Creating A Cleaner Energy Future For the Commonwealth

DOER
Massachusetts Department of Energy Resources

MASSACHUSETTS LEADING BY EXAMPLE PROGRAM

PUBLIC LEADERSHIP, STEWARDSHIP, COMMITTMENT

Leading By Example Council Meeting

March 10, 2015

Agenda

- Welcome and Introductions
- State Policy Updates
- Solar PV Thermal Technology Vendor Presentation
- LBE Updates
- DCAMM AEP Updates
- LBE Outreach
- Solar PV Canopies
- DFW Field Headquarters Building Overview & Tour

State Policy Updates

Administration Transition

EEA TEAM

- Matt Beaton, Secretary
- Ned Bartlett, Undersecretary
- Ron Gerwatowski, Assistant Secretary for Energy
- Daniel Siegler- Assistant Secretary for Environment
- Martin Suuberg, Commissioner, MassDEP
- Dan Burgess, Acting Commissioner, DOER

Other Appts.

- Carol Gladstone Commissioner, DCAMM

Clean Energy Stats

Installed Capacity for Solar, Wind & CHP

752 MW	107 MW	478 MW
		

Installations through 2/1/15

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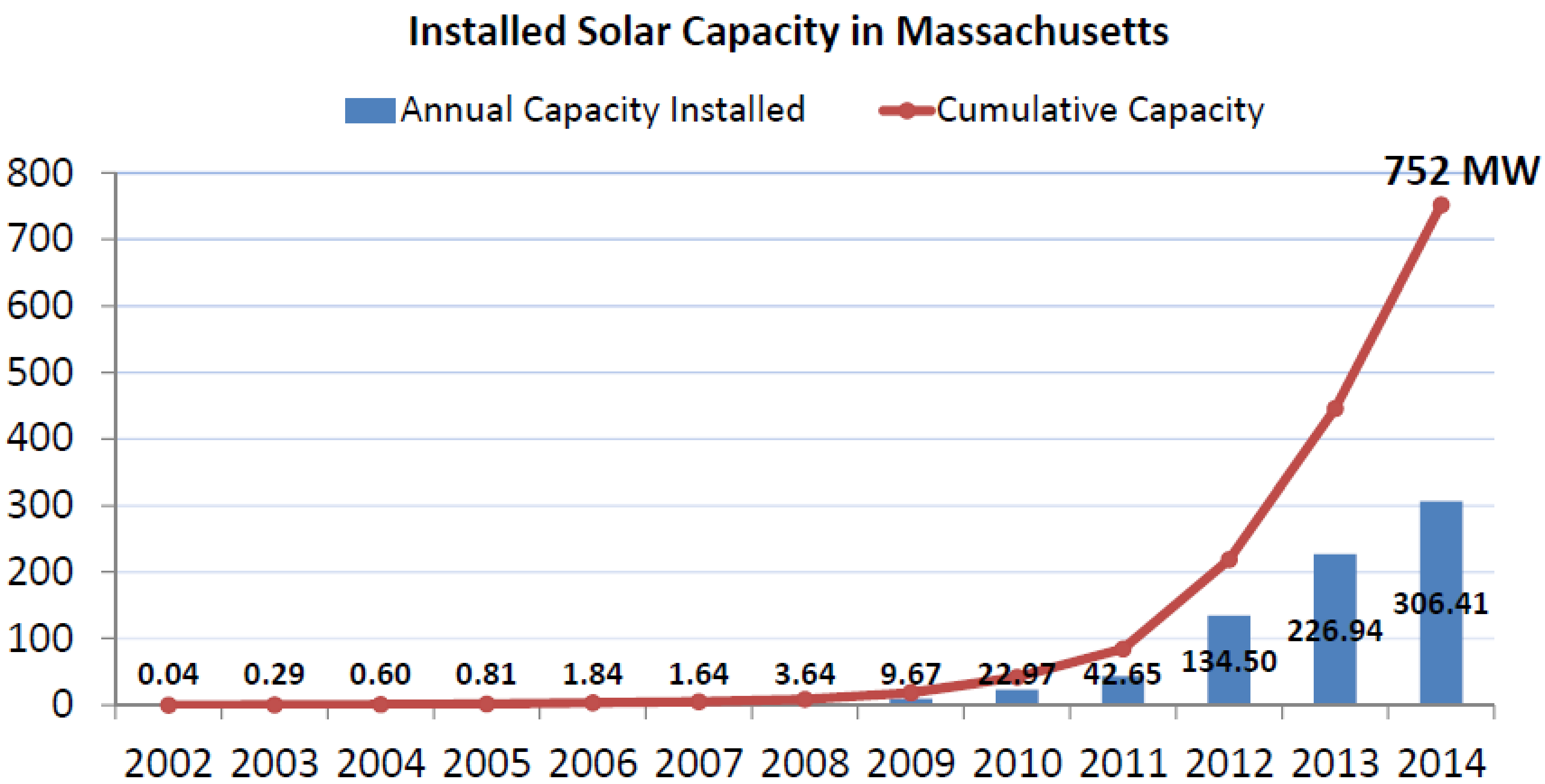
Clean Energy Stats



Installations through 2/1/15

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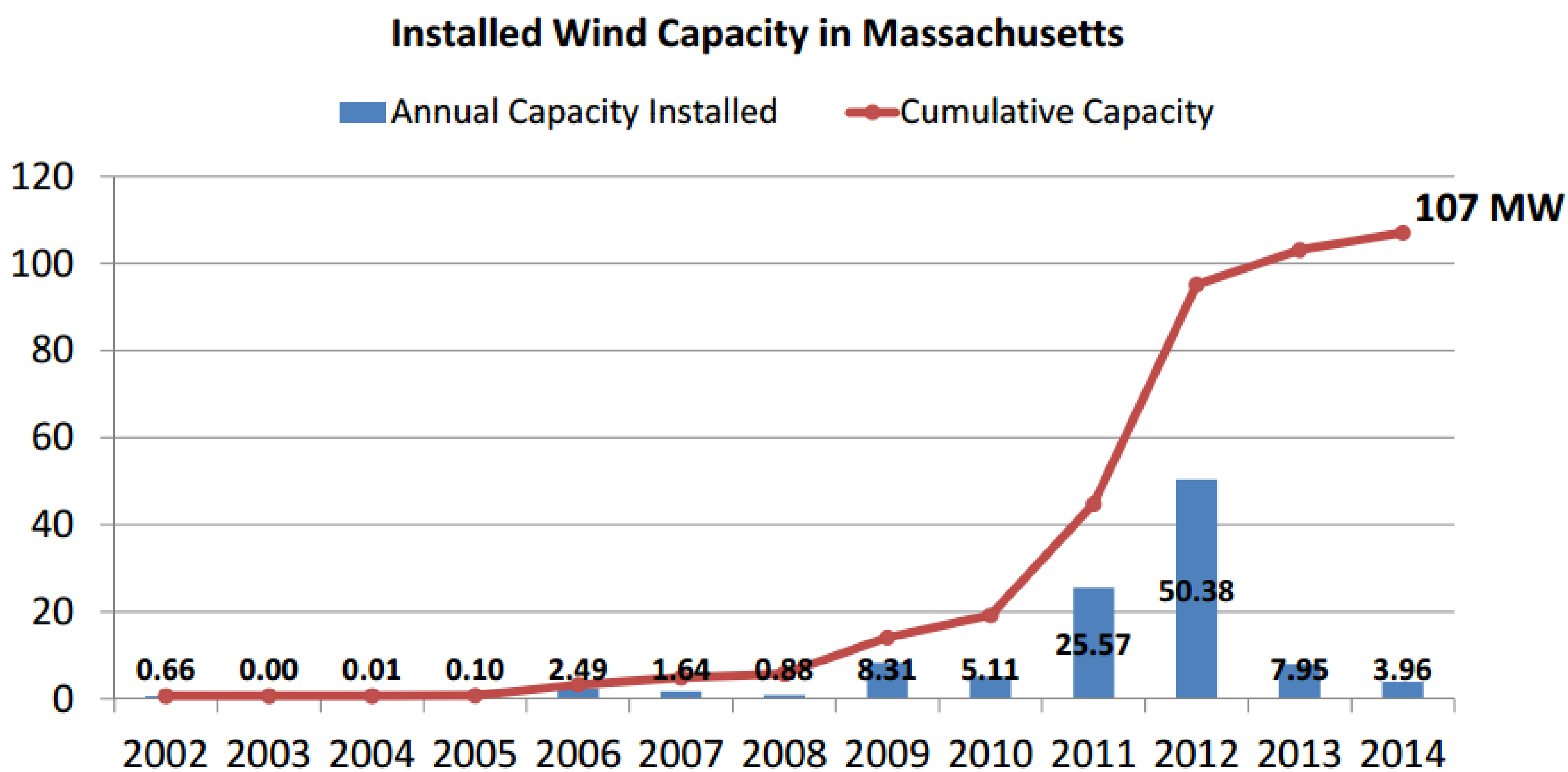

Installations through 2/1/15

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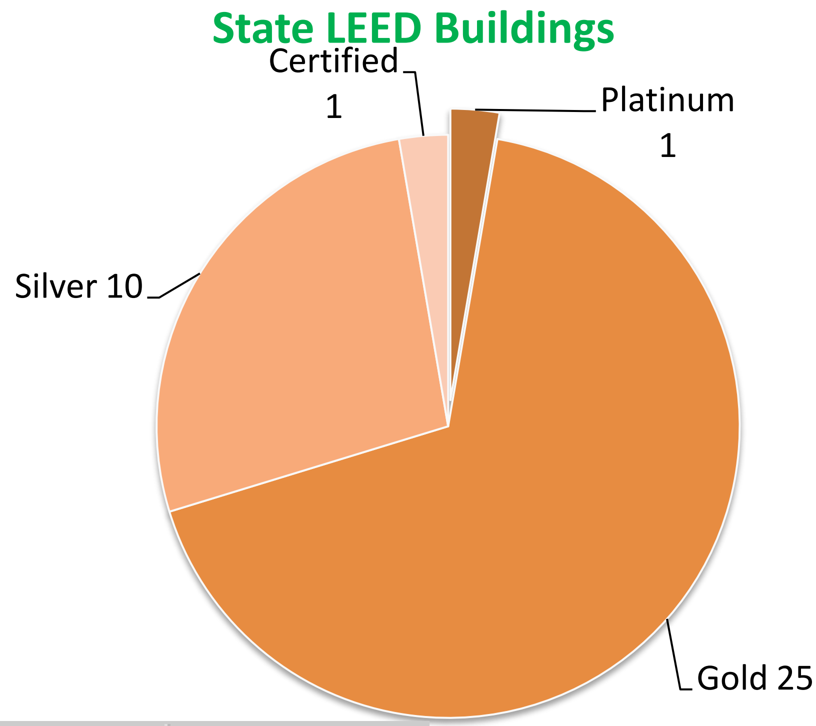
Clean Energy Stats: LEED Buildings

- MA 5th in nation in LEED buildings (statewide)
  - Top 5 for 3 years in a row
- 99 LEED buildings certified in 2014 (statewide)
- 37 LEED buildings in state government portfolio



Rank	State	Projects certified in 2014	Square feet LEED certified in 2014	Per-capita square footage
1	Illinois	174	42,457,254	3.31
2	Colorado	102	15,816,498	3.15
3	Maryland	132	15,583,423	2.70
4	Virginia	150	18,617,712	2.33
5	Massachusetts	99	14,662,950	2.2

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Commonwealth Facility Fund for Energy Efficiency (CoFFEE)

- State agencies eligible to apply for $10,000-$90,000 in loans for energy and water efficiency projects
- Loans can cover the full or partial cost of a conservation measure
- Application deadline extended to **March 31, 2015**
- Recorded webinar with details available online:
  - http://www.mass.gov/dcamm/coffee
- Contact Ryan Harold at DCAMM with questions

  ryan.harold@state.ma.us

Upcoming Events

- **College and University Recycling Coalition Webinar- 4/9/15**
  - Is Your Education Outreach Changing Behavior?
  - Register with CURC (www.curc3r.org)
- **Food Donations for Waste Diversion: Best Practices Stakeholder Meetings**
  - Western MA- 3/25/15
  - Central MA- 4/9/15
  - Eastern MA- 4/29/15
  - RSVP with RecyclingWorks: info@recyclingworksma.com
- **MASSbuys Expo- 4/30/15**
  - 375 exhibitors
  - EPPS highlighted
  - MAFMA Annual Meeting
  - Register with OSD (mass.gov/osd)

Net Metering and Solar Task Force

- 17 member Task Force will analyze and produce recommendations on how best to reach state's 1600 MW solar goal
- 6th Task Force Meeting held last week
- Recommendations to legislature targeted for **March 31, 2015**
- More info:

http://www.mass.gov/eea/energy-utilities-clean-tech/nms-taskforce/

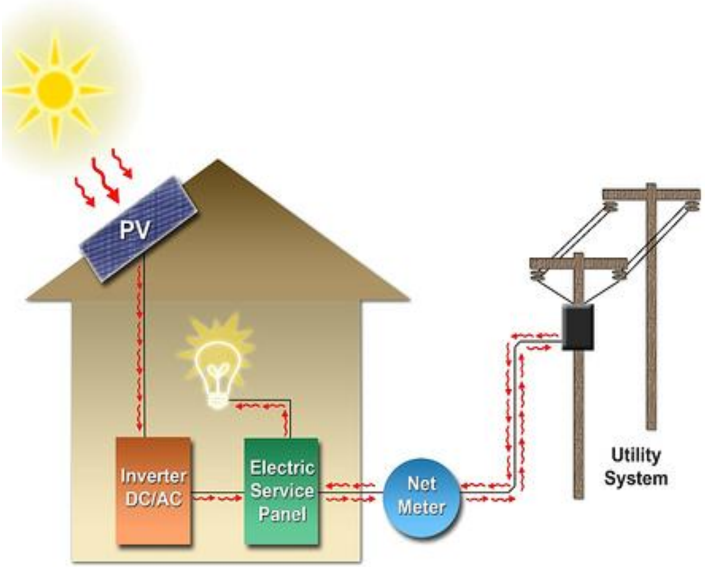


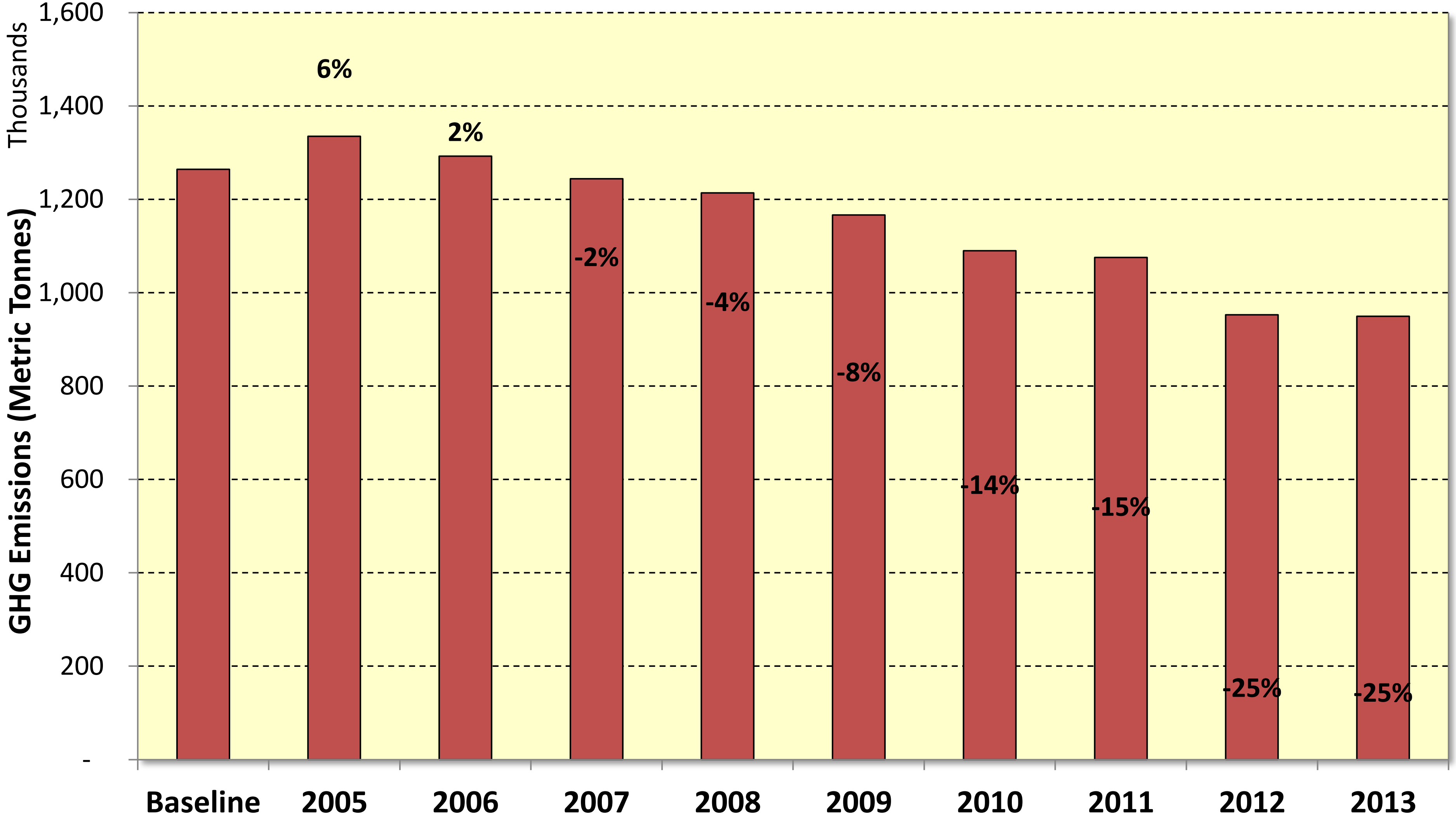
Image: Green Living Ideas

Solar PV Thermal Technology Vendor Presentation

LBE Updates

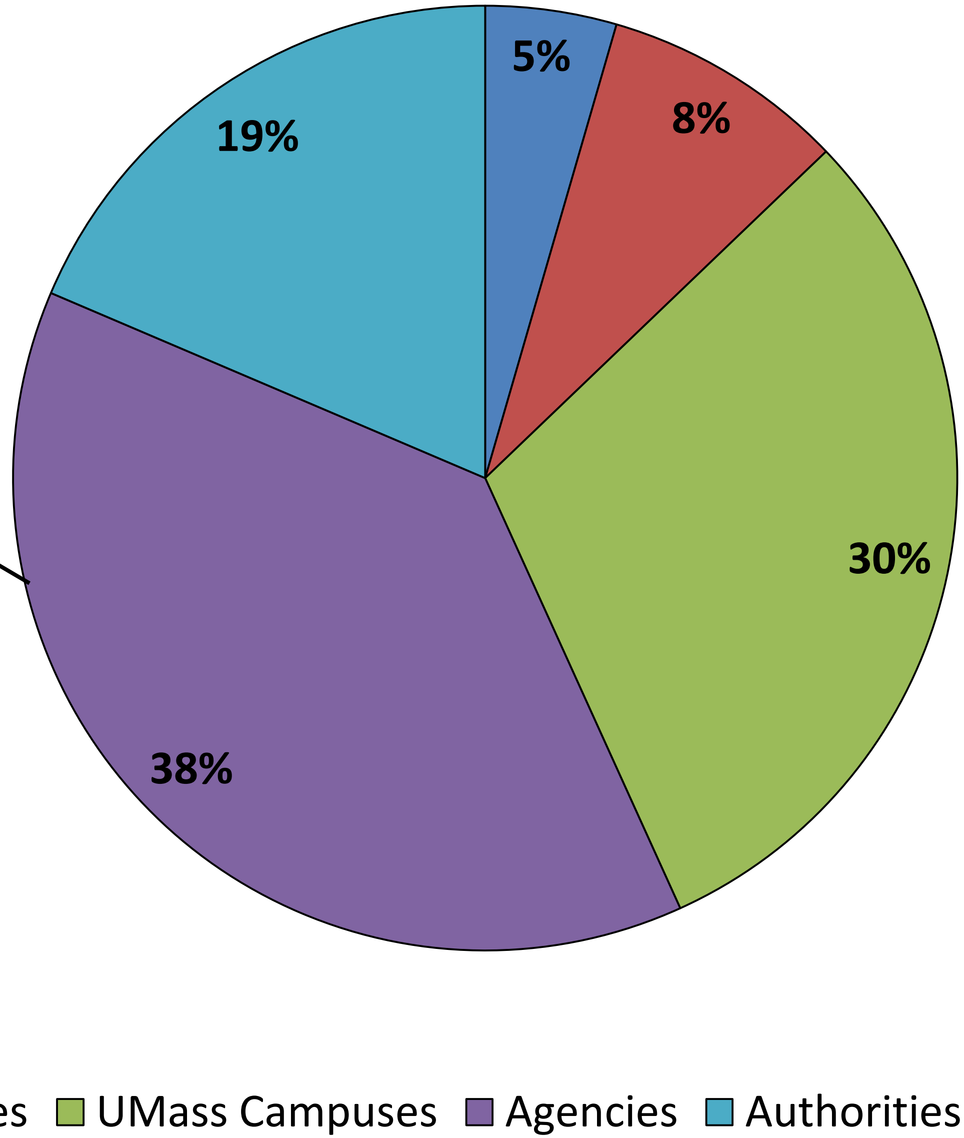
FY13 E.O. 484 Target: GHG Emissions Reduction

- GHG Emissions reduced by 25% from the LBE Baseline



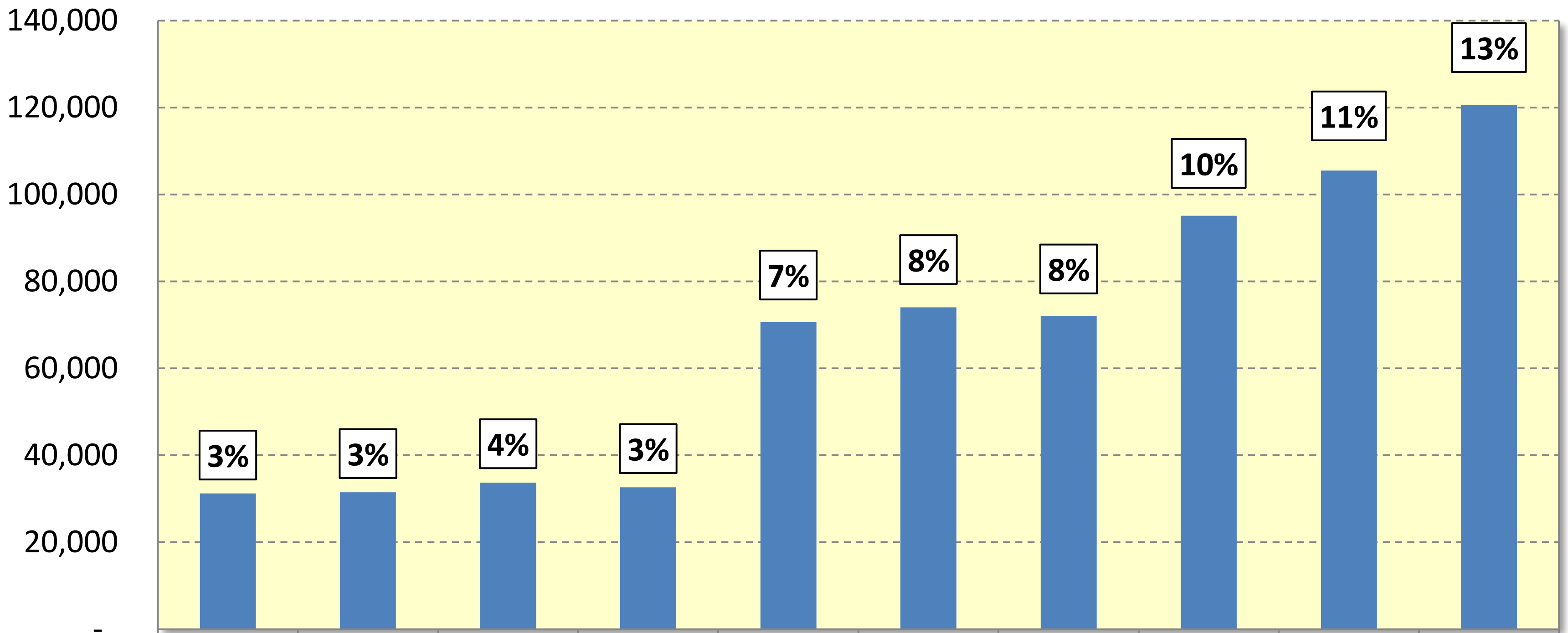
FY13 E.O. 484 Target: GHG Emissions Reduction

<u>GHG Emissions</u>
DOC: 8%
MassDOT: 7%
State Police: 4%
DDS: 3%
Trial Court: 3%
DCAMM: 3%
DCR: 3%
DPH: 2%
DMH: 2%
BSOB: 2%
Military: 1%
DYS: 1%
Chelsea Soldier's Home, DFS, FWE, Holyoke Soldier's Home, MassDEP, Env Police: >1%



FY13 E.O. 484 Target: GHG Emissions Reduction

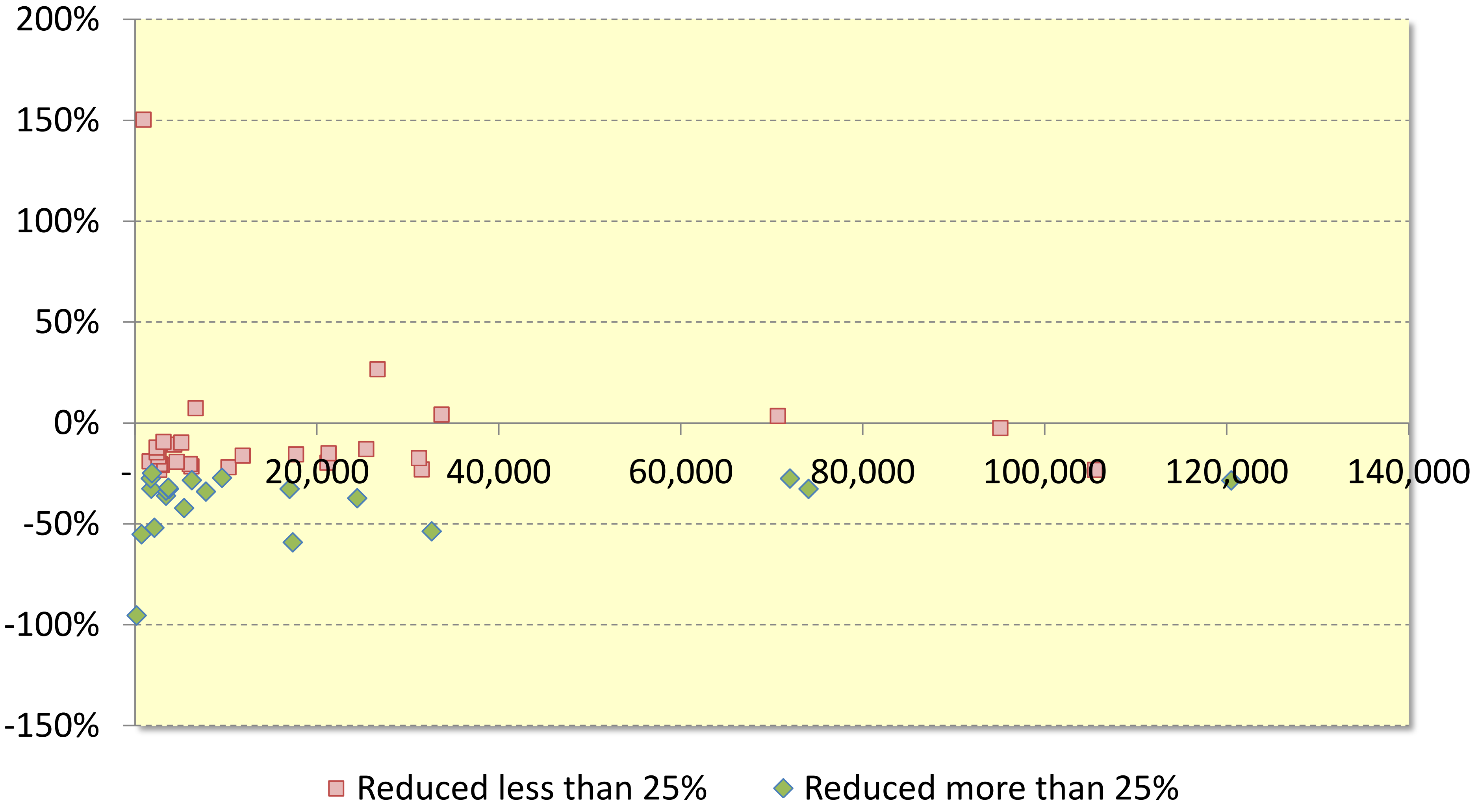
- Top 10 GHG emitters account for 70% of total emissions



	UMass Lowell Total	Trial Court Total	Dept. of State Police Total	Dept. of Developmental Services Total	MassDOT - Highway & Turnpike Divisions Total	Mass. Water Resources Authority Total	Dept. of Correction Total	UMass Medical Total	MassPort Authority Total	UMass Amherst Total
GHG Emissions (metric tonnes)	31,217	31,525	33,697	32,619	70,667	74,041	72,001	95,124	105,537	120,503
% of Overall GHG Emissions FY13	3%	3%	4%	3%	7%	8%	8%	10%	11%	13%

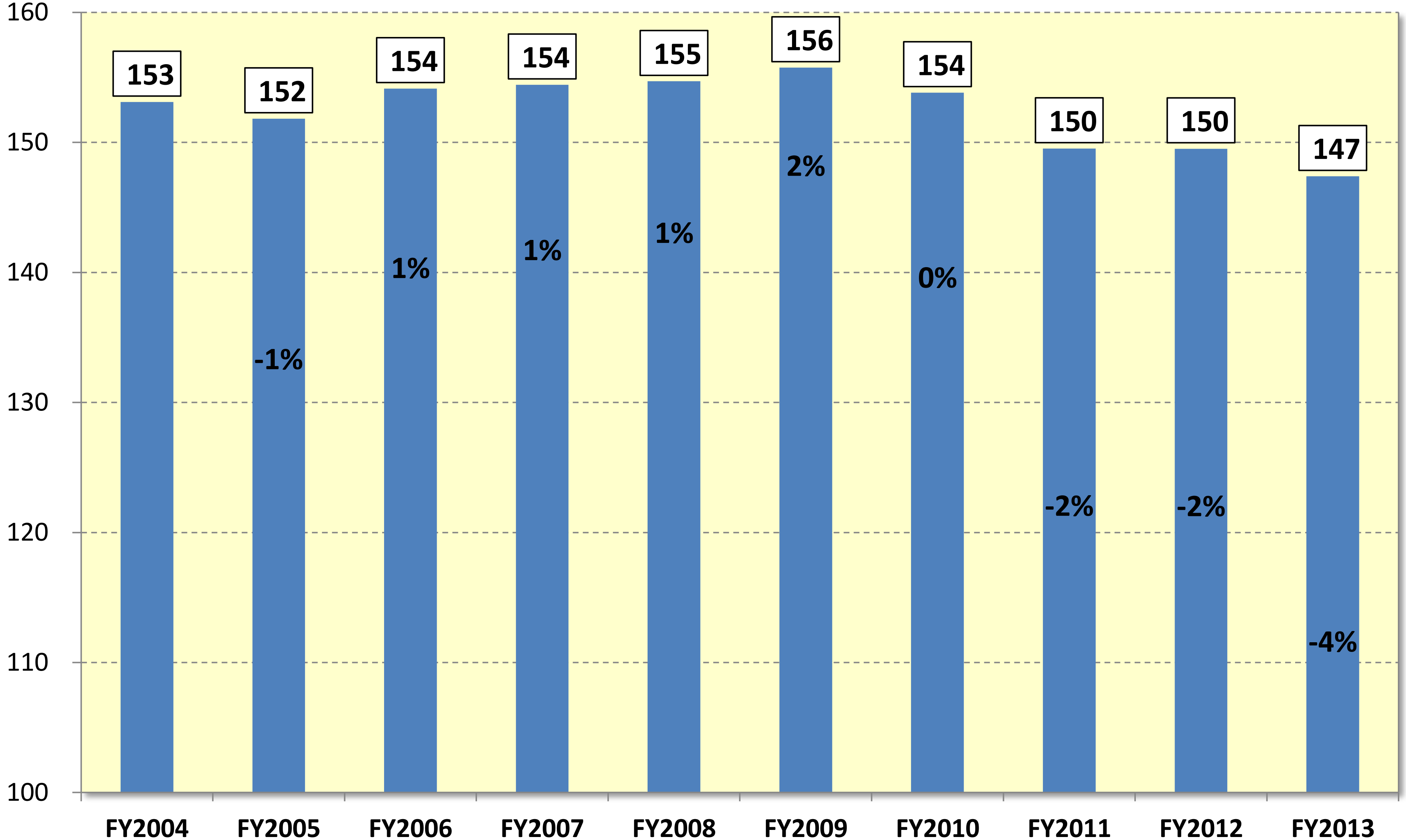
FY13 E.O. 484 Target: GHG Emissions Reduction

- 20 agencies reduced GHG emissions more than 25% from the LBE Baseline to FY13



FY13 E.O. 484 Target: EUI Reductions

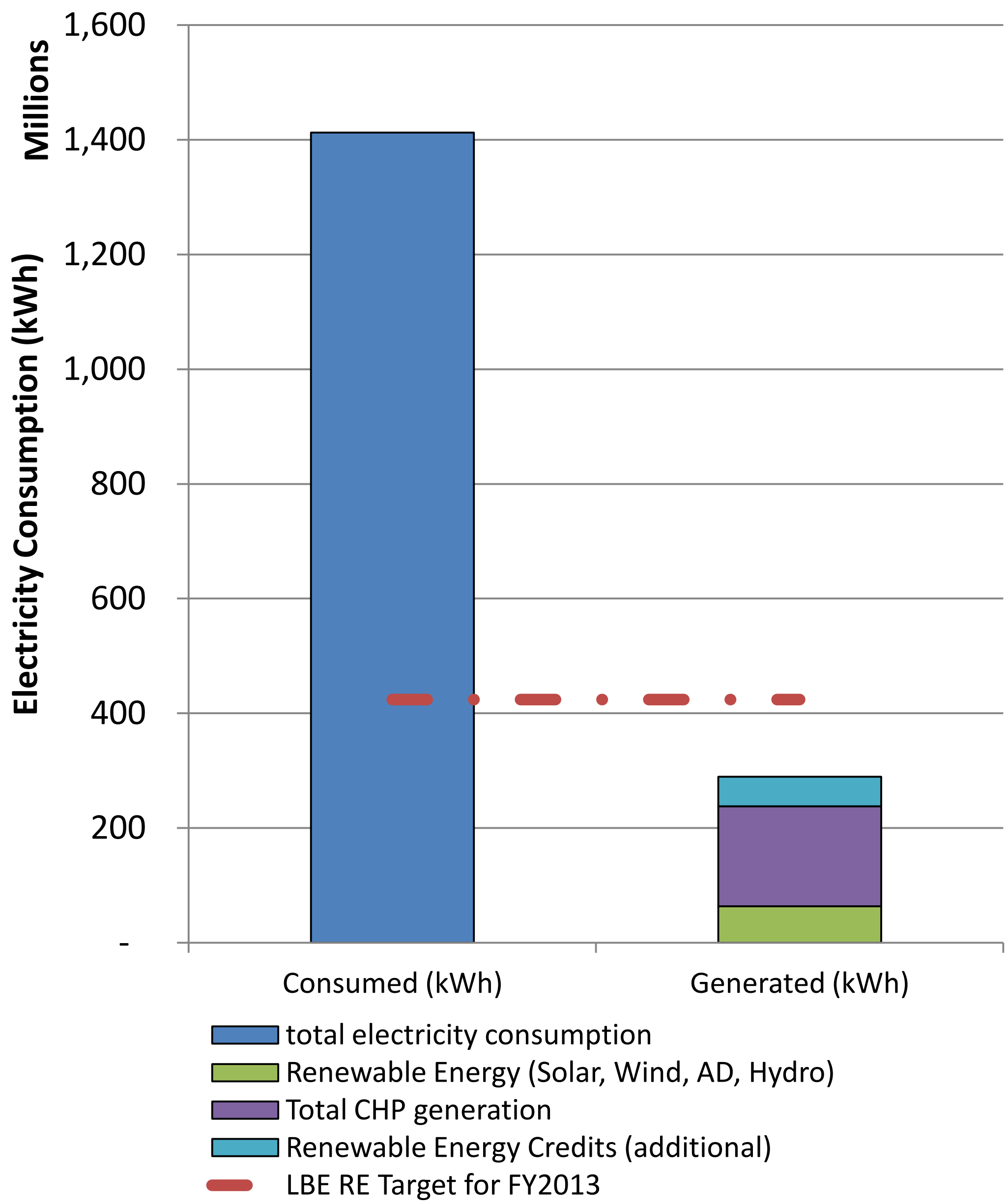
- 4% weather normalized EUI reductions from FY2004



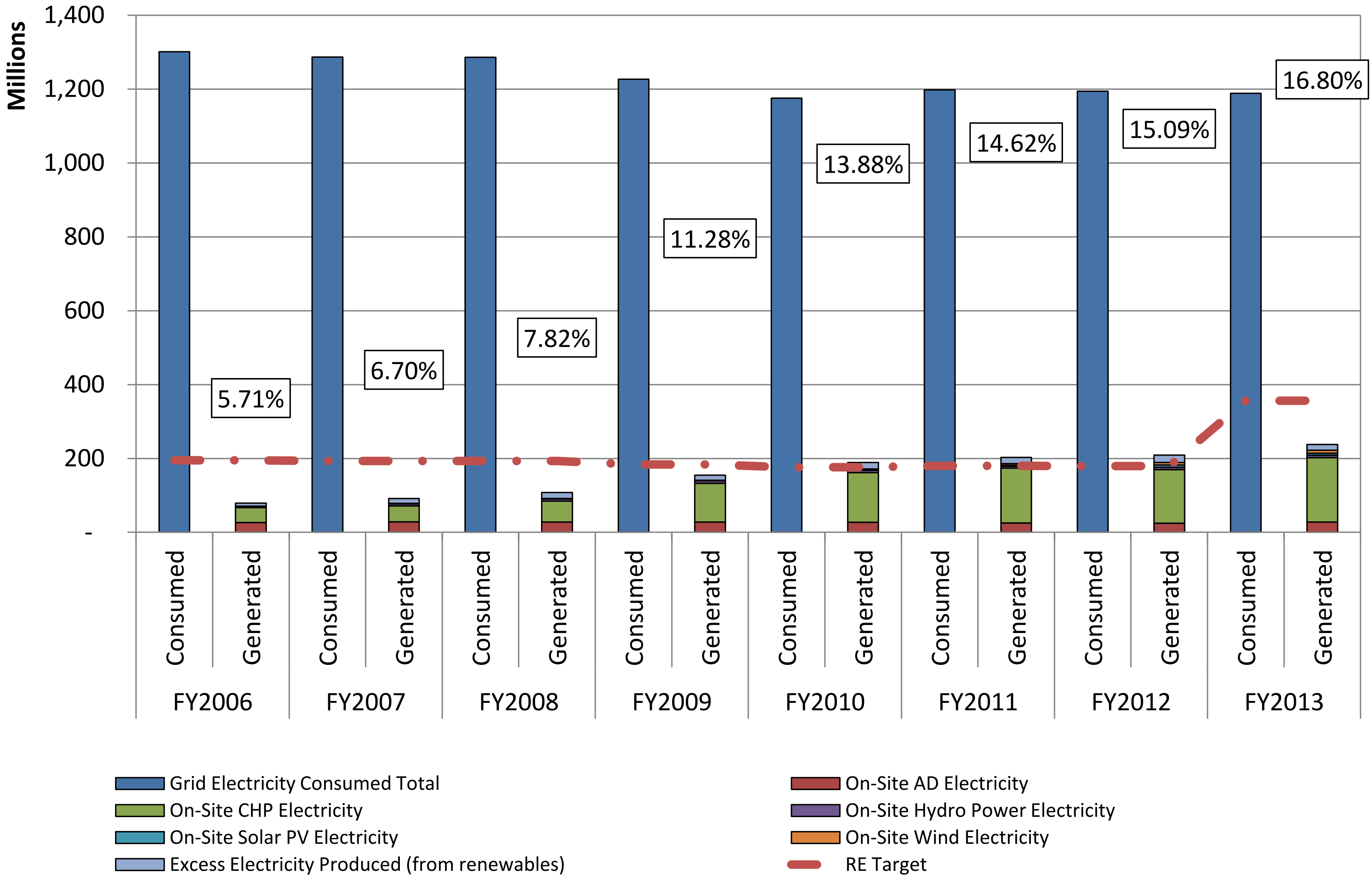
FY13 Renewable Energy and On-site Generation

- 16.8% of state's total electricity consumption came from on-site generation

- Total electricity consumption of 1.4 billion kWh
- 237.6million kWh generated by on-site renewable power (green bar) and CHP (purple bar)
- Red line represents E.O. 484 Target for FY13, 423.8 million
- 51.8 million kWh additional MA RECs purchased (NOTE: This is not included in percentage)



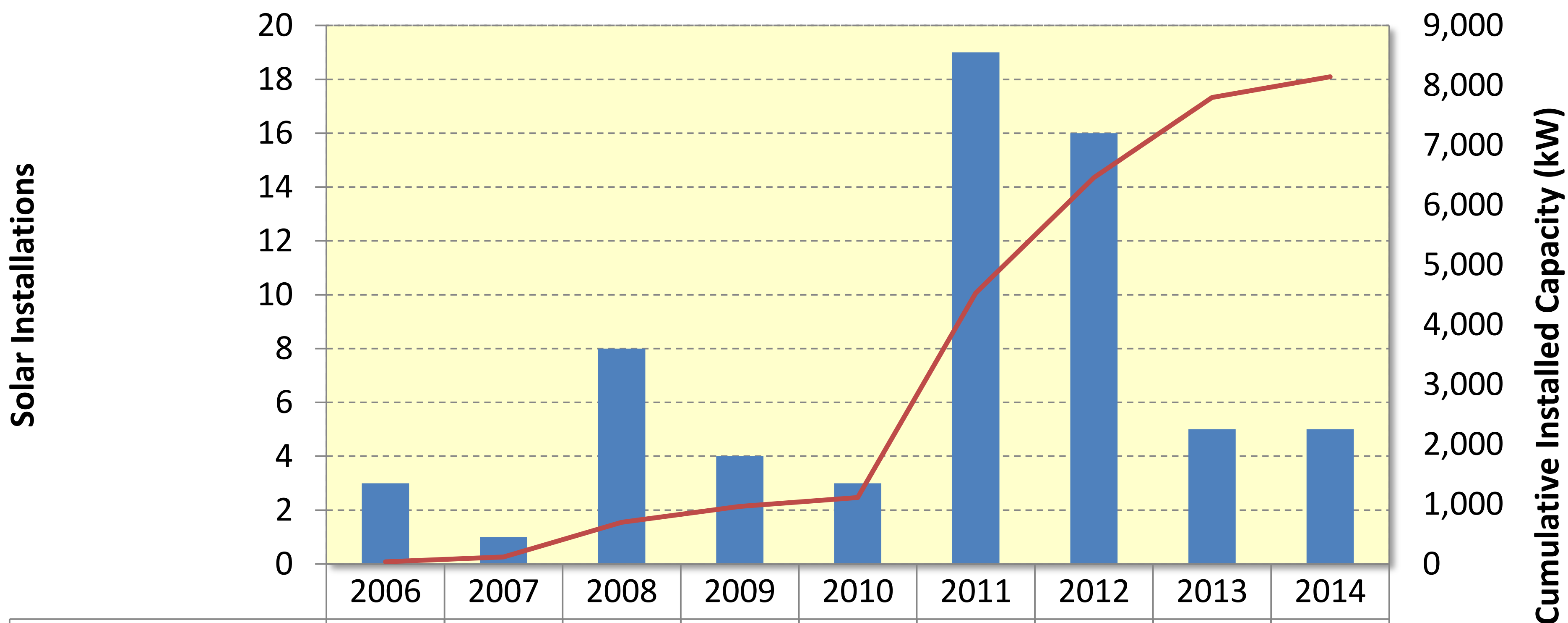
FY13 Renewable Energy and On-site Generation



LBE Renewable Capacity: Solar

Over 8 MW of solar PV installed at state facilities with an additional 3MW to be online by the end of FY2015

Solar PV installations FY06-FY14

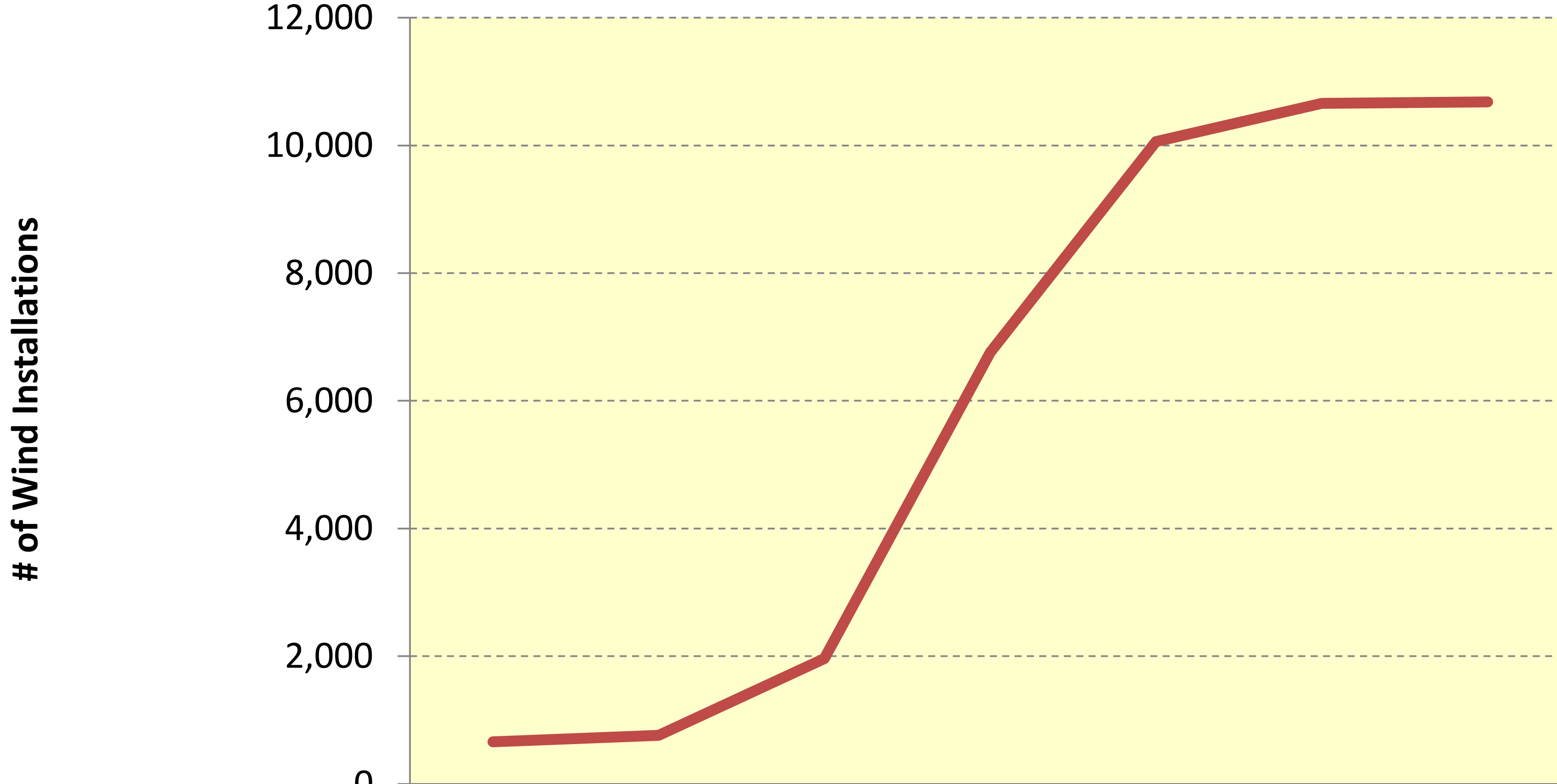


	2006	2007	2008	2009	2010	2011	2012	2013	2014
Solar Installations	3	1	8	4	3	19	16	5	5
Cumulative Installed Capacity (kW)	37	118	694	964	1,112	4,531	6,458	7,799	8,145

LBE Renewable Capacity: Wind

Over 10.5 MW of solar PV installed at state facilities

Wind installations FY06-FY14



	2006	2007	2008	2009	2010	2011	2012
Cumulative Installed Capacity (kW)	660	760	1,960	6,760	10,060	10,660	10,681

Massachusetts Clean Tech Event

- **Advanced Clean Energy Technologies for College Campuses Seminar and Expo**
- April 3: 8:00-11:45am at Quinsigamond Community College
- Presentations:
  - Campus Energy Reduction Opportunities
  - Campus Energy Use Best Practices
- Clean Energy companies networking expo
- Register Online

QUINSIGAMOND Community College

MASSACHUSETTS CLEAN ENERGY CENTER

PACE

A True Statewide Partnership

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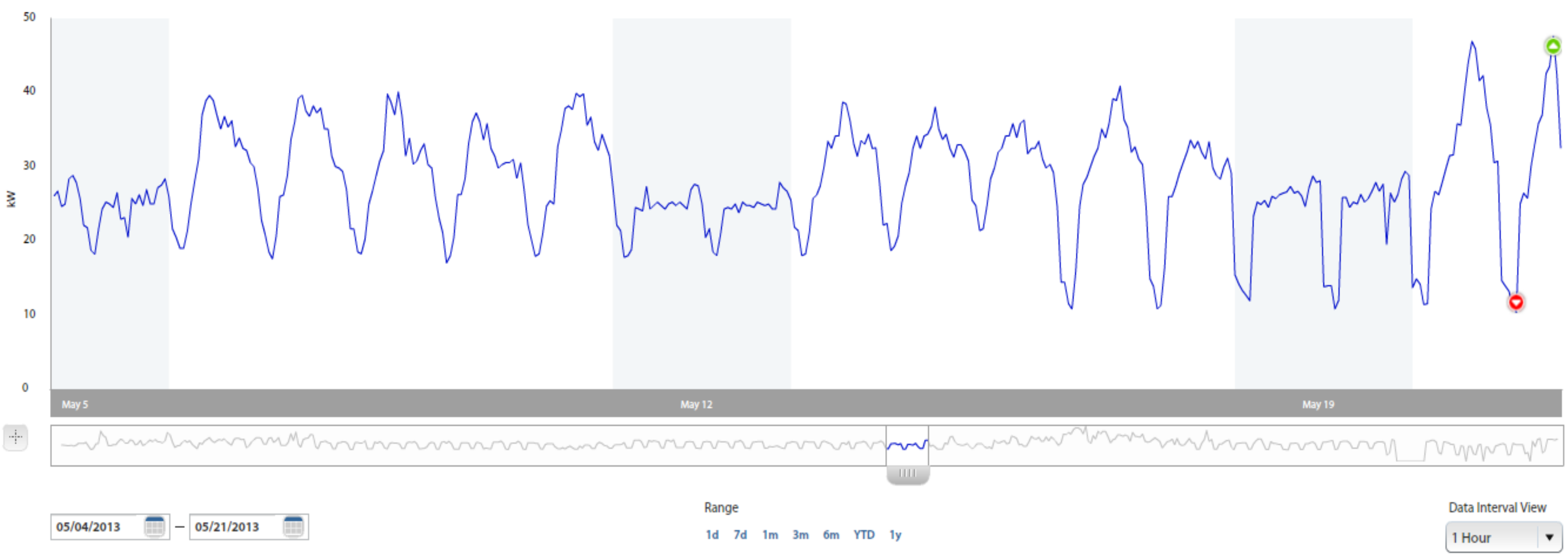
EEMS Contract Update

- Temporary contract extension through March 31, 2015 – hoping to extend through May
- Consultant work on Market Research and Assessment of Challenges and Benefits complete
- Preparing to release RFR in coming months
- Next phase procurement will be managed by DCAMM

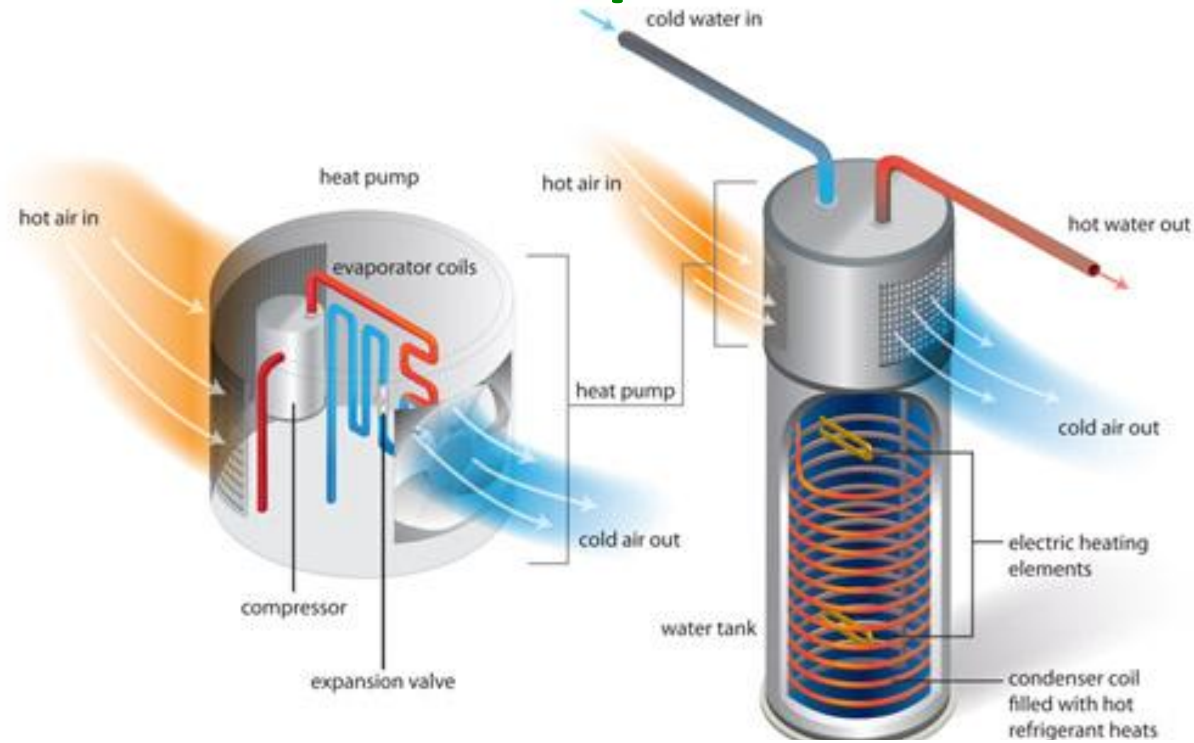


LBE Renewable Grants Updates

<u>Awarded Grants</u>

- Department of Fish and Game
  - ASHP installation at Shellfish plant, $44,058
  - Biomass installation at Fish Hatchery, $190,560
- Department of Conservation and Recreation, $202,720
  - 8 Feasibility Studies for biomass and ASHP
  - ASHP installation at Quabbin and Walden Pond
- Trial Court ASHP Feasibility Studies, $37,600 (Westborough and Uxbridge)
- LBE seeking to reduce fuel oil for heating at large remaining sites
- Grants still available for feasibility and implementation
- Solar canopy projects awarded at Walden Pond and UMass Amherst

Technology Spotlight:
Air Source Heat Pump Hot Water Heaters



How it Works

- “Refrigerator in reverse”-transfers heat from surrounding air to heat water
- Transfers existing heat instead of generating it

Technology Spotlight:
Air Source Heat Pump Hot Water Heaters

Efficiency

- 2-3 times more efficient than electric resistance water heaters
- Short payback (1-3 years average)
- Cools surrounding air

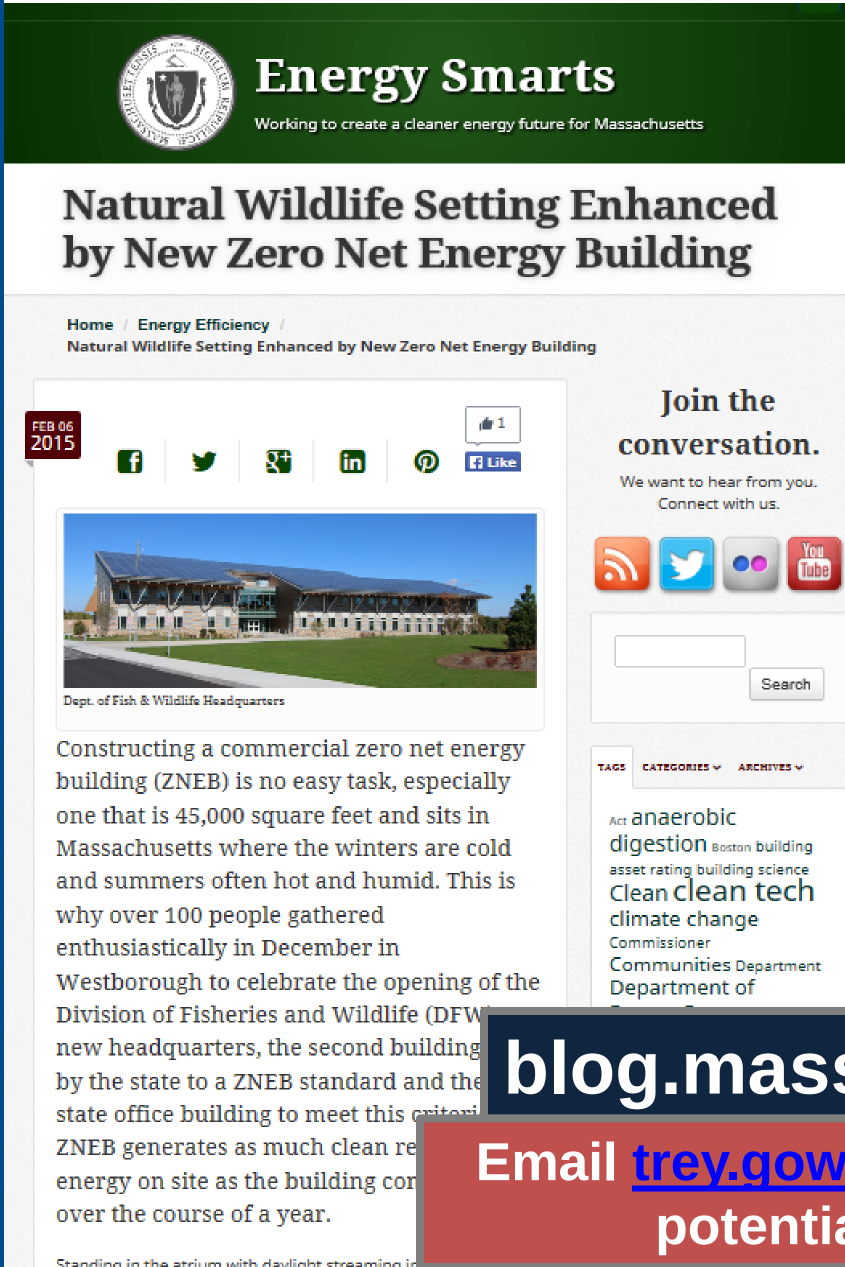
Installation

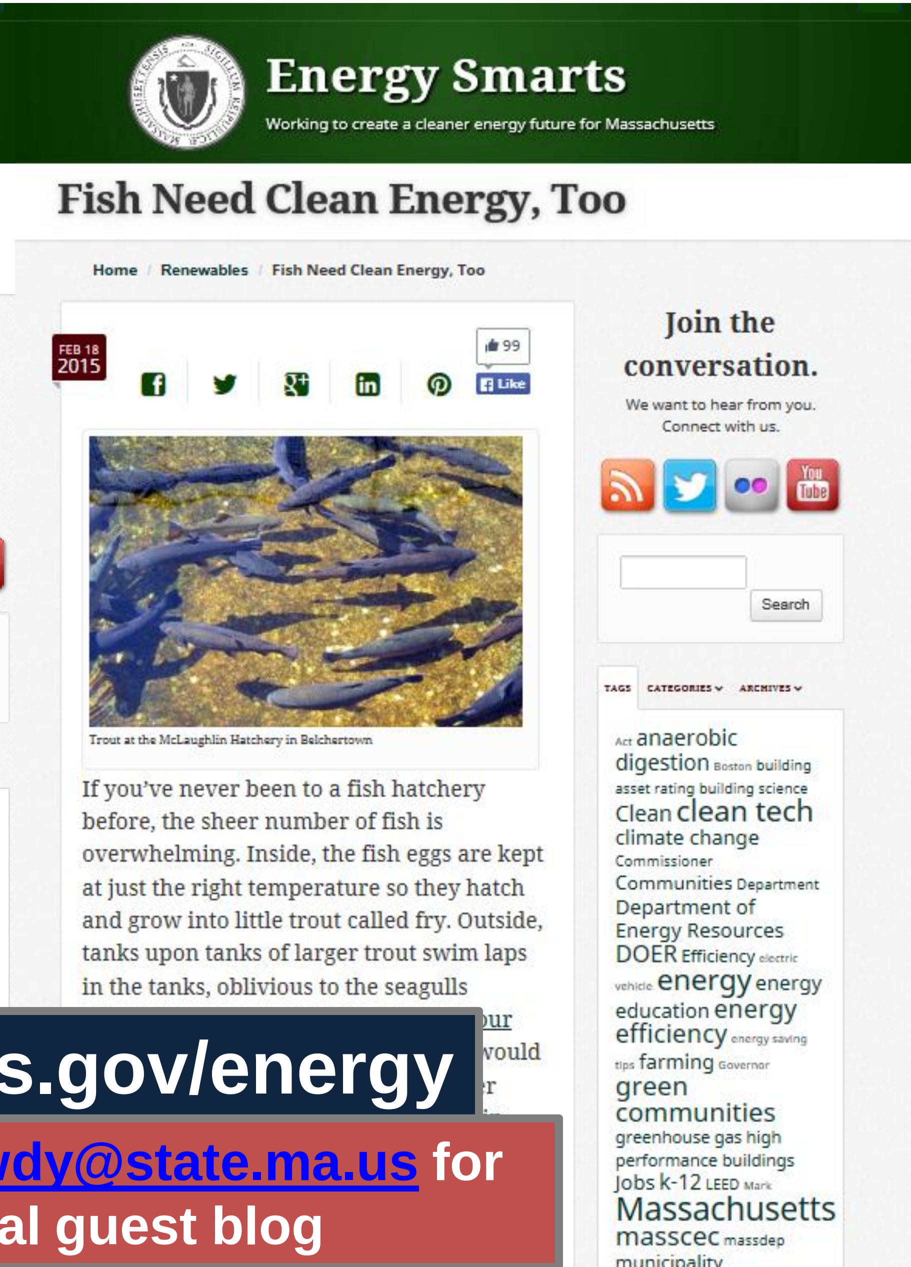
- Ideal in interior unconditioned or semi-conditioned rooms with excess heat (i.e. furnace room)
- Primarily for Residential sizes (e.g. 50-80 gallons)
- Need sufficient air flow

DCAMM Updates:
AEP Phase 1 Report

LBE Outreach

Blog Posts





blog.mass.gov/energy

Email trey.gowdy@state.ma.us for potential guest blog

Solar Canopy Webinar

- April 15 from 11:30am-1:00pm
- Presentations from:
  - DOER
  - Project owners
  - Manufacturers
- Registration link to be provided shortly

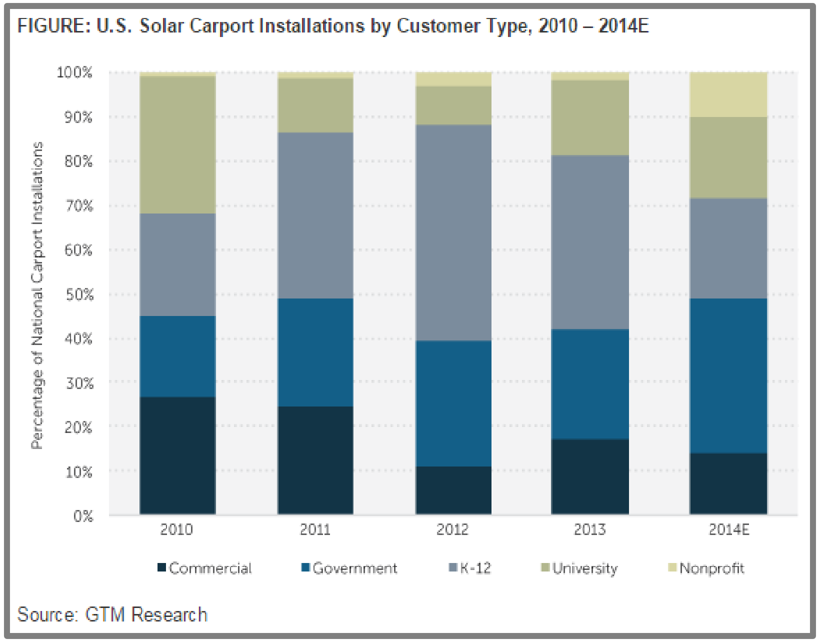
Earth Day Activities

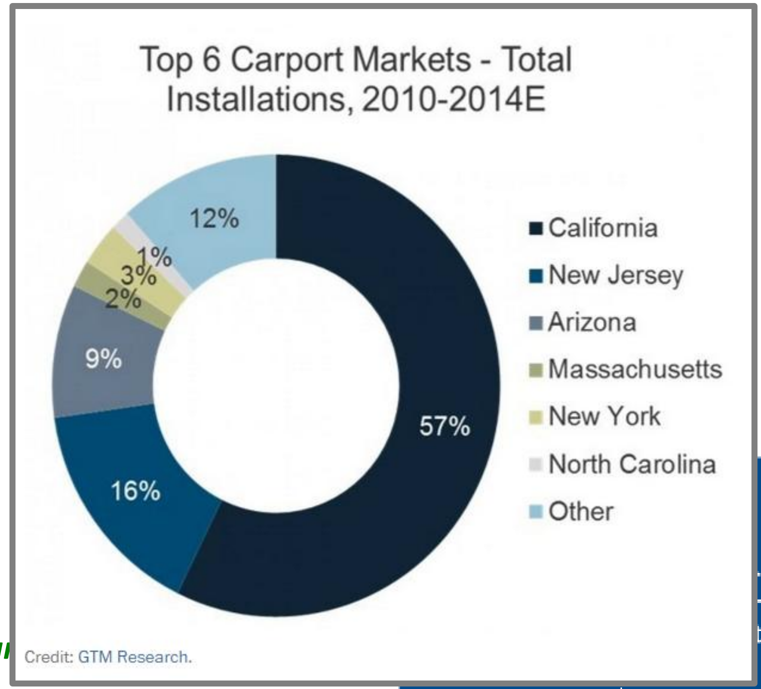
- Earth Day: April 22
  - 43 days away!
- LBE to highlight Earth Day events across state
- What is your agency or campus doing?
- Will send out form after meeting

Solar PV Canopies

Why Solar Canopies?

- Substantial potential across MA state facilities
  - In general, 40% of pavement is parking lots
  - Only 4 MW installed capacity
- Incentives set to expire
  - ITC expires at end of 2016
  - SRECs drop significantly by 2024
- California leads market
  - 57% of market from 2010-2014 (MA - 2%)
  - Champion solar canopies at state facilities
    - In 2013, canopies made up 30% of all non-residential installations





Why Solar Canopies?

Advantages

- Energy security and savings
- Aesthetic Value
- Shade and Shelter from weather
  - Reduce Urban Heat Island Effect
- Maintenance Savings
  - Reduced snow/ice removal, asphalt maint.
- Revenue for "premium parking"
- Fuel source for Electric Vehicles

Downsides

- Cost - more per watt than roof/ground mntd

(But - prices have fallen 51% since 2010, with another 24% decrease by 2018)

Solar Canopies: Key Metrics

- **Size**
  - ➢ Larger the system, the less expensive
    - ▪ Approx. 400 spaces = 1 MW
    - ▪ 100 feet of HtH parking = 50-60 kW
- **Layout**
  - ➢ Straight edges or curved
  - ➢ Head to head parking or single rows
- **Soil Type**
  - ➢ Bedrock or sandy
- **Shading**
  - ➢ Proximity to trees, buildings
- **Other considerations**
  - ➢ Previous or Future Land Uses
    - ▪ Landfill/marsh, future development
  - ➢ Lighting retrofit

Ideal Lots


Salisbury Beach State Reservation
P
800


Plymouth Superior Court
Coles Ln


Horseneck Beach State Reservation
WESTPORT
P
1350


P
236

Less-than Ideal Lots

Solar Canopy Financing for State Agencies

LBE Grant → Third Party Ownership → Bond Financing

LBE Solar Canopy Grant Program

$1.2 million remains of grant for solar PV at parking lots, garage roofs and pedestrian walkways on state owned land

- $0.50/Watt (up to $500,000 per project)
- Preference given to projects over 200 kW
- All procurement options eligible
- Some onsite consumption required
- EV charging stations required - # dependent on array size

Solar Canopy Financing for State Agencies

LBE Grant → Third Party Ownership → Bond Financing

Power Purchase Agreement (PPA)

Contract whereby one party, the project owner, agrees to install, operate and maintain a RE system and the other party, the buyer, agrees to purchase the electricity generated.

- Fixed price per kWh, with or without agreed upon escalator
- Usually 20 year contract
- **Pros**: no upfront cost, no O&M responsibilities, predictable price of power
- **Cons**: least cost-effective, no benefits of owning system

Solar Canopy Financing for State Agencies

LBE Grant → Third Party Ownership → Bond Financing

Power and Attribute Purchase Agreement (PAPA)

Contract whereby one party, the project owner, agrees to install, operate and maintain a RE system and the other party, the buyer, agrees to purchase the electricity generated ***as well as the environmental attributes****.*

- Fixed annual "lease" payment
- 10 year contract, with option to buy at 5 yrs
- **Pros**: higher annual revenue (SRECs), higher savings over time, shorter contract
- **Cons**: higher risk, higher annual payments

Solar Canopy Financing for State Agencies

LBE Grant → Third Party Ownership → **Bond Financing**

Non-Building EE Investment Program (NEEIP)

A type of MA general obligation bond, termed a "green bond", created to finance clean energy projects whereby annual savings or revenue generated by the project is used to make bond payments.

- Estimated 3.5% interest rate
- 10, 15, 20 year bond terms
- Annual savings/revenue must be at least 10% > debt service payment
- **Pros**: agency retains all ownership benefits, greater earnings over time
- **Cons**: most scenarios require some upfront capital (either by agency or through other means), O&M responsibilities, annual debt payments

Solar Canopy Financing for State Agencies

LBE Grant → Third Party Ownership → **Bond Financing**

Clean Renewable Energy Bonds (CREBs)

A form of tax credit bond for qualified renewable energy projects in which some or all of the interest is paid in the form of federal tax credit by U.S. govt., thus reducing interest for the issuer.

- IRS issued new round of allocations in Feb. 2015, Applications opened March 5
- $600 million (1/3 of total) available to state/municipal governments nationwide
- Estimated 1.5% interest rate
- Bond term varies, but approx. 15-25 years
- **Pros**: lower cost of borrowing, lower upfront cost required, greater earnings over time than 3rd party models, agency retains ownership benefits
- **Cons**: most scenarios require small upfront cost, O&M responsibilities

Hypothetical 5 MW Project

Project Assumptions	
Total Project Size	5 MW
Total Project Cost	$17.5 M
Cost per Watt	$3.50
Electricity Rate	$.16/kWh
Electricity Escalation	*2.0%*
PPA Rate	$0.115/kWh
PPA Escalation	*0.0%*

Project Benefits				
	Build to Own		**Third Party Ownership**	
	CREBs	**NEEIP**	**PPA**	**PAPA**
Bond Financing	$16.625 M	$14 M	$0	$0
ACP Funds	$875,000	$3.5 M	$0	$0
Percent Contribution	5%	20%	N/A	N/A
Bond Term	15	15	N/A	N/A
Bond Rate	1.5%	3.5%	N/A	N/A
Net Benefit - Year 1	1,326,862	$1,357,261	$202,356	$611,115
Avg. Net Benefit (20 yrs)	$855,555	$878,354	$233,730	$595,806
20 Year Earnings	**$17,111,106**	**$17,567,090**	**$8,685,044**	**$12,525,846**

Next Steps

- LBE soliciting information about state sites:
  - Location and size of lot
  - GIS image if available
  - Any known information about:
    - Interconnection – distance, issues, etc
    - Past/future land use
    - Net metering allowance
- LBE to compile 15-20 state sites with the highest potential
- Feasibility study or PowerOptions discussion
- Potential to include in CREBs application, state financed, or PPA

Send site list or contact with questions:

jillian.dimedio@state.ma.us

DFW Field Headquarters Building Overview