CLEANENERGYRESULTS

Annual Report to the Massachusetts Department of Energy Resources

Covering January 1, 2018 – December 31, 2018

Earth Day 2019 Event at the Rockport Water Treatment Facility

2018

Massachusetts Department of Environmental Protection

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EXECUTIVE SUMMARY

The Clean Energy Results Program (CERP), launched in November 2011, is a first-of-its-kind partnership between the Massachusetts Department of Environmental Protection (MassDEP) and the Massachusetts Department of Energy Resources (DOER). This innovative program builds on MassDEP's regulatory expertise and authority to support DOER in advancing the permitting and development of renewable energy and energy efficiency projects throughout Massachusetts. MassDEP also works closely with the Massachusetts Clean Energy Center (MassCEC) on CERP program activities.

This Annual Report covers MassDEP activities performed from January 1 – December 31, 2018. It is being provided pursuant to the Memorandum of Agreement (MOA) executed between MassDEP and DOER, which sets the conditions for the Clean Energy Results Program funding. Below are highlights from each key program area. More information on each of these can be found under the Detailed Program Progress section of this report.

The Gap Grant Program, known as Gap II, announced in late 2017, kicked-off the second round of funding supporting installation of energy efficiency and renewable energy projects at water and wastewater facilities. The application deadline was the end of November 2017, and in 2018 the applications were reviewed and awards announced in April. The program solicitation, initially funded with $3 million from Alternative Compliance Payments (ACP) by DOER, demonstrating strong continuing interest. 48 applications were received from public water and wastewater facilities requesting $6.3 million in funding for projects. Implementation of the Gap II projects started almost immediately, and continued through calendar year 2018.

MassDEP continued to assist with development of clean energy projects across Massachusetts, and in 2018 significant progress was made in permitting innovative projects, providing technical assistance, and collaborating on policy and regulatory initiatives that promote clean and renewable energy and energy efficiency projects. MassDEP reviewed air and waste permits for anaerobic digester projects that will manage source-separated organics, furthering MassDEP's goal of diverting an additional 350,000 tons of organics from disposal by 2020. In addition, MassDEP was part of a team of several Commonwealth agencies, including UMass Lowell and UMass Amherst, along with the United States Environmental Protection Agency (US EPA) that organized workshops with the Food and Beverage Industry. The group focused on providing information and assistance not only on energy efficiency, but also reducing water and chemical use, and substituting safer cleaning materials, all with an eye toward reducing costs and promoting improved operations. MassDEP updated policies addressing installation of solar projects in wetland resource areas as well as within the Zone I (the 400 foot radius around a wellhead) of public drinking water wells.

Work done by MassDEP staff directly advanced a number of specific clean energy and energy efficiency projects through review and permit approvals. They included installation of solar PV systems on contaminated sites and closed landfills, construction of anaerobic digestion facilities, promotion of techniques for greener cleanups of contaminated sites, and energy efficiency projects at numerous wastewater and drinking water treatment and industrial facilities.

The CERP program provided assistance to the Bureau of Air and Waste (BAW) by managing the rollout of Round III of the MassCleanDiesel: Clean Markets Grant Program. Round III of the grant program provides grants to replace diesel-powered transportation refrigeration units with all-electric units located at food distribution warehouses and markets to reduce air emissions at those locations.

More information on each program area can be found under the Detailed Program Progress section of this report.

Detailed Program Updates

Food and Beverage Industry "Green Your Bottom Line" Workshops

Over the past 2 years MassDEP worked as part of a team consisting of UMass Lowell, Center for Sustainable Production; UMass Amherst, Center for Energy Efficiency & Renewable Energy; UMass Clean Energy Extension; USEPA Region I; the Department of Agricultural Resources; the Department of Energy Resources; the Department of Public Health; the Office of Technical Assistance; and the Toxics Use Reduction Institute to conduct workshops with the Food and Beverage industry on how to reduce costs by improving energy efficiency and use of renewable energy, reducing chemical use and switching to safer cleaning materials. Five workshops were held during 2016 and 2017, organized to help companies learn about the opportunities that are available to reduce energy use, water consumption and limit toxic chemical use and thereby save money. The workshops provided opportunities for companies to learn about no cost energy audits that can be provided by the energy suppliers and UMass. In addition, the participating companies discussed other sustainability topics such as using less toxic cleaning agents, opportunities to divert waste from disposal to composting or anaerobic digestion, and energy efficiency in refrigeration. As a direct result of the workshops, several companies scheduled energy audits with their energy provider or UMass and put the resulting recommendations into effect. In addition, via contacts made at the workshops, companies contracted to divert organics from disposal and sought further information about less toxic cleaning agents. In 2018, a final workshop was held as a webinar in March to reach companies that may not have been able to attend a workshop in person.

The workshops were made possible by a grant from EPA Region I to the University of Massachusetts, Lowell.

Anaerobic Digestion/Organics Diversion

Recycling Loan Fund –The Bureau of Air and Waste Recycling Loan Fund continued to oversee and service approximately $1.2 million in outstanding loans to three AD facilities that will use food waste organics as one of their input streams – Commonwealth Resource Management Company (CRMC), Pine Island Farm, and Rockwood Farm. Recycling Loan Fund loans continue to be available for AD facilities taking in source separated organics. The Rockwood Farm loan was issued in 2017 to assist with the construction of their proposed AD facility, which commenced in 2018.

Municipal Organics Grants – MassDEP continued to offer several categories of food waste grants under its Sustainable Materials Recovery Municipal Grant Program. In 2018, MassDEP awarded two grants totaling $32,500 to support municipal food waste collection programs.

RecyclingWorks in Massachusetts – RecyclingWorks in Massachusetts (RecyclingWorks) continued to provide technical assistance to businesses and institutions to increase food waste diversion. In 2018 the RecyclingWorks program:

- Delivered technical assistance to 57 businesses
- Addressed 74 hotline inquiries regarding food waste
- Presented on food waste reduction issues at 26 events
- Prepared new website content to support and inform commercial food waste reduction efforts.

Commercial Organics Waste Ban Compliance and Enforcement – MassDEP continued to monitor compliance with the commercial organics waste disposal ban at solid waste facilities, and issue enforcement for waste ban violations. In 2018, MassDEP issued 29 notices of non-compliance and two administrative consent orders with penalties for violations of the commercial organics waste disposal ban.

Organics Progress Report – MassDEP presented an organics progress report at the Solid Waste Advisory Committee's Organics Subcommittee meeting in December 2018. The report indicated that in 2017, more than 280,000 tons of food material was diverted from disposal, with about 90,000 tons going to anaerobic digestion. Massachusetts has more than 400,000 tons of existing anaerobic digestion capacity for food material, and this capacity is expected to grow to nearly 600,000 tons counting capacity currently under development. In addition, the number of businesses serviced by separate food waste collection has grown by 70%, from 1,350 in 2014 to 2,300 in 2018. The presentation is available at: https://www.mass.gov/files/documents/2018/12/13/1218-orgrpt.pdf.

Siting and Permitting of New Anaerobic Digestion Facilities

The siting, permitting and construction of new and expanding anaerobic digestion facilities continued during 2018. Pre-application meetings were held with the following proposed digester projects:

- Franklin County, Greenfield
- Springfield Wastewater Treatment Plant
- Rockwood Farm, Granville

Facilities permitted in 2018:

- Whittier Farm, Sutton

Facilities under construction in 2018 include:

- Luther Belden Farm in Hatfield
- Rockwood Farm in Granville
- Jordan Heifer Farm in Spencer
- The Greater Lawrence Sanitary District (GLSD) continued construction on its AD expansion project and continued handling organics on a pilot scale, slowly ramping up the amount of organics accepted over the course of the year.

Facilities that started operating in 2018 include:

- Crescent Farm in Haverhill started operating in September, 2018
- The second engine at Pine Island Farm, Sheffield

Clean Energy at Drinking Water and Wastewater Utilities

Water and Wastewater Utilities

MassDEP continued to leverage its CERP partnership efforts to achieve "real savings, real quick" and boost economic and environmental results in the municipal water sector.

As part of CERP efforts to reduce operating costs and greenhouse gas emissions in the water sector, MassDEP made a second round of grant funding (Gap II) available for energy efficiency and renewable energy installations at public drinking water and wastewater facilities in Massachusetts – (Notice of Intent (NOI) on October 5, 2017, under DEP-NOI-CERP-FY2018-05).

The Gap II Grant Program was designed to accomplish the following goals and objectives:

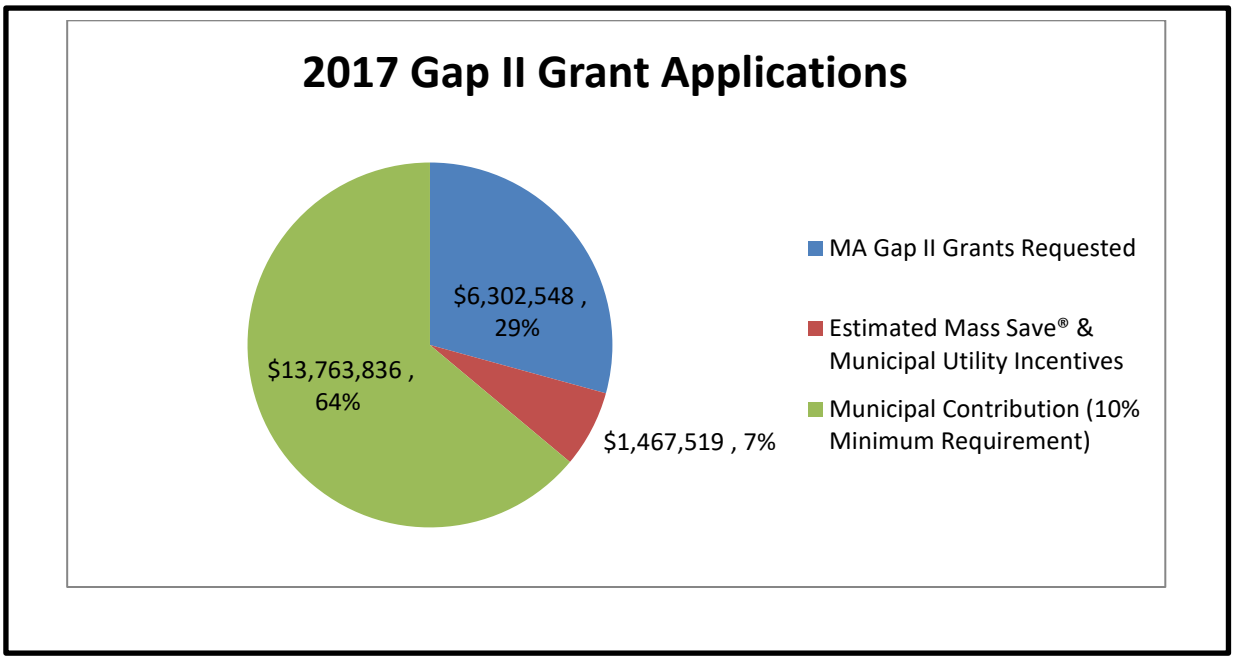
Goals

1. Reduce facility energy and operating costs – thereby enabling drinking water and wastewater utilities to reinvest their annual cost savings back into maintaining and improving their infrastructure and assets;
2. Continue the cost-effective and results-based efficient Gap Funding grant model to leverage funding from multiple partners for clean energy project implementation;
3. Address the challenge of funding smaller efficiency and clean energy projects that have costs too large to cover with an operating budget, but too small to warrant financing; and
4. Provide additional financial grant incentives for larger efficiency and clean energy projects that are cost effective.

The grant program used a simple and streamlined online application process to provide funding to expedite the installation of clean energy and energy efficiency projects at drinking water and wastewater facilities. It also incentivized the direct investment in clean energy by municipal, district or authorities operating drinking water or wastewater facilities. The grant funding allowed for the use of other funding sources to lower operating costs and reduce the operator's carbon footprint. Finally, each award required the recipient to communicate project results through a public education component. Highlighting the projects will amplify educational awareness of immediate and long-term benefits of energy management and sustainable water infrastructure. The grant program included two funding tracks: one for smaller projects less than $100,000; and a second track for larger projects greater than $100,000. The maximum grant available was $200,000. MassDEP effectively utilized MA DOER's online grant application process for streamlining the Gap II grant offering. MassDEP received 48 applications for 109 projects, requesting $6.3 million in grant funds.

In total, the statewide summary of the 48 grant applications received represented over $21.5 million in total project costs for energy efficiency and clean energy implementation:

- $6.3 million in Gap II grant assistance requested
- (17) drinking water, (27) wastewater, and (4) both wastewater and drinking water
- (24) in National Grid, (13) in Eversource, (11) Municipal Light Plant service territories
- 75% for implementation of energy efficiency measures and 25% for clean energy generation
- (19) applications requesting < $100,000 in Gap II grant funds
- (29) applications requesting > $100,000 in Gap II grant funds
- $ 1.6 million in estimated annual cost savings for facilities
- 10,500 megawatt hours of estimated annual savings or on-site clean energy generation



Applications were reviewed and ranked on the basis of five criteria outlined in the grant NOI:

- Cost-effectiveness of the grant (grant dollars invested/projected energy savings)
- Total projected energy savings
- Energy utility incentives/contributions
- Estimated project completion date
- Applicant's cost share contribution

The $6.3 million in total grant requests exceeded MassDEP's available program funds. Therefore, in addition to the project ranking results from the criteria outlined in the NOI above, MassDEP's evaluation also looked at which projects would have a direct beneficial impact on the core water purification or water treatment mission of these facilities. Projects with direct water quality benefits included modifications to aeration systems at wastewater treatment facilities, pumping optimization, etc. Additionally, projects that proposed only lighting retrofits, for which utility incentives are currently available, were not funded in this grant round.

On April 19th 2018, as part of the Commonwealth's Baker-Polito Administration celebration of Earth Week, state environmental officials and area legislators announced the $4 million of Gap II grant funding for energy efficiency and renewable energy upgrades at 36 water and wastewater facilities at an event in Ware. The upgrades will improve treatment efficiency, leverage Mass save® incentives, lower operating costs and cut greenhouse gas emissions. In total, these 36 "Gap II" grant awards are effectively jump-starting over $17 million of clean energy improvement projects that will save facilities a projected $1.3 million annually and generate 8,660 MW hours of electricity savings through energy efficiency and clean on–site generation. These projects, many of them targeted for completion in 2019, will strengthen our clean water infrastructure, improve its reliability and resilience, cut the use of fossil fuels, and allow energy savings to be reinvested back into municipal water operations. The press release can be found here: https://www.mass.gov/news/baker-polito-administration-awards-4-million-for-energy-efficiency-and-renewable-energy

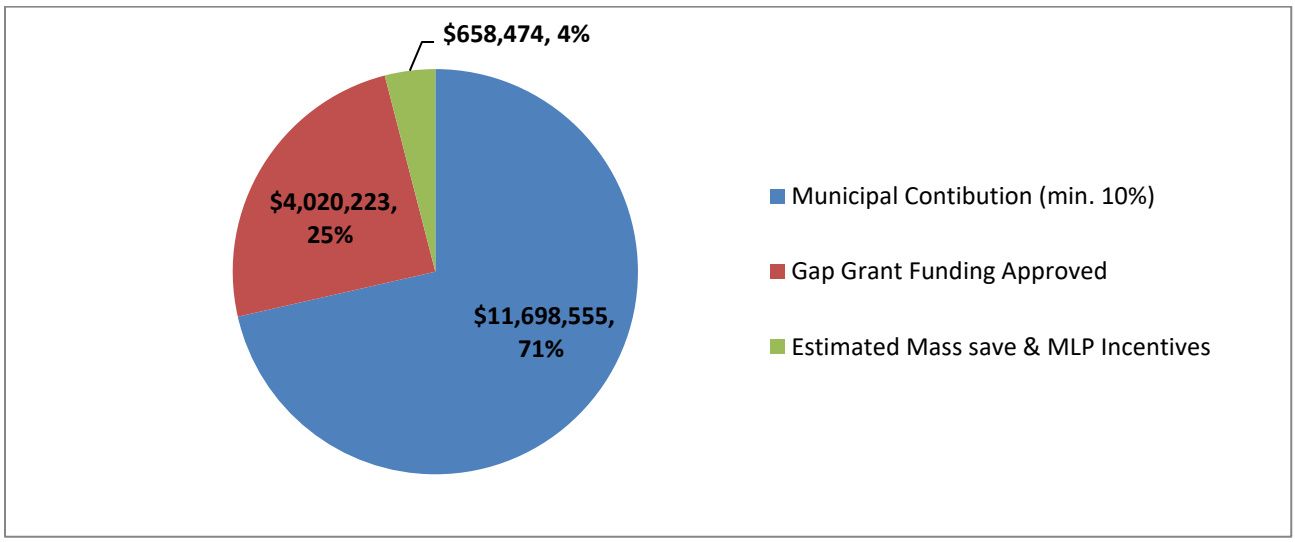
Many of the municipal grant recipients attended and expressed their appreciation for these state grant funds that expedited the implementation of previously assessed efficiency and clean energy projects across the state.

Figure 1 - Gap II Grant Awards Announcement

On July 11th 2018, MassDEP issued its first Gap II grant reimbursement payment of $13,380 to the Town of Milford for the successful completion of a new air compressor at their wastewater treatment plant. This energy efficiency project has provided the Town with "real savings, real quick" - resulting in a 3 month payback upon project completion (see project economics and benefits below).

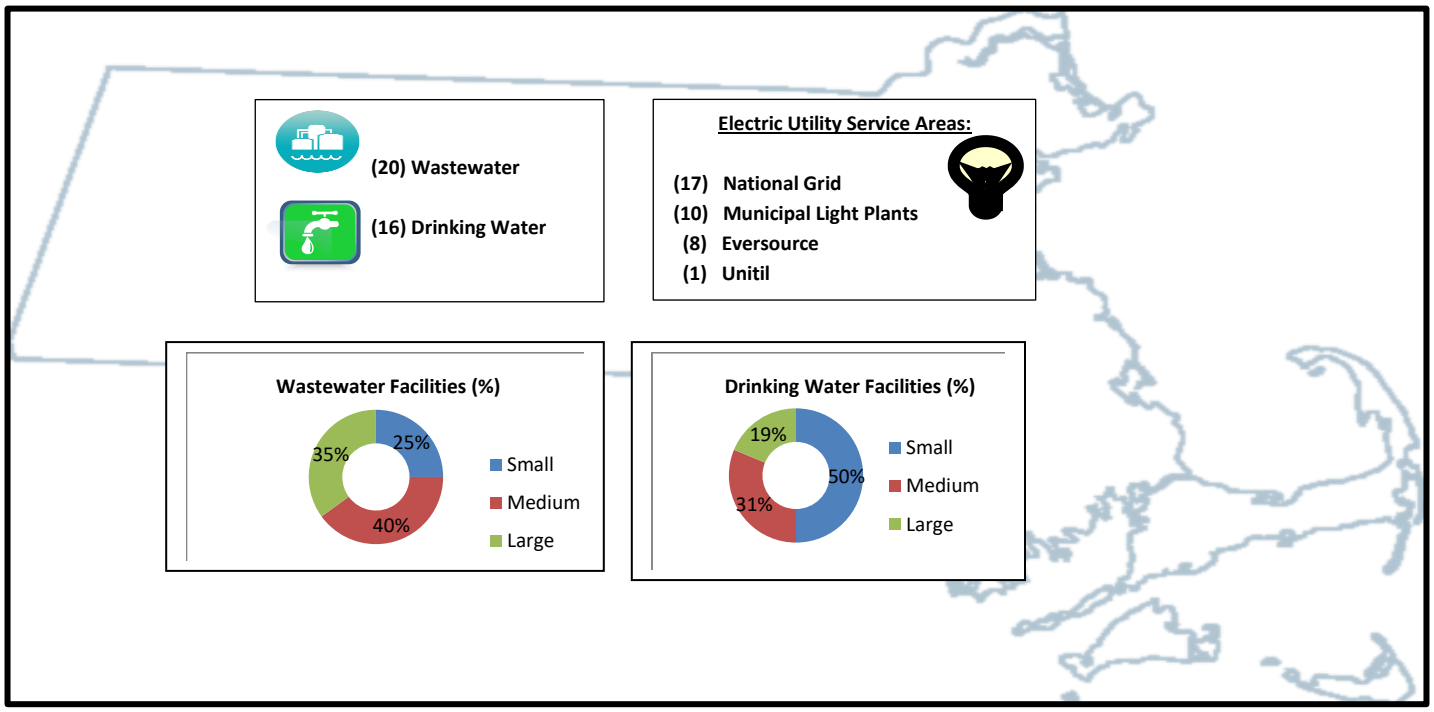
2018 Gap II Grants – Leveraging Multiple Funding Contributions

Statewide Implementation of Energy Efficiency and Clean Energy Generation at Drinking Water and Wastewater Facilities



The Gap II grant program funding was effectively distributed among different-sized wastewater and drinking water facilities and electric utility service areas throughout Massachusetts; providing a variety of treatment facilities to become more efficient and reduce their operating costs and greenhouse gas emissions.

Distribution of Gap II Grant Projects Funded



Gap II Grant Projects – Anticipated Results

70 Energy Efficiency and Renewable Generation Projects Being Implemented

- Including installation of 413 kW of Solar and 10 kW of In-Line Hydropower

Estimated Annual Savings for Facilities

$1,300,000 of operating costs
8,405 MWh of electricity or on-site power generation
4,469 Therms of natural gas
3,280 Gallons of diesel fuel

Estimated Annual Greenhouse Gas Reductions and Equivalents

2,975 Metric tons
1,148 MA homes this could power by electricity
652 Equivalent cars off the road

Town of Milford: Wastewater Treatment Plant
Project: Replacement of the existing air compressor with a new energy-efficient model

Total Project Costs:		$19,367
Less: Gap II Grant Award:	$13,380	
National Grid Incentive:	$ 4,500	
Subtotal:		$17,880
Town of Milford (10% cost share amount):		**$ 1,487**
Annual Cost Savings:		**$6,259**
Annual Electricity Savings:		**32,941 kWh**

Figure 2 - Installation of energy efficient rotary screw air compressor

Below are project thumbnail descriptions of the Gap II grant projects that were announced by the Baker-Polito Administration on April 19th 2019.

MUNICIPALITY	FUNCTION	TOTAL GRANT AWARD	PROJECT DETAILS
Ayer ***(Projected savings of $ 4,877 and 29,688 kWh / year)***	Wastewater	$46,785	For wastewater pumping system control optimization at the Central Avenue station.
Bernardston Fire and Water District ***(Projected savings of $58,900 and 208,500 kWh / year)*** ***Facility is expected to achieve Zero-Net Energy Status***	Drinking Water	$200,000	Install a 150 kW solar photovoltaic system (ground-mounted) at the Pratt Field Wellhead Area; install a soft start and variable speed drive to Sugar House pumping station.
Blackstone ***(Projected savings of $6,657 and 35,108 kWh / year)*** ***42% reduction in annual electricity usage***	Drinking Water	$42,521	Decommission well #5 and install a new variable frequency drive -controlled submersible high-lift pump in Well No. 5A.
Brockton ***(Projected savings of $40,994 and 292,812 kWh / year)*** ***26% reduction in annual electricity usage***	Wastewater	$200,000	Install an Aerzen Turbo Blower to the aeration system at the Brockton Wastewater Treatment Plant.
Charlemont Sewer District ***(Projected savings of $3,800 and 13,000 kWh of on-site generation / year)***	Wastewater	$45,000	Install a 11.7 kW solar photovoltaic system (roof-mounted), above flood level, at the wastewater treatment plant. New solar system is part of a larger vulnerability preparedness FEMA-funded project.

Chicopee ***(Projected savings of $144,430 and 558,450 kWh / year)*** ***Better oxygen transfer will increase sludge treatment and reduce disposal costs***	Wastewater	$200,000	Replacement of the existing onsite pressure swing absorption oxygen aeration system (major components 1974 vintage) with a bulk delivered liquid oxygen system.
Dartmouth ***(Projected savings of $$83,509 and 460,675 kWh and 1,341 therms / year)***	Wastewater & Drinking Water	$107,057	For Pumping system optimization (PSO) upgrades (VFD, motor, pump rebuilds) to Municipal drinking water wells A, B,C, D; boiler replacement to the sludge building and installation of 3 emergency generator block heaters at the wastewater treatment plant.
Fairhaven ***(Projected savings of $12,038 and 66,876 kWh / year)***	Wastewater	$23,924	Install a variable frequency drive to aeration blower #3 and a new heat pump system to the existing emergency generator at the wastewater plant.
Fitchburg ***(Projected savings of $10,203 and 65,297 kWh of on-site generation / year)*** ***Implementation of a 2012 feasibility study***	Drinking Water	$200,000	Replace the existing drinking water pressure reducing valve at Narrows Road with a 10 kW hydroelectric "Pump as Turbine" (PAT) generation system.
Franklin ***(Projected savings of $10,329 and 70,686 kWh / year)***	Drinking Water	$79,380	Install 10 high efficiency motors to five drinking water wells and two booster stations.
Groton ***(Projected savings of $8,000 and 55,158 kWh / year)***	Drinking Water	$83,295	Install variable speed pumps and electrical controls to Whitney Well drinking water (pumps #1 & #2) for both energy efficiency and peak electrical demand management.
Hatfield ***(Projected savings of $32,679 and 217,861 kWh / year)***	Wastewater	$200,000	For energy efficiency solids handling modifications by converting one of the sludge holding tanks (previously served as a digester) to a gravity thickener at the wastewater treatment plant.
Hull ***(Projected savings of $18,686 and 118,946 kWh / year)*** ***Implementation of a 2004 efficiency study***	Wastewater	$61,685	For aeration blower optimization; installation of a variable speed drive to the odor control fan and an emergency generator block heater at the wastewater treatment plant.

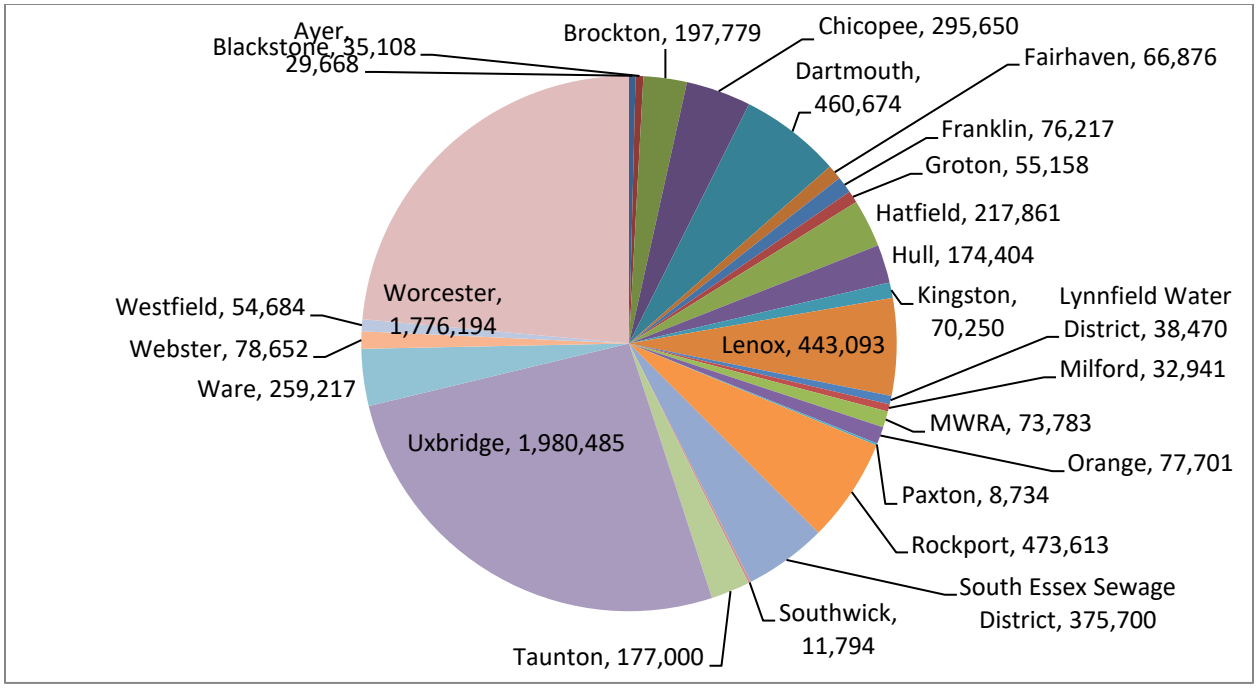
Kingston ***(Projected savings of $5,511 and 8,892 kWh and 3,128 therms / year)***	Wastewater	$76,020	Replace the existing cast iron boiler with a new 94% efficient condensing boiler; optimize the circulation of the hot glycol in the heating system by replacing the motors and installing a variable speed drive at the wastewater treatment plant.
Lenox ***(Projected savings of $56,221 and 443,093 kWh / year)*** ***Improved aeration will improve taste and odor problems***	Drinking Water	$98,542	Install a variable speed drive to a low-lift pump at the Root Reservoir water treatment plant; install new solar-powered mixers to the Lower and Upper Root Reservoirs.
Lynnfield Water District ***(Projected savings of $7,348 and 38,470 kWh / year)***	Drinking Water	$79,443	Replace pumps #1 & #2, motors, and variable speed drives at the Lynnfield drinking water booster pumping station.
Massachusetts Water Resources Authority ***(Projected savings of $13,284 and 73,783 kWh / year)***	Wastewater & Drinking Water	$81,027	Install variable frequency drives on two circulation water pumps at the Union Park Detention & Treatment and Deer Island Facilities; and install 222 feet of water pipe insulation in an underground vault at Loring Road to reduce the need for dehumidification.
Middleborough ***(Projected savings of $5,037 and 14,558 kWh of on-site generation / year)***	Drinking Water	$43,437	Install a 9.75 kW (ground-mounted, dual-access tracker) solar photovoltaic system to the water treatment.
Milford ***(Projected savings of $6,259 and 32,941 kWh / year***	Wastewater	$13,380	Install an energy efficient rotary screw air compressor with variable speed drive at the wastewater treatment plant.
Millbury ***(Projected savings of $11,028 and 33,045 kWh of on-site generation / year)***	Wastewater	$155,385	Install a 25 kW solar photovoltaic carport system and install a 1.5 ton air source heat pump to the DPW office / sewer building.
Montague ***(Projected savings of $33,823 and 261,061 kWh of on-site generation / year***	Wastewater	$150,000	Install a 200 kW solar photovoltaic system (ground-mounted) at the wastewater treatment plant.
Nantucket ***(Projected savings of $21,879 and 91,161 kWh of on-site generation / year)***	Wastewater	$200,000	Install a 75 kW roof-mounted solar photovoltaic system on the wastewater sludge building.

North Carver Water District ***(Projected savings of $10,800 and 3,280 gallons / year)***	Drinking Water	$58,230	Replace the existing oversized 350 kW propane Pleasant Street emergency generator with a 125 kW generator at the plant.
Orange ***(Projected savings of $11,655 and 77,701 kWh / year)***	Wastewater	$200,000	Replace the existing two 50 HP aeration blowers with energy efficient 35 HP mixer / blowers.
Paxton ***(Projected savings of $1,069 / and 8,734 kWh year)***	Drinking Water	$22,814	Replace two existing 20-year-old 100hp motors with NEMA premium efficient motors; upgrade existing dehumidification system; and install ductless mini-split for building heating and cooling at the pumping station.
Rockport ***(Projected savings of $77,534 / year and 473,613 kWh)***	Wastewater	$81,081	Perform aeration blower control improvements and optimize the aerobic digester blower control system.
Shrewsbury ***(Projected savings of $10,956 and 75,581 kWh of on-site generation / year)*** ***Implement a MA DOER-funded solar assessment***	Drinking Water	$200,000	Install a 60 kW solar photovoltaic system (ground mounted) to Home Farm water treatment plant.
Beverly/Danvers/Marblehead/Peabody/ **Salem** ***(Projected savings of $52,600 and 375,700 kWh / year)*** ***Better oxygen transfer for biological treatment and decreased maintenance costs***	Wastewater	$200,000	Replace the existing three trains of aeration mixer blades with a higher-efficiency blade system at the South Essex Sewage District.
Southwick ***(Projected savings of $3,066 and 11,794 kWh / year)***	Drinking Water	$40,546	Install two heat pump systems to preheat the existing 45kW emergency diesel generators to replace the inefficient electric block heaters at the College Highway and North Longyard pump stations.
Taunton ***(Projected savings of $11,158 and 101,435 kWh / year)***	Wastewater	$35,500	Install a variable frequency drive on the aeration blower #1 (100HP) motor at the wastewater plant.

Uxbridge ***(Projected savings of $356,4882 and 1,980,485 kWh / year)*** ***Implementation of a 2011 efficiency study will improve the biological treatment process***	Wastewater	$168,613	Convert the existing coarse bubble air diffusers and centrifugal aeration blowers to fine bubble air diffusers and rotary hybrid blowers; upgrade the existing oil heating and electric HVAC system with a natural gas based system.
Ware ***(Projected savings of $46,660 and 259,217 kWh / year)***	Wastewater	$160,783	Install three new motors, variable speed drives, and dissolved oxygen, pH and temperature sensors into the aeration basins.
Wareham Fire District ***(Projected savings of $16,500 and 101,300 kWh of on-site generation / year)***	Drinking Water	$200,000	Install a 81 kW ground-mounted solar photovoltaic system at the Maple Springs Water Purification Plant.
Webster ***(Projected savings of $15,730 and 78,652 kWh / year)***	Wastewater	$26,351	Perform pumping system optimization by rebuilding 3 Return Activated Sludge (RAS) pumps at the wastewater treatment facility.
Westfield ***(Projected savings of $7,820 and 54,684 kWh / year)***	Wastewater	$39,424	Perform pumping system optimization by rebuilding and epoxy coating 4 Influent wastewater pumps.
Worcester ***(Projected savings of $161,634 and 1,776,194 kWh / year)*** ***50% reduction in annual electricity usage***	Drinking Water	$200,000	Replace the existing 20-year old ozone generation system with the most current liquid oxygen system (LOX) system for improved treatment while using less electricity.

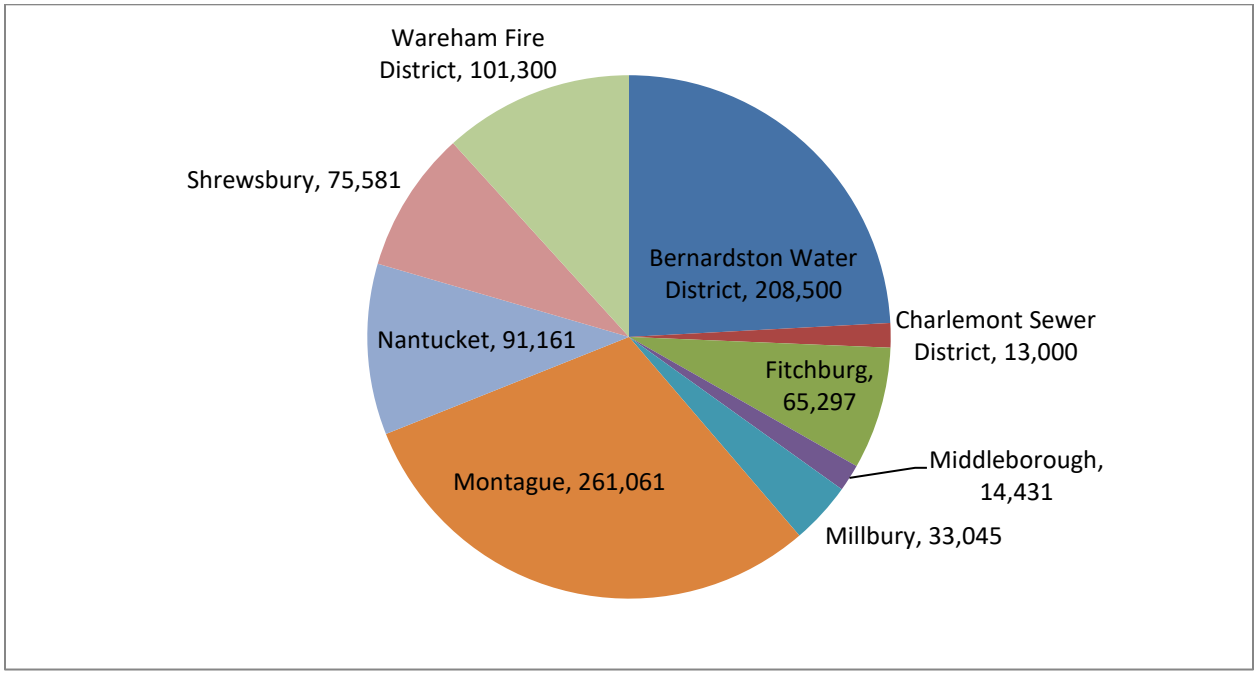
Gap II Grants - *produce 8,405 megawatt hours of savings annually*

Energy Efficiency Improvements:
7,541,706 kWh of Electricity Saved / Year



On-Site Renewable Energy Generation

863,376 kWh of Electricity Generated / Year

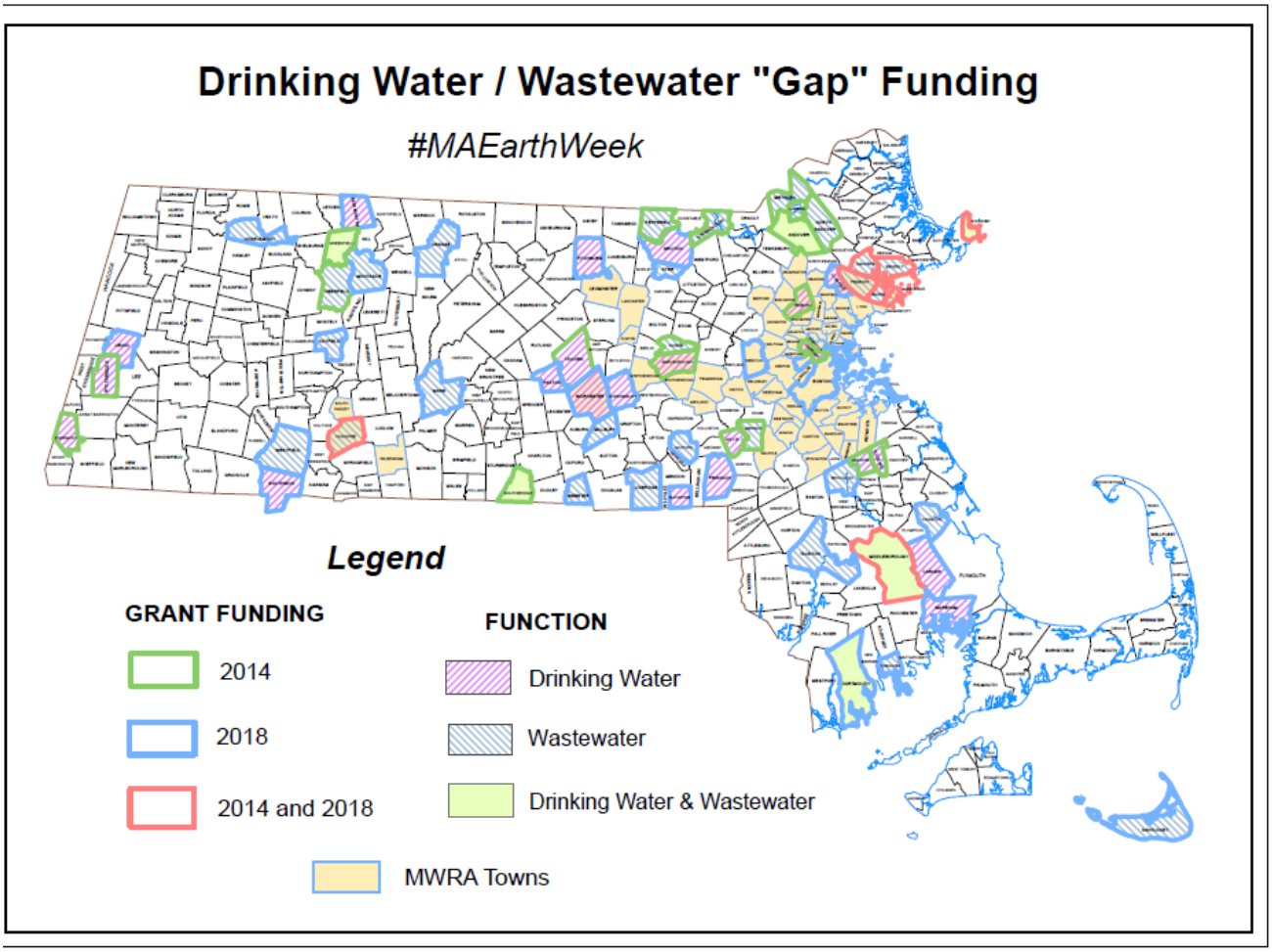


Massachusetts Gap Grant Program Expands Its Reach Across the Commonwealth

The Gap Grant Program has been very successful in moving energy efficiency and renewable energy projects off the planning shelf by providing state grant funds to supplement utility incentive payments and other partial sources of funding.

A cost-benefit analysis of the Gap I grant program conducted in 2016 in partnership with the American Water Works Association (AWWA) and the Policy Navigation Group found that the total Massachusetts investment of $2.5 million in energy efficiency projects will result in more than $40.2 million in public benefits over 15 years ($31 million in energy savings and over $9 million of public environmental benefits). As a result, the economic and environmental benefits of this program were shown to be both immediate and long-term. These energy cost savings and emission reductions are a great public 'return-on-investment' for the Commonwealth of Massachusetts and its taxpayers.

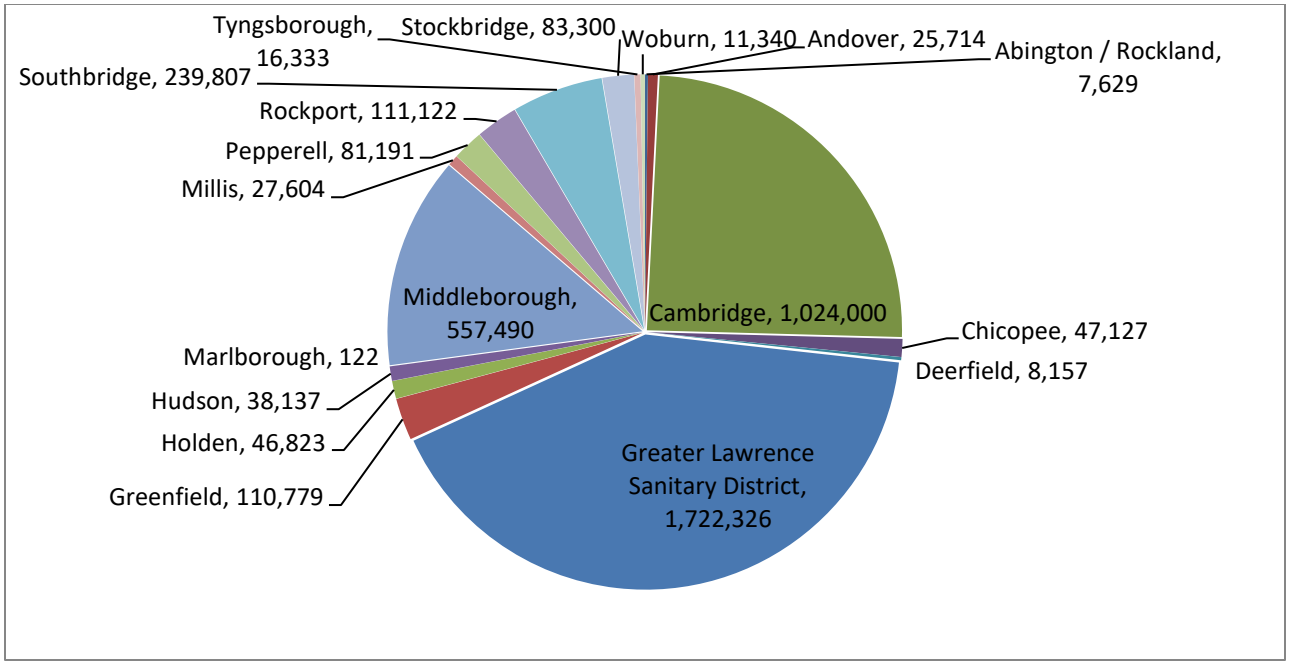
Gap I grant projects continue to operate in 2018. The final Gap I project expects to be completed in 2019 and others are operational.



Gap I Grants – *produce 15,789 megawatt hours of savings annually*

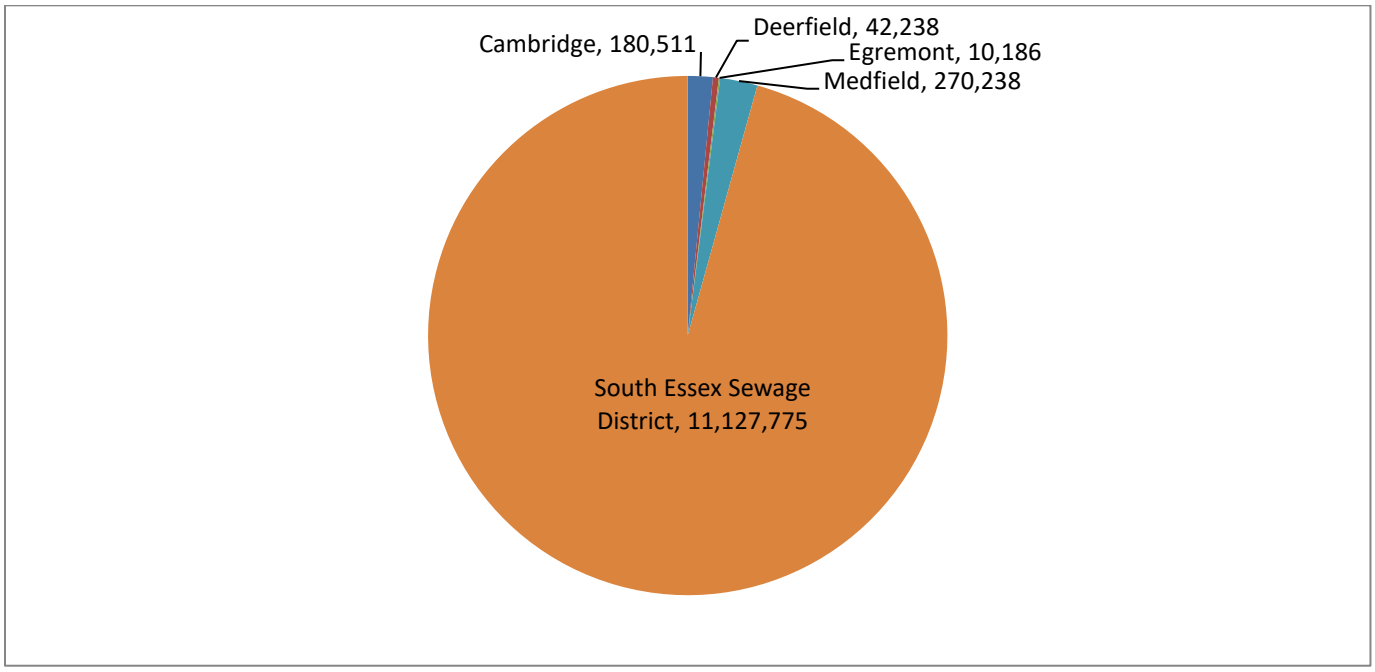
Energy Efficiency Improvements

4,159,001 kWh of Electricity Saved / Year



On-Site Renewable Energy Generation

11,630,948 kWh of Electricity Generated / Year



Massachusetts Continues to Optimize Pumping Systems in the Water Sector

Over the course of three years, MassDEP has worked in collaboration with National Grid, Eversource and pumping system specialists to assess and implement pumping optimization opportunities at municipal drinking water and wastewater facilities statewide. Pumping systems represent a major electrical load

for this sector and therefore represent an opportunity for plants across Massachusetts to increase efficiency and reduce costs. Pumping represents approximately 90% of electric usage for water facilities and 20-30% at wastewater facilities. Identifying and implementing energy efficiency improvements at water and wastewater plants has been a major focus of our energy management efforts.

In 2018, as a result of Massachusetts' energy-saving efforts and the issuance of our Gap II grant funding, six additional pumping system optimization projects were funded and are being implemented. In total, these projects are estimated to save facilities $125,941/ year and reduce their annual electrical usage by over 697,000 kilowatt hours. Each of these optimization projects is described in Table 1 below.

Table 1. Pump System Optimization Projects

Facility	Electric Utlity	Electricity Savings (kWh/year)	Project Cost	Annual Cost Savings	Utility Incentives	Gap II Grant	Simple Payback (years)[1]
Ayer - Wastewater	National Grid	29,668	$59,400	$4,877	$7,417	$46,785	1.1
Blackstone – Drinking Water	National Grid	35,108	$56,000	$6,657	$8,755	$42,521	0.7
Dartmouth – Wastewater & Drinking Water	Eversource	460,674	$389,329	$83,509	$115,168	$107,057	2.0
Lynnfield – Drinking Water	Municipal	38,470	$ 88,270	$7,348	----------	$79,443	1.2
Webster - Wastewater	National Grid	78,652	$52,379	$15,730	$23,100	$26,351	0.2
Westfield - Wastewater	Municipal	54,684	$53,100	$7,820	$9,296	$39,424	0.6
Totals		**697,256**	**$698,478**	**$125,941**	**$163,736**	**$341,581**	**1.5 (average)**

Advancing MassCEC's Wastewater Treatment Innovation Technology Pilot Grants

Since its inception in August 2016 MassDEP has actively participated in MassCEC's wastewater treatment innovation technology pilot grant program. The primary goal of the Program is to assist publicly-owned Massachusetts Wastewater Treatment districts and authorities by funding the piloting of innovative water technologies with strong potential to increase the energy efficiency of the wastewater treatment process.

In 2018 MassDEP continued to provide technical assistance, outreach and assist in reviewing grant applications with the Innovation Group at MassCEC. MassDEP served on the grant review team and evaluated eight innovative technologies grant proposals – ranging from intensified nutrient removal and carbon diversion, micro-bubble aeration and biomedia, ultrafiltration membrane for wastewater reuse, and Ammonia-based process optimization. MassDEP will continue our inter-agency collaboration with MassCEC to advance wastewater innovation and efficiency work across the state in 2019.

Outreach and Education Efforts to Drinking Water and Wastewater Facilities

[1] Simple payback is based on the total cost of the project, minus utility incentives and the Gap II grant, divided by the annual cost savings. It represents the time needed for project savings to exceed or "pay back" the municipal funding investment.

MassDEP continued to provide additional technical assistance and education to municipal drinking water and wastewater managers in Massachusetts, as well as water managers for other state programs, on opportunities to reduce energy and greenhouse gas emissions at facilities. The MassDEP CERP program provided information or presentations to the Environmental Council of States (ECOS) and the American Water Works Association (AWWA). The presentations can be found here:

- Environmental Council of States Clean Water SRF Webinar – *Massachusetts Clean Energy Partnership Helps Move Greater Lawrence Sanitary District to "Zero-Net" Energy* (January, 2018)

- AWWA Connections National Newsletter Article Published – *Rebates, Government Incentive Programs Help Utilities Save Energy Costs* MA Gap Funding Program Highlighted (March, 2018)

Worcester Polytechnic Institute Project - Addressing Vulnerabilities and Emergency Power Capacities in the Wastewater Sector of Massachusetts

When power outages occur in wastewater treatment facilities, there can be very serious consequences. Any spills or leaks of untreated sewage into the community or receiving waters can present serious health risks from parasites and harmful bacteria. This is why it is vital to ensure that wastewater treatment facilities continue to operate even when the main electrical grid goes out. In response, MassDEP is taking the initiative to document the emergency power capabilities in the water sector of Massachusetts.

Partnering with WPI, MassDEP worked with a student team to combine emergency power survey data, conduct interviews, and help address vulnerabilities and emergency power capacities in the wastewater sector of Massachusetts. This led to the creation of a map prototype that visually represents facilities' vulnerabilities, and an informational resource pamphlet for facility managers. These tools can be used by response agencies and the facility managers to strengthen emergency preparation efforts in wastewater treatment plants.

Lack of complete data inhibits the MassDEP from a complete and full understanding the vulnerabilities and needs of municipal wastewater facilities for backup power resources. Additional work in this area is planned.

Recommendations from the Student Team:

1. MassDEP should implement a system for more reliable and accurate data gathering
2. MassDEP should improve on informational resources to support emergency planning
3. The MassDEP should create a self-assessment tool for facility managers
4. The MassDEP should create targeted funding source for backup power and provide information on funding opportunities through a website
5. The MassDEP should conduct similar vulnerability assessments on the drinking water facilities in Massachusetts

Renewable Energy on Closed Landfills

During 2018, MassDEP continued to review and approve solar photo voltaic (PV) projects at closed landfills, while several previously approved projects completed construction and came online. Through the end of 2018, 103 landfills had received post-closure use permits for a total of 238 MW of solar and wind and 71 projects generating 162.4 MW had come on line and are now operating. Operating landfill

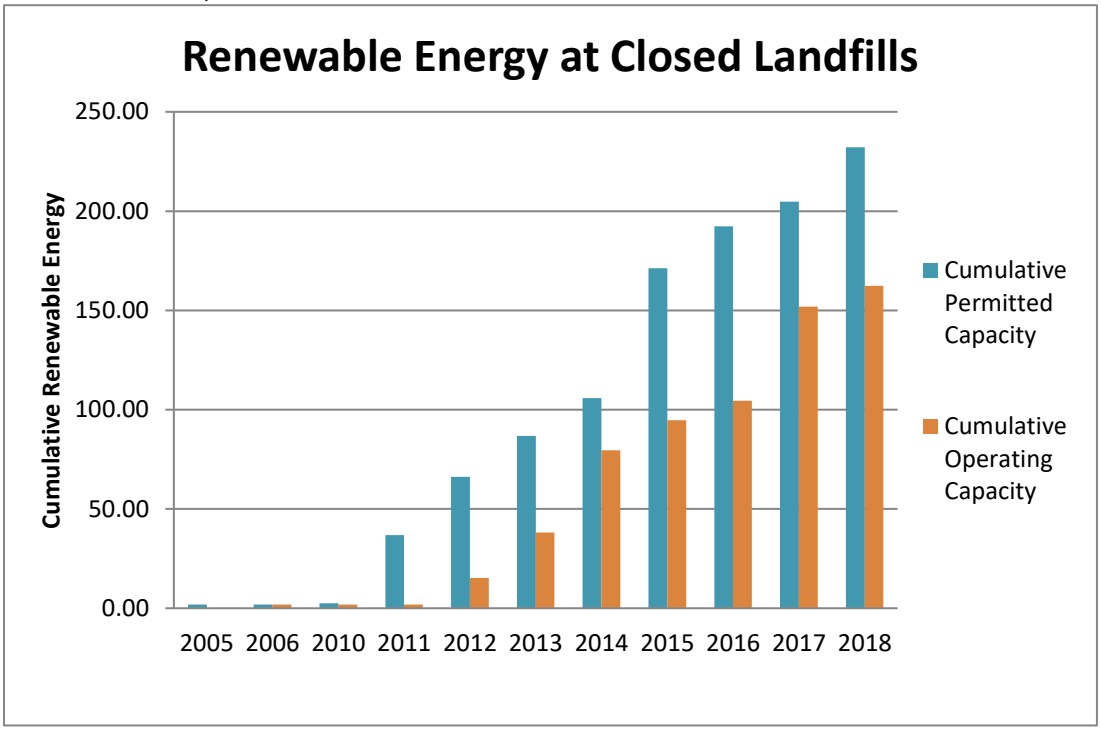
renewable energy projects represent 6.4% of operating solar in Massachusetts. The following lists summarize the activities that occurred with solar-on-landfill projects during 2018:

Twelve New, Modified or Revised Post-Closure Use Permits for Solar-on-Landfill Installations Rated at a Total of 27.28 megawatts (MW):

- Shrewsbury Ash LF
- Ayer LF
- Raynham Municipal LF
- Ware LF
- Hamilton LF
- Chelmsford LF
- Amesbury Titcomb Pit LF
- Springfield Crane Foundry Sand LF
- Stoughton LF
- Westport LF
- Beverly Brimbal Avenue LF
- Wellfleet LF

Four Previously Permitted Solar-on-Landfill Projects Began Operations in 2018, Generating a Total of 10.5 MW:

- Stockbridge LF – 0.9 MW
- Ashland LF – 0.9 MW
- Montague LF – 6.0 MW
- Winchendon, River St. LF – 2.7 MW



Renewable Energy on Contaminated Sites

Goal 1: Renewable Energy on Contaminated Land

BWSC's efforts to develop 50 MW's of renewable energy/solar PV on contaminated land by 2020.

The Department of Environmental Protection's (MassDEP) Bureau of Waste Site Cleanup (BWSC) continued its national leadership role in ongoing stewardship around the Commonwealth of the support for development of solar photovoltaic renewable energy generation units on closed landfills and contaminated land such as Brownfield's. The state currently leads the nation in the number of operational units per site and is number two in total energy capacity produced. The goal to achieve 50 MW of solar generating capacity on contaminated sites by 2020 has been exceeded.

Capacity as of February 12, 2019 (see attached "*MA CL Installed Solar PV Sites List*"):

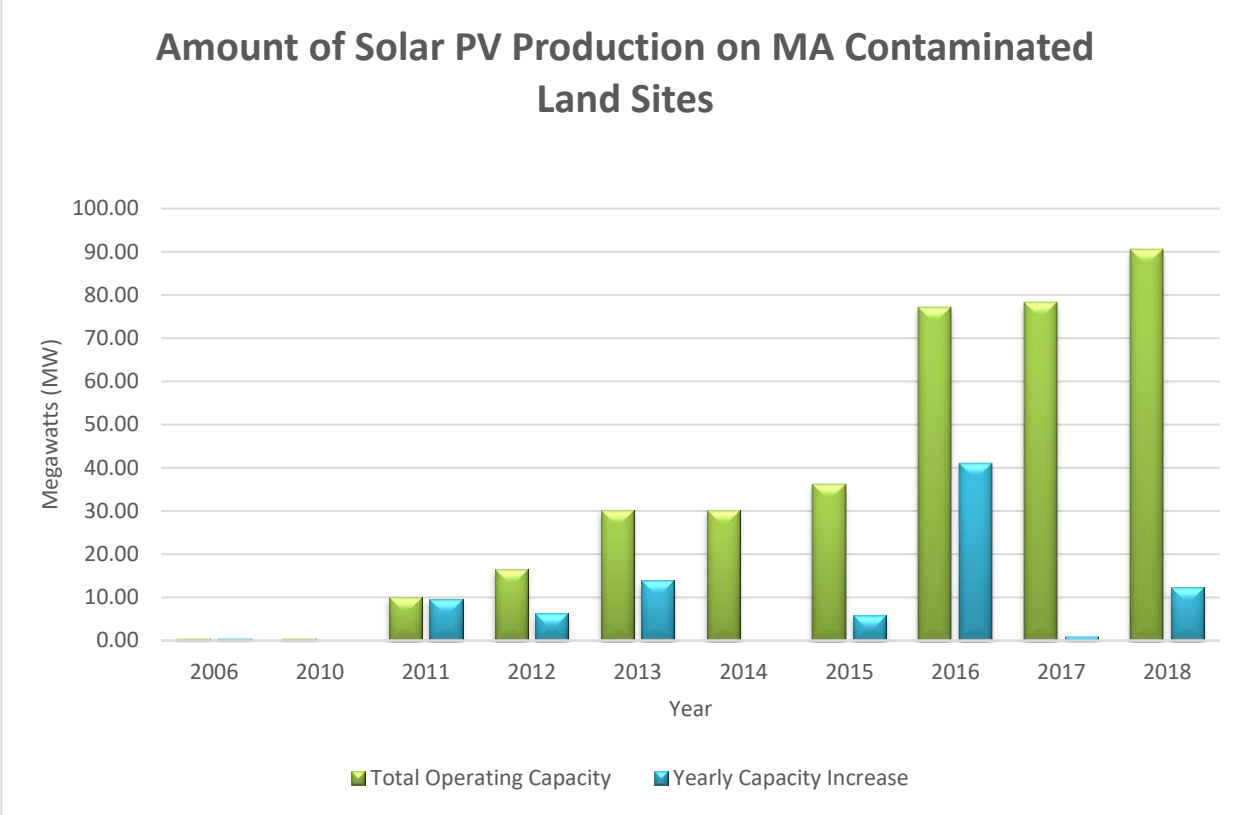
	Operational (MW)	**Proposed (MW)**	**TOTAL (MW)**
Solar Photovoltaics	84.01	51.80	**141.11**
Wind	6.5	0.0	**6.5**
Total	**90.51**	**51.80**	**147.61**

BWSC CERP activity during 2018 includes the following:

PROJECTS: *SREC II*-SMART "BROWNFIELD" PRE-DETERMINATION LETTERS FILED WITH DOER IN 2018

MassDEP issues pre-determination letters on proposed projects that may be located on a "Brownfield". These letters provide guidance to DOER as to whether a project is likely to qualify as being located on a Brownfield as that term is defined in 225 CMR 20.02. To facilitate PV development on Brownfields, DOER uses pre-determination letters to make decisions on Brownfield qualification after consultation with MassDEP. Letters recommending Brownfield designation were sent to DOER in 2018 for the following projects.

- City of Springfield (FMR Chapman Valve), Springfield, 16 acres, 2.0 MWs, 1/19/18 - RTN 1-0000170
- Charles George Reclamation, Superfund, Tyngsboro, 71 acres, 2.2 MW's - RTN 3-2000136
- FMR Kinzer Salvage Yard, Gardner, 30 acres, 4.0 MW's, 6/8/18 - RTN 2-200453
- Cresticon Sub NGGEC Former Litton, Westminster, 18 acres, 2.0 MW, 7/11/18 - RTN 2-0000165
- Westport Stone & Sand LLC, 72 acres, 6.0 MW (72 acres), 8/7/18 - RTN 4-014405
- "New release", Halifax, 38 Acres, 6.0 MW's, 8/14/18 - RTN 4-0027311
- Sutton Brook Disposal Area (Superfund), 50 acres, 3.3 MWs, 11/13/18 - RTN 3-003893



Brownfield Determination letters denied in 2018: MassDEP sent pre-determination letters that did not support Brownfields designations for the following projects in 2019.

- FMR Foisey Farm, Cheshire, 82 acres, 6.0 MWs, 11/13/18 - RTN 1-000567
- Swansea Water District, 1.0 MW, 11/13/18 - RTN 4-0018522
- FMR Mailet Gravel Pit, Salisbury, 20 acres, 6.0 MWs, 11/29/18 - RTN 3-0023908

POTENTIAL PROJECTS: MassDEP consulted with and/or held ongoing discussions with project proponents and EPA related to the following projects in 2018.

- Nyanza (Superfund), Ashland, 226 acres, 3.5 MW's – Citizens Energy - RTN 3-0000216
- W.R. Grace (Superfund), Acton, 240 acres, 5.0 MW's - RTN 2-000010
- Nuclear Metals Inc. (Superfund), Concord, 240 acres, 1.4 MW's - RTN 3-0000295

COMPLIANCE ASSISTANCE MEETINGS HELD. MassDEP held a number of compliance assistance meetings in 2018, including the following:

- Terra Navigator Meeting, 3/26

- Cypress Creek Renewables (Ironwood Land Partners – Louisiana), 4/3
- Soltage LLC Meeting, 4/26
- AD Location for CORE Company with Harvest
- Raptor Maps
- USEPA's RE-Powering America's Land Initiative – review of data update

PUBLIC OUTREACH. Public education and targeted outreach continued in 2018 with the following events:

- SPEAKER: Brownfields Listing LLC – States Webinar (MA, IL, NY) May 3rd
- SPEAKER: Solar Marketplace Event, June 19th NJIT, Newark, NJ – education and marketplace mixer

ENERGY STORAGE WITH SOLAR PHOTOVOLTAICS. MassDEP supported consideration of energy storage with solar PV installations with the following activities:

- Meeting with British Petroleum (BP) Fuels Group, new retail stations. Resilient Gas Stations Initiative
- Northern Reliability, VT – interested in energy storage at contaminated lands/landfills. Small to large scale
- Ed Woll/Sierra Club – "Underutilized Impaired Land and Energy Development Bill"
- Integrate advanced energy storage (e.g. batteries) at existing/new CL/LF; replace demand for more natural gas, available to meet peak energy demands. Assess: Will it work? Barriers to implantation (technological, political, gaps, financing, tec.)

Goal 2: Green Remediation/Greener Cleanups

BWSC's efforts toward the promotion and application of green approaches for the assessment and remediation of oil and hazardous disposal sites is consistent with the Commonwealth's mandates to improve energy efficiency, reduce emissions and expand the use of renewable energy resources where practicable through a *reduction in the Net Environmental Footprint* of cleanup assessment and remediation activities to the maximum extent possible.

MassDEP's BWSC continued its national leadership role in its ongoing efforts to reduce the overall net environmental footprint of assessment and cleanup activities associated with the release of oil and hazardous materials to the environment, issuing its second annual Greener Cleanup Leadership Recognition citation and continuing its public outreach on the issue.

BWSC CERP activity for green remediation/greener cleanups during 2018 included the following:

PROJECTS:

- 2018 Worcester Polytechnic Institute Interactive Qualifying Project (IQP) Project – "Identifying Opportunities for Advancing Green & Sustainable Applications for Waste Sites", October 2018

COMPLIANCE ASSISTANCE MEETINGS

- USEPA Region 1 – Bi-Monthly collaboration meetings on Greener Cleanup and Sustainability Issues.

PUBLIC OUTREACH

- CERO Greener Cleanups BWSC Staff Presentation, 6/26/18
- 2018 Association for Environmental Health and Sciences Foundation (AEHS): UAV "Drone" Workshop – Clean Energy, Solar PV O&M
- Northeastern Guest Lecturer– 9/19/18 (Tom Potter)

05/07 (BWSC) Springfield, LSPA's Western Massachusetts May Membership Meeting– Bureau of Waste Site Cleanup (BWSC) staff attended and presented at this event hosted by the Licensed Site Professional Association (LSPA) Western Massachusetts Chapter. BWSC was part the evenings program titled "Case Studies of Site Remediation Using Greener Cleanup Principles." The program addressed the MCP regulatory Greener Cleanup requirements and policy as well as illustrating those principles through the presentation of two case studies. The program was certified by the LSP Board of Registration for 1.0 hour of "DEP Course" regulatory continuing education credit.

06/13 (BWSC) Taunton, LSPA's June Membership Meeting– Bureau of Waste Site Cleanup (BWSC) staff attended and presented at this event hosted by the Licensed Site Professional Association (LSPA). BWSC was part the evenings program titled "Case Studies of Site Remediation Using Greener Cleanup Principles." The program addressed the MCP regulatory Greener Cleanup requirements and policy as well as principles through the presentation of two case studies. The program was certified by the LSP Board of Registration for 1.0 hour of "DEP Course" regulatory continuing education credit.

10/16 (BWSC) Amherst, AEHS Soils, Sediments, Water and Energy Conference – MassDEP's Bureau of Waste Site Cleanup (BWSC), The Boeing Company, DuPont and Norfolk Southern Corporation participated in a platform session titled "Organizational Drivers for Sustainable Remediation Panel" sponsored by the Sustainable Remediation Forum (SURF). The panel discussed the opportunities, the challenges, and the drivers that have they have found to be successful in developing and implementing sustainable remediation programs within their organizations.

Goal 4: BWSC CERP Climate Change and Resilience within Sustainable Remediation

In conjunction with the Commonwealth's Executive Order 569 – "Establishing an Integrated Climate Change Strategy for the Commonwealth" and the Sustainable Remediation Forum's Technical Initiative for Climate Resilience with Sustainable Remediation, BWSC is assessing the vulnerability of its universe of waste sites to the impacts of climate change and evaluating its adaptation options with an emphasis on improving energy efficiency, reducing emissions and expanding the use of renewable energy resources where practicable

MassDEP's BWSC partnered with EcoAdapt and the Sustainable Remediation Forum (SURF) in the launch of a nation leading initiative to address climate change and resilience of contaminated lands that addresses both site vulnerability and the long-term sustainability of remediation and reuse from climate change impacts.

Bloomberg Environment & Energy Report – "States Take Lead in Preparing Toxic Sites for Climate Change", January 2018. States and cities are proactively adapting their contaminated sites for severe

*weather amid federal reluctance to plan for risks related to climate change. [*BNA article ("*States Take Lead in Preparing Toxic Sites for Climate Change*")*]*

BWSC CERP activity during 2018 includes the following:

PROJECTS

- MassDEP Pilot Project with ECOAdapt, SURF – vulnerability assessment progress with Boston University
- International Technology and Regulatory Council (ITRC) Proposal for Green and Sustainable Remediation (GSR) & Climate Resiliency – FY 2019 Project. MA & NJ Co-Chairs.
- ASTM Standard Guide for "Remedial Action Resiliency to Climate Impacts"

COMPLIANCE ASSISTANCE MEETINGS

- Mystic River Watershed Association (MyRWA). BARR Foundation grant assistance to Julie Wormser of MyRWA. Work with BWSC (NRD & Sites Vulnerability)

MassCleanDiesel: Clean Markets Grant Program

The CERP program has been assisting the Bureau of Air and Waste (BAW) with Round III of their MassCleanDiesel: Clean Markets Grant Program. Rounds I and II of this program provided grants to replace diesel air pollution control equipment with more effective pollution controls and to replace diesel-powered transportation refrigeration units (TRUs) on stationary or semi-stationary trailers with all-electric refrigeration units (eTRUs) used at food distribution centers, warehouses and markets. Funds for this program come from the federal Diesel Emissions Reduction Act (DERA). Round III of the grant program is limited to replacement of TRUs with eTRUs.

In May, 2018 MassDEP launched Round III of the grant program. This initial application period was extended to July 31, 2018 to attract more applications. The application period was extended once more to August 17, 2018. Four applications for eTRUs were received during the extended application period to switch out a total of 20 units, and requested $183,912 in grant funding. Contracting with the applicants was completed in 2018 and the eTRUs will be installed on the applicant's trailers in 2019.

The installation of the 20 eTRUs is projected to reduce annual emissions of nitrogen oxide by nearly seven tons, particulate matter by almost three tons, hydrocarbons by nearly one ton, carbon monoxide by seven tons and carbon dioxide by more than 812 tons, or the equivalent of removing 172 passenger cars from the road for one year.

Regional Office and Boston Summaries

Western Region 2018 CERP Summary

- **1/5, Martins Farm, Greenfield:** MassDEP issued a Final Recycling, Composting or Conversion (RCC) permit to Martins Farm for its commercial food waste composting operation. This action completes their transition from a Determination Of Need (DON) permit to an RCC permit.
- **1/10, Technical Support, Former Cohen Bros. Salvage Property, Springfield:** MassDEP met with Northern Tree Service, a potential site tenant that will set up a wood fuel processing facility, to discuss Massachusetts Contingency Plan (MCP) liability concerns for the redevelopment as well as assessment and cleanup considerations for this Brownfields site.
- **1/19, Regional Anaerobic Digestion, Deerfield**: MassDEP attended a meeting with Franklin County area wastewater officials to discuss the group's interest in a regional anaerobic digestion facility in Franklin County.
- **2/7, Franklin County, Greenfield:** MassDEP met with representatives of various Franklin County communities, including Greenfield to discuss permitting requirements related to the group's interest in a regional anaerobic digestion facility to serve municipal wastewater treatment plants to be located adjacent to the Greenfield POTW.
- **3/1, Northeast Biodiesel Company LLC, Greenfield:** MassDEP entered into an Administrative Consent Order with Northeast Biodiesel Company, LLC, the operator of a biodiesel manufacturing facility in Greenfield. As a result of a MassDEP inspection, it was discovered that Northeast Biodiesel was not following the monitoring, recordkeeping and reporting provisions of its Air Quality Plan Approval issued on March 15, 2016. In addition, Northeast Biodiesel failed to comply with MassDEP's hazardous waste notification and labeling standards and did not register an emergency generator with the MassDEP's Environmental Results Program (ERP).
- **3/6, Rockwood Farm, Granville:** MassDEP conducted a pre-application meeting with Rockwood Farm and its consultants to discuss a proposed anaerobic digestion facility at the farm.
- **3/16, Roberts Energy Renewables LLC. , Ashfield:** MassDEP and Roberts Energy Renewables executed an Administrative Consent Order with Penalties to resolve outstanding air pollution control violations at the site of a proposed wood fuel to energy project.
- **4/24, FERC Relicensing Roundtable, Greenfield:** The MassDEP participated in a full-day roundtable related to the relicensing of two FERC regulated power facilities on the Deerfield River.
- **7/6, Forefront Solar, Ware:** MassDEP issued a permit to Forefront Solar approving the construction of a 1MW solar array on top to the closed Town of Ware Landfill located off of Robbins Road. Construction will likely not commence until 2019.
- **8/17, Citizens Oak Street Solar, Springfield:** MassDEP issued a permit to Citizens approving the construction of a 3,5 MW solar array at the former Crane Foundry landfill located off of Oak St. in Springfield. Construction will commence in 2019.
- **9/24, Town of Lenox Landfill, Lenox:** MassDEP issued a permit to the Town of Lenox which approves repairs to the landfill surface which resulted from activities related to the construction of a solar array by Ameresco.
- **10/16, Roberts Energy Renewables LLC. , Ashfield:** The MassDEP held a pre-application meeting with the design engineer for the proposed wood fuel to energy project.
- **11/1, Springfield Water and Sewer Commission, Springfield:** MassDEP conducted a pre-application meeting with the Commission and its consultants regarding the feasibility of utilizing sewage sludge to feed an anaerobic digestion facility located at the wastewater treatment plant.
- **11/19, Joint DPU, MassDEP, DOER Meeting:** An interagency meeting was held to discuss the Roberts Energy Renewables LLC proposal for a wood to energy power plant.
- **11/13, Hull Forest Products LP, Williamsburg:** MassDEP issued a Unilateral Administrative Order to Hull Forest Products LP, owner of the site at 103 Briar Hill Road for wetlands and water quality violations at an active solar construction site which impacted the West Branch of the Mill River.

- **11/13, Dynamic Energy Solutions LLC, Williamsburg:** MassDEP issued a Unilateral Administrative Order to Dynamic Energy Solutions LLC , developer and site contractor for wetlands and water quality violations at an active solar construction site which impacted the West Branch of the Mill River.

- **11/14, TTC Energy, Windsor:** MassDEP staff met with Tim Crane of TTC Energy. TTC Energy is proposing to develop a wood chip drying facility in Windsor. The facility would take in green wood chips and dry them using a steam loop from a wood chip fired boiler. TTC Energy anticipated submitting an application before the end of 2018.

Northeast Region 2018 CERP Summary

- **5/16 - Hamilton Landfill, Hamilton (NERO):** BAW Solid Waste approved the Closure Certification Report for closure of the Hamilton Landfill located in Hamilton. The application included certification that the construction of the 12.7-acre landfill cap was completed in accordance with the design and specifications approved by MassDEP in 2013. The approval states that the landfill is deemed closed pursuant to the Solid Waste Regulations. The decision also includes approval of a post-closure monitoring and maintenance plan for the landfill. In a separate application, the Town and Ameresco, Inc. have proposed the installation of a 930.24 kW solar photovoltaic power generating facility on a 3.1-acre portion of the landfill.
- **7/12 - Hamilton Landfill, Hamilton (NERO):** The BAW Solid Waste Section issued a Post-Closure Use Permit to the Town of Hamilton, approving a proposed 930 kW (DC) solar photovoltaic power generating facility on a 3.1-acre portion of the closed Hamilton Landfill located in Hamilton. Capping of the landfill was completed in 2016. Subject to conditions set forth in the approval, the proposed solar facility will be constructed on the landfill and connected to the National Grid utility grid. The Town has entered into an agreement with Chebacco Road Solar PV, LLC (Ameresco, Inc.) for installation and operation of the solar facility. Construction is expected to begin in 2018.
- **7/13 - Chelmsford Landfill -- BWC Stony Brook LLC, Chelmsford (NERO):** The BAW Solid Waste Section issued a Post-Closure Use Permit to BWC Stony Brook, LLC (Blue Wave Solar), approving a

proposed 1.3 Megawatt (DC) solar photovoltaic power generating facility on a 6.8-acre portion of the closed Chelmsford Landfill located at 40 Swain Road in Chelmsford. Capping of the landfill was completed in 1991. Subject to conditions set forth in the approval, the proposed solar facility will be constructed on the western area of the landfill and connected to the National Grid utility grid. Prior to construction of the solar facility, the Town will complete repairs to the landfill cap, including removal of woody vegetation and restoring areas of differential settlement. Construction is expected to begin in 2018.

- **7/26 - Crow Lane Landfill, Newburyport (NERO):** The BAW Solid Waste Section held a pre-application meeting with representatives of Blue Wave Capital to discuss the proposed installation of a solar photovoltaic power generating facility on a portion of the Crow Lane Landfill located in Newburyport. NERO BAW anticipates additional discussion with the solar developer and landfill owner as the application for a post-closure use permit is prepared.
- **9/13 - Town of Chelmsford, Chelmsford Landfill (NERO)**: BAW Solid Waste issued a conditional approval to the Town of Chelmsford for the proposed repair of the final cover system of the closed Chelmsford Landfill located off Swain Road in Chelmsford. The Town will remove areas of woody vegetation growth and restore localized areas of minor differential settlement on the landfill cap. Following completion of the repairs, the approval requires a third-party inspection of the Landfill and submittal of a certification report. Pursuant to a separate post-closure use permit issued in July 2018, BlueWave Solar will install a solar photovoltaic power generating facility on the western area of the Landfill following restoration of the cap.
- **10/3 - Brimbal Avenue Landfill, Beverly (NERO):** BAW Solid Waste issued a conditional approval to BWC Rams Horn Channel, LLC (BlueWave Solar) which permits the installation and operation of a 4.9-megawatt (MW) solar photovoltaic power generating facility on the closed Brimbal Avenue Landfill, located off of Otis Road in Beverly. The City of Beverly owns the landfill; BWC will install and operate the solar facility. Subject to conditions set forth in the approval, the proposed solar facility will be constructed on a 20-acre portion of the landfill and will be connected to the National Grid electric utility grid. The approved design also includes construction of a roadway across the landfill to provide access to the solar facility and to landlocked property located adjacent to the landfill. The landfill was previously capped in 1999 and certified closed pursuant to the Solid Waste Regulations in 2008. BWC will maintain the area of the landfill inside the fenced solar facility, and the City will continue to perform routine environmental monitoring at the site. Construction is expected to begin in late 2018 or early 2019.

Southeast Region 2018 CERP Summary

- **5/17 - Town Landfill, Hull (SERO):** BAW Solid Waste staff met with the Town of Hull and their consulting engineer to discuss the status of the Town's municipal solid waste landfill, which is currently operating and partially capped. The Town intends to cease operations by January 2022. MassDEP provided guidance regarding physical and environmental assessment and final closure of the landfill. MassDEP also discussed the permitting pathway for several potential post-closure uses of the landfill being considered by the Town including boat storage, a photovoltaic array, and/or high power energy storage using battery stacks.
- **6/26 - SMART Program Solar Opportunities for Cranberry Industry Workshop, Plymouth (SERO):** Southeast's Regional Director, BWR Boston's Director of the Wetlands and Wastewater Program and Boston Wetlands Staff attended the SMART workshop sponsored by the Cape Cod Cranberry Growers Association (CCCGA). This Workshop was designed to help growers better understand the new Massachusetts DOER SMART program for the installation of solar arrays on and near agricultural lands. MA DOER showcased the SMART Program and what it's all about, including agricultural guidelines for cranberries; MDAR discussed their recent guidance titled Solar Massachusetts Renewable Target Program (225 CMR 20.00) as well as compliance assistance service

and possible programs/grants. MassDEP focused on the intersection of the Wetlands Protection Act and energy related policy, guidelines and general direction on evaluating floating solar proposals on wetland resources. Other presenters included solar development companies who expanded on site evaluation practices, timelines, lease/purchase agreement structuring, utility company representatives who described the interconnection process and demand opportunities, growers who discussed current crop growing/marketing first-hand experience and their interest in solar projects on agricultural lands, and finally conservation agents expressing their local level experience regarding solar proposals.

- **7/25 - Future Generation Wind Turbines, Plymouth (SERO):** At the request of the towns of Bourne and Plymouth, MassDEP reviewed the results of a sound monitoring report prepared by Tech Environmental on behalf of Con Edison pursuant to permitting requirements by the Town of Plymouth. SERO's BAW DRD and C&E Chief will meet with Plymouth's Director of Inspectional Services to discuss MassDEP's findings. Residents in the community of Bourne have expressed and filed a large volume of noise-related complaints over the years with MassDEP Boston and SERO staff.
- **7/31 - Solar Project Pre-application Meeting, Carver, Norton and Rochester (SERO):** Southeast's Regional Director and BWR Deputy Regional Director and Wetlands & Waterways Director met with representatives from AD Makepeace and NextSun Energy to discuss several projects proposing to install solar panels in cranberry bogs to take advantage of the Commonwealth's DOER SMART Program. The projects propose SMART Program, credit eligible solar installations to create a "dual use" of cranberry bogs for food production and energy generation.
- **7/31 - Bay State Wind Offshore Wind Farm Project, Lakeville (SERO):** Southeast's Regional Director participated in a conference call with Orsted and its consultants to discuss recent optimization efforts and elements of the proposed Bay State Wind Project. The project proposes off-shore wind energy production in Southeastern Massachusetts and Rhode Island via installation of export cables and wind turbines.
- **9/5 - Town of Stoughton Landfill Solar Project, Stoughton (SERO):** BWR Solid Waste Program issued an approval for the installation and operation of a 1.2 megawatt DC photovoltaic array (PV) on the site of the Town of Stoughton Landfill (Landfill), located at 100 Page Street, Stoughton, MA. The project was proposed by Conroy Development and will involve the installation of 3,312 photovoltaic panels covering an area of approximately 3.25 acres on the previously operated 33 acre Landfill.
- **9/13 - Floating Solar Project Development, Rochester (SERO):** Deputy Regional Director for Bureau of Water Resources will meet with representatives from AD Makepeace to assist with project site selection and provide permitting guidance for several proposals to install floating solar arrays in agricultural reservoirs used for cranberry cultivation.
- **9/17 - Landfill Solar Project, Westport (SERO):** BAW Solid Waste Section issued an approval for the installation and operation of a 0.62 megawatt DC photovoltaic array (PV) on the site of the Town of Westport Landfill (Landfill), located at 72 Hix Bridge Road, Westport, MA. The project was proposed by the Town of Westport and will involve the installation of 1,728 photovoltaic panels covering an area of approximately 2.0 acres on the previously operated Landfill. The Landfill operated from the mid-1800s until its operations ceased in August 1998.
- **10/12 - Town of Wellfleet Landfill Solar Project, Wellfleet (SERO):** BAW Solid Waste section issued an approval for the installation and operation of a 0.90 megawatt DC photovoltaic array (PV) on the site of the Town of Wellfleet Landfill (Landfill), located at 370 Coles Neck Road, Wellfleet (Town). The project was proposed by the Town and will involve the installation of 2,448 photovoltaic panels covering an area of approximately 2.2 acres on the previously operated Landfill. The Landfill operated from 1938 until its operations ceased in 1992.
- **11/05 - New Bedford Anaerobic Digestion, New Bedford (SERO):** The City of New Bedford is proposing to solicit a third party operator to construct and operate an anaerobic digester for the digestion of WWTP sludge originating from the cities of New Bedford, Taunton and Brockton. MassDEP has determined that a major modification to the site assignment for the New Bedford solid

waste transfer station is required in order to locate the digester at that location. A pre-application meeting was held on 11/5/2018 with the City's consultants to review the site suitability criteria for the site assignment modification.

- **12/14 - Hingham Landfill, Hingham (SERO):** BAW's Solid Waste Section held a pre-application meeting with representatives of Omni Navitas Holdings, LLC and their consulting engineer to discuss the site specific conditions at the Town of Hingham landfill and the permitting process for MassDEP approval of installation of a photovoltaic (PV) array on the landfill. Omni Navitas Holdings, LLC is proposing to install a 0.428 megawatt DC PV array on part of the landfill final cover system in 2019. The closed and capped landfill is currently the site of a municipal solid waste transfer station located adjacent to the closed landfill and a town operated leaf and yard waste compost operation located above part of the final cover system, both of which will continue to operate when the PV array is installed.

Central Region 2018 CERP Summary

- **4/11 - National Grid's Municipal Energy Summit, at Holy Cross College in Worcester:** National Grid, in partnership with MassDEP and other state partners, hosted an energy efficiency summit for municipal drinking water and wastewater facilities. MassDEP's Michael DiBara presented its Clean Energy Results Program and Gap funding efforts to save facilities energy and reduce their operating costs. Over 40 municipal facility representatives from across Massachusetts attended and the event drew in nearly 100 attendees.
- The CERO wetlands section reviewed and issued 59 Orders of Conditions for solar projects potentially impacting wetland resources in 2018
- **11/14/18 Southbridge Landfill** submitted their Operating Permit application for review.
- **11/15/18 - Sutton Farm Anaerobic Digester1 LLC air plan approval** – An air permit for a farm anaerobic digester engine was approved to allow the Sutton Farm anaerobic digester project to generate electricity;
- **12/21/18 - Fitchburg-Westminster Landfill –** The landfill submitted a revision of their landfill gas to energy plan approval to the region for review. The revised approval now includes formaldehyde emission limits.
- **12/24/18 Sutton – Whittier Farms Anaerobic Digester Final RCC Permit –** A final RCC permit was issued for the Sutton-Whittier Farms anaerobic digester project.

Boston 2018 CERP Summary

- **1/3/18 - Meeting with DCAMM** on whether the state should continue to support exploration of the MCI Shirley anaerobic digester (AD) project. MassDEP recommended not pursuing the project given the changed landscape for AD in Massachusetts and the number of digesters now constructed or in the permitting process. There is no longer a need for a state-owned AD facility since the private sector has responded with a number of facilities with sufficient capacity.
- **1/30/18 – ECOS Clean Water State Revolving Fund webinar** featuring innovative projects funded in part through the Clean Water State Revolving Fund in Massachusetts, Idaho and Iowa. Massachusetts talked about the Greater Lawrence Sanitary District optimizing its anaerobic digestion facility by processing food waste for energy. This project supports a goal of creating a zero net energy wastewater facility.
- **3/15/18 – Food processor webinar with Madeline Snow and UMass Lowell** was a continuation of the Green Your Bottom Line workshops held across the state to provide information to the food and

beverage industry on the importance of conducting energy assessments and to provide and share information on energy conservation, water conservation and toxics reduction.

- **4/19/18 – The Gap II grant announcement event in Ware** was held as part of the Commonwealth's celebration of Earth Week. State environmental officials and area legislators announced the $4 million of Gap II grant funding for energy efficiency and renewable energy upgrades at 36 water and wastewater facilities. The upgrades will improve treatment efficiency, leverage Mass save® incentives, lower operating costs and cut greenhouse gas emissions.
- **5/4/18 – Briefing with Commissioner Suuberg regarding Greenfield AD proposal** – Greenfield is looking for assistance to construct a sludge digester at its wastewater treatment facility to operate as a regional sludge management facility, and held a meeting on site.
- **5/10/18 – Greenfield AD proposal – meeting with the Town in Greenfield** at which the town requested funding assistance with construction of a sludge digester at its wastewater treatment facility with a goal of operating as a regional facility to provide sludge management, which is getting increasingly expensive.
- **5/29/18 – ENERKEM – Meeting with project proponents** of a waste processing technology with a facility now operating in Edmonton, AB. The technology processes Municipal Solid Waste to extract alcohols for industrial use and other biofuels post-recycling. Next steps are for the proponent to locate a site and find off-takers for the products and then come back to MassDEP for permitting.
- **6/27/18 – Water Infrastructure Advisory Committee Meeting at EOEEA** to discuss potential funding for water infrastructure projects to address the infrastructure backlog and future needs.
- **7/9/18 – Worcester water supply and Upper Blackstone WWTP tours** with MassDEP summer interns to learn about how Worcester's water infrastructure is managed from drinking water reservoirs to treatment of wastewater.
- **8/8/18 – Groton Water Department site visit to verify Gap II project installation**. CERP staff visited the Groton Water Department to verify the installation of Groton's installation of variable speed pumps and electrical controls to their Whitney Well. This site visit is the first of the 36 Gap II grant projects to be constructed.
- **8/23/19 – Webinar on the Status of Recycling Solar Panels –** while no recycling infrastructure exists in the US at this time, the need for management of panels will start ramping up as older PV projects approach end-of-life and panels will need to be replaced.
- **10/3/18 – Attended Combined Heat and Power (CHP) session sponsored by Eversource** to promote CHP as a good energy alternative for certain businesses and industries that have a significant need for energy.
- **10/9/18 – Worcester Polytechnic Institute Students' Final Presentation on project.** WPI student team presented the final results for their MassDEP research project entitled "Addressing Vulnerabilities and Emergency Power Capacities in the Wastewater Sector of Massachusetts".
- **10/18/18 – Environmental Business Council (EBC) Energy Resources presentation with other state agencies –** CERP staff spoke about MassDEP efforts to promote energy efficiency and renewable energy at facilities that MassDEP regulates.
- **10/22/18 – Conference Call with AquaSight –** Presentation of AquaSight's smart wastewater management of the future platform for existing wastewater facilities.
- **10/23/18 – Central Massachusetts Business Environmental Network (CMBEN) Meeting in Worcester –** Presentations by Saint Gobain and other companies outlined the types of energy efficiency projects they have put in place followed by a short meeting with CMBEN to brainstorm best ways to spread the word on energy efficiency upgrades to other businesses.
- **11/2/18 – Vanguard Haverhill AD ribbon-cutting:** Commissioner Suuberg spoke at the ribbon cutting of the newest Vanguard farm digester at Crescent Farm in Haverhill.
- **11/14/18 - New Generation Wind Turbines, Plymouth:** BAW's DRD and C&E Chief attended a meeting with Plymouth's Director of Inspectional Services to discuss the review of supplemental data that Con Edison submitted in response to MassDEP's letter dated August 2, 2018. MassDEP's

letter provided comments to the Town of Plymouth following a review of the sound monitoring report required under the permitting process by Plymouth for the Future Generation Wind Turbines. In order to perform a compliance evaluation, BAW staff from the Southeast Regional Office, in conjunction with program staff in Boston, requested information in order to supplement the sound monitoring data and understand the details of the curtailment plan being implemented.

- **11/19/18 – Conference call follow-up with CMBEN and Wyman Gordon.** The call was a continuation of the conversation initiated at the CMBEN fall meeting.
- **01/09 (BWSC) Boston, CERP Project Proponent Meeting: MassDEP's CERP Director and** BWSC CERP staff met with Northern Reliability, an energy storage company from Waterbury, VT. Northern Reliability "provides off-the-shelf, customizable power and energy storage solutions for a variety of applications." Northern Reliability is interested in the storage opportunities at both existing and future utility-scale solar PV provided by contaminated/brownfield and landfill sites across Massachusetts in conjunction with DOER's new Solar Massachusetts Renewable Target (SMART) program. In addition, Northern Reliability is interested in storage opportunities that provide resiliency and cost savings to existing oil and/or hazardous materials release active remedial systems.
- **3/08 (BWSC) Boston, CERP Project Proponent Meeting:** BWSC CERP staff met with personnel from Cypress Creek Renewables (https://ccrenew.com/) a national provider of local solar solutions with over $2 billion raised and invested and over 5 gigawatts of local solar farms deployed or in development. Cypress Creek is interested in the acquisition and development of solar energy at contaminated/brownfield sites across Massachusetts under DOER's new Solar Massachusetts Renewable Target (SMART) program.
- **3/14 (BWSC) Boston, CERP Project Proponent Meeting**: BWSC CERP staff met with personnel from Soltage LLC (www.soltage.com). Soltage LLC harnesses "financial, technical, and operational expertise to create a business model to enable the engagement of a diverse pool of clients, investors and partners in the utilization of solar power." Soltage LLC is interested in the acquisition and development of solar energy at contaminated/brownfield sites across Massachusetts under DOER's new Solar Massachusetts Renewable Target (SMART) program.
- **4/25 (BWSC) Boston, CERP-Environmental Justice Community Solar**: Boston CERP and EJ staff met with representatives from Boston University (BU) to receive a report back on their efforts to develop legislation that encourages community shared solar in EJ communities. These efforts began through an Independent Research Project with BU students and MassDEP.
- **06/19 (BWSC) Newark, NJ, Brownfield Listings – Brightfields 2018, Powering Up Landfills, Greyfields & Brownfields with Solar Energy**: BWSC-CERP staff was an invited featured speaker at this one-day event hosted by Brownfield Listings of Chicago, IL focusing on the development of solar photovoltaics on Landfill and Brownfield properties for brownfield/landfill owners and renewable energy developers. MassDEP BWSC staff joined at the campus of the New Jersey Institute of Technology (NJIT) in Newark, New Jersey for one day of solar development informational programming and interactive activities. Two tracks of educational sessions in the morning, an engaging group lunch and an afternoon full of networking, market-making and on-site technical assistance ended the day. Municipal and state agencies, land owners and solar developers all participated in the conference.
- **10/15 (BWSC) Amherst, AEHS Soils, Sediments, Water and Energy Conference** – MassDEP's Bureau of Waste Site Cleanup (BWSC) sponsored development and participated in a 4-Hour workshop titled "**A View From Above: Environmental Monitoring and Surveillance Through Unmanned Aerial Vehicles (UAVs)".** The workshop highlighted the expanding use and application of UAV technology (a.k.a. "drones") throughout the environmental industry and included presentations on the technical, licensing and regulatory aspects of UAV flight including case studies on field mapping, environmental conceptual site model and clean energy infrastructure operation and maintenance.

- **05/07 (BWSC) Springfield, LSPA's Western Massachusetts May Membership Meeting –** Bureau of Waste Site Cleanup (BWSC) staff presented at this event hosted by the Licensed Site Professional Association (LSPA) Western Massachusetts Chapter. BWSC was part the evening program titled "Case Studies of Site Remediation Using Greener Cleanup Principles." The program addressed the MCP regulatory Greener Cleanup requirements and policy as well as illustrating those principles through the presentation of two case studies. The LSP Board of Registration certified the program for 1.0 hour of "DEP Course" regulatory continuing education credit.
- **06/13 (BWSC) Taunton, LSPA's June Membership Meeting –** Bureau of Waste Site Cleanup (BWSC) staff presented at this event hosted by the Licensed Site Professional Association (LSPA). BWSC was part of the evening program titled "Case Studies of Site Remediation Using Greener Cleanup Principles." The program addressed the MCP regulatory Greener Cleanup requirements and policy as well as illustrated those principles through the presentation of two case studies. The LSP Board of Registration certified the program for 1.0 hour of "DEP Course" regulatory continuing education credit.
- **10/16 (BWSC) Amherst, AEHS Soils, Sediments, Water and Energy Conference –** MassDEP's Bureau of Waste Site Cleanup (BWSC), The Boeing Company, DuPont and Norfolk Southern Corporation participated in a platform session titled "Organizational Drivers for Sustainable Remediation Panel" sponsored by the Sustainable Remediation Forum (SURF). The panel discussed the opportunities, the challenges, and the drivers that they have found to be successful in developing and implementing sustainable remediation programs within their organizations.

Summary of Goals for 2019

MassDEP will continue to work with DOER and MassCEC to pursue energy efficiency and renewable energy projects at facilities across the Commonwealth in 2019 as well as look for opportunities, such as with the food and beverage industry, to continue to expand our work to new categories of facilities.

- Implementation of Gap II Grant Program – Contract with each facility and verify implementation of energy efficiency or renewable energy measures and reimburse facility up to grant amount
- Continue to issue post-closure use permits for utility scale solar projects on old capped and closed landfills
- Continue to work with developers to install utility scale solar projects at contaminated land/brownfield sites and bring such sites back into productive use
- Continue to work with external stakeholders to explore sustainable community solar opportunities for Environmental Justice Communities where Low-Moderate Income and Contaminated Land/Brownfields intersect
- Continue to promote green and sustainable remediation practices including the deployment of energy efficiency measures and renewable energy technologies in site cleanup applications
- Continue to promote the application and installation of renewable thermal technologies/Ground-Source Heat Pumps for building heating and cooling and remedial process water qualifying under the Alternative Portfolio Standard (APS)
- Explore opportunities for deployment of climate change adaptation and resiliency measures inclusive of energy storage and standby power applications for remedial systems supported by the Energy Diversity Act and Governor Baker's Executive Order 569.
- Continue to improve compliance with the commercial organics waste ban through a combination of enforcement and technical assistance, driving more feedstock to anaerobic digestion facilities.

- Continue to work with development of anaerobic digester projects to provide infrastructure for managing diverted waste organics and generate clean energy
- Use every opportunity to work with partners, DOER and MassCEC, to encourage businesses and facilities that MassDEP regulates to consider conducting energy assessments and implementing energy efficiency measures and/or renewable power
- Assess resilient power options using the National Renewable Energy Lab's (NREL) REopt Lite Tool to road-test this tool at three treatment plants in order to determine the data entry and management requirements, and the results of this battery storage/screening tool. If the model is useful then CERP will expand it to other interested water and wastewater facilities.
- Complete implementation, contracting, verification and reimbursements for the MassCleanDiesel: Clean Markets Grant Program.
- Assist the Bureau of Air and Waste (BAW) with the Volkswagon Settlement Grants
- Follow up on the recommendations from the WPI Project on backup power capacity and in particular improving the database of emergency power capabilities at water and wastewater facilities.