MA Leading by Example Council Meeting

July 17, 2018

Massachusetts Department of Energy Resources

MASSACHUSETTS LEADING BY EXAMPLE PROGRAM

PUBLIC LEADERSHIP, STEWARDSHIP, COMMITMENT

Massachusetts Leading by Example
State Government Progress – as of June 2018

Greenhouse Gas (GHG) Emissions

↓ 28%

2004 -2017

Energy Use Intensity per Square Foot

↓ 15%

2004-2017

Electricity via Renewable or Onsite Generation

CHP

20%

In 2017

Heating Oil Consumption at State Facilities

↓ 84%

2006-2017

23.3 MW Installed Solar PV at State Sites

15.2 MW

Since 2015

76 LEED Certified State Buildings

38

Since 2015

116 Electric Vehicle Charging Stations at State Sites

54

Since 2015

Leading by Example Grants Awarded

$10.5 M

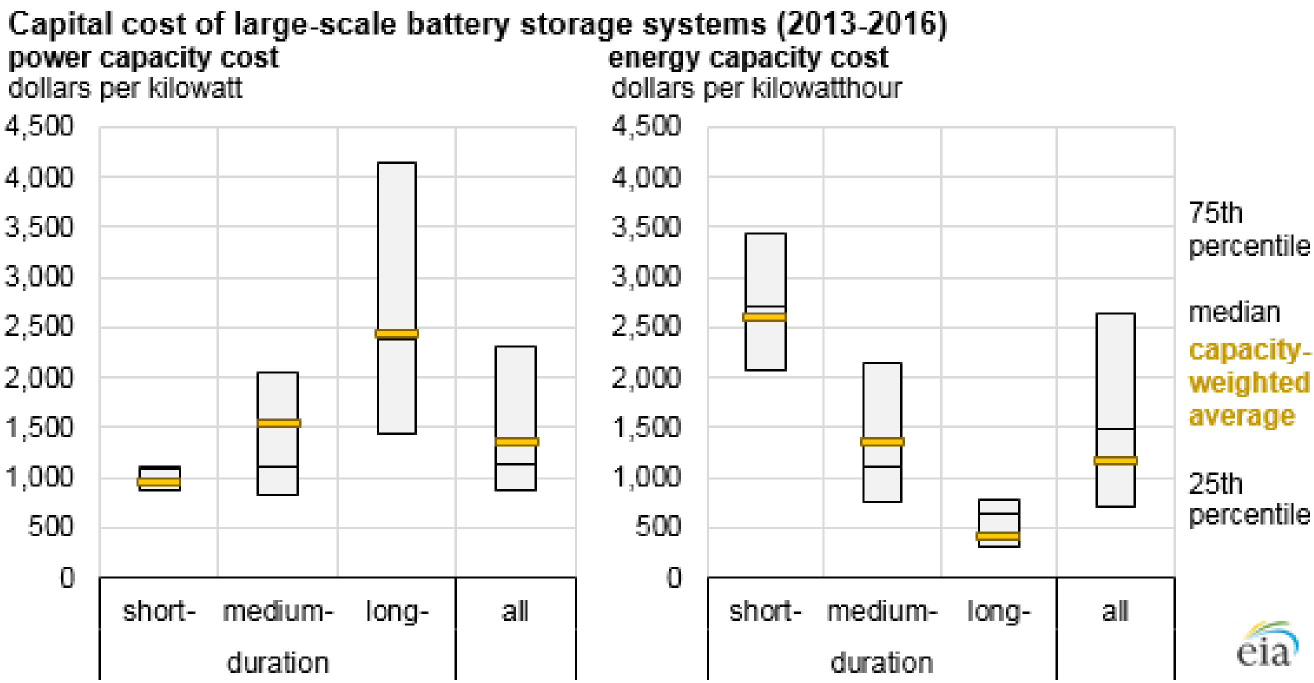
Since 2015

Agenda

- Welcome & Introductions
- News from Around the World
- Commonwealth Updates
- Solar Updates/Discussion
- LBE Updates
- LBE Post-2020 Recap
- EV Charging Stations Discussion
- Sterling Energy Storage System Tour

News From Around the World

Battery Storage Costs



- **Short-duration** batteries—which are power oriented—have durations of less than 30 minutes.
- **Medium-duration** battery storage systems have nameplate durations ranging between 30 minutes and 2 hours.
- **Long-duration** battery storage systems—which are energy oriented—have more than 2 hours of nameplate duration.

EIA, 2018

Solar Becomes #3 Renewable Source

Among renewable sources, only hydro and wind generated more electricity in 2017:

Hydro: 300 million MWh

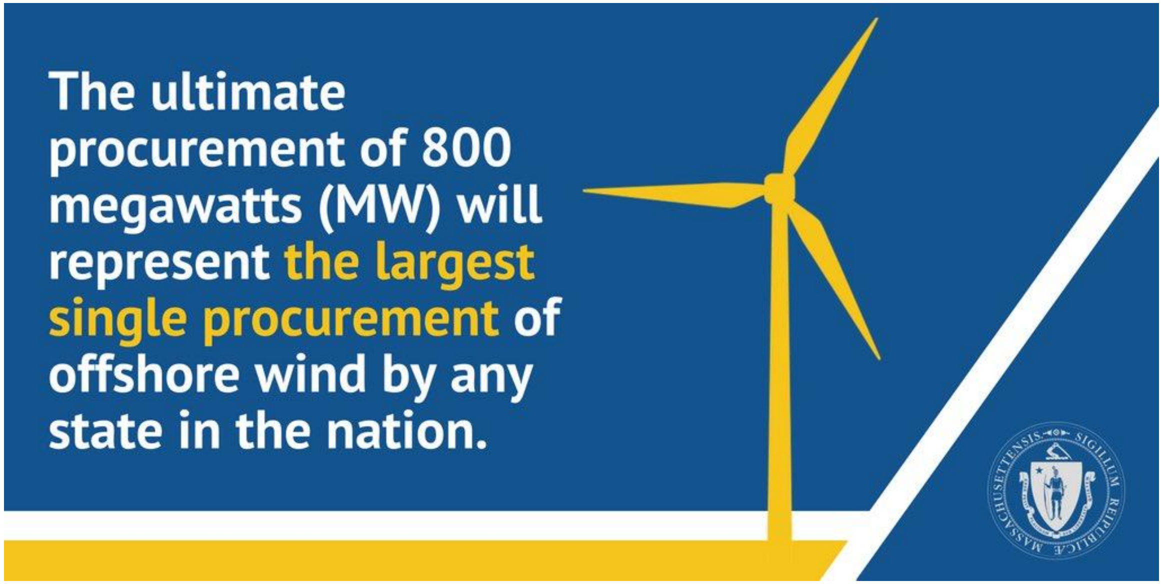
Wind: 254 million MWh

[EIA, 2018]

Commonwealth Updates

MA Offshore Wind

- August 2016: Gov. Baker signed *An Act Relative to Energy Diversity*
- **May 2018: Selection of Vineyard Wind by Commonwealth Electric Distribution Companies announced**

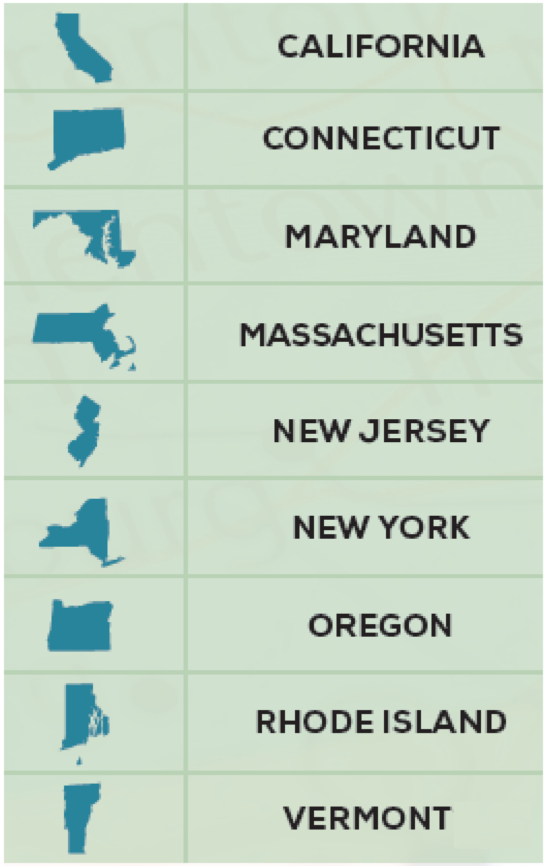


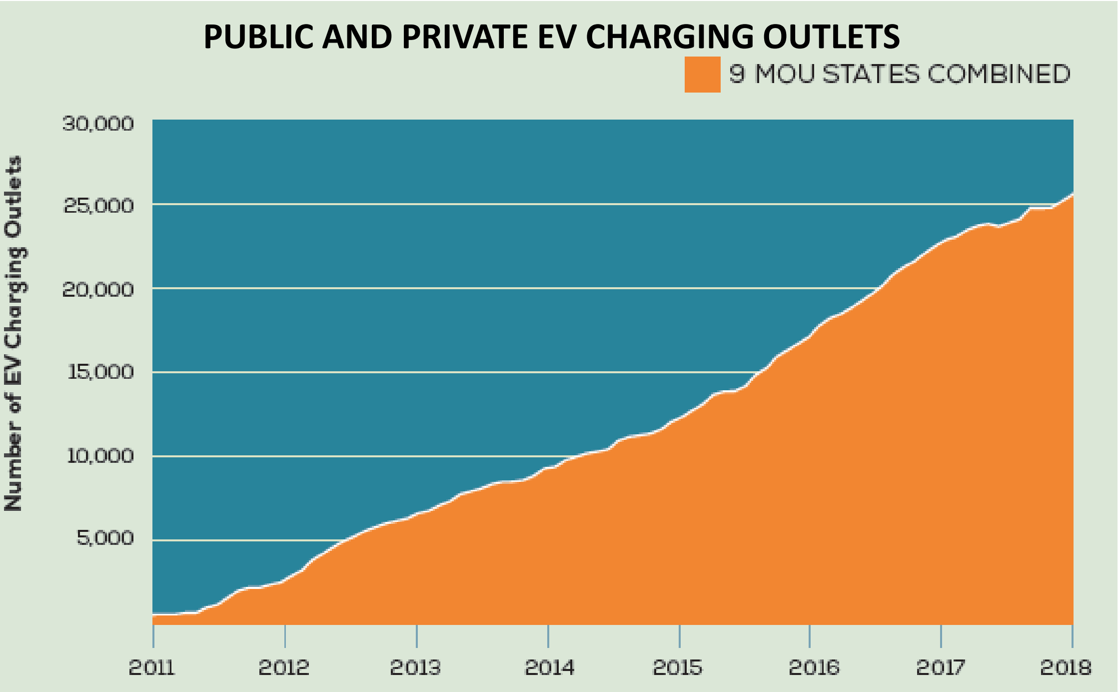
  - RI concurrently announced selection of Deepwater Wind to procure 400MW of offshore wind

Commonwealth Press Release, 2018

Nine-State Zero Emission Vehicle Coalition

- MA joined eight other Northeast and West Coast states in reaffirming commitment to a clean, low-carbon transportation sector
- **New Multi-State Zero Emission Vehicle (ZEV) [Action Plan] for 2018-2021**
  - Builds on successes and lessons learned from implementation of 2014 Plan
- 80 market-enabling recommendations for states, automakers, utilities, and others





Commonwealth Press Release, 2018

Senate Energy Bill

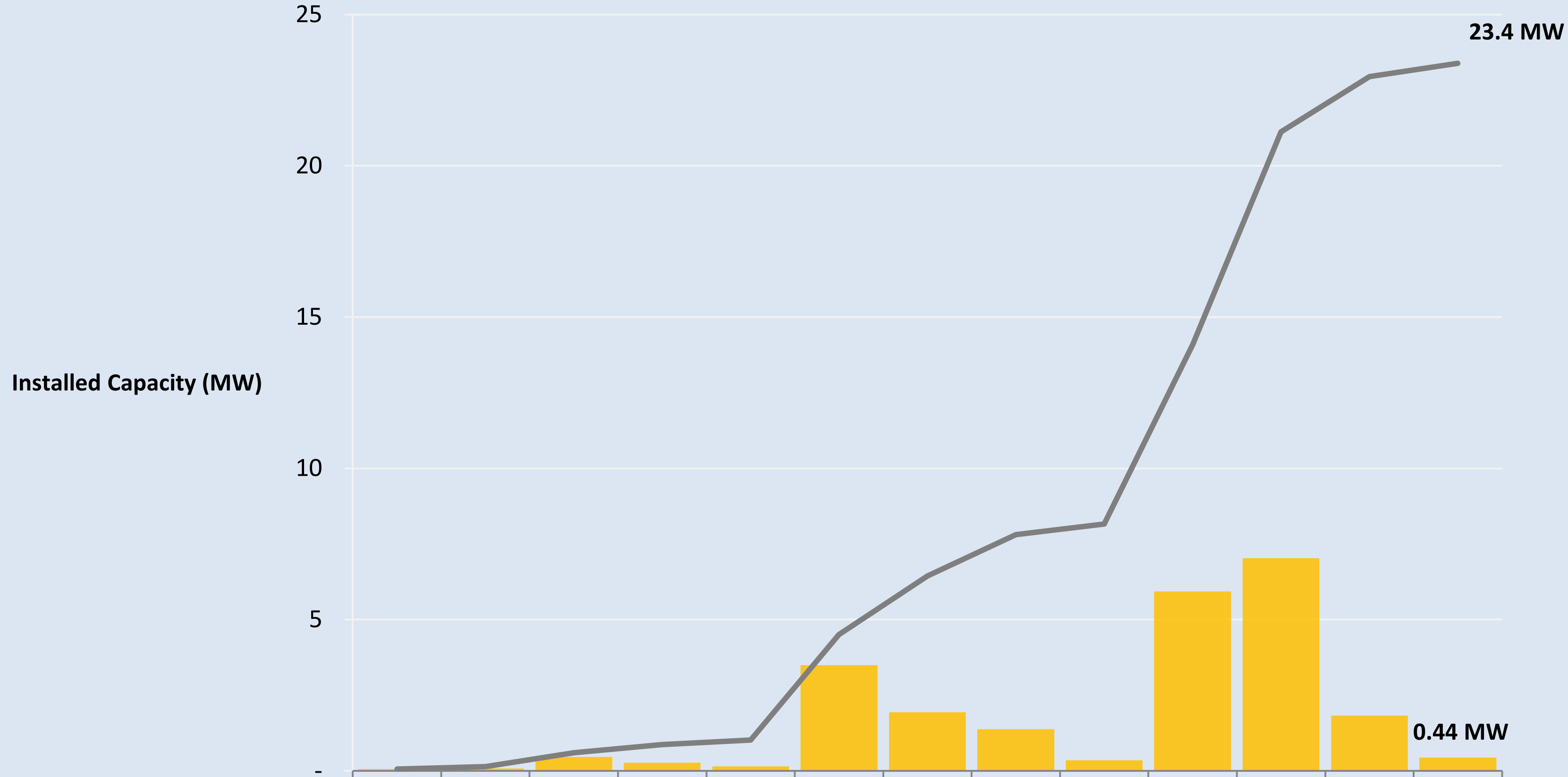
"An Act to promote a clean energy future" (Senate, No. 2545)

Item	Current Policy	Proposed Policy
Net metering	GP cap determined by % of peak load	Remove net metering caps
Offshore wind energy	Mandated 1.6GW	Mandated 5GW offshore wind
RPS	Increase 1% each year	Increase 3% each year
Carbon emissions	N/A	Carbon price for transportation and heating
Global Warming Solutions Act	25% reduction by 2020 80% reduction by 2050	45% reduction by 2030 65% reduction by 2040
Energy storage	200MWh by 2020	2GW by 2025
Demand charges	Allows Eversource demand charges on residential solar	Limit to peak hours
Electric Vehicles	State must purchase HEVs or AFVs if feasible	Create TOU rates for charging stations, 50% state fleet are EVs by 2025

Passed Senate 35-0 on 6/14/18. House passed its own set of bills. Going to conference committee.

Solar Updates/Discussion

Solar Installations at State Facilities



	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18
Annual Installed Capacity	0.06	0.08	0.46	0.27	0.15	3.49	1.94	1.37	0.34	5.94	7.03	1.83	0.44
Cumulative Installed Capacity	0.06	0.14	0.60	0.87	1.02	4.51	6.44	7.81	8.15	14.09	21.12	22.95	23.38

Franklin County Sheriff's Office 436kW Solar Canopy

- $545,000 LBE Grant
- Expected to generate approx. 439,000 kWh annually
  - ➢ Equivalent to approximately 26% of the facility's consumption
  - ➢ Estimated $92,376 annual financial benefits
- 2 dual-head EV charging stations

Part of larger DCAMM efficiency project

THE 2018-2019 MASSACHUSETTS LEADING BY EXAMPLE

SOLAR GRANT PROGRAM FOR STATE ENTITIES

Grants Available for:

- Solar Canopies
- Innovative solar
- Roof-mounted solar
- Ground-mounted solar
- + Energy Storage Adder

Key Dates	• PON Issued: May 17, 2018 • Grants Reviewed: Grants will be reviewed and awarded on a rolling basis until allocated funds are awarded • PON Responses Submission Deadline: December 31, 2019
Contact	Trey Gowdy, Trey.Gowdy@state.ma.us, 617-626-7328
COMMBUYS posting	See File Attachments section on COMMBUYS Posting for full details: https://www.commbuys.com/bso/external/bidDetail.sdo?docId=BD-18-1041-ENE01-ENE01-27494&external=true&parentUrl=bid • Grant Program Description Document (Word) • Grant Application Form (Excel)

LBE Solar Grant

- $5 million grant program
- All types of solar projects are supported
- Per-watt incentive levels increased

State-owned Solar Canopies (>200kW)	$1.65/watt, up to $1 million per project
Third-party owned Solar Canopies (>200kW)	$1.10/watt, up to $750,000 per project
Innovative Solar	$0.65/watt, up to $350,000 per project
Conventional Roof/ground solar	$0.50/watt, up to $250,000 per project

- Energy storage system adder – varies based on ownership structure and resiliency benefits

State-owned	$200/kWh, up to$250,000 per project
State-owned with islanding capabilities	$400/kWh, up to $400,000 per project
Third-party owned	$100/kWh, up to $125,000 per project
Third-party owned with islanding capabilities	$200/kWh, up to $200,000 per project

PowerOptions Pathway Update

- Large solar projects (>300 kW) contract with SunPower
  - Includes battery storage options
- Small solar projects (<300 kW) contract with Solect
  - No storage option
- No upfront costs or maintenance responsibilities
- Fixed price for electricity over 20 years, typically below the utility-delivered price for power
- Includes all types of installations, including canopies
- Public entities permitted to utilize these contracts without conducting own competitive procurement
- In discussions with DCAMM about legal issues associated with PPA and state Ts&Cs

SMART Calculations-Sample Project

- 900 kW Solar Canopy in Eversource east
- $5.50 per watt construction cost = $4.95 million
- LBE grant for owned systems - $1.65/watt = $1 million maximum grant
- Total installed cost = $3.95 million
- Total value = $287,126 in year 1 (includes avoided cost of energy and SMART Incentive)
- See SMART Incentive sample calculations
- Simple payback: 13.9 years
- Does not include changing energy rates, declining solar output, maintenance, etc.

Incentive Calculations - Sample

Assumptions	
Size Solar Canopy	900 kW
Production	1 million kWh / year
Utility Rate Class	G-2
Utility Rate	$0.12722
Retail Rate All In	$0.13
Net Meter Rate	$0.125
Virtual Net Meter Rate	$0.17952
Solar Canopy Adder	$0.06
Public Adder	$0.02
Eversource Northeast Base Rate for projects between 500kW and 1000 kW	$0.187

- NM rates are set by utilites and DPU
- SMART incentive is paid by utility, on monthly basis, through check or electronic transfer
- All credits appied directly to bills, while QFs are paid through check or electronic transfer

	Behind the Meter				Standalone		
	Net Metering		No Net Metering		Net Metering	On-Bill Crediting	QF
All-In Rate	$0.267		$0.267		$0.267	$0.267	$0.267
kWh generated / year	1,075,378		1,075,378		1,075,378	1,075,378	1,075,378
kWh Exported	10%	25%	10%	25%	All	All	All
Annual value avoided electricity	$125,819	$104,849	$125,819	$104,849	None	None	None
Value of Energy (20 year)	$0.12722		$0.12722		$0.17952	$0.10764	$0.03
	(3 yr avg basic service & transmission, transition & distribution		(3 yr avg basic service & transmission, transition & distribution		Potentially variable (net meter rate $0.18)	Basic Service Rate (Supply rate through utility)	QF Rate (market based wholesale price)
Smart Incentive (based on production)	$150,316		$150,316		$94,074	$171,372	$254,864
	(All in rate - value of energy = .$0.13978 all-in value of energy		(All in rate - value of energy = .$0.13978 all-in value of energy		Changes in relation to net metering rates (all-in rate -net-metering rate) = $0.08748	All-in value of energy (All in rate - value of energy) = $0.15936	All-in QF rate = $0.237
Net metering/ On-bill Credits	$13,442	$33,606	$3,226	$8,065	$193,052	$115,754	$32,261
	(Total kWh Generated x % Exported x Net Meter Rate)		* Exported enery sold at QF rate (Total kWH Generated x % Exported x QF rate)		(Total kWH Generated x Value of Energy)	(Total kWH Generated x Value of Energy)	(Total kWH Generated x Value of Energy)
Total Annual Benefit	**$289,578**	**$288,771**	**$279,362**	**$263,231**	**$287,126**	**$287,126**	**$287,126**
Additonal Notes	VoE is fixed at the time of calculation. Avoided electricity & NM will vary relative to current energy charges.		VoE is fixed at the time of calculation. Avoided electricity will vary relative to current energy charges. QF rate varies and is applied to every kWh exported.		All-in rate is fixed for 20 years, but incentive vs. NM values will vary depending on rates.	All-in rate is fixed for 20 years, but incentive &. on-bill credit values will vary depending on rates.	All-in rate fixed for 20 years, but incentive & energy payment will change as value of wholesale energy changes.

LBE Updates

Pollinator Habitats

May 2017

June 2018

Taunton State Hospital

2.7 acre wildflower meadow

June 2017

Pollinator Habitats

- June: Inter-agency Commonwealth Agency Pollinator Habitat Summit
- Draft LBE guidance document
- Habitat site/data tracking
- Draft Pollinator Habitat Calculator

Pollinator Habitat Savings Calculator

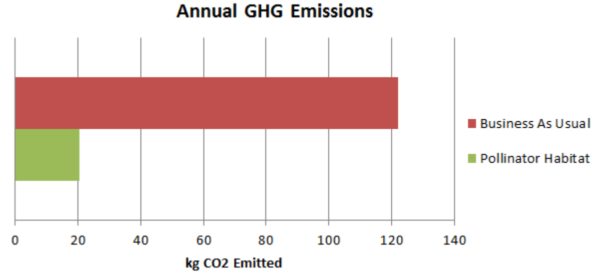
Instructions: Fill out the "Input" section (yellow boxes) as thoroughly as possible. If unknown, indicate that you would like to use the default option. Fie specific. For further information on how the "default" values are calculated, visit the "Assumptions" p

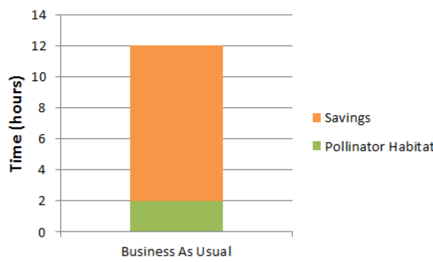
Category	Default	Use default?	Site Data
Parcel Size (acres)*	Must input	N/A	2
Current # of Mows (anually)*	Must input	N/A	6
Fuel Type*	Must input	N/A	diesel
Type of Change*	Must input	N/A	till & seed
Mowing Time (hours per mow)	2	no	
Fuel Cost (per gallon)	$3.19	yes	
Fuel Usage (gallons per mow)	2	yes	
Labor Cost (per hour)	$60.00	yes	
Annual Maintenance Cost	$66.00	yes	

Pollinator Habitat Capital Costs

Insert values below if known. Otherwise, default is used.

Preparation Costs	Default Costs	Input
Tilling, air raiding, etc.	$31.00	
Seed Cost	$873.36	
Seeding cost	$39.00	
Total Cost	$943.36	

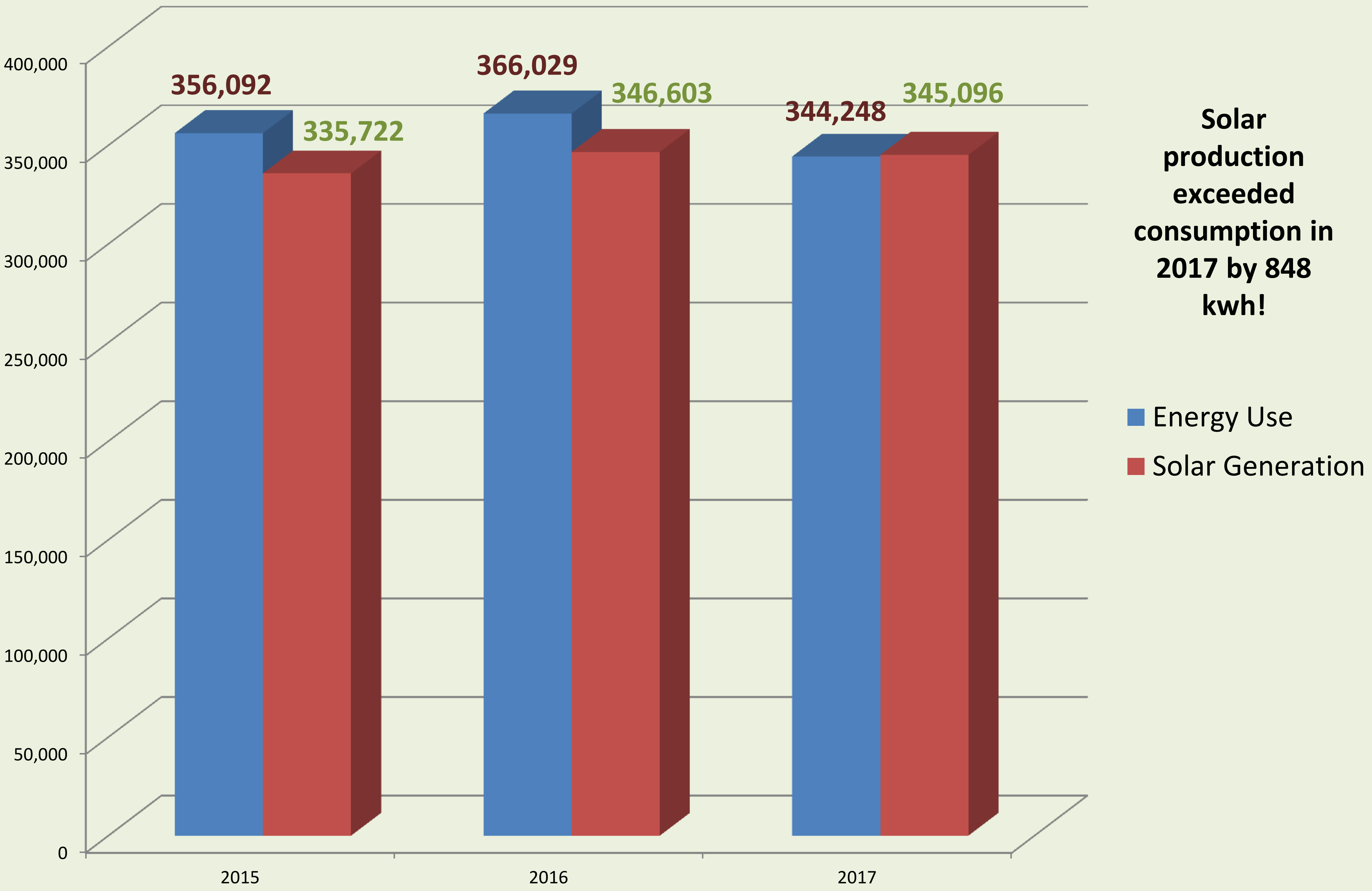




Creating A Clean, Affordable and Resilient Energy Future For the Commonwealth

DOER
Massachusetts Department of Energy Resources

Zero Net Energy Buildings-DFW Headquarters



Electric Vehicles Added to State Fleet

- 6 battery electric Chevy Bolts purchased by EEA and MassDEP
- First full BEVs in state fleet

GM boosts Bolt EV by 20%

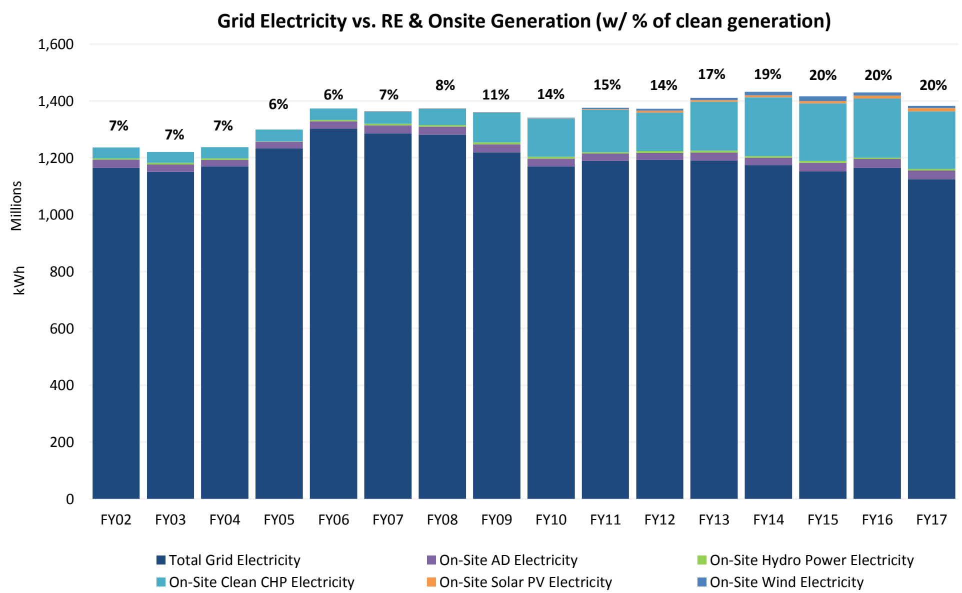
General Motors announced a 20% increase in production of the Chevrolet Bolt EV electric car due to higher-than-expected demand from customers. GM reported a 40% jump in global sales for the EV model in the first half of 2018 year-over-year, driven by sales in the U.S., Canada, and South Korea.

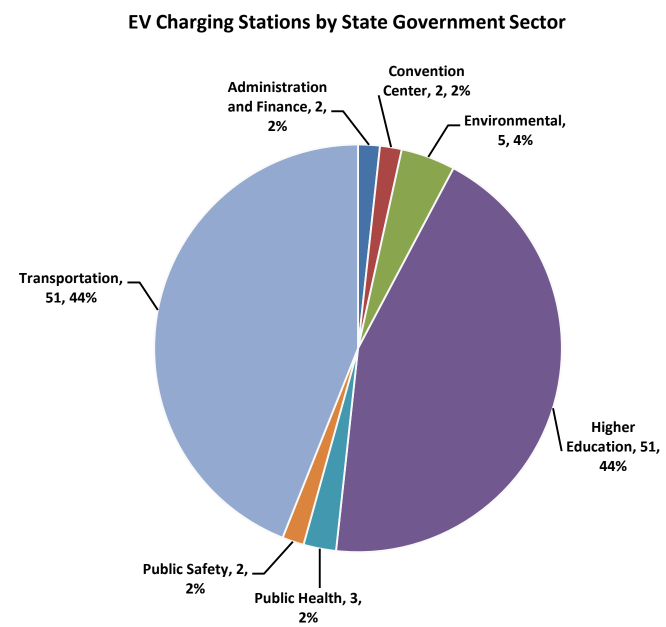



New Data Visualizations

mass.gov/leading-by-example-state-government-progress

Leading by Example: State Government Progress		
Overview	Greenhouse Gas Emissions	Energy Use
Renewable and Onsite Generation	Green Buildings	Clean Transportation





Efficient Labs Pilot Opportunity

New Eversource **High Performance Labs Program**

Prioritizing EHS issues, identifying HVAC and/or equipment energy efficiency opportunities including:

- Ultra-low freezers (-80°), Energy STAR qualified freezers
- Plug-loads (on-the bench)
- Fume Hood Hibernation (e.g. lock-out/tag-out)

Seeking to identify pilot sites to receive assessment from utility vendor

Possible good candidate sites:

- No pneumatic controls
- No major upgrades in the last 10 years
- Primarily lab space/large lab space

LBE Post-2020 Discussion Recap

Summary of May LBE Council Meeting Brainstorm

Metrics & Targets

- Reassess EUI as metric
- Develop alternate ways to track renewables (e.g. % vs. capacity)
- Create interim targets for existing/replaced metrics
- Add transportation target(s)
- Add targets for newer emerging tech/strategies
- Consider other target(s) – e.g. renewable thermal, landscaping, plug loads, water

Other Key Initiatives/Plans

- Increase efficiency & sustainability of new construction
- Expand/Create building maintenance & operations programs – e.g. require real-time metering & UBM for energy/construction projects; retro-commissioning; operational guidance
- Increase feasibility study & innovative grant programs
- Establish technical assistance programs – e.g. 101 classes

Roles, Responsibilities, Structure

- Develop agency specific plans
- Require Green or LBE teams at each agency/campus & utilize these teams to engage CFOs, presidents, & other pertinent stakeholders
- Increase transparency through reporting, both internally & to public

Electric Vehicle Charging Stations Discussion

EV Station Equipment and Installation Costs

Station Type	Equipment $	Installation $
Level I trickle charge	$400 - $1,000	$300 - $2000
Level 2	$5,000 - $10,000	$500 - $12,000
Fast charger	$30,000 +	$4,000 - $20,000 +

Exact costs are very site dependent!

Key factors affecting equipment costs

- Mounting
- Ports
- Cables
- Data package

Key factors affecting installation costs:

- Electrical updates
- Distance to power
- Multiple stations reduces cost per station
- Wall vs. freestanding

EV Station Operating Costs

Ongoing Cost Categories:

- Electricity consumption – total kWh month
- Demand charges – peak kW demand
- Maintenance – cleaning, wear
- Data package – subscription fee for networked stations

Costs Depend On:

- Type of station and power demand
- # of uses
- Length of charging time
- Battery charge level
- Utility demand charge
- Utility kWh rate
- Whether station is on own account

Sample Operating Costs

Assumptions:

kWh rate: $0.20

Demand charge rate: $6.00/kW (National Grid)

Level 2 used 60 times/month, 180 total hours/month

Fast charger used 30 times/month, 45 total hours/month

Station Type	Max kW Draw	Total kWh / month	Monthly Cost	Annual Cost
Level 2 Dual Charger	14	1890	$378.00	$4,536
DC Fast Charger	50	1687.5	$337.50	$4,050
Demand Charge	64	-	$384.00	$4,608
Data Charges ($250/port)	-	-	-	$750
Maintenance	-	-	-	$300
			Total	**$14,244**

New Technology Option

- Solar powered EV stations
- Can be independent of grid
- No demand or power charges
- Installation costs only
- No trenching costs
- Come in 17 kW with 6 station modules
- Coming out with grid connected and storage options

www.pairedpower.com

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the Commonwealth or DOER.

DOER

Massachusetts Department of Energy Resources

Optional Tour of Sterling Energy Storage System