



ACCELERATED ENERGY PROGRAM

Presentation to Governor

2012-2014

www.mass.gov/dcam/aep



Governor Deval Patrick
Lt. Governor Timothy P. Murray



Secretary Jay Gonzalez
Commissioner Carole Cornelison

Division of Capital Asset Management
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Secretary Richard K. Sullivan
Commissioner Mark Sylvia



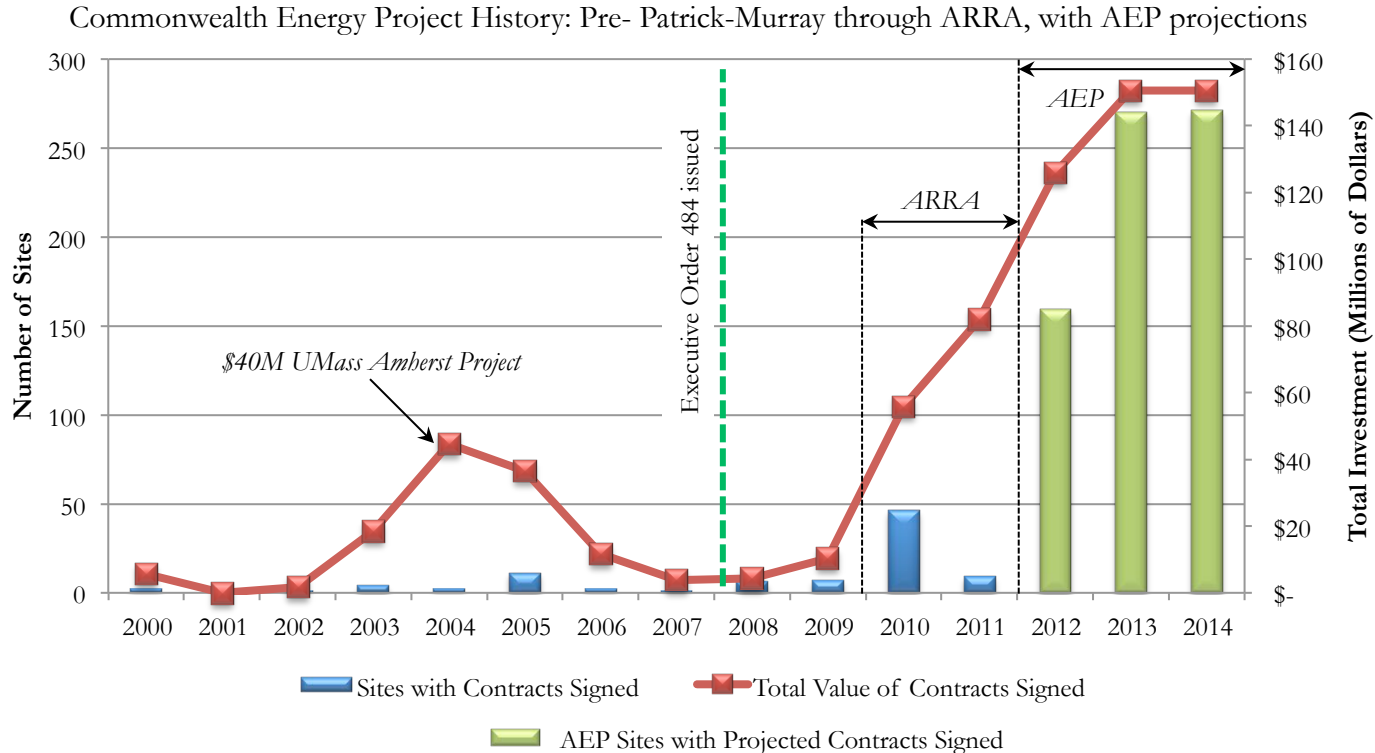
Table of Contents

Accelerated Energy Program - Overview	3
AEP Goals & Status Update	4
What is “Green”?	5
AEP “Green” Standard	6
AEP Objectives	7
AEP Partners	8
AEP Sustaining Benefits	9
Commonwealth Energy Project History	10
Energy Program Investment	11
Implementation Plan	12
Program Status	13
Implementation Group Investment – Overview	14
AEP Spotlights	15
Investment Plan	19
Investment Plan – Funding Sources	20
Projected Energy Costs & Savings – Overview	21
Projected Energy Costs & Savings – Detail	22
AEP Next Steps	23

Cover page photos, clockwise from top left: Middlesex Community College Ground Source Heat Pump drill rig; Massachusetts State House; Berkshire Community College; Murphy Memorial Rink; UMass Dartmouth Wind Turbine

Accelerated Energy Program – Overview

The AEP is comprised of 700 sites and over 4,000 buildings across the Commonwealth, spanning eight Program Areas and dozens of agencies.



- All sites will be complete or have entered construction by the end of 2014.
- Larger sites may require complex retrofits and are projected for spending through 2017.
- More accurate schedules will be developed as projects are prioritized for implementation.
- Financial projections will be continually refined as better data becomes available.

AEP Goals & Status Update

We will “green” 700 Sites

In a total of 700 Working days

We have initiated work at 105 Sites in the AEP

And now have 99 Sites **In Progress**

And 6 Sites **Complete.**

What is “Green”?

“Green” is a continuous process – opportunities for energy savings continually evolve as economics change and technology advances.

The Accelerated Energy Program establishes a “green” standard that all 700 sites will achieve. Some energy-leading Commonwealth facilities already exceed it, and others have the potential to do so.

Examples of actions that energy leaders can take to exceed the current “green” standard include:

- **Deeper measures.** Implementing improvements and innovative technologies that will yield energy reductions of 35% or more.
- **Renewable energy.** Increasing the use of clean energy to reduce the Commonwealth’s carbon footprint.
- **Integration with facility operations.** Training operations staff to maximize and sustain energy and water savings.
- **Preventative maintenance.** Developing a plan for preventative maintenance to keep systems operating at optimum efficiency.



Mount Wachusett Community College

AEP “Green” Standard

The table below describes the AEP “green” standard for different site types.

Large Sites (i.e. hospitals, colleges)	Small Sites (i.e. police barracks, career centers)	Occasional Use Sites (i.e. ice rinks, state parks)
<p>Reduce total site energy use by 25%.</p> <p>Projects <i>must</i> include:</p> <ol style="list-style-type: none"> 1) Lighting retrofits 2) Water retrofits 3) Space conditioning (HVAC, boilers, etc.) <p>Projects are likely to include <i>many</i> of the following:</p> <ol style="list-style-type: none"> 1) Lighting, Lighting controls 2) Efficient motors, Variable frequency drives 3) Heating and Cooling improvements 4) Ventilation sensors and controls 5) Building envelope improvements 6) Upgraded Building/Energy Management System 7) Plug load reduction (vending machines, printers, computers, etc.) 8) Low-flow water fixtures 9) Installation of on-site renewable/clean energy 10) Other 	<p>Reduce total site energy use by 20%.</p> <p>If baseline data is not available, reduction target will be reached by implementing <i>at least six</i> of the following measures:</p> <ol style="list-style-type: none"> 1) Lighting 2) Lighting controls 3) Motors 4) Heating and Cooling improvements 5) Ventilation sensors and controls 6) Building envelope improvements 7) Upgraded Building/Energy Management System 8) Plug load reduction 9) Low-flow water fixtures 10) Installation of on-site renewable/clean energy 11) Other 	<p>Retrofit <i>at least three</i> of the following systems, if applicable:</p> <ol style="list-style-type: none"> 1) Lighting 2) Lighting controls 3) Motors 4) Air conditioning 5) Plug load uses 6) Water fixtures 7) Other <p>If three are not applicable, then retrofits of as many that are applicable.</p>

AEP Objectives



AEP Partners

Division of Capital Asset Management



EOLWD



AEP Sustaining Benefits



The AEP will generate an estimated 3,500 to 4,500 clean energy jobs across the Commonwealth over six years

The AEP will save an estimated 120,000 metric tons of carbon each year. This is equivalent to approximately...

- 90,000 fewer passenger vehicles
- Consuming 1,000,000 fewer barrels of oil
- Planting 100,000 acres of pine or fir forest
- The electricity use of 56,000 homes

Commonwealth Energy Project History

The Administration's Leading by Example (LBE) program and the federal American Recovery and Reinvestment Act (ARRA) have resulted in a significant increase in the number of energy and water conservation projects in state-owned sites across the Commonwealth.



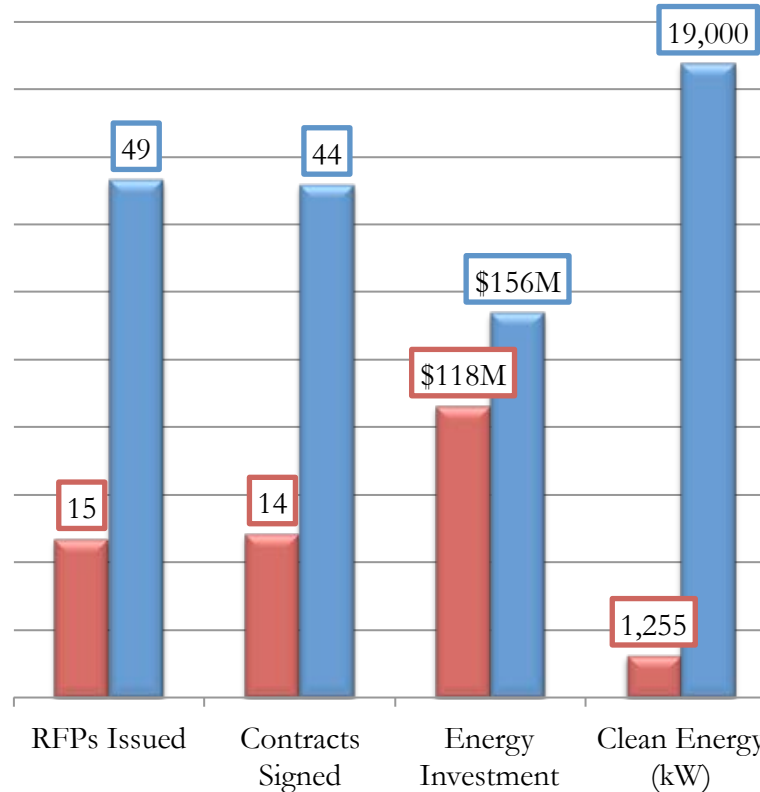
Mass Maritime Academy



Massasoit CC



Wrentham Dev. Center
Division of Capital Asset Management
D · C · A · M



- Pre- Patrick-Murray Administration (2000-2007)
- Patrick-Murray Administration (2007-2011)



Edward Brooke Courthouse



Hampshire County Jail



NCCI Gardner

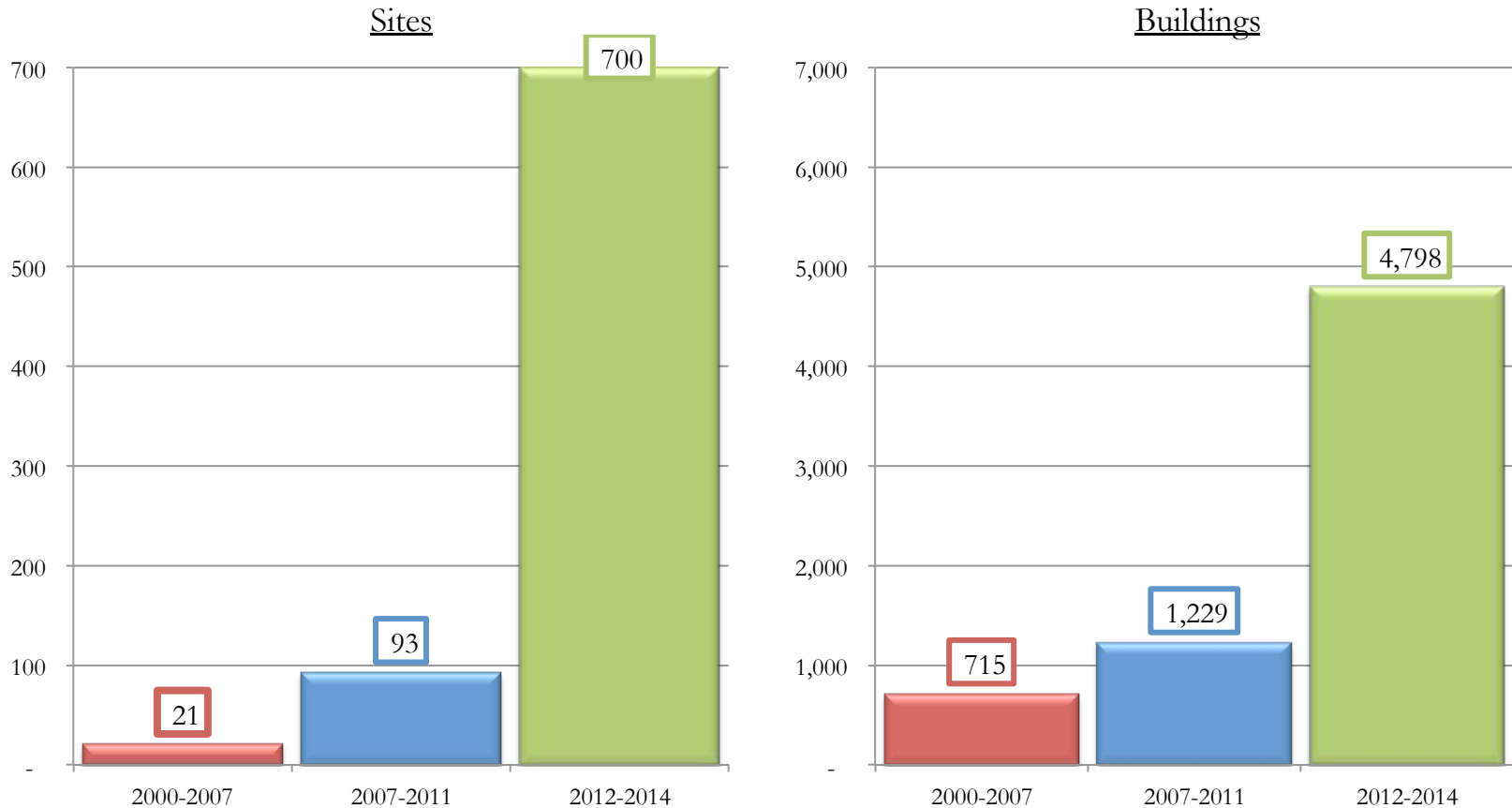
The Commonwealth of Massachusetts
Accelerated Energy Program



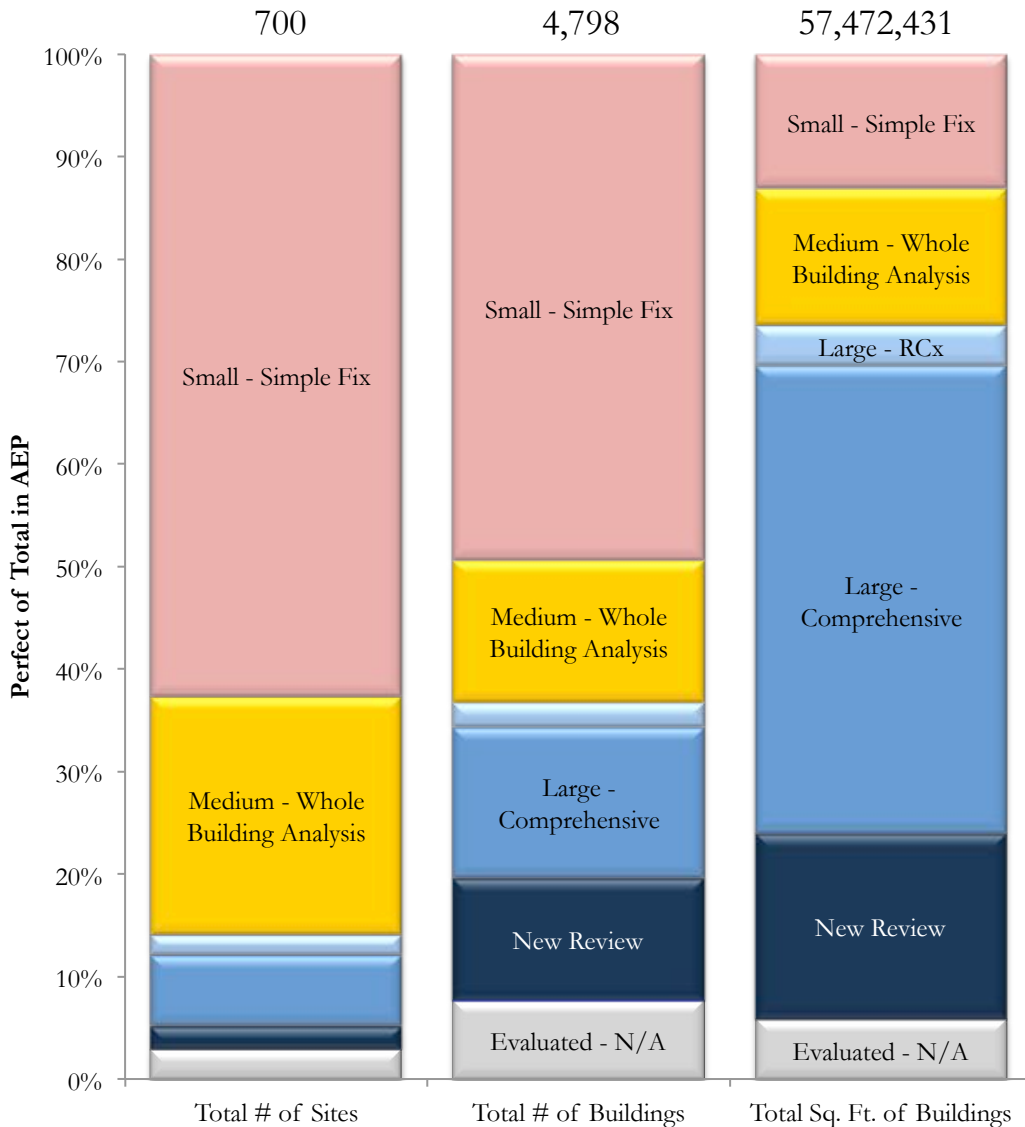
Energy Program Scope

The AEP will build on the Patrick-Murray Administration's Leading by Example (LBE) program to increase the number of energy efficient facilities.

2000-2007 2007-2011 2011-2014
Pre- Patrick-Murray Administration Patrick-Murray Administration Accelerated Energy Program



Implementation Plan



Small Sites: New partnerships with utilities and facility maintenance staff for “Simple Fix” implementation of O&M energy measures (438 Sites with 2,366 Buildings).

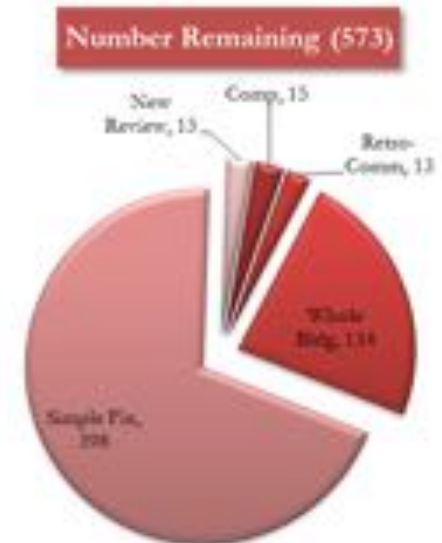
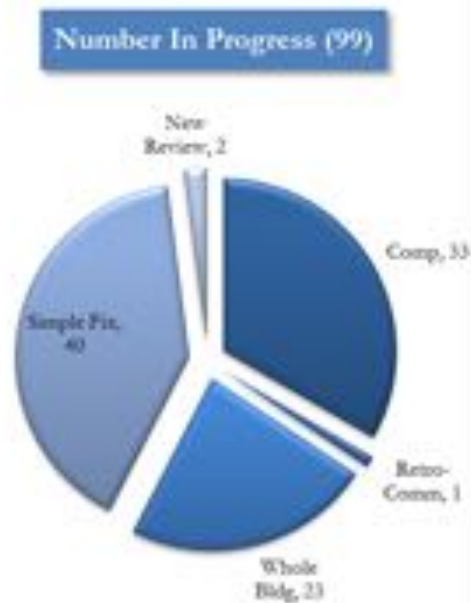
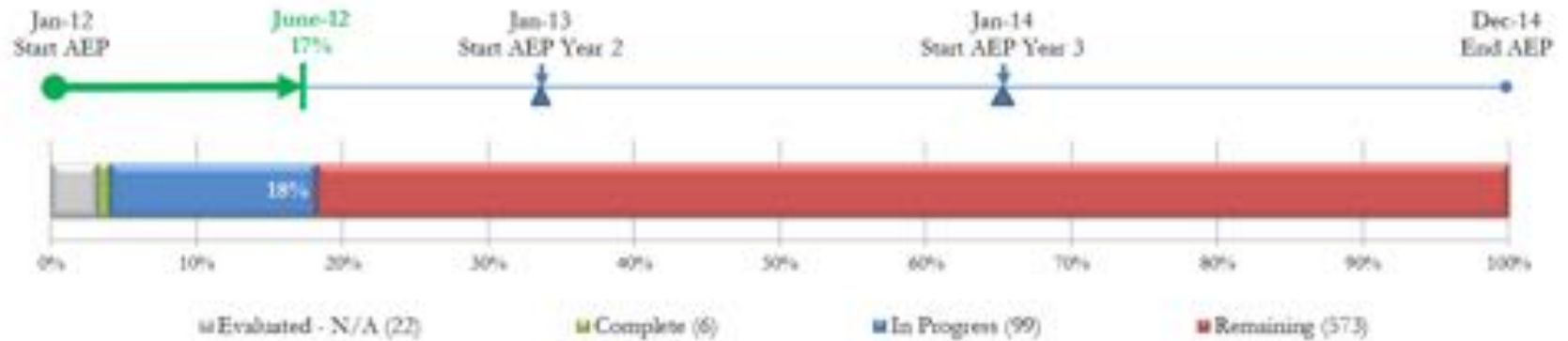
Medium Sites: Perform retrofits and work with utilities for “Whole Building Analysis” ECMs, leverage funds for larger upgrades / renewables (162 Sites with 661 Buildings).

Large Sites: Accelerate DCAM’s current comprehensive project model (48 Sites with 704 Buildings) and retro-commissioning (14 Sites with 116 Buildings)

New Review: Sites retrofitted by DCAM between 2000-07 that will be re-evaluated for additional savings. (16 Sites with 578 Buildings).

Evaluated – N/A : Sites do not use energy resources or do not require retrofits (22 Sites with 373 Buildings).

Program Status



Implementation Group Investment – Overview

Different Implementation Groups have projects with different energy measures, processes, and paybacks:

<p>Est. Cost: \$2.02/sf Est. Savings: \$0.22-\$0.43/sf</p>	<p>Simple Fix</p>	<ul style="list-style-type: none"> • Lighting/Water Upgrades • Work with existing utility programs
<p>Est. Cost: \$5.87/sf Est. Savings: \$0.58-\$0.77/sf</p>	<p>Whole Building Analysis</p>	<ul style="list-style-type: none"> • Efficient HVAC Upgrades • Medium payback projects
<p>Est. Cost: \$10.60/sf Est. Savings: \$0.55-\$0.73/sf</p>	<p>Retro-commissioning</p>	<ul style="list-style-type: none"> • Metering, equipment upgrades • Update systems/major audits
<p>Est. Cost: \$12.00/sf Est. Savings: \$0.47-\$0.93/sf</p>	<p>Comprehensive</p>	<ul style="list-style-type: none"> • Major equipment upgrades • Multiple ECMs, lengthy process
<p>Est. Cost: \$0.10/sf Est. Savings: \$0.22-\$0.43/sf</p>	<p>New Review</p>	<ul style="list-style-type: none"> • Building check-ups for sites with relatively recent projects

AEP Spotlight – Simple Fix

Department of Conservation and Recreation

Wompatuck State Park Hingham, MA

Site Overview:

- Preliminary audit results suggested several smaller measures can be implemented including:
 - Lighting and lighting controls
 - Programmable Thermostats
 - Insulate Attic, Replace Storm Windows
 - Replacement of Refrigerator
- The implementation of recommended measures will reduce the overall utility costs by an estimated \$13,000 per year.
- Implementation of these ECMs has a payback of 3.3 years.



Wompatuck State Park



AEP Spotlight – Whole Building Analysis

Department of Conservation and Recreation

Energy Efficient Skating Rinks

Murphy Memorial – South Boston, MA

Reilly Memorial – Brighton, MA

Daly Memorial – Brighton, MA

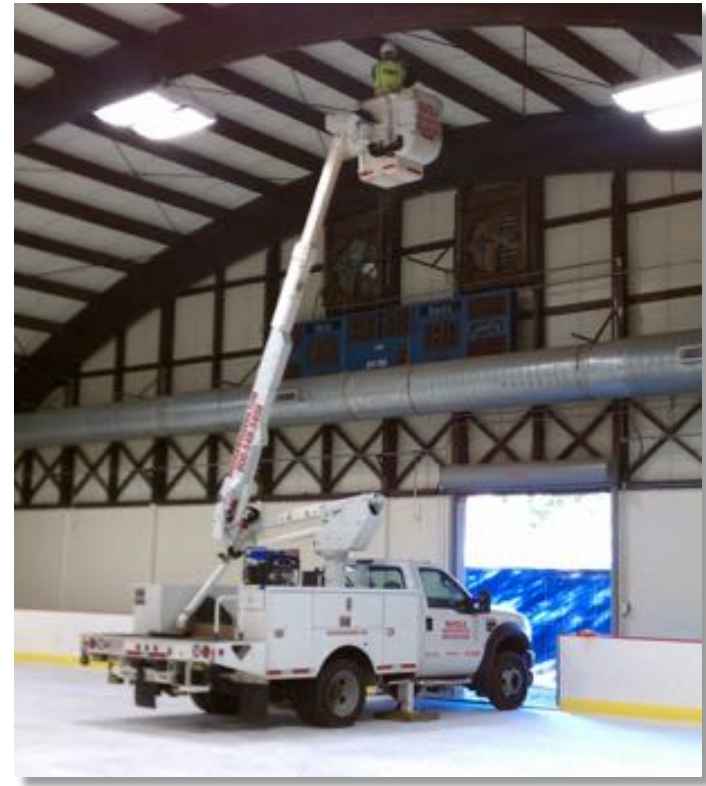
Devine Memorial – Dorchester, MA

Bajko Memorial – Hyde Park, MA

Connell Memorial – Weymouth, MA

Project Overview:

- DOER led project utilizing ARRA funds.
- Low-Emissivity ceilings at five ice rinks will reduce energy use and improve ice quality.
- After installation of new low-e material, rink managers measured a 20 degree temperature drop at ice level.
- New ceilings will reduce rink refrigeration loads by 25-40%.
- The project will yield an estimated 30%+ in total energy savings.



Murphy Memorial Rink



Judiciary

Worcester Trial Court Worcester, MA

Project Overview:

- 420,000 square foot building was built in 2007.
- Audit will investigate function of HVAC, Energy Management System, and lighting systems.
- Depending on retro-commissioning results, operational upgrades and quick payback ECMs may be recommended for implementation.

Other Judiciary Sites:

- 11 AEP sites and 15 other sites are bundled into larger projects that are currently in study and construction.



Worcester Trial Courthouse

AEP Spotlight – Comprehensive Retrofit

Bureau of State Office Buildings

Massachusetts State House Boston, MA

Project Overview:

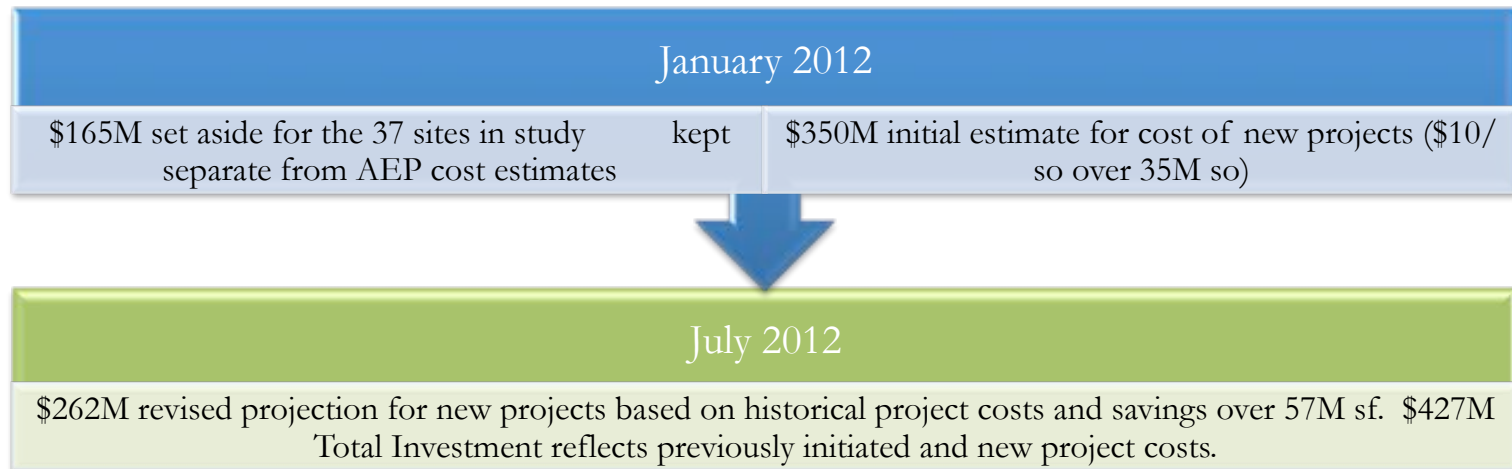
- 650,000 square foot facility built in 1798.
- Comprehensive energy and water retrofit includes:
 - Pumps and fan motors – High efficiency Variable Frequency Drives (VFDs)
 - Energy Management System dashboard
 - Retro-commissioning and operational enhancements
 - Rainwater harvesting, toilet fixtures
 - VFDs on chilled water pumps
 - Re-design of the central plant chiller
 - Variable Air Volume (VAV) HVAC systems
- Estimated savings of \$410,000 per year.
- Comprehensive project also addresses McCormack, Hurley, and Lindemann state buildings.
- State House is also currently undergoing a large lighting upgrade retrofit.



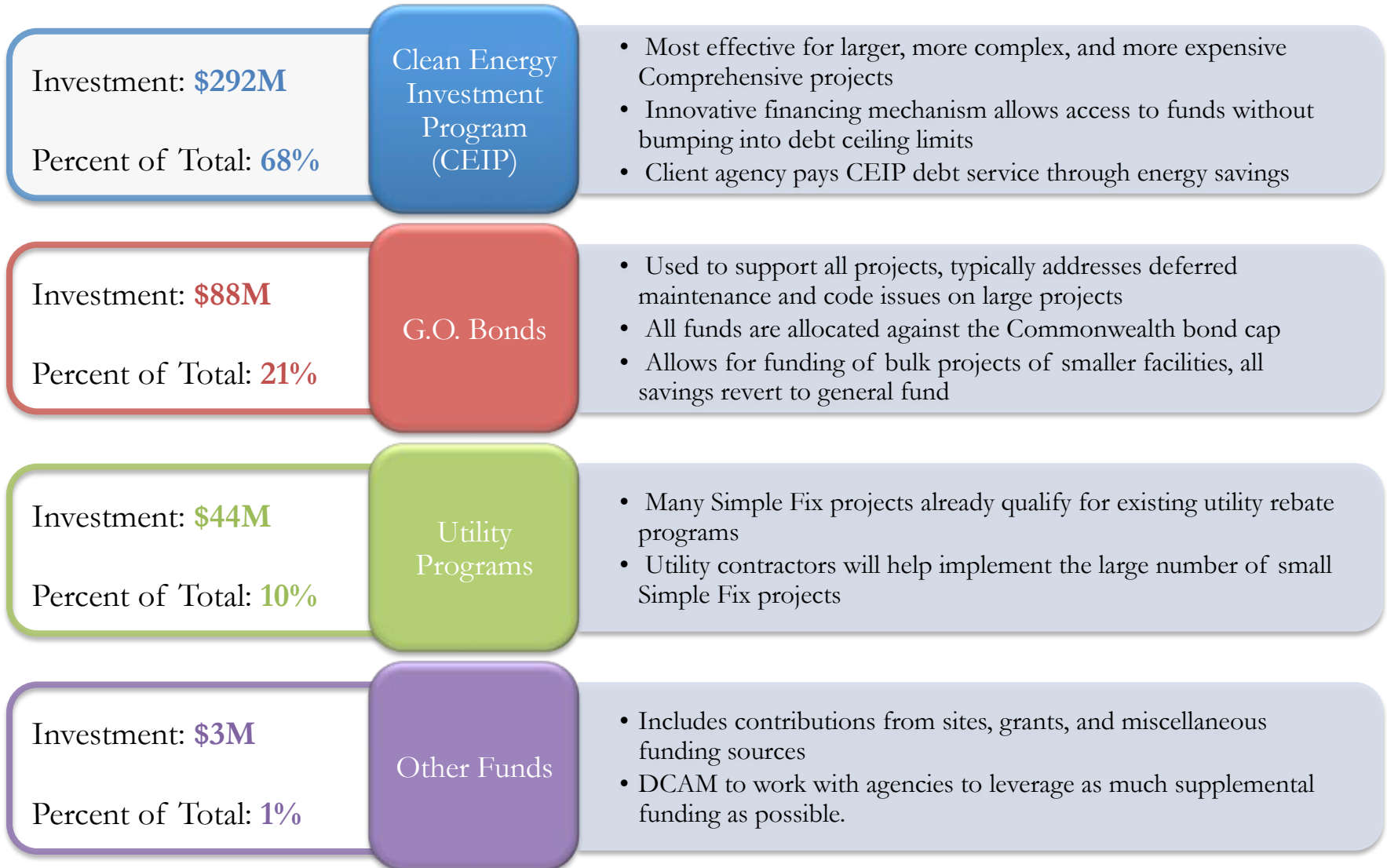
Massachusetts State House

Investment Plan

663 sites were identified as potential opportunities for new energy and water conservation projects and 37 sites had studies underway.



Investment Plan – Funding Sources



Projected Energy Costs & Savings - Overview

\$185M

Estimated
Energy Costs
for AEP Sites
Per Year

- DOER collects utility bill data from agencies in their Mass Energy Insight database.
- This data is used to create a baseline for how much energy each site in the AEP currently uses.

\$43M

Estimated
Energy Savings
Per Year

- Analysis of historical project data (from completed DCAM, DOER, and utility projects) provides a benchmark for estimated savings for each building type and Implementation Group.
- These \$/sq-ft estimates are rolled up to create total savings estimates.

\$142M

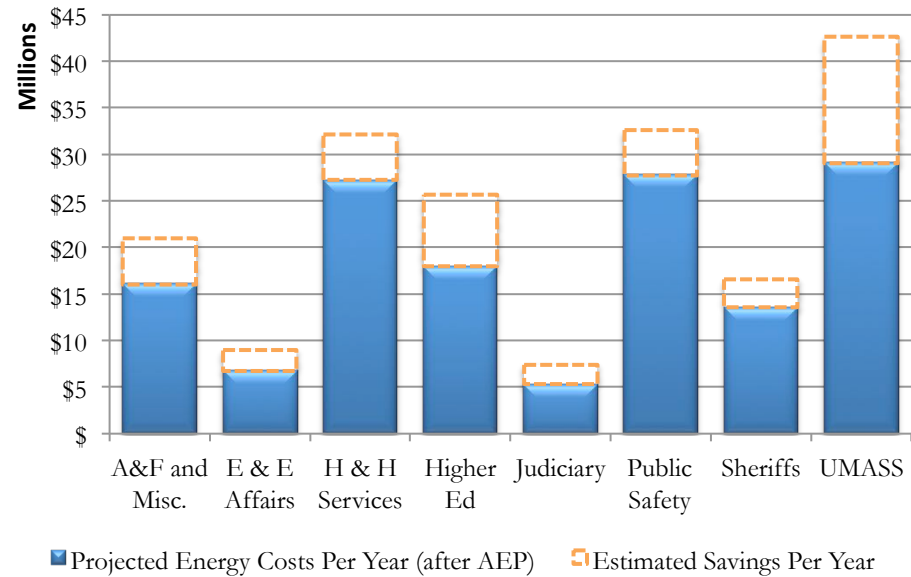
Projected
Energy Costs
Per Year (after
AEP)

- The anticipated total savings are subtracted from the current level of spending on energy to establish projected energy costs for each program area once all AEP projects have been implemented.

Projected Energy Costs & Savings - Detail

- Shown are energy costs for AEP sites in the Commonwealth, with anticipated reductions from current levels represented by the green dashed areas.
- Savings estimates were generated using historical data.
- Comprehensive projects yield higher savings, so agencies with larger facilities have higher projections.

Total Savings Per Year:
\$43 Million



	Estimated Investment for AEP Sites	Estimated Energy Costs Per Year for AEP Sites	Estimated Savings Per Year	Projected Energy Costs Per Year (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%

AEP Next Steps

Simple Fix	<ul style="list-style-type: none">• Secure contracts with utility vendors
Audits & RCx	<ul style="list-style-type: none">• Develop standardized template for audits, connect to real-time metering
Outreach & Tech Support	<ul style="list-style-type: none">• Survey to facility managers
Sites Upgrades	<ul style="list-style-type: none">• Develop building code matrix
Communications	<ul style="list-style-type: none">• Launch AEP
Data & Performance	<ul style="list-style-type: none">• Create AEP Dashboard and revise financial projections
Procurement	<ul style="list-style-type: none">• Develop approach for achieving M/WBE goals
Leasing	<ul style="list-style-type: none">• Identify priority leased spaces
Labor & Workforce	<ul style="list-style-type: none">• Establish AEP Certification Program