	Demand Control Ventilation	107
	Retro-Comissioning	42
	Variable Frequency Drives	57
Memorial Hall Library	Lighting Upgrade	353
	Demand Control Ventilation	233
	BAS Recommissioning	321
	Low Cost Recommissioning	47
	Multi Zone to VAV Conversions	230
	Variable Frequency Drives	13
	Premium Motor Upgrade	4
	Boiler Retrofit	388
	Computer Power Management	9
Public Safety Center	Lighting Upgrade	220
	Vending Machine Controls	11
	BAS Recommissioning	1,562
	Low Cost Recommissioning	263
	Demand Control Ventilation in Mtg Rm	177
	Seal Hose Tower with Door	66
Street Lights	Turn off select lights	870
Town House	Lighting Upgrade	64
	Demand Control Ventilation	155
	BAS Recommissioning	112
	Low Cost Recommissioning	12
	Computer Power Management	1
Town Offices	Lighting Upgrade	708
	Retro-Comissioning	366
	Low Cost Recommissioning	43
	Computer Power Management	43
		13,858
	COMPLETED	
	PROPOSED IN THIS GRANT	

## **Questions and Contacts**

Questions regarding this application can be directed to:

Janet Nicosia, Records Clerk  
Plant and Facilities Department  
Town of Andover  
36 Bartlet Street  
Andover, MA 01810  
[jnicosia@andoverma.gov](mailto:jnicosia@andoverma.gov)  
Ph. 978-623-8373  
Fax 978-623-8290

or

Maria Maggio, Acting Director  
Plant and Facilities Department  
Town of Andover  
36 Bartlet Street  
Andover, MA 01810  
[Mmaggio@andoverma.gov](mailto:Mmaggio@andoverma.gov)  
Ph. 978-623-8280  
Fax 978-623-8290