



Quarterly Report Q2 2012

The Commonwealth of Massachusetts
Accelerated Energy Program
2012-2014

www.mass.gov/dcam/aep



Governor Deval Patrick
Lt. Governor Timothy P. Murray

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Division of Capital Asset Management
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Table of Contents

Introduction	3
Program Goals & Objectives	4
Program Planning & Definition.....	5
Program Status.....	11
AEP Spotlight.....	25
Program Exposures.....	35
Financial Plan.....	38
Implementation Committee Working Group Accomplishments	40
Appendix A – Performance Metrics.....	55
Appendix B – Program Planning and Definition Methodologies.....	59
Appendix C – Financial Plan.....	65
Appendix D – List of AEP Sites by Executive Office	
Appendix E – List of AEP Sites by Implementation Group	

Introduction

The Commonwealth of Massachusetts is recognized as a leader in energy and water efficiency with its establishment of energy policies and the implementation of innovative, sustainable, and economical energy and water solutions. In 2011, the American Council for an Energy Efficient Economy (ACEEE) ranked Massachusetts number one in the nation for energy efficiency, the Energy Services Coalition (ESC) ranked Massachusetts third in the most performance contracting dollars spent per capita and the US Green Building Council (USGBC) ranked Massachusetts in the top 10 states for the most square feet of space to earn LEED certification per capita.

The Accelerated Energy Program (AEP) was established in December 2011 to accelerate the implementation of energy and water projects across the Commonwealth and help the Commonwealth comply with Executive Order 484, Clean Energy and Efficient Buildings, signed by Governor Patrick in April 2007. The Division of Capital Asset Management (DCAM) is working with the Department of Energy Resources (DOER) and other partners to retrofit 700 sites encompassing nearly 4,800 buildings throughout the Commonwealth over the next three years.

In the second quarter of 2012, the AEP team worked to finalize a planning and implementation strategy for the AEP and began to retrofit sites. After categorizing sites into appropriate implementation groups, the team developed financial projections for all 700 sites in the AEP. The Commonwealth plans to invest over \$425 million in energy and water conservation improvements to implement the AEP, with an expected savings on the order of \$43 million annually.

In addition to the energy planning accomplished during Q2 2012, the Commonwealth initiated work at 99 sites, completed energy projects at 6 sites, and determined that 22 sites do not use energy or are otherwise not applicable for energy work. At the end of the quarter, 17% of the way through the expected timeline of the program, 18% of the 700 AEP sites have been initiated, completed, or otherwise evaluated – right on schedule.

The AEP Quarterly Report for Q2 2012 contains detailed updates on the program definition, implementation status, and financial projections, and highlights innovative solutions for procurement, implementation, and outreach for the AEP. Also included are profiles of several sites in the AEP and an overview of each Working Group – both the work completed in Q2 and the tasks ahead as the Accelerated Energy Program moves into the third quarter of 2012.

Program Goals & Objectives

DCAM and DOER are working with a number of partners, including agencies and utilities, to accomplish the six main objectives of the AEP:



¹AEP Metrics are provided in Appendix A.

²ACEEE is the American Council for an Energy Efficient Economy.

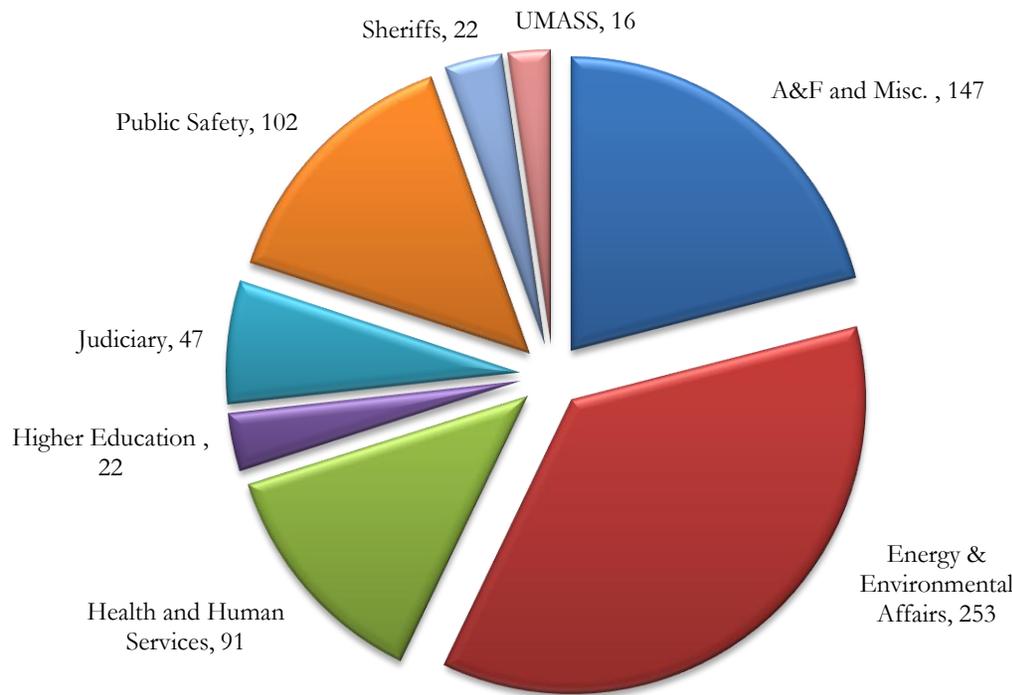
Program Planning & Definition

There are 818 sites in the Commonwealth’s capital asset inventory. A total of 118 were excluded from the AEP because they are not currently in use, are considered retrofitted through recent prior projects, or do not consume energy. The remaining 700 sites will be retrofitted through the AEP. Appendix B provides a summary of the methodology to arrive at the total of 700 sites within the AEP.

During Q2 2012, DCAM defined the number and project categorization of each site. DCAM expects to continuously refine the implementation strategy as new information is gained through energy audits and surveys.

The graphic below provides an overview of the 700 sites by Program Area. A full list of AEP sites is provided in Appendices D and E.

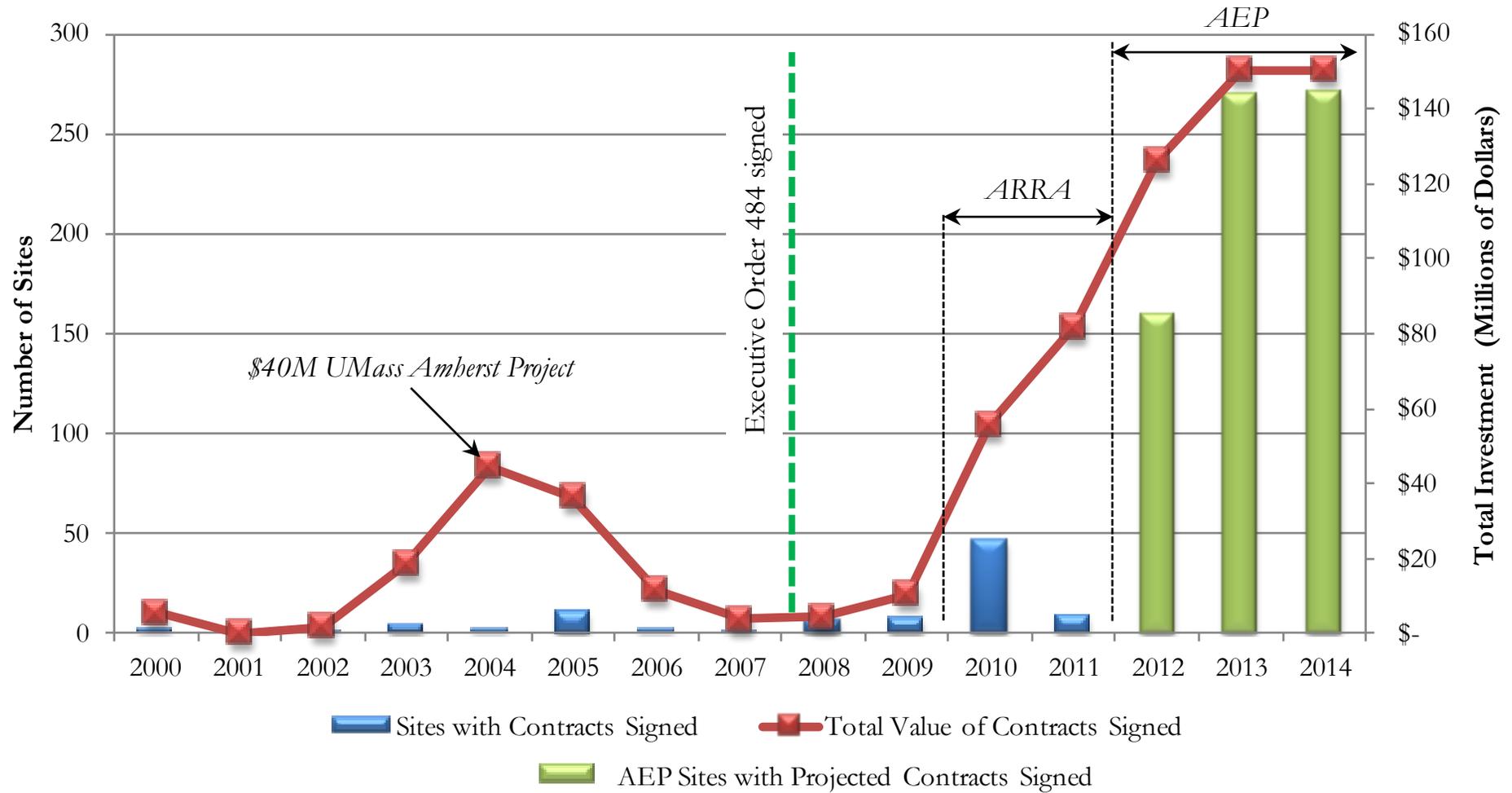
AEP Sites by Program Area



**AEP Scope
700 Sites**

Accelerated Energy Program

The Patrick-Murray Administration has greatly expanded the Commonwealth's investment in energy and water conservation. In December 2011, the Patrick-Murray Administration established the Accelerated Energy Program (AEP) to accelerate and expand energy and water conservation projects.



Implementation Planning

DCAM and DOER have developed a comprehensive implementation strategy for the sites in the AEP. The implementation strategy and conservation measures recommended are based on several site characteristics such as size, building usage, and energy usage intensity. This approach allows the Commonwealth to leverage existing retrofit programs with utilities and facility maintenance staff.

Small Sites: Simple Fix

The Simple Fix group represents the largest number of sites and buildings, but only represents a small percentage of square footage in the AEP. There are **438 small sites** with **2,366 buildings** (generally less than 5,000 sq. ft.) that have relatively simple electrical equipment or HVAC systems. The majority of the sites in the Simple Fix Implementation Group are managed by the Department of Conservation and Recreation (DCR) and the Massachusetts Department of Transportation (MassDOT). Within the DCR sites, most are parks, state forests or reservations.

The majority of the Simple Fix measures will be lighting upgrades (bulbs, fixtures, lamps, LEDs), lighting controls, HVAC filters, resetting control setpoints, programmable thermostats, simple weatherization (weather stripping, caulking, window film, etc.) and water conservation. Retrofit projects will have low initial cost and will provide immediate energy savings.

DCAM and DOER are currently working with investor-owned electric utility providers to explore opportunities for implementing retrofits through the utilities' Direct Install Program. There are **74 sites** located in municipal electric utility territories. DCAM and DOER are currently exploring several options for retrofits at these sites including a centralized implementation approach procured by DCAM or working directly with local agency staff.

Medium Sites: Audit – Whole Building Analysis (WBA)

There are **162 medium sites** with **661 buildings** (generally between 5,000 and 50,000 sq. ft.) that are composed of offices, residences, skating rinks, and pools.

In the addition to the Simple Fix measures described above, there are measures with a higher degree of complexity and cost that are applicable for this implementation group. These measures included window film, steam trap replacement, motor replacement, duct sealing, variable frequency drives (pumps, fans, cooling towers), kitchen hood controls, high efficiency fans, high efficiency pumps, high efficiency boilers, insulating piping & equipment, occupancy sensors to override HVAC equipment and increased building insulation. The majority of the buildings that will receive these types of measures will most likely be greater than 35,000 ft.³ thereby requiring licensed professionals to design and install the measures after obtaining appropriate permits.

DCAM and DOER are pursuing various avenues to conduct whole building analyses through either utility programs or its own vendors as appropriate and beneficial. DCAM will utilize its own consultants to conduct the audits when deemed appropriate and will hire more firms as needed to perform these services.

Implementation of the measures identified through WBA will be handled through the strategies described in the Implementation Planning section.

Large Sites: Retro-Commissioning (RCx)

E.O. 484 requires that all buildings over 50,000 square feet be retro-commissioned. Retro-commissioning is the application of the commissioning process to existing buildings that improves how building equipment and systems function together. Depending on the age of the building, retro-commissioning can often resolve problems that occurred during design or construction, or address problems that have developed throughout the building's life. Retro-commissioning improves a building's operations and maintenance (O&M) procedures to enhance overall building performance.

There are **14 sites** (larger than 50,000 square feet) with **116 buildings** planned for retro-commissioning as part of the AEP. Many of these buildings are on sites with additional, smaller buildings. Typically, retro-commissioning of smaller buildings does not generate enough savings to justify an investment in detailed engineering analyses. As such, retro-commissioning is planned only for the larger buildings on these sites; other approaches will be pursued for the smaller buildings.

DCAM developed an approach to programmatically distinguish which buildings will be targeted for RCx level audits and upgrades and which smaller buildings will be targeted for simple fix work.

Large Sites: Comprehensive Retrofit

There are **48 sites** (larger than 100,000 square feet) with **704 buildings** identified for comprehensive retrofits as part of the AEP.

E.O. 484 requires that DCAM retrofits all sites over 100,000 square feet. Comprehensive retrofit projects will involve complex measures requiring longer construction durations and, in most cases, a design phase. These measures include the combination of major renovations such as HVAC systems, energy management systems, and building envelope improvements. Comprehensive projects will provide the greatest savings and improvements in energy efficiency across the state inventory.

DCAM has shortened the overall procurement duration for energy design-build and comprehensive performance contracts by 67% through Lean process improvements. More discussion of the Lean process is found in the Procurement Working Group section.

New Review

DCAM retrofitted **16 sites** between 2000 and 2007 that will be re-evaluated for additional savings as part of the AEP. DCAM will review these sites (encompassing **578 buildings**) and identify additional energy savings potential since the last major improvement was completed. Savings will only be achieved if DCAM identifies a viable project.

Evaluated – N/A

There are **22 sites** with **373 buildings** that do not consume energy resources or do not require energy retrofits. These sites were determined to have extremely low or no potential to save energy. This may be due to the fact that these sites are scheduled to close before the useful life of new measures is reached or their structures do not consume energy (fire towers, etc.).

The following table illustrates potential ECMs by Implementation Group for the AEP:

ECM	Implementation Group			
	Simple Fix	Whole Building Analysis	Retro-Commissioning	Comprehensive
Group 1 (Short payback, mini-audit, ready to build)				
Lighting Upgrades (lamps, LED's)	✓	✓	✓	✓
Lighting Controls	✓	✓	✓	✓
Low Resistance Air Filters	✓	✓	✓	✓
Resetting Control Setpoints	✓	✓	✓	✓
Programmable Thermostats	✓	✓	✓	✓
Weather Stripping	✓	✓	✓	✓
Water Conservation	✓	✓	✓	✓
Window Film		✓	✓	✓
Steam Trap Replacement		✓	✓	✓
Motor Replacement		✓	✓	✓
Seal leaking ductwork		✓	✓	✓
Retro-Commissioning		✓	✓	✓
Measurement and Verification		✓	✓	✓
Variable Frequency Drives (Pumps, Fans, Cooling Towers)		✓	✓	✓
Group 2 (Medium payback - Study and detailed design)				
Kitchen Hood Controls		✓	✓	✓
High Efficiency Fans		✓	✓	✓
High Efficiency Pumps		✓	✓	✓
High Efficiency Boilers		✓	✓	✓
Insulating piping & equipment		✓	✓	✓
Provide occupancy sensor to override HVAC equipment		✓	✓	✓
Increased building insulation		✓	✓	✓
Metering			✓	✓
Convert constant volume systems to Variable volume			✓	✓
Energy Dashboard			✓	✓
New windows or storm windows			✓	✓
Energy Recovery			✓	✓
Solar Thermal			✓	✓
Add Vestibules at Building Entrances			✓	✓

ECM	Implementation Group			
	Simple Fix	Whole Building Analysis	Retro-Commissioning	Comprehensive
Group 3 (Long payback - Feasibility study, design)				
Photovoltaic's			✓	✓
Natural Ventilation			✓	✓
Solar Thermal			✓	✓
Rainwater harvesting			✓	✓
Load shedding				✓
Wind Turbines				✓
CHP and/or cogeneration				✓
Synchronous fan drives				✓
Geothermal				✓
Chilled Water Storage				✓
Ice Thermal Energy Storage				✓
Recovery Cooling Coil Condensate				✓
Asymmetrical chiller sizing				✓

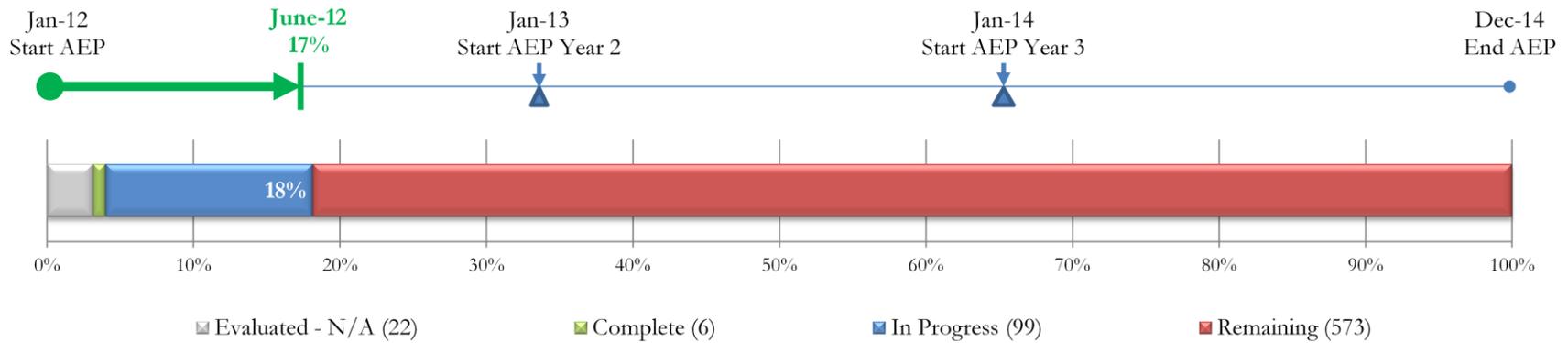
Program Status

The AEP has 700 working days from March 1, 2012 to December 31, 2014. DCAM and DOER plan to “Green” 700 sites in this period. To date we have initiated work at 105 sites in the AEP. Of the 105 sites, 99 are currently in progress (study, procurement, or construction) and 6 projects have completed construction.



Schedule Status

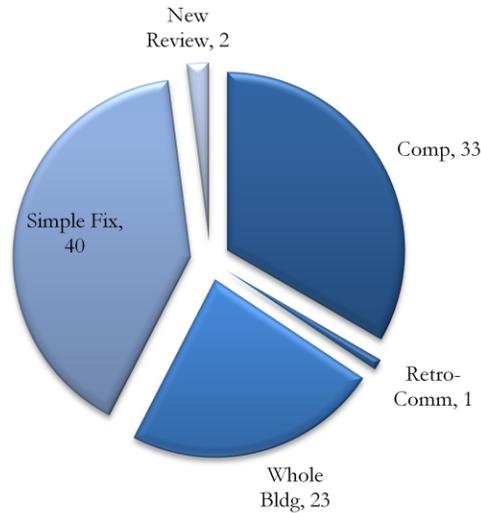
As of the end of Q2 2012, the program has been in place for 6 months (17% of the total duration of the AEP) and seen 127 sites evaluated, in progress, or complete (18% of the AEP.) The pie charts below provide a summary status of the AEP implementation by group.



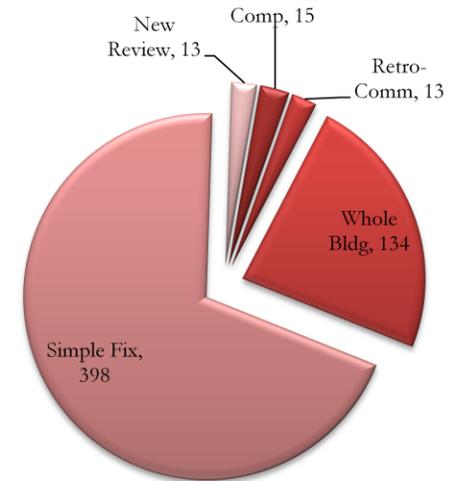
Number Complete (6)



Number In Progress (99)

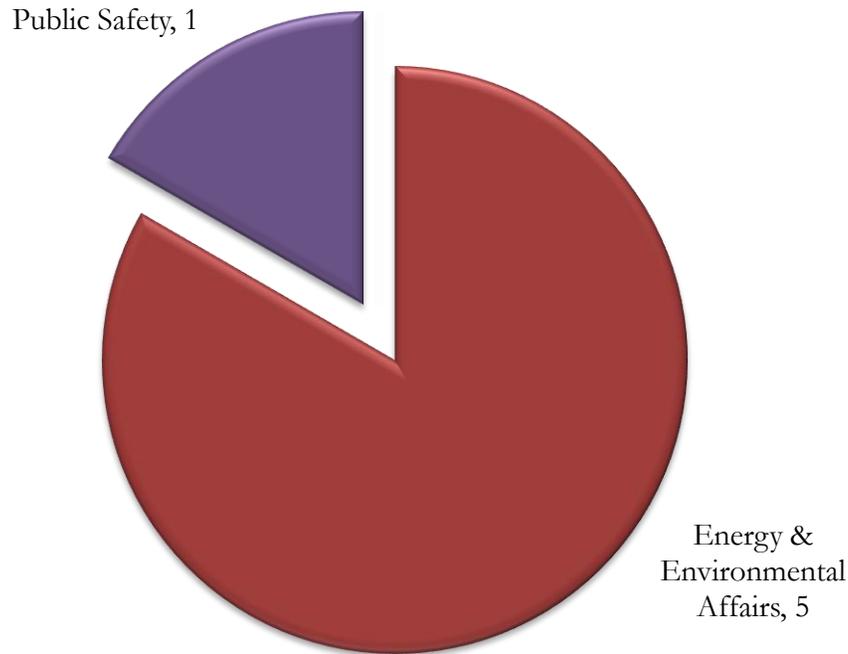


Number Remaining (573)



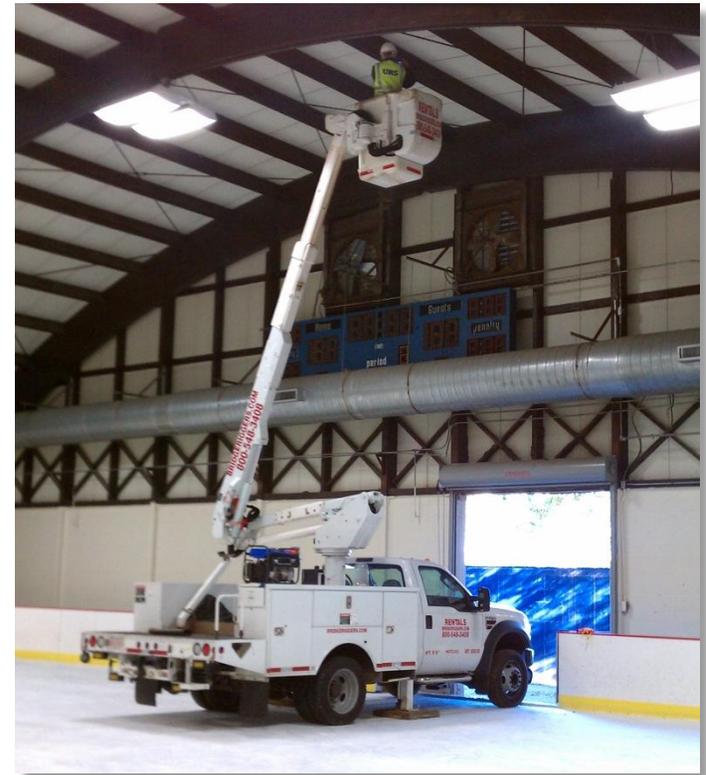
Complete Sites

Number Complete: 6 Sites



Five Department of Conservation and Recreation skating rinks have been retrofitted with reflective ceilings. These projects were managed by DOER using ARRA funding.

One Department of Correction site, MCI Norfolk, has completed a water conservation project.



Murphy Memorial Rink

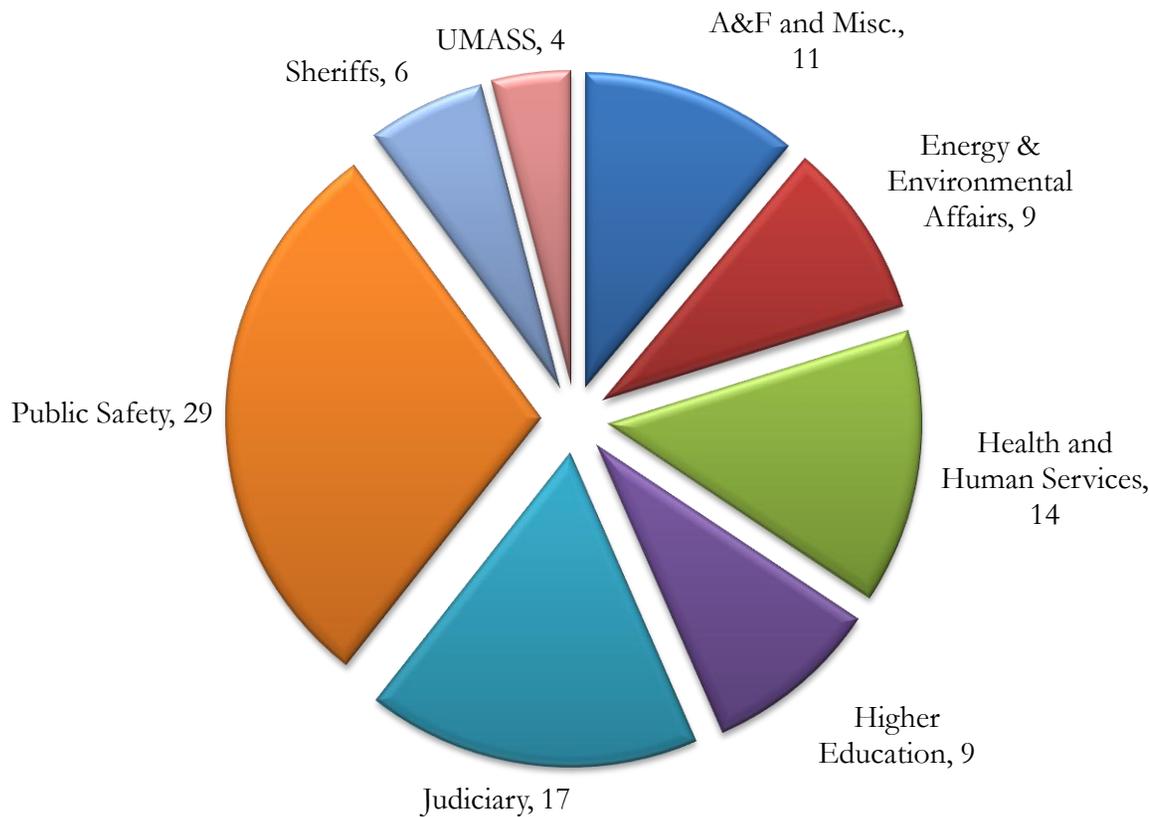
Complete
 On Hold

Completed this Quarter
 Planned next Quarter

Site Information				AEP Program Status						
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish
Complete Simple Fix Facilities				Total		0				
Complete Audit - Whole Building Analysis Facilities				Total		5				
Energy & Environmental Affairs	Dep. Of Conservation & Recreation	AUBR3	HORGAN MEMORIAL SKATING RINK	DOER	Ceiling Upgrades	NStar	●	●	●	●
		MDC25	RINK/DEVINE MEMORIAL	DOER	Ceiling Upgrades	NStar	●	●	●	●
		MDC33	RINK/BAJKO MEMORIAL	DOER	Ceiling Upgrades	NStar	●	●	●	●
		MDC45	MARINE PARK RESERVATION	DOER	Ceiling Upgrades	NStar	●	●	●	●
		MDCD6	POOL & RINK/CONNELL MEMORIAL	DOER	Ceiling Upgrades	NStar	●	●	●	●
Complete Audit - RCx Facilities				Total		0				
Complete Audit - Comprehensive Facilities				Total		0				
Complete New Review Facilities				Total		1				
Public Safety	Dep. Of Corrections	DOC08	MCI - NORFOLK	DOC	Water Conservation	TRC	●	●	●	●

In Progress Sites

Number In Progress: 99 Sites



The following major milestones have been achieved through Q2 2012:

- Department of State Police – Audits initiated at 27 sites
- DCR and MassDOT – Audits initiated at 14 sites. 11 of the audits were completed this quarter
- Department of Mental Health – Audits initiated at 8 sites
- State House – Construction started on lighting project
- Government Center Complex – Finalizing audits at 5 sites
- Middlesex Community College – Construction started on ground source heat pump project

Complete
 On Hold

Completed this Quarter
 Planned next Quarter

Site Information				AEP Program Status						
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish

In Progress Simple Fix Facilities **Total 40**

A&F and Misc.	MassDOT	DPW50	MHD DARTMOUTH FAUNCE CORNER-D5	NStar	Lighting and lighting controls.	AECOM	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		DPW51	MHD DARTMOUTH STATE RD-D5				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		DPW95	MHD MATTAPOISETT DEPOT-D5				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		DPWF5	MHD SHARON/WALPOLE DEPOT-D5				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Energy & Environmental Affairs	Dep. Of Conservation & Recreation	HPSP3	HOPKINTON STATE PARK	DCAM	Lighting, lighting and HVAC controls, insulation, refrigerator replacement, and water conservation.	EE&D	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		MDC69	NANTASKET BEACH RESERVATION				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		MTOM4	MOUNT TOM RESERVATION				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		OTTR4	OTTER RIVER STATE FOREST				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		WLDN2	WALDEN POND STATE RESERVATION				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		WOMP2	WOMPATUCK STATE PARK				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Public Safety	Dep. Of State Police	POL01	ANDOVER STATE POLICE BARRACKS	DCAM	Energy Performance Contract including lighting, occupancy controls, EMS, boilers and water conservation.	Constellation New Energy	<input checked="" type="checkbox"/>			
		POL02	ATHOL STATE POLICE BARRACKS							
		POL03	BOURNE STATE POLICE BARRACKS							
		POL04	BROOKFIELD STATE POLICE TROOP C							
		POL05	CHESHIRE STATE POLICE STATION							
		POL06	CONCORD STATE POLICE BARRACKS							
		POL08	FOXBOROUGH STATE POLICE BARRACKS							
		POL11	HOLDEN STATE POLICE TROOP C							
		POL12	LEE STATE POLICE BARRACKS							
		POL13	LEOMINSTER STATE POLICE BARRACKS							
		POL14	MIDDLEBORO STATE POLICE BARRACKS							
		POL16	NEWBURY STATE POLICE STATION							
		POL17	NORTHAMPTON STATE POLICE BARRACKS							
		POL18	NORWELL STATE POLICE BARRACKS							

Site Information				AEP Program Status						
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish

In Progress Simple Fix Facilities **Total 40**

Public Safety	Dep of State Police	POL19	OAK BLUFFS STATE POLICE BARRACKS	DCAM	Energy Performance Contract including lighting, occupancy controls, EMS, boilers and water conservation.	Constellation New Energy	●			
		POL20	RUSSELL STATE POLICE BARRACKS							
		POL21	SHELBURNE STATE POLICE BARRACKS							
		POL22	SPRINGFIELD STATE POLICE BARRACKS							
		POL23	STURBRIDGE STATE POLICE BARRACKS							
		POL24	STATE POLICE CRIME LAB							
		POL25	YARMOUTH STATE POLICE BARRACKS							
		POL27	REVERE STATE POLICE BARRACKS							
		POL29	S. BOSTON STATE POLICE- 125 WJD							
		POL31	DANVERS STATE POLICE BARRACKS							
		POL32	MEDFORD STATE POLICE BARRACKS							
		POL33	SPECIAL OPERATIONS MARINE DIVISION							
		POL36	MILTON POLICE BARRACKS	DOER	Indoor Lighting		●	●	●	○
Public Safety	Military	MIL11	ARMORY - CONCORD	DCAM	Lighting, lighting and HVAC controls, insulation, refrigerator replacement, window replacement, and water conservation	EE&D	●	●	○	
Sheriffs	Sheriffs Dep. at Worcester	SDW00	SHERIFF'S DEPT-WORCESTER-W BOYLSTON	DCAM	Wind Feasibility Study. Study complete, determining funding sources.		●	●	Hold	
UMASS	UMASS Amherst	UMA10	UMASS - WALTHAM	NStar	Lighting and lighting controls	NStar	●	○		

Site Information				AEP Program Status						
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish

In Progress Audit - Whole Building Analysis Facilities **Total** **23**

Energy & Environmental Affairs	Dep. Of Conservation & Recreation	MDC15	POOL & RINK/REILLY MEMORIAL	NStar	Lighting and lighting controls	NStar	●	○		
		MDC17	RINK/DALY MEMORIAL				●	●	○	
		MDC19	RINK/CHARLESTOWN MEMORIAL	DOER	Ceiling Upgrades		●	●	●	○
Health & Human Services	Dep. Developmental Services	DMR25	TEMPLETON DEVELOPMENTAL CENTER	DCAM	Wind Feasibility Study. MET Tower data complete, proceed into formal feasibility if the data is favorable.		●	Hold		
	Dep. Of Mental Health	DMH37	WORCESTER STATE HOSPITAL - Bryant & Other Buildings	DCAM	Energy Performance Contract including lighting, lighting controls, motors, mechanical, water and sewer conservation, steam traps, VFD's fans and pumps, insulation, weatherstripping, HVAC & kitchen hood controls, and metering.	Sebesta / JCI	●	○		
Judiciary	Trial Court	TRC05	DORCHESTER DISTRICT COURT	DOER	Indoor Lighting	Nstar	●	●	●	○
		TRC23	FRAMINGHAM DISTRICT COURT		Indoor Lighting	Nstar	●	●	●	○
		TRC46	SOMERVILLE DISTRICT COURT		Indoor Lighting	Nstar	●	●	●	○
		TRC49	WALTHAM DISTRICT COURT		Indoor Lighting	Nstar	●	●	●	○
		TRC51	WOBURN DISTRICT COURT		Indoor Lighting	Nstar	●	●	●	○
		TRC40	NEWTON DISTRICT COURT		Indoor Lighting	Nstar	●	●	●	○
		TRC52	WORCESTER COURTHOUSES	DCAM	Retro-Commissioning	SBS	●	○		
		TRC15	CHICOPEE DISTRICT COURT	DCAM	Energy Design Build Contract including lighting, lighting controls, EMS, water conservation, VFDs, vending misers, & replace boiler. Construction contract (ESA) expected to sign august	ARUP / B & G Mechanical	●	●	○	
		TRC28	HOLYOKE COURTHOUSE							
		TRC41	PALMER DISTRICT COURT							
		TRC47	SPRINGFIELD COURT COMPLEX							
		TRC59	NORTHAMPTON PROBATE & FAMILY COURT							
TRC60	HAMPSHIRE COUNTY COURT									

Site Information				AEP Program Status							
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish	
In Progress Audit - Whole Building Analysis Facilities				Total	23						
Judiciary	Trail Court	TRC63	SPRINGFIELD HOUSING/JUVENILE COURTS	DCAM	Energy Design Build Contract. (refer to prior page for details)		●	●	○		
		TRC64	PITTSFIELD DISTRICT								
		TRC65	PITTSFIELD SUPERIOR								
		TRC66	PITTSFIELD PROBATE AND FAMILY								
Sheriffs	Plymouth Sheriffs	SDP00	SHERIFF'S DEPT-PLYMOUTH-MAIN	DCAM	Water Retrofit	TRC	●	○			

Site Information				AEP Program Status						
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish
In Progress Audit - RCx Facilities				Total 1						
A&F and Misc.	Empl. & Training	DES04	JOB CENTER - TAUNTON	DCAM	Audit complete, Recommended measures include retro-commissioning, boiler replacement, lighting, lighting controls, vending misers, and demand controlled ventilation	EE&D	●	●	○	

Site Information				AEP Program Status								
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish		
In Progress Comprehensive Facilities				Total 33								
A&F and Misc.	Bureau of State Buildings	BSB00	HURLEY BUILDING	DCAM	Comprehensive Energy and Water Design Build Contract including VFDs, EMS, retro-commissioning, rainwater harvesting, & HVAC Lighting Upgrades	Kling Stubbins / TBD	●	○				
		BSB01	MCCORMACK BUILDING									
		BSB06	LINDEMANN BUILDING									
		BSB03	STATE HOUSE									
	Dep. Of Capital Assets	DCP02	STATE TRANSPORTATION BUILDING	DCAM	Comprehensive Energy and Water Design Build Contract.		●					
	DCP15	SPRINGFIELD STATE OFFICE DWIGHT ST	DCAM	Major Renovation including HVAC. Design, Bid, Build in design.								
Health and Human Services	Dep. Of Mental Health	DMH02	SOLOMON CARTER FULLER MENTAL HEALTH	DCAM	Energy Performance Contract including lighting, lighting controls, motors, mechanical, water and sewer conservation, steam traps, VFD's fans and pumps, insulation, weatherstripping, HVAC & kitchen hood controls, and metering. DYS Tauton assesement complete, construction expected next quarter.	Sebesta / JCI	●	○				
		DMH05	CAPE COD/ISLANDS MENTAL HEALTH CTR									
		DMH06	BROCKTON MENTAL HEALTH CTR									
		DMH11	CORRIGAN MENTAL HEALTH CTR									
		DMH16	HARRY C. SOLOMON MNTL HEALTH CENTER									
		DMH26	QUINCY MENTAL HEALTH CENTER									
		DMH32	TAUNTON STATE HOSPITAL									
		DMH40	DMH WESTERN MA AREA OFFICE									
	Dep. Of Youth Services	DYS15	DYS - TAUNTON									
	Dep. Of Public Health	DPH00	LEMUEL SHATTUCK HOSPITAL									
DPH02		MASS HOSPITAL SCHOOL										
DPH04		WESTERN MASS HOSPITAL - WESTFIELD										
Higher Ed.	Fitchburg State College	FSC01	FITCHBURG STATE UNIVERSITY	DCAM	Solar Thermal Pool Installations at 1 building on the campus	ARUP / TBD	●	○				

Site Information				AEP Program Status						
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish

In Progress Comprehensive Facilities	Total	33
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Higher Ed.	Mass Maritime Academy	MMA00	MASSACHUSETTS MARITIME ACADEMY	DCAM	Solar Thermal Pool Installations at 1 building on the campus	ARUP / TBD	●	○		
	Mass College of Lib. Arts	NAC00	MASS COLLEGE OF LIBERAL ARTS	DCAM	Comprehensive Energy and Water Design Build including lighting, HVAC, steam system improvements, biomass, and PV.	ARUP / TBD	●			
	Middlesex CC	MCC00	MIDDLESEX COMMUNITY COLLEGE	DCAM	Ground Source Heat Pump	ARUP / Coners	●	●		
	N Essex CC	NEC00	N ESSEX COMM COLLEGE-HAVERHILL	DCAM	Comprehensive Energy and Water Equipment Design Build including electric to gas heat conversion, EMS upgrades, HW Boiler replacement, and other energy efficiency measures.	Kling / Enterprise	●	●		
		NEC01	N ESSEX COMM COLLEGE-LAWRENCE							
	Salem State	SSA00	SALEM STATE UNIVERSITY	DCAM	Comprehensive Energy and Water Performance Contract including lighting, EMS, and water conservation	Sebesta / Consellation	●			
	Springfield Tech	STC00	SPRINGFIELD TECH COMMUNITY COLLEGE	DCAM	Heating and Cooling System Upgrade Study	Green Engineer / TBD	●			
	Westfield State	WSC00	WESTFIELD STATE UNIVERSITY	DCAM	Comprehensive Energy Design Build	TBD	●	Hold		

Site Information				AEP Program Status						
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish

In Progress Comprehensive Facilities **Total 33**

Public Safety	DOC	DOC06	NORTH CENTRAL CORRECTIONAL INSTITUT	DCAM	Comprehensive Energy Design Build including boiler replacement, convert steam dryers to natural gas, insulation, water conservation fixtures, and upgrade windows.	Kling / TBD	●	●	○	
Sheriffs	Dept. Berkshire	SDB00	SHERIFF'S DEPT-BERKSHIRE-NEW	DCAM	Energy and Water Design Building including ground mounted solar PV system.	Bart Bales	●	●		
		SDB01	SHERIFF'S DEPT-BERKSHIRE-OLD							
	Dept. Middlesex	SDM01	SHERIFF'S DEPT-MIDDLESEX-BILLERICA	DCAM	Energy and Water Design Building including lighting, HVAC, and water controls	TRC /TBD	●	○		
UMASS	UMass Boston	UMB00	UMASS - BOSTON	DCAM	Solar Thermal Pool Installations at 1 building at each campus	ARUP / TBD	●	○		
	UMass Lowell	LOW02	UMASS - LOWELL- LOWELL							

Site Information				AEP Program Status						
Program Area	Agency	Site Code	Site Name	Leading Org.	Project Description	Active Consultant / Contractor	Energy Assessment Start	Energy Assessment Finish	Installation Start	Installation Finish
In Progress New Review Facilities				Total		2				
Sheriffs	Suffolk Sheriff	SDS01	SHERIFF'S DEPT-SUFFOLK-COUNTY JAIL	DOER	Indoor Lighting	Nstar	●	●	●	○
UMASS	UMass Amherest	UMA00	UMASS - AMHERST	DCAM	Biomass Plant Project	Edwards-Kelcey / TBD	●	●	Hold	
					Small Energy Retrofit	ARUP / Thielsch	●	●	●	

AEP Spotlight – Simple Fix

Department of Conservation and Recreation

Wompatuck State Park

Hingham, MA

Status: Audit Complete

Project Overview:

In April 2012, Energy Engineering & Design, Inc. (EE&D) performed a detailed audit of the property and an analysis of the operation of the systems and equipment. The preliminary audit results suggest several small measures can be implemented to achieve energy savings, including:

- Lighting and lighting controls
- Programmable thermostats
- Attic insulation
- Storm window replacement
- Weather stripping or replacing doors
- Refrigerator replacement

The estimated cost of implementing these upgrades is just over \$42k, and they are expected to yield a savings of nearly \$13k annually – a simple payback of 3.3 years. In addition, the measures are expected to save nearly 10,000 kWh of electricity and 2,600 gallons of oil per year.



Wompatuck State Park



AEP Spotlight – Simple Fix

Executive Office of Labor & Workforce Development

Career Center

Taunton, MA

Status: Audit Complete

Project Overview:

In April 2012, Energy Engineering & Design, Inc. (EE&D) performed a detailed audit of the property and an analysis of the operation of the systems and equipment. The preliminary audit results suggest several small measures can be implemented to achieve energy savings, including:

- Demand controlled ventilation
- Replacing the boiler
- Lighting controls
- Computer management
- Vending Misers
- Retro-commissioning the BAS

The estimated cost of implementing these upgrades is under \$37k with an expected savings of \$16k – just a 1.1 year payback. In addition, the measures are expected to save nearly 50,000 kWh or electricity and 10,000 therms of natural gas per year.



Taunton Career Center



**Utility Costs and Electric End Use from EE&D Audit*

AEP Spotlight – Whole Building Analysis

Department of Conservation and Recreation

Energy Efficient Skating Rinks

Murphy Memorial – South Boston, MA

Reilly Memorial – Brighton, MA

Devine Memorial – Dorchester, MA

Bajko Memorial – Hyde Park, MA

Connell Memorial – Weymouth, MA

Status: In Construction / Complete

Project Overview:

DOER completed projects at five Department of Conservation and Resources ice rinks in Q2 2012. Using federal funding from the American Recovery and Reinvestment Act, low-emissivity ceilings were installed to reduce the energy use at each of the rinks and improve the ice quality. The new ceilings will reduce rink refrigeration loads by 25-40% and are expected to yield an estimated 30% or more in total energy savings. One rink manager was able to attest to the effectiveness of the ceilings – when installation was half finished at his building, he was able to measure a 20 degree temperature drop at ice level between the section of the rink that had the new ceiling and the half that did not.



Murphy Memorial Rink



AEP Spotlight – Retro-Commissioning

Judiciary

Worcester Trial Court

Worcester, MA

Status: Audit Initiated

Project Overview:

The Worcester Trial Court is a 420,000 square foot building that opened in 2007. The RCx audit investigates the function of the HVAC and lighting systems as well as the Energy Management Systems. Upgrades to building operations will ensure that the building is running as efficiently as it when it was first built. Depending on the retro-commissioning results, some quick payback ECMs may also be recommended for implementation.

Elsewhere in the Judiciary, 11 AEP sites and 15 other sites are bundled into larger projects, the former in study and the latter in construction.



Worcester Trial Courthouse

AEP Spotlight – Comprehensive Retrofit

Sheriff's Department Berkshire

Berkshire County Jail and House of Corrections Pittsfield, MA

Status: Study Initiated

Project Overview:

The Berkshire County Jail and House of Corrections is a 160,000 square foot facility dedicated in 2001. Large facilities can realize significant energy and water savings through comprehensive measures, such as those anticipated in the project at the Berkshire Jail and HOC, which include:

- Lighting improvements
- Occupancy sensors
- Metered timer controls for showers
- Condensing boilers
- Solar photovoltaic array for on-site power generation
- Solar thermal heating system for domestic hot water

The estimated investment of \$2.7M brings major savings that will result in just a 5.4 year simple payback. The timer controls on the showers will save an estimated 45,625 gallons of water per year alone, and the PV array is expected to generate 225 kW of power.



Berkshire County Jail and House of Corrections

AEP Spotlight – Comprehensive Retrofit

Higher Education

Northern Essex Community College

Haverhill, MA and Lawrence, MA

Status: Construction Contract Negotiations

Project Overview:

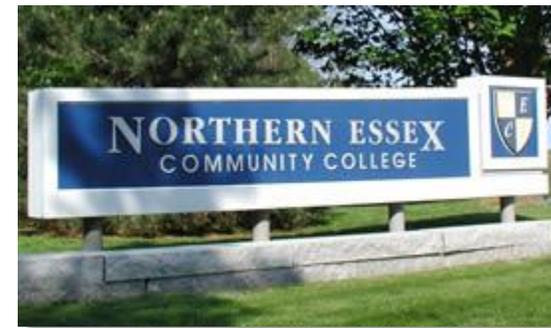
Northern Essex Community College includes sites at both Haverhill and Lawrence for a total of 422,111 square feet in the AEP. A comprehensive retrofit is currently in progress and includes measures such as:

- Lighting
- Premium efficiency motors
- Electric to gas heat conversion
- Energy Management System upgrades
- Building Insulation
- Demand control ventilation
- Replacement of hot water boiler

The investment is expected to yield \$350k per year in savings, including significant electricity consumption and demand savings by switching over from electric to gas heating at Haverhill.



Northern Essex Community College



AEP Spotlight – Comprehensive Retrofit

Department of Mental Health

Energy Performance Contract at Various DMH Sites

Status: Audit Initiated

Project Overview:

An AEP project currently underway includes state mental health facilities in Quincy, Lowell, Brockton, Fall River, Boston, Northampton, Westborough and Worcester and impacts a total of 1,997,737 square feet. The project involves a comprehensive retrofit and measures such as:

- Lighting upgrades
- Motors
- Energy Management System
- Domestic water/sewer conservation
- Variable Frequency Drives
- Building Insulation

The measures will upgrade the sites and allow them to save more than 400,000 kWh and \$129k per year.



Corrigan Mental Health Center



Cape Cod & Islands Mental Health Center

AEP Spotlight – Comprehensive Retrofit

Bureau of State Office Buildings

Massachusetts State House

Boston, MA

Status: Construction Initiated / Study Initiated

Project Overview:

The Massachusetts State House, home to the Governor's office and state legislature, is one of the most iconic buildings in the state. It is a 650,000 square foot building completed in 1798. There are two current projects at the State House – a large lighting upgrade, and a comprehensive project that also includes retrofits to the McCormack, Lindeman, and Hurley state buildings. Measures in the comprehensive project include:

- Pumps and fan motors – High efficiency Variable Frequency Drives (VFDs)
- Energy Management System dashboard
- Retro-commissioning and operational enhancements
- Rainwater harvesting
- Toilet fixtures
- VFDs on chilled water pumps
- Variable Air Volume (VAV) HVAC systems



Massachusetts State House

AEP Spotlight – New Review

University of Massachusetts

UMass Amherst

Amherst, MA

Status: In Construction / Study Initiated

Project Overview:

The University of Massachusetts at Amherst is the single largest site in the Commonwealth's inventory. As a result, DCAM has invested a significant amount in energy efficiency measures since 2000, including a \$43M Comprehensive energy project started in 2004 and a \$3M Cogeneration project started in 2009. Since the site is so large, however, UMass Amherst qualifies for a New Review of potential upgrades. Ongoing New Review projects include:

- Small energy retrofit project – ESA signed 6/27. Will invest \$1.7M in lighting upgrades and controls, fume hood controls, and optimization of chillers and the Central Heating Plant.
- New Biomass Plant – Study currently In Progress.

Additional projects and measures may be determined during the AEP.



University of Massachusetts – Amherst



UMass Amherst Central Heating Plant

AEP Spotlight – Partners

Each quarter, DCAM and DOER will recognize individuals and organizations for their contribution to the success of the AEP. This quarter DCAM and DOER recognize Stephen Brown and Yvonne Jones from DCR. In Q2, DCR provided innovative thoughts, attended numerous planning meetings and aided DCAM and DOER in advancing the goals of the AEP.

Some of their contributions include:

- Detailed coordination with site contacts to schedule test run audits
- Feedback on the results of the test run audits, the quality of the documents and the applicability of recommended ECMs in DCR facilities
- Suggestion and offer to provide DCR facility personnel to install simple fix ECMs identified in test run audits
- Self-directed initiatives to improve the efficiency of DCR facilities including a Green Team initiative being carried out at Waquoit Bay National Estuarine Research Reserve

It is thanks to these dedicated efforts and participation of Stephen and Yvonne, the AEP will be a success.



Program Exposures

The AEP is a complex program with a variety of stakeholders and contributors. Given the complexity of the program, the identification and mitigation of risks becomes an important factor in successful program management. The table below provides a list of the risks with planned response and owners responsible for risk mitigation. Risks are categorized by the area of the program which will be affected. The risk score represents a combination of the probability of that risk being realized and potential impact of that realized risk on the AEP.

Risk Identifier	Risk	Impact Description	Risk Score (1=Low 6=High)	Timeline	Risk Response	Risk Owner (Working Group)
Program Definition						
PD-R1	Difficulty in identifying all projects completed at each site	Site status not validated until Audit performed	3	Near term	Develop a detailed survey to identify energy projects completed at each site.	Data & Performance Management / Outreach & Technical Support
Implementation Planning						
IP-R1	Mapping of utility accounts to sites/buildings is incomplete	Cannot accurately assess energy savings	6	Near term	Develop a detailed survey to map utility accounts to sites/buildings.	Data & Performance Management / Outreach & Technical Support
IP-R2	Lack of consensus in definition of "Green" and set benchmark for completion	Cannot accurately track progress of AEP	2	Near term	Collaboratively develop a definition for completion.	Data & Performance Management / Communications
IP-R3	Estimated cost of implementing ECM's is understated	Not enough funds to complete program	4	Near term	Specific identification of work required for each ECM. Developing a strong database of construction costs.	Data & Performance Management
IP-R4	All requested funding not in place (bond bills, utility rebates, etc.)	Not enough funds to complete program	6	Near term	Develop a project prioritization list based on highest return on investment or critical needs.	Procurement
IP-R5	Development of inaccurate financial plan	Not able to execute projects	3	Near term	Develop a financial plan based on finalized list of potential opportunity sites.	Procurement
IP-R6	Site implementation grouping changes throughout program.	Not enough funds to complete program	6	Near term	Finalize all site implementation groupings during planning and include contingency in estimated costs.	Data & Performance Management / Procurement
Project Management						
PM-R1	Identification of individual projects does not occur in a timely manner	Not able to initiate and procure projects	6	Near term	Develop a detailed plan for project implementation including bundled projects.	Simple Fix / Audits

Risk Identifier	Risk	Impact Description	Risk Score (1=Low 6=High)	Timeline	Risk Response	Risk Owner (Working Group)
Project Management						
PM-R2	Negotiation of Simple Fix contracts with utility companies fails to result in agreement	Schedule impacts to all projects and overall program	6	Near term	Develop alternative delivery methods for Simple Fix projects independent of utility companies.	Simple Fix
PM-R3	Utility rebate programs do not meet funding requirements	Not able to fund all projects	3	Mid-term	Identify alternate sources of funding.	Simple Fix / Audits
PM-R4	Inadequate House Doctor resources to perform all audits	Not able to perform all audits in a timely manner	4	Near term	Expand current pool of approved House Doctors to handle higher volume of audits.	Audits
PM-R5	Inadequate internal project management resources to handle increased volume of projects	Schedule impacts to all projects and overall program	6	Mid-term	Augment existing project management staff by outsourcing or bring in additional long term hires within DCAM.	Implementation Committee
Center of Excellence						
CE-R1	Inadequate resources for developing and implementing training	Training program launch delayed or cancelled	4	Mid-term	Identify DCAM staff available for developing curriculum and training. Outsource curriculum and training.	Outreach & Technical Support / Labor & Workforce Development
CE-R2	Coordination efforts with Integrated Facility Management does not occur	Site shutdown not coordinated with AEP	2	Mid-term	Coordinate with IFM/MAFMA to determine implementation approach for consolidated sites.	Outreach & Technical Support / Data & Performance Management
CE-R3	Collection of all energy consumption and accounting data for dashboards does not occur	Energy dashboard initiative not completed	6	Mid-term	Identify and assess the data collection and energy accounting system. Develop alternative methods for collecting and analyzing energy consumption and financials.	Outreach & Technical Support / Data & Performance Management
CE-R4	Lack of building occupant training participation	Full energy saving potential not realized	3	Long term	Coordinate with IFM/MAFMA to incentivize building occupants to adopt new energy saving practices.	Outreach & Technical Support
Standards & Process Creation						
SP-R1	Procurement duration does not get shorter	Program implementation is delayed beyond 3 years	2	Near term	Streamline existing procurement methods using lean process improvement.	Procurement

Risk Identifier	Risk	Impact Description	Risk Score (1=Low 6=High)	Timeline	Risk Response	Risk Owner (Working Group)
Standards & Process Creation						
SP-R2	Inadequate procurement/contracting resources to handle increased volume of projects	Program implementation is delayed beyond 3 years	6	Near term	Augment existing procurement/contracting staff by outsourcing or bring in additional long term hires within DCAM.	Procurement / Labor & Workforce Development
SP-R3	Building codes change during implementation	Construction change orders	2	Long term	Coordinate with MAFMA to identify and monitor state regulations and building codes to identify changes prior to construction. Quarterly updates.	Site Upgrades
SP-R4	Building codes require additional work outside of energy conservation measures	Increased individual project costs	1	Long term	Coordinate with MAFMA to identify and monitor state regulations and building codes to identify changes prior to construction. Quarterly updates.	Site Upgrades
Data & Performance Management						
DM-R1	Data collection is prolonged and laborious	Inaccurate reporting of progress	2	Long term	Incentivize House Doctors, contractors and other parties by making data reporting form submittal required prior to payment. Define timelines for DCAM project managers to submit data.	Data & Performance Management
DM-R2	Inaccurate data	Inaccurate reporting of progress	2	Long term	Perform QA/QC prior to entering data into database. Create a centralized QA/QC for audit validation. Define detailed processes for QA/QC.	Data & Performance Management
DM-R3	Project Management Information System (PMIS) not operational by end of 2012	Program reporting increased level of effort	4	Mid-term	Develop alternative tools for project tracking and reporting.	Data & Performance Management
DM-R4	Lack of collaboration for data collection across all stakeholders	Not meet communication goals for all stakeholders	4	Long term	Coordinate amongst various agencies to establish inter-agency working groups to aid in communication and data sharing.	Data & Performance Management
Communications						
CO-R1	Communication plan is not in place	Lack of broad support for AEP	1	Mid-term	Engage stakeholders and the public through targeted events.	Communications

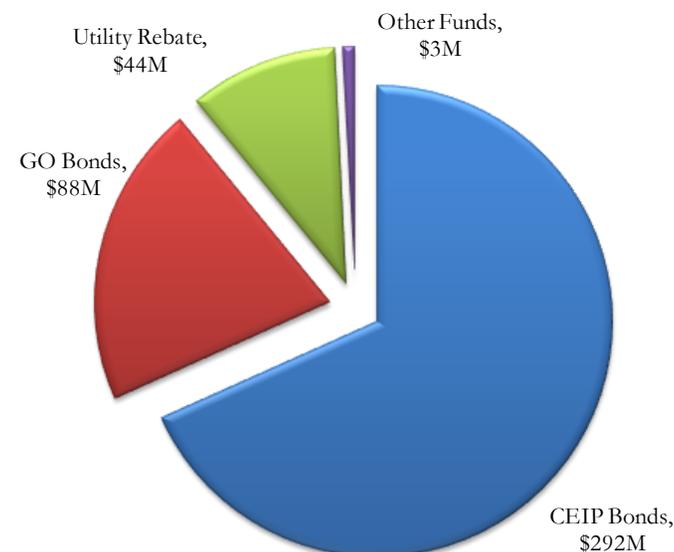
Financial Plan

Investment

AEP retrofits will be funded by a combination of CEIP Bonds, G.O. Bonds, utility rebates and other funding sources.

- CEIP bonds, an innovative investment approach created by the Patrick-Murray administration, are funded through energy savings. Debt service is repaid through energy savings.
- CEIP bonds are expected to fund \$292 million or 68% of the total AEP.
- Utility rebates are estimated at \$44 million based on a review of past DCAM, DOER, and utility projects. Smaller projects are eligible for higher rebates because of quick payback and ease of implementation.
- G.O. Bonds and Other Funds are expected to fund the remaining \$91 million.

Total Investment:
\$427 Million



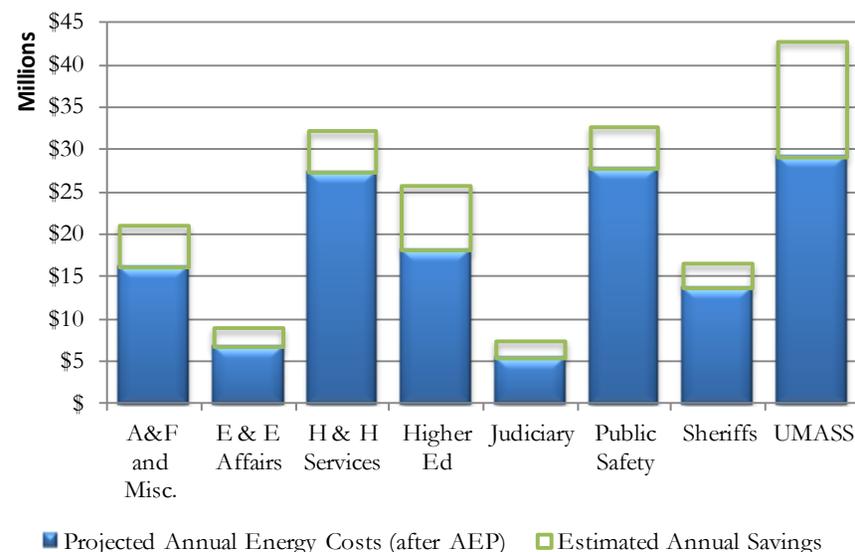
Implementation Group	Est. Total Investment	CEIP Bonds	GO Bonds	Percentage Utility Rebate	Utility Rebate	Other Funds
Simple Fix	\$14,852,628	\$0	\$9,757,089	34%	\$5,095,539	\$0
Retro-Commission	\$24,044,193	\$16,540,689	\$3,635,320	16%	\$3,868,185	\$0
Whole Building Analysis	\$48,064,626	\$8,120,497	\$25,715,726	29%	\$14,038,578	\$189,825
Comprehensive	\$276,189,547	\$213,699,773	\$41,875,026	7%	\$18,748,005	\$1,866,743
New Review	\$58,875,402	\$49,643,845	\$6,465,385	3%	\$1,605,694	\$1,160,478
Evaluated NA	\$5,056,142	\$3,719,751	\$1,048,330	4%	\$201,109	\$86,953
TOTAL	\$427,082,539	\$291,724,555	\$88,496,876	10%	\$43,557,108	\$3,304,000

Annual Energy Cost Reductions

Retrofits are expected to achieve annual savings in energy costs.

- Annual energy costs for AEP sites are estimated at \$186 million.
- Investment in retrofits is expected to generate \$43 million in annual energy cost savings. This represents a 23% annual energy cost reduction.
- Savings estimates were calculated using historical data from hundreds of prior retrofit projects.
- Comprehensive projects yield higher savings, so agencies with larger facilities such as Higher Education and UMASS are expected to achieve higher savings. This is due to a combination of all ECMs types ranging from simple fix lighting measures to more comprehensive, longer payback measures such as building system upgrades being implemented. Refer to the ECM table in the Implementation Planning section of this report.

Total Savings:
\$43 Million



Program Area	Estimated Investment for AEP Sites	Estimated Annual Energy Costs for AEP Sites	Estimated Annual Savings	Projected Annual Energy Costs (after AEP)	Energy Cost Reduction
A&F and Misc.	\$49,829,454	\$20,961,609	\$4,930,485	\$16,031,124	24%
E & E Affairs	\$18,813,593	\$8,977,175	\$2,211,009	\$6,766,166	25%
H & H Services	\$41,987,863	\$32,122,118	\$4,868,228	\$27,253,890	15%
Higher Ed	\$90,488,942	\$25,662,582	\$7,685,970	\$17,976,613	30%
Judiciary	\$17,803,516	\$7,409,110	\$2,092,363	\$5,316,746	28%
Public Safety	\$40,060,475	\$32,563,421	\$4,792,255	\$27,771,167	15%
Sheriffs	\$32,980,530	\$16,553,246	\$2,989,273	\$13,563,973	18%
UMASS	\$135,118,164	\$42,673,429	\$13,612,983	\$29,060,446	32%
Grand Total	\$427,082,539	\$186,922,690	\$43,182,566	\$143,740,124	23%

Implementation Committee Working Group Accomplishments

Throughout Q2, the Implementation Committee Working Groups made significant accomplishments. The table below highlights the accomplishments in Q2 and planned goals in Q3:

AEP Working Group Accomplishments and Goals

	Q2 2012	Q3 2012
Communications	Hired firm to promote the AEP, launched public website	Develop Strategic Public Relations and Stakeholder Engagement Campaign
Simple Fix	Developed implementation strategies and engaged with utilities	Secure contracts with utilities
Audits & RCx	Developed standardized audit template and Retro Commissioning approach	Initiate Retro-Commissioning audits
Outreach & Tech Support	Finalized Site Survey	Distribute Survey to facility managers and analyze results
Sites Upgrades	Developed building code matrix	Develop roadmap for building codes
Data & Performance	Refined program definition, energy baseline, and initial financial plans	Prioritize all AEP projects using baseline data
Procurement	Explored innovative contract options with utilities, comptroller, and DCAM business units.	Develop approach for achieving M/WBE goals
Leasing	Identified all leased spaces in privately owned Sites	Develop approach for leased spaces
Labor & Workforce	Established new working group, defined goals and objectives	Establish AEP Certification Program

Communications Working Group

AEP Public Website

To communicate the status and successes of the AEP, DCAM launched an AEP web page. The website is embedded as part of the DCAM's Energy & Sustainability website.

The website will be continuously updated and expanded with the following information:

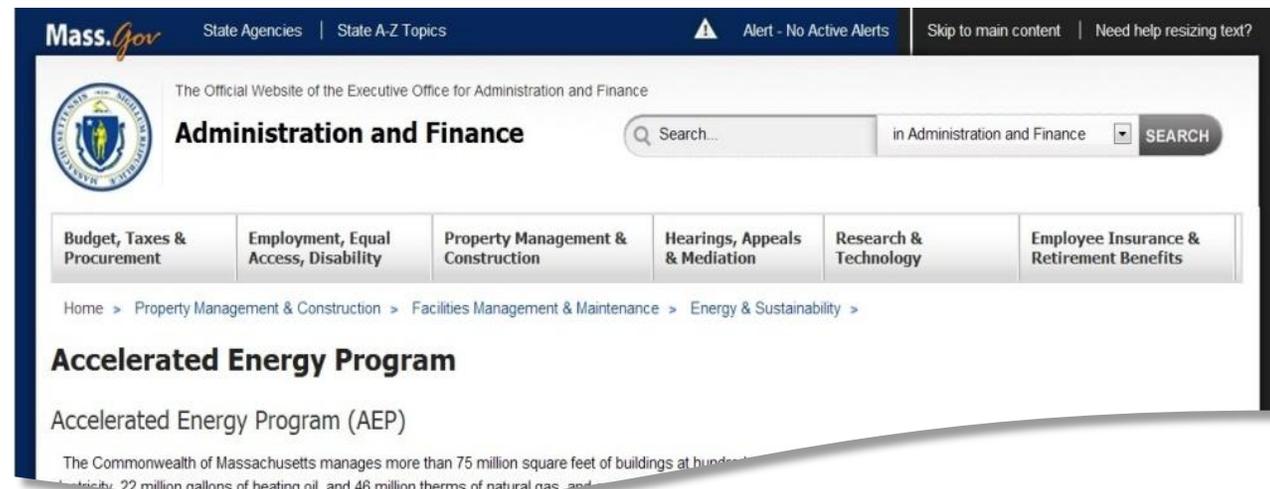
- Overview of the AEP
- Goals of the AEP
- Program Status
- Project Spotlights
- Outreach events
-And much more.

Working Group Objectives:

- Collaborate with Associations and Leadership Councils
- Outreach to Building Occupants
- Promote AEP to Employees and the Public

AEP Public Website

<http://www.mass.gov/DCAM/AEP/>



Communications Campaigns

The Communications Working Group negotiated a scope of work with a communications consultant to create a press kit, AEP branding, a strategic public relations campaign, and a stakeholder engagement campaign.

Simple Fix & Audits Working Group (Project Management)

Utility Program

There are 504 smaller sites in the AEP served by investor-owned electric utility companies.

DCAM met with all four investor-owned electric utility companies (National Grid, Western Massachusetts Electric Company (“WMECO”), NSTAR and Unitil) to leverage their expertise and help retrofit the smaller sites.

NSTAR initiated “test run” audits on 11 sites within their service territory. A broad selection of sites across DCR, MassDOT, UMass, Courts and State Police provided information to assess the overall opportunity. Five (5) audits were completed and seven (7) audits are underway.

Both National Grid and WMECO agreed to perform “test run” audits in their territories. These audits are planned for Q3 2012.

Municipal Electric Territories

There are 97 smaller sites in the AEP served by municipal electric companies. These electric utility providers are not required to offer energy efficiency rebates. One energy project has been completed and additional energy audits have been initiated at 18 sites.

In Q2, DCAM contracted with a consultant to perform “test run” audits on 7 sites of the remaining 78 sites: 5 DCR sites, one armory and one EOLWD site.

The majority of remaining sites in municipal electric service territories are from Department of Conservation and Recreation (DCR) and Massachusetts Department of Transportation (MassDOT).

The majority of remaining 78 sites are in the Simple Fix Implementation Group. The conservation measures are primarily comprised of lighting upgrades (bulbs, fixtures, lamps, LEDs), lighting controls, HVAC filters, resetting control set points, programmable thermostats, simple weatherization (weather stripping, caulking, window film, etc.) and water conservation. With the appropriate training, maintenance personnel or students from vocational technical schools, community colleges, or other youth labor organizations are expected to be able to complete these retrofits.

DCAM plans to hire consultants to perform audits on the remaining DCR sites.

Working Group Objectives:

- Plan and lead retrofit of all small facilities (Simple Fix Working Group)
- Plan and lead implementation of audits and retro-commissioning (Audits Working Group)



Otter River State Forest

Agency Collaboration

During Q2, DCAM engaged with DCR to explore the potential of using DCR staff or existing contractors to install the simple energy conservation measures identified by the consultant in the test run audits. These measures include compact fluorescent and LED light upgrades, appliance upgrades and small weatherization measures like window replacement and weather stripping.

DCAM and DCR will continue to develop this option for the installation of energy conservation measures in Q3 2012. DCAM also intends to explore this option with other agencies with large numbers of sites such as MassDOT, Military Division and DDS.



Retro-Commissioning (RCx) Approach

Retro-commissioning is a process that seeks to improve how building equipment and systems function together.

In Q2 2012, DCAM developed an approach to programmatically distinguish which buildings will be targeted for RCx level audits and services, and which smaller buildings will be targeted for Simple Fix work.

If RCx opportunities are justified in at least one building on a site, DCAM will issue an RFP to qualified vendors with a scope of work that includes RCx energy saving measures in those buildings.

The scope of work will require vendors to bid on the RCx work as well as engage with electric and gas utility programs to:

- a) Secure rebate funds for all work eligible in the building(s) slated for retro commissioning services and
- b) Engage with utility program providers to secure both services and rebates through the utility's programs in the smaller buildings.

DCAM has already initiated retro-commissioning at Worcester court complex and plans to initiate retro-commissioning at an EOLWD site in Q3 2012.

Standardized Audit Data Collection

Many different firms will conduct energy and water audits on sites in the AEP over the next three years.

DCAM recognized that a standardized template was needed to streamline in-the-field data collection, reporting and electronic transfer of audit results consistent across all firms and individuals performing the audits. Furthermore the standardized template would allow for a structured and consistent Quality Control (QC) Review of the audit data submitted by the different firms.

In Q2, DCAM developed an easy-to-use standard template in Microsoft Excel that will meet the needs of the AEP for the purposes listed above.

The Audit Template is pre-populated with site specific information from CAMIS and the AEP database to allow users to select energy conservation measures based on classifications established by DCAM. This standardizes the collection of ECM information and improves the quality of the audit.

The Audit Template includes Input and Output worksheets to distinguish between data collection and the standardized calculations of energy investment and savings.

In Q3, DCAM plans to integrate the Audit Template with the AEP data system for improved data management reporting.

Example of Audit Template Input and Output Sheets

Site - Audit Template

Audit Date	6/19/2012	Site Contact - Name	John Faro
CAMIS Site Code	WLDN2	Site Contact - Title	NE Regional Supervisor
Site	WALDEN POND STATE RESERVATION	Site Contact - #	978-369-3254
Secretariat	Energy & Environmental Affairs	Site Contact - Email	
Agency	DEPARTMENT OF CONSERVATION AND RECREATION	Auditor Prime	EE&D
Site Address		Auditor Sub	EE&D
Site City	Concord, MA	Auditor - Name	David Ward
Site ZIP		Auditor - Title	Principal Auditor
Prim Elect Util	Municipal	Auditor - #	508-460-1946
Project Number	DCP1207 AD1	HD Contact - Email	davefward@gmail.com
Data Source	Audit		
Date of NTP	4/3/2012		

Building Codes	Building Name	Sq Ft	Consumes				
			Audited	In Use	Elect	Fossil	Water
Totals	14	9,404	13	13	7	2	2
430DEM0401	GALLERY SHED	150	Y	Y	N	N	N
430DEM0402	GARAGE	300	Y	Y	N	N	N
430DEM0403	NATURE CENTER SHED	160	Y	Y	Y	N	N
430DEM0780	BARN	830	Y	Y	Y	N	N
430C							

Site - Audit Results

Audit Date	6/19/2012	Site Contact - Name	John Faro
Site Code	WLDN2	Site Contact - Title	NE Regional Supervisor
Site	WALDEN POND STATE RESERVATION	Site Contact - #	978-369-3254
Secretariat	Energy & Environmental Affairs	Site Contact - Email	
Agency	DEPARTMENT OF CONSERVATION AND RECREATION	Auditor Prime	EE&D
Site Address	0	Auditor Sub	EE&D
Site City	Concord, MA	Auditor - Name	David Ward
Site ZIP	0	Auditor - Title	Principal Auditor
Prim Elec Util	Municipal	Auditor - #	508-460-1946
Project Number	DCP1207 AD1	HD Contact - Email	davefward@gmail.com
Data Source	Audit		
Date of NTP	4/3/2012		

Energy Conservation Measure	Cost		Annual Savings			Simple PB [yrs]
	Estimated Install Cost [\$]	Utility Incentive [\$]	Energy [MMBtu]	Water [Gallon]	Cost [\$]	
Totals	\$ 22,911	\$ -	139	372	\$ 7,345	3.1

Outreach & Technical Support Working Group

Agency Survey

To better collaborate with agencies, DCAM developed a web-based survey to outreach to facility managers and collect information on all 700 sites in the AEP.

Many agencies have self-performed retrofits at their sites that are not typically reported to or tracked by DCAM.

The survey asks facility managers for information on past retrofit projects as well as requests input on desired future retrofits. The survey also asks facility managers for updated facility points of contact, asset, energy consumption, and project information.

In Q3, DCAM plans to issue the survey to all facility managers with sites in the AEP.

The survey can be viewed at the following URL: https://www.surveymonkey.com/s.aspx?sm=z547zNMzSryqDat5ZkTWcg_3d_3d

Working Group Objectives:

- Develop specifications, guidelines, training through a new “Center of Excellence”
- Manage content on AEP internal website
- Deliver outreach and support

DCAM Accelerated Energy Program - General Survey Exit this survey

DCAM Accelerated Energy Program - General Survey

DCAM has initiated the Accelerated Energy Program (AEP). Through the AEP DCAM will work with all state agencies to develop and implement energy water conservation projects, thereby assisting agencies in meeting the goals outlined in Executive Order 484 Clean Energy and Efficient Buildings.

Completing this survey will help DCAM in determining where to invest staff and financial reserves over the next 3 years.

This survey is designed to obtain updated facility contacts, asset, and energy consumption and project information. We anticipate this effort will take approximately 30 minutes of time.

1. Enter Executive Office

2. Enter Agency

3. What is the Facility/Campus Name?

Powered by **SurveyMonkey**
 Check out our new... [SurveyMonkey](#)

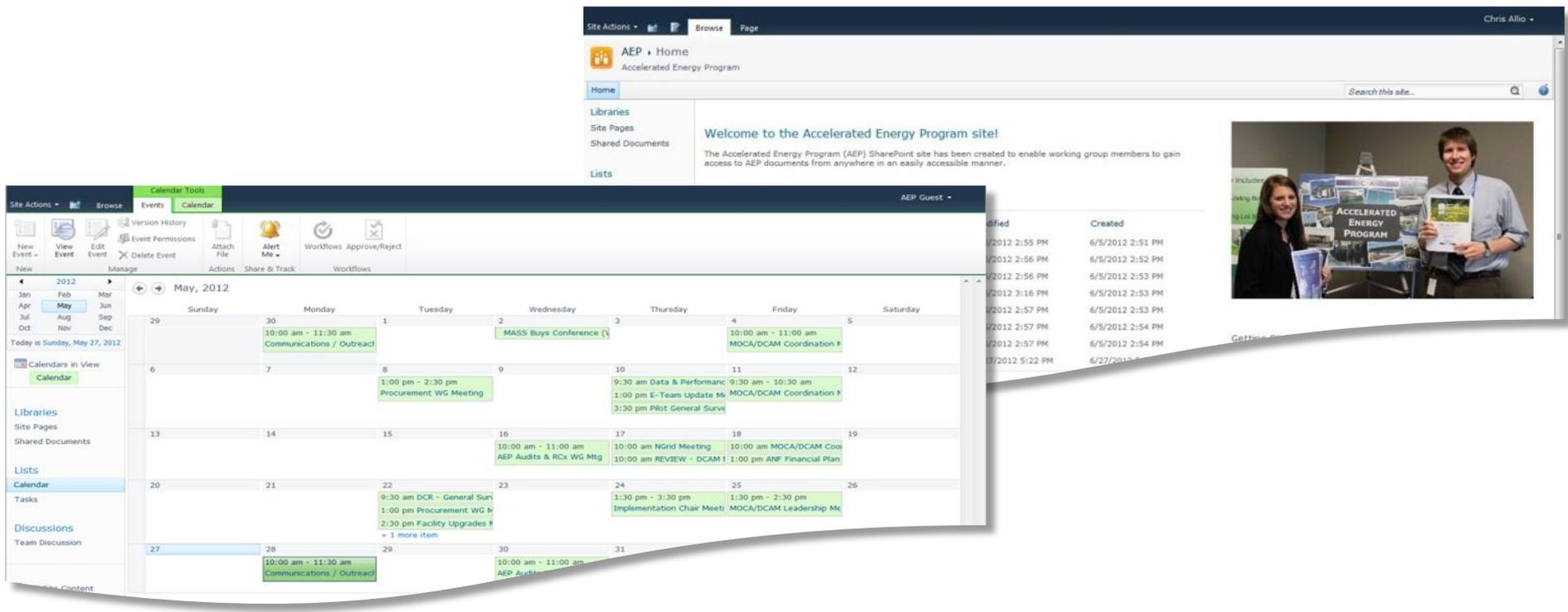
AEP Internal Website (SharePoint)

There are many participants of the AEP across a large number of organizations. The SharePoint website will enable participants to communicate effectively and easily.

In Q2, DCAM launched the AEP Internal Website to enable participants to stay informed of events and meetings, as well as get access to AEP documents.

The AEP Internal Website (SharePoint) is continuously updated with the following information:

- AEP team calendar which can be synced with Outlook
- AEP Event photos
- AEP presentations and reports
- Working Group materials, meeting agendas and minutes and discussion boards.



Outreach Meetings

The AEP team held or participated in many outreach meetings in Q2:

April

- MassDOT Review of GreenDOT (April 13, 2012)
- WMECo Meeting (April 30, 2012)

May

- MASSbuys EXPO & MAFMA Semi-Annual Meeting (May 2, 2012)
- National Grid Meeting (May 17, 2012)
- Energy Efficiency Inquiry Summit (May 15-16, 2012)
- A&F Financial Plan Meeting (May 18, 2012)

June

- Implementation Committee Meeting (June 12, 2012)
- Unifil Meeting (June 12, 2012)
- EOLWD Meeting (June 22, 2012)
- CFAC Meeting (June 26, 2012)



Jenna Ide presenting an overview of the AEP at the MASSbuys EXPO on May 2nd.



Commissioner Cornelison leading group participation at the Implementation Committee Meeting on June 12th.

Site Upgrades Working Group

Building Codes Matrix

There are many codes and regulations that govern the retrofit of sites in the AEP. It is important for DCAM to educate facility managers and direct contractors to adhere to all codes and regulations.

In Q2, DCAM staff engaged with various stakeholders including the Department of Energy Resources and the Board of Building Regulations and Standards to identify the “family” of codes and regulations that will likely be encountered in the installation of energy conservation measures.

The codes encompass a wide range of disciplines, including the following:

- International Energy Conservation Code,
- MA Advisory – Energy Requirements CMR 780,
- Specialized codes for health and safety,
- Massachusetts Architectural Access Board Regulations,
- Environmental Protection,
- Various trades (electrical, plumbing, fire and safety) and
- Others.

In Q3, DCAM will create reference documents, summaries about each code, and locations for additional information. A matrix of these codes is currently being developed as guidance for each implementation group. In the future, this information will become part of the Center of Excellence for guiding facility managers.

Working Group Objectives:

- Guide when to use deferred maintenance funds to supplement AEP projects
- Incorporate repairs & improvements
- Define relevant building code requirements



Data & Performance Management Working Group

Throughout Q2, the data and performance management working group played an integral role in planning the AEP and developing data and reporting tools.

The following represents some of the notable accomplishments:

- Evaluated and grouped all sites into Implementation Groups
- Refined the Program Definition
- Drafted an Energy Consumption Baseline in coordination with DOER
- Developed the initial Financial Plan
- Developed monthly reports and updates

AEP Data Management

User requirements for a program management information system (PMIS) were developed to effectively manage the AEP and communicate progress to stakeholders. This system will include functionality such as web dashboards for tracking and reporting and the integration of data across organizations and databases to streamline the management of work. A collaborative effort between DCAM and A&F IT is taking place to pilot Oracle BI dashboards with the AEP.

In Q3, DCAM will expand upon this effort through a Lean event for data management and reporting. The goal is to improve the process and quality of energy data management and reporting to meet the needs of the AEP.

Working Group Objectives:

- Plan and prioritize projects
- Manage data for all WGs
- QA/QC & project controls
- Performance management, tracking and reporting



DCAM and A&F personnel defined software requirements for the AEP PMIS through multiple interactive planning charrettes.

Procurement Working Group

Throughout Q2, the Procurement Working Group supported the AEP project managers with utility program planning, Minority and Woman Business Enterprise strategy development, access and opportunity initiatives, expansion of the DCAM Consultant Pool, and Lean process improvements for project procurement.

Utility Program

The Procurement Working Group is working with the investor-owned utilities to develop a new contracting approach. This will support the retrofit of 463 sites in their service territories. DCAM met with representatives of National Grid, Western Massachusetts Electric Company and Unitil to explore potential contractual arrangements. The Procurement Working group is also exploring the option of contracting directly with utility approved vendors to provide the services required for the installation of ECMs in these sites.

Access & Opportunity

The AEP has established M/WBE requirements, either through direct employment or assignment of work to sub-contractors. Firms working on the AEP will be required to meet the following M/WBE requirements:

- Services:
 - Design: 17.9%
 - Construction: 10.4%
- Workforce:
 - Minority: 15.3%
 - Women: 6.9%

The Procurement Working Group and DCAM's Compliance unit are exploring options for achieving these goals through innovative approaches such as aggregating goals programmatically or applying the goals to each individual firm and/or project.

Jobs Created

As the AEP gains momentum, jobs will be created. Consulting firms, vendors, and construction firms will ramp up their staff to meet the needs of the AEP. Job creation will be tracked by DCAM as part of AEP metrics. As noted above, a number of the jobs for women and minorities will be tracked to comply with the AEP goals of 6.9% and 15.3% respectively.

Working Group Objectives:

- Create new procurement processes with utilities and Job Order Contracting
- Improve existing processes using Lean
- Meet Access & Opportunity goals (M/WBE)



The AEP will meet M/WBE goals through new contracting opportunities

Lean Process Improvement

DCAM applied Lean process improvement techniques to identify opportunities and shorten the procurement duration for energy design-build and comprehensive performance contracts.

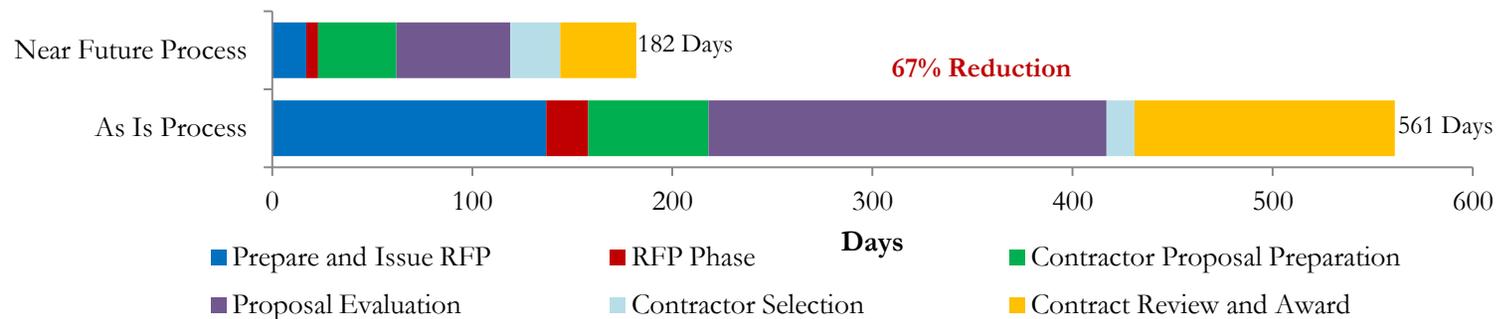
Six (6) Lean training workshops were held in April and May with members of the extended AEP team. Through these efforts a new procurement process was developed using time value analysis and value stream mapping. DCAM will implement the new Lean process for the procurement of all AEP comprehensive projects. The near future process is estimated to take 182 days to complete, which is a 67% reduction from the as-is process of 561 days.

The team has already put the recommendations into practice and signed an unprecedented six contracts in the month of June.



Initial Lean workshop to develop a near term process.

AEP Energy Design-Build Procurement Process



Expansion of Consulting Firms

A robust pool of consulting firms will be needed to deliver auditing and retrofit services to all 700 sites in three years. DCAM currently has a number of consulting firms that are performing services similar to those required for the AEP. These firms were competitively selected using statewide contracts or the Designer Selection Board.

DCAM analyzed the needs of the AEP and determined that the current pool of consultants is not likely to be sufficient to meet the goals of the AEP. To address the potential shortfall of consulting firms, DCAM identified 32 new consulting firms, including 8 firms certified by the Supplier Diversity Office, to expand the the consultant pool.

The table below provides an overview of AEP consulting services required by implementation group. It highlights the type of firm capable of providing the required services.

In Q3, DCAM plans to expand the consulting pool.

Analysis of Firms Capable of Supporting AEP by Delivery of Services

Impl Group	Electric Service Provider	Number of Sites	DELIVERY OF SERVICES								Legend	
			Audits	Water Survey	RCx Audits	30% Design Services	65% Design Services	100% Design Services	Constr. Mgmt	Constr.		
SF ¹	Utilities	364	Utility Prog	HD/FA/Util					Utility Prog	Utility Prog	Utility Prog	Adequate
	Municipal	74	HD/FA	HD/FA					HD			Shortfall
WBA ²	Utilities	140	HD/FA/Util	HD/FA/Util		HD/Util	HD/Util	HD/Util				None
	Municipal	23	HD/FA	HD/FA		HD	HD	HD				None
RCx		14		HD/FA	HD/FA	HD	HD	HD	HD			Not Applicable
Comp ³		48	HD	HD		HD	HD	HD	HD			Adequate
New Review ⁴		16	HD	HD/FA								Not Applicable

¹Total SF Sites = 438. 8 SF Sites are served by both a muni and utility electric company. Each of these sites has been assigned to a single

²Total WBA Sites = 163. 2 WBA Sites are served by both a muni and utility electric company Each of these sites have been assigned to a

³Of the 48 Comprehensive Sites, 33 are in progress

⁴Of the 16 New Review Sites, 2 are in progress and 1 is complete

Leasing Working Group

Leased Space Implementation Approach

In Q2, the leasing working group identified all State-owned leased sites. The working group is currently working to identify all leased spaces in privately owned sites and develop an implementation strategy for all leased spaces. This is beyond the 700 sites in the AEP. This group will coordinate closely with the Integrated Facilities Maintenance.

Preliminary review indicates that the majority of the sites are in use by the Trial Courts, Department of Conservation and Recreation and Department of Developmental Services.

The working group will work to prioritize those sites that pay their own utility bills from those that have utility bills included in the lease.

Working Group Objectives:

- Develop plan to retrofit Leased Buildings
 - State-owned facilities that are leased
 - Third-party facilities being leased by state agencies



DEP Boston leased space

Labor & Workforce Development Working Group

There are a number of metrics in the AEP designed to create sustainable job opportunities across the Commonwealth. Given the important impact the AEP can have on the labor market, DCAM established a new working group to address directly these opportunities and challenges.

Office of Employment and Workforce Development

In June, DCAM met with the Secretary of Labor and Workforce Development, Joanne F. Goldstein, to discuss ways the AEP can create jobs and have a positive impact on labor in the Commonwealth.

Paths that will be explored and developed in Q3 include:

- Programs for younger population such as Youth Works and Youth Build
- Develop targeted AEP pre-apprenticeship programs in collaboration with labor unions
- Operation A.B.L.E – a program to assist mature workers, 45 and older, return to work

AEP Certification Program

DCAM will develop and rollout a new AEP certification program. Individuals will receive training, knowledge, and be provided with tools to be able to demonstrate energy efficiency awareness and best practices.

DCAM will explore setting goals for contractors and may require them to employ or utilize individuals with the new AEP certification when executing work in AEP sites. DCAM will work in close collaboration with the Executive Office of Labor and Workforce Development as the certification program evolves.

Working Group Objectives:

- Develop programs to assist in the development of skills for a younger population of workers aged 18-24.
- Develop an AEP Certification program.
- Partner with labor unions to develop pre-apprenticeship training programs based on existing models.



Quarterly Report Q2 2012

Appendix A

Performance Metrics

(as of June 30, 2012)

Performance Metrics

Accelerate delivery of energy projects to 3 years and "green" every facility where feasible	Target	Q2 Actual
Sites Retrofitted ("touched") (Total # & Sq. Ft.)	700	6
<i>Retrofitted Sites over 100,000 Sq. Ft. (Total #)</i>	48	
<i>Retro-Commissioned Sites over 50,000 Sq. Ft. (Total #)</i>	14	
<i>Whole Building Analysis Sites (Total #)</i>		5
<i>Simple Fix Sites (Total #)</i>		
<i>New Review Sites (Total #)</i>		1
Leased Spaces Retrofitted (Total #)		
Existing Buildings Renovated to LEED Standards (Total #)		
Energy Projects Completed (Total #) by Agency, Utility & DCAM		
<i>Energy Studies Initiated</i>		105
<i>Energy Assessments (Audits) Completed</i>		105
<i>Energy Projects RFP Issued</i>		
<i>Energy Projects Contract Signed</i>		
Annual Energy & Water Savings (Estimated Total \$)	>\$43M	
Investment in Energy Projects (Estimated Total \$)	\$427M	
<i>by CEIP Bond, DCAM Cap Bond, Utility Incentive, etc.</i>		
Average Payback on Total Investment	≤ 10 Years	
Communicate progress.	Target	Q2 Actual
Public Website with Quarterly Updates	Quarterly	
Total # of Unique Visitors per Month (Public Website)		
Total # of Buildings "Tagged" with AEP Label		

 = LBE target

Implement innovative, sustainable, and economical energy solutions.	Target	Q2 Actual
Total # of Projects Using Innovative Approaches or Methods		
Energy Consumption Reduction by Program Area (% kBtu per sf. Ft)		
Renewable Energy by Program Area (% of Total Consumption)		
Greenhouse Gas Emissions by Program Area (% MTCO2 Reduction)		
Potable Water by Program Area (% of Reduction of Total potable water usage)		
Sewer/Wastewater by Program Area (% of Reduction of Total Sewage output)		
Improve energy and water efficiency and sustainability.	Target	Q2 Actual
Energy Conservation Classes Offered (Total #)		
Energy Training Sessions Provided (Total #)		
Buildings with Utility Metering or Energy Dashboards		
Continuously improve processes.	Target	Q2 Actual
On-Time Project Completion	100%	
On-Budget Project Completion	100%	
Program Exposures		
Energy Design Build Procurement Duration		
Performance Contract Procurement Duration		
Create sustainable job opportunities across the Commonwealth.	Target	Q2 Actual
Workforce / Jobs Created (Total #)		
<i>AEP Certified Laborers (Total #)</i>		
<i>Voc-Tech School / Community College Jobs Created (Total #)</i>		
<i>Minorities</i>	15.3%	TBD
<i>Women</i>	6.9%	TBD
M/WBE Participation (Project Commitment / Awards)		
<i>Design Contracts</i>	17.9%	TBD
<i>Construction Contracts</i>	10.4%	TBD

 = LBE target

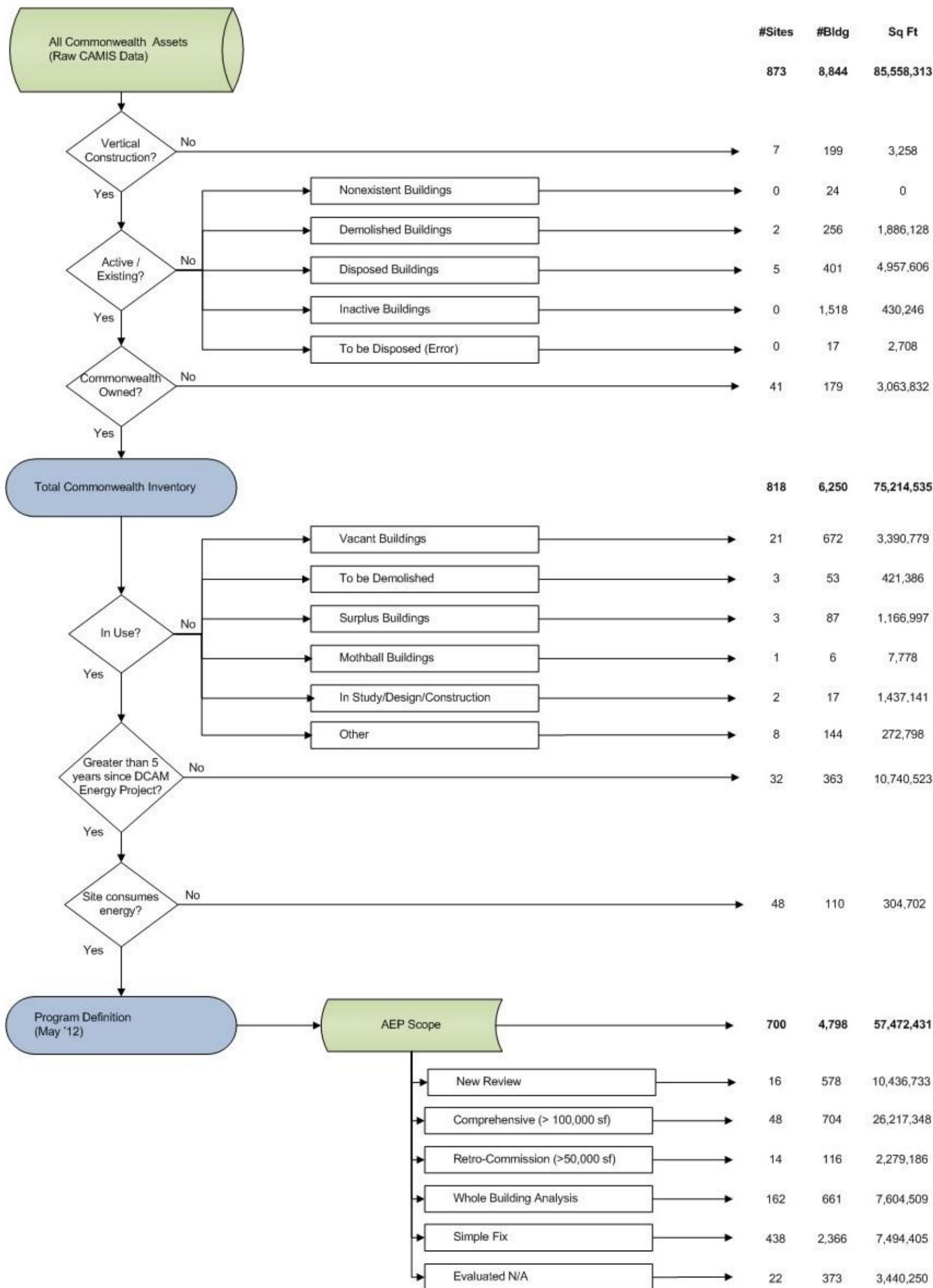
Quarterly Report Q2 2012

Appendix B

Program Planning and Definition Methodologies

(as of June 30, 2012)

Program Planning and Definition Methodologies



Energy Baseline Methodology

Goals

The goal of this task is to develop an energy usage baseline for all facilities within the AEP. The baseline is to be established using best available data.

Executive Summary

DCAM and DOER collectively agreed that FY09 utility data would serve as the energy baseline year for the AEP. The total energy usage baseline for the AEP facilities is 7,228,143 MMBtu at an average intensity of 126 kbtu/sf. The utility costs were calculated at \$186,922,690 as shown in Table 1.

Table 1 - AEP Summary of Consumption

Secretariat	Fac #	Bldg #	Sq Ft	Consumption		Avg Intensity (kbtu/sf)
				(MMBtu)	(Cost)	
A&F and Misc.	147	737	5,929,038	704,902	\$ 20,961,609	119
Energy & Environmental Affairs	253	1,672	5,415,162	332,276	\$ 8,977,175	61
Health and Human Services	91	672	8,442,004	1,461,777	\$ 32,122,118	173
Higher Education	22	366	8,805,203	1,031,777	\$ 25,662,582	117
Judiciary	47	50	2,538,681	243,061	\$ 7,409,110	96
Public Safety	102	760	8,552,208	1,371,318	\$ 32,563,421	160
Sheriffs	22	138	3,623,077	693,538	\$ 16,553,246	191
UMASS	16	403	14,167,058	1,389,495	\$ 42,673,429	98
	700	4,798	57,472,431	7,228,143	\$ 186,922,690	126

Approach

The Department of Energy Resources provided DCAM with all available FY09 utility data for the buildings within the AEP. The available utility data consisted of 65,432 account line items encompassing 5,595 unique utility accounts. Of the 700 facilities within the AEP, a total of 132 facilities, representing 19% of all facilities, were successfully mapped to electric utility account data and 70 facilities, representing 10% of the total facilities, were successfully mapped to the gas utility account data. This data was weather normalized to provide estimated annual energy consumption in the buildings mapped to utility accounts. The normalized utility data mapped to known facilities and building types was then extrapolated to the remaining buildings and facilities within the AEP where no utility data existed. Extrapolation of the known data to the remaining buildings was performed by identifying similar building types and end uses. The results of this task are that every facility has an established energy usage baseline, either based upon known utility data or extrapolation.

Center of Excellence

This data establishes baseline energy consumption at the facility and building level. It is anticipated that as the AEP progresses, all utility accounts and bills will be mapped to their respective buildings in CAMIS. This will present an opportunity for DCAM, Agencies and Facility Managers to understand and track energy use at the building level. It will also allow stakeholders to determine the realized value of energy saving measures implemented within a particular building.

Process Documentation

The estimation of the energy usage baseline effort involved analyzing each building to assess the available utility data, and develop a transparent methodology to fill data gaps when no data or partial data exists. Below is the documented process used to develop the AEP baseline.

1. Establish valid utility data sets

Each building or facility where utility bills (electric, gas or oil) were mapped, the information was confirmed to ensure an entire fiscal year's data was present and that the numbers were within the CBECS¹ standard intensity range.

Table A.1 - Example of Raw Utility Data

Account #	Fuel	Provider	Complex	complex	complex	facility_d	facility_i	usage_usage_end	area	Use (MM)	kBTU/SF	usage_cost	usage_u
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	6/30/2009 0:00	347,022	2,153.31	6	\$43,174	631,100	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	6/1/2009 0:00	347,022	2,116.46	6	\$30,710	620,300	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	4/30/2009 0:00	347,022	2,075.86	6	\$29,102	608,400	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	3/31/2009 0:00	347,022	1,949.62	6	\$26,899	571,400	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	3/2/2009 0:00	347,022	2,194.26	6	\$27,679	643,100	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	1/29/2009 0:00	347,022	2,129.09	6	\$27,146	624,000	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	12/30/2008 0:00	347,022	1,895.37	5	\$25,897	555,500	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	11/30/2008 0:00	347,022	1,951.32	6	\$25,898	571,900	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	10/29/2008 0:00	347,022	2,012.40	6	\$28,832	589,800	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	9/29/2008 0:00	347,022	2,369.98	7	\$41,854	694,600	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	8/28/2008 0:00	347,022	2,325.96	7	\$41,331	681,700	
25964501008	Electric	NSTAR	Hurley Builc BS800	11892	551BSB9001	11893	7/30/2008 0:00	347,022	2,579.13	7	\$45,137	755,900	
												7,547,700	

Table A.2 - Example of Mapped Utility Data

SITE_CODE	SITE_NAME	BLDG_CODE	BLDG_NAME	Building Type	Account #lines	Sum of usage_use [kWh]	Elect kWh/sf Data
BSB00	HURLEY BUILDING	551BSB9001	HURLEY BUILDING	OFFICE	12	7,547,700	1

¹Commercial Building Energy Consumption Survey through the US Energy Information Administration

2. Weather normalizing the consumption

The consumption data, once validated, was normalized using 1971-2000 data from the national oceanic and atmospheric administration. (<http://hurricane.ncdc.noaa.gov/climate normals/clim81/MAnorm.pdf>)

Table A.3 – HDD and CDD used to normalize the AEP baseline

	Heating Degree Days (HDD)	Cooling Degree Days (CDD)
1971-2000	6437	465
FY09	6508	436

2.1 Weather normalizing - Electric

The following assumptions were made to electric distribution:

- 40% Light
- 40% HVAC (Weather Sensitive)
- 20% Other

The normalized electric consumption was calculated:

$$Elect_{Norm} = \left(Elect_{HVAC} \times \frac{CDD_{Norm}}{CDD_{Act}} \right) + Elect_{Light \& Other}$$

Table A.4 – Example set of Electric Normalized Data

BLDG_CODE	BLDG_NAME	Electric							
		Account #lines	Sum of usage_use [kWh]	Elect Data Go	kWh/sf	kWh(HVAC)	kWh(other)	kWh (Normalized Total)	kBtu (Normalized Total)
551BSB9001	HURLEY BUILDING	12	7,547,700	1	22	3,019,080	4,528,620	7,745,329	26,427,062

2.2 Weather normalizing - Gas

The following assumptions were made to gas distribution:

- 80% HVAC (Weather Sensitive)
- 20% Other

The normalized gas consumption was calculated:

$$Gas_{Norm} = \left(Gas_{HVAC} \times \frac{HDD_{Norm}}{HDD_{Act}} \right) + Gas_{Other}$$

Table A.5 – Example set of Gas Normalized Data

		Gas								
BLDG_CODE	BLDG_NAME	Account #lines	Sum of usage_use [Therms]	Gas Data Good	Therms/sf	Therm(HVAC)	Therm(other)	Therm (Normalized Total)	kBtu (Normalized Total)	
551BSB9001	HURLEY BUILDING	23	274,297	1	0.79	219,438	54,859	271,893	27,182,773	

2.3 Weather normalizing - Oil

Oil data sets were not normalized due to the irregularity of delivery dates.

3. Disaggregating facility data into building data

For instances where the facility information is valid, the process used to disaggregate to the building level was based on the % of consumption of the building using CBECS consumption data. This was calculated:

$$X1 = Xt \left(\frac{C1}{Ct} \right)$$

Where;

Xt = Consumption (electric, gas or oil) of total facility

X1 = Consumption of building 1 with the facility

Ct = CBECS Consumption of total facility

C1 = CBECS Consumption of building 1 of facility

4. Extrapolating consumption

After assigning all accounts to their respective buildings, the building types with valid utility sets were determined. The average intensity for each building type was used to extrapolate to all buildings with partial or no data.

5. Unit costs

	Electric	Gas	Oil
FY09	\$0.158/kWh	\$1.45/Therm	\$2.5/gallon

The energy costs reflected in the table are from the following sources:

http://www.eia.gov/cneaf/electricity/page/sales_revenue.xls

<http://www.eia.gov/dnav/ng/hist/n3020ma3m.htm>

<http://www.eia.gov/todayinenergy/detail.cfm?id=3630>

Quarterly Report Q2 2012

Appendix C

Financial Plan

(as of May 31, 2012)

Financial Plan – Part 1: Funding Overview (May 2012)

The following table provides an overview of the funding sources and initial financial plans broken down by project status. Additional information on the financials of specific projects will be furnished upon request.

Total AEP, Not including AEP Initiated	Total Project Cost	Spent To-Date	FY13	FY14	FY15	FY16	FY17
Accelerated Energy Program - CEIP Funds	\$ 150,383,460	\$ -	\$ -	\$ 37,595,865	\$ 37,595,865	\$ 37,595,865	\$ 37,595,865
Accelerated Energy Program - G.O. Bond Funding	\$ 71,122,385	\$ -	\$ 11,956,642	\$ 20,769,757	\$ 20,769,757	\$ 8,813,114	\$ 8,813,114
Sub Total	\$ 221,505,844	\$ -	\$ 11,956,642	\$ 58,365,622	\$ 58,365,622	\$ 46,408,979	\$ 46,408,979
Other Funding Sources - Utility Rebates	\$ 39,977,853	\$ -	\$ 6,603,297	\$ 11,645,288	\$ 11,645,288	\$ 5,041,991	\$ 5,041,991
AEP Base Total	\$ 261,483,698	\$ -	\$ 18,559,940	\$ 70,010,909	\$ 70,010,909	\$ 51,450,970	\$ 51,450,970

AEP Initiated	Total Project Cost	Spent To-Date	FY13	FY14	FY15	FY16	FY17
Initiated - Accelerated Energy Program - CEIP Funds	\$ 141,341,095	\$ -	\$ 39,608,714	\$ 56,509,048	\$ 37,890,000	\$ 7,333,333	\$ -
Initiated - Accelerated Energy Program - G.O. Bond Funding	\$ 4,300,000	\$ -	\$ 2,541,667	\$ 1,641,667	\$ 116,667	\$ -	\$ -
Initiated Study Costs - Accelerated Energy Program - G.O. Bond Funding	\$ 13,074,491	\$ 2,529,702	\$ 7,908,592	\$ 2,108,958	\$ 527,239	\$ -	\$ -
Initiated - Other Funding Sources - Utility Rebates	\$ 3,579,255	\$ -	\$ 1,263,628	\$ 1,455,628	\$ 860,000	\$ -	\$ -
Initiated - Other Funding Sources	\$ 3,304,000	\$ -	\$ 3,304,000	\$ -	\$ -	\$ -	\$ -
Total Initiated	\$ 165,598,841	\$ 2,529,702	\$ 54,626,600	\$ 61,715,299	\$ 39,393,906	\$ 7,333,333	\$ -

Total AEP, Including AEP Initiated	Total Project Cost	Spent To-Date	FY13	FY14	FY15	FY16	FY17
Accelerated Energy Program - CEIP Funds	\$ 291,724,555	\$ -	\$ 39,608,714	\$ 94,104,912	\$ 75,485,865	\$ 44,929,198	\$ 37,595,865
Accelerated Energy Program - G.O. Bond Funding	\$ 88,496,876	\$ 2,529,702	\$ 22,406,901	\$ 24,520,381	\$ 21,413,663	\$ 8,813,114	\$ 8,813,114
Sub Total	\$ 380,221,431	\$ 2,529,702	\$ 62,015,615	\$ 118,625,294	\$ 96,899,528	\$ 53,742,313	\$ 46,408,979
Other Funding Sources - Utility Rebates	\$ 46,861,108	\$ -	\$ 7,866,925	\$ 13,100,915	\$ 12,505,288	\$ 5,041,991	\$ 5,041,991
AEP With Initiated Total	\$ 427,082,539	\$ 2,529,702	\$ 69,882,539	\$ 131,726,209	\$ 109,404,815	\$ 58,784,303	\$ 51,450,970

Grand Total Energy Program	\$ 427,082,539	\$ 2,529,702	\$ 69,882,539	\$ 131,726,209	\$ 109,404,815	\$ 58,784,303	\$ 51,450,970
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Part 2: Methodology

The initial financial plan was developed using both estimated implementation costs and actual project costs when available. The financial plan was developed as an initial estimate for implementing energy efficiency measures across all 700 sites in the AEP. The following table outlines all of the assumptions made during the development of the initial financial plan.

Description
Project Costs & Savings
There is a total of 684 sites that will require funding to execute across Simple Fix, Audit – Whole Building Analysis, Audit – Retro-commissioning, Comprehensive Retrofit, and New Review.
There are 22 sites in the Evaluated – N/A category that have not been included since they will not require any investment.
Comprehensive project costs and savings were primarily based upon project information included in DCAM's Energy Database. An escalation factor of 3.3% per year was used to account for anticipated cost increases.
Retro-commissioning implementation costs account for the cost of retro-commissioning audit and potential “deeper” measures. Retro-commissioning sites will receive additional ECMs as a result of the audit. The value was calculated as Comprehensive implementation cost prior to escalation.
Cost and savings per square foot for SF and WBA were primarily derived from past utility and consultant project data.
Building inventory was consolidated from 208 different building types to 13 for purposes of calculating costs and savings.
Approximately 600 data points from various sources were used for calculating estimated costs and savings per square foot. Sources include: DCAM's Energy Database, DCAM's House Doctor (HD) reports, DOER databases, and Electric Utility project data.
Savings were adjusted downward for building types with seasonal use to reflect lower annual operating hours.
Sites or buildings that do not have vertical structures (parking lots, roadways, open fields, etc.) do not have estimated implementation costs and savings.
Financial Accounts
Accounts were mapped at the Agency level based on information provided by DCAM.
Any agency that did not directly map to an existing account was assigned as “TBD_AGENCY”

Description
Utility Incentives
A summary utility incentive table is provided below.
Specific utility incentive values were estimated using existing data, conversations with utility representatives, and industry
There are no utility incentives anticipated in Municipal Electric service territories.
CEIP Bonds
CEIP cost is calculated as: Total Project Costs – Utility Incentive.
CEIP cost cannot exceed 10 times the estimated savings or the cost of the ECMs, whichever is less.
Simple Fix, Audit – Whole Building Analysis, and New Review facilities will not use CEIP.
G.O. Bonds
G.O. bond amount is calculated as: Total Project Costs – Utility Incentive – CEIP Bond.
G.O. bond debt service will be paid back using savings.
Spending Prioritization
All project funds are evenly distributed across the project lifecycle.
Simple fix – 3 years starting FY13.
Audit – Whole Building Analysis – 3 years starting FY13.
Audit – RCx Driven – 4 years starting FY14.
Comprehensive Retrofit – 4 years starting FY14.
New Review – 3 years starting FY13.
Study Phase
Study phase costs are assumed to be \$0.25/sf for Comprehensive projects, \$0.10/sf for Retro-commissioning and New Review projects, \$0.05/sf for Audit - WBA projects, and \$0.00/sf for Simple Fix projects.
Study phase funds are a component of the total project cost.
Based on actual project data, the study phase costs at Bunker Hill CC were approximately \$0.22/sf. This data was used to validate our assumption for comprehensive projects of \$0.25/sf.
Manual Override
A column has been added to the "Master Raw Data" spreadsheet to identify facilities that have had cost data manually altered. These costs are used to replace the initial estimates generated by the financial plan. Costs were updated based on historical data.
Mass Information Tech Center = \$5,000,000 estimated project cost
UMass Medical Center – Worcester = \$10,000,000 estimated project cost

Financial Plan Estimated Costs & Savings

Consolidated Bldg Type	Simple Fix		WBA		RCx		Comprehensive		New Review	
	Cost	Save	Cost	Save	Cost	Save	Cost	Save	Cost	Save
	\$/SqFt	\$/SqFt	\$/SqFt	\$/SqFt	\$/SqFt	\$/SqFt	\$/SqFt	\$/SqFt	\$/SqFt	\$/SqFt
Office / Courthouse	\$2.02	\$0.43	\$5.87	\$0.77	\$10.60	\$0.73	\$12.00	\$0.93	\$0.10	\$0.43
Dormitory / Residence Hall	\$2.02	\$0.43	\$5.87	\$0.77	\$10.60	\$0.73	\$12.00	\$0.93	\$0.10	\$0.43
Classroom college hall	\$2.02	\$0.43	\$5.87	\$0.77	\$10.60	\$0.73	\$12.00	\$0.93	\$0.10	\$0.43
Correction / Police / Fire	\$2.02	\$0.43	\$5.87	\$0.77	\$10.60	\$0.73	\$12.00	\$0.93	\$0.10	\$0.43
Swimming Pool	\$2.02	\$0.33	\$5.87	\$0.58	\$10.60	\$0.55	\$12.00	\$0.70	\$0.10	\$0.33
Warehouse / Garage / Storage	\$2.02	\$0.43	\$5.87	\$0.77	\$10.60	\$0.73	\$12.00	\$0.93	\$0.10	\$0.43
Skating rink	\$2.02	\$0.33	\$5.87	\$0.58	\$10.60	\$0.55	\$12.00	\$0.70	\$0.10	\$0.33
Hospital / Laboratory	\$2.02	\$0.43	\$5.87	\$0.77	\$10.60	\$0.73	\$12.00	\$0.93	\$0.10	\$0.43
Telecom / Radio / Mechanical / Electrical	\$2.02	\$0.43	\$5.87	\$0.77	\$10.60	\$0.73	\$12.00	\$0.93	\$0.10	\$0.43
Residence	\$2.02	\$0.43	\$5.87	\$0.77	\$10.60	\$0.73	\$12.00	\$0.93	\$0.10	\$0.43
Seasonal / Occasional use /Bathroom	\$2.02	\$0.22	\$5.87	\$0.39	\$10.60	\$0.37	\$12.00	\$0.47	\$0.10	\$0.22
Other without use	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Unknown	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

Financial Plan Estimated Utility Incentives

Consolidated Bldg Type	Simple Fix					Whole Building Assessment					Retro-Commissioning					Comprehensive Retrofit					New Review				
	Estimated Utility Incentive					Estimated Utility Incentive					Estimated Utility Incentive					Estimated Utility Incentive					Estimated Utility Incentive				
	NGRID	NSTAR	WMECO	UNITIL	MUNI	NGRID	NSTAR	WMECO	UNITIL	MUNI	NGRID	NSTAR	WMECO	UNITIL	MUNI	NGRID	NSTAR	WMECO	UNITIL	MUNI	NGRID	NSTAR	WMECO	UNITIL	MUNI
Office/courthouse	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
Dormitory / Residence Hall	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
Classroom college hall	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
Correction / Police / Fire	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
Swimming Pool	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
Warehouse, garage, storage	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
Skating rink	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
Hospital / laboratory	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
Telecom / radio / mechanical / electrical	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
residence	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%
seasonal / occasional use /bathroom	50%	30%	58%	30%	0%	50%	30%	56%	15%	0%	20%	20%	20%	10%	0%	10%	10%	10%	5%	0%	50%	50%	50%	50%	0%