CLEANENERGYRESULTS

Annual Report to the Massachusetts Department of Energy Resources

Covering January 1, 2020 – December 31, 2021

Town of Shrewsbury
59-kilowatt (kW) solar photovoltaic system Home Farm water treatment plant

2020-21

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 during calendar years 2020 and 2021, from January 1, 2020 – December 31, 2021. It is being provided to DOER 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.

MassDEP made significant progress in the Gap Energy Grant Program during the last two years. The Gap Energy Grant Program supports implementation of energy efficiency and clean energy upgrades to municipal drinking water and wastewater facilities by filling the funding Gap that is not covered by utility incentives and municipal budgets.

1. In 2020, as the agency shifted gears due to the COVID -19 Pandemic, the CERP staff worked remotely continuing to provide guidance and assistance to the Commonwealth's drinking water and wastewater facilities who were tasked with ensuring that critical services were provided to the residents of the Commonwealth.

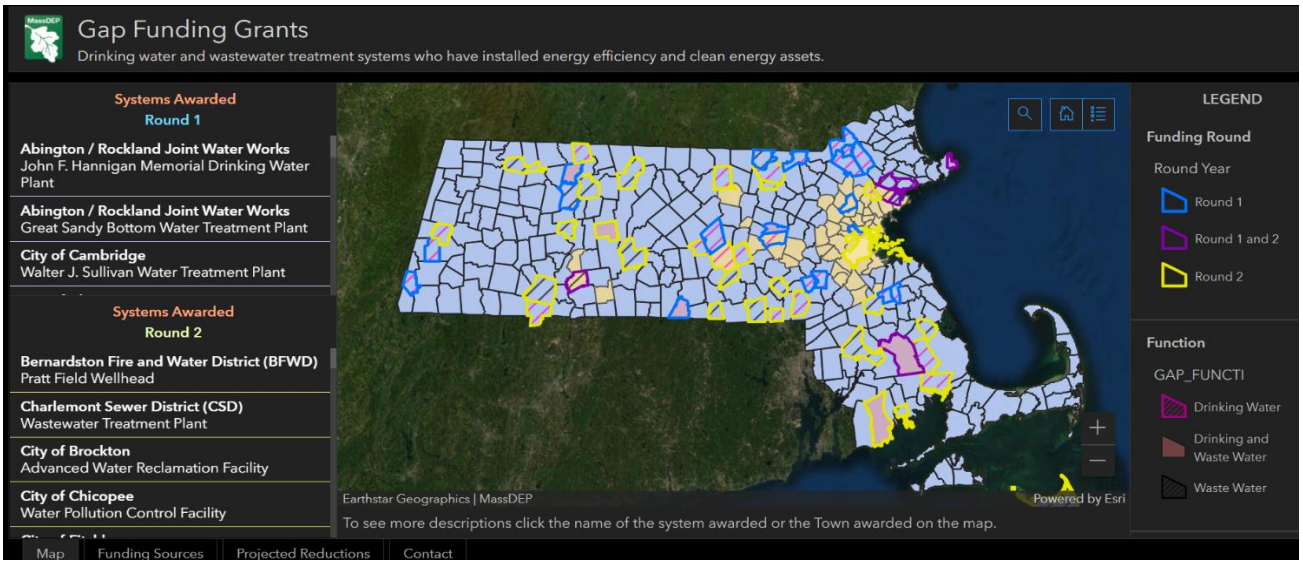
   In light of the State of Massachusetts' response to the COVID-19 pandemic emergency, and the Protocols put in place, MassDEP's CERP developed a COVID-19 Guidance to local communities and facilities to continue the timely processing and close-out of Gap II energy grant reimbursement requests. Generally, to verify completion of Gap II grant projects undertaken by drinking water and wastewater facilities, MassDEP staff would perform a site visit. In order to protect public health during the COVID-19 outbreak and ensure a quick turnaround of grant reimbursements to municipal facilities for project expenses already paid, this COVID-19 Guidance laid out the required steps that included written and photographic documentation of projects in the final report for communities to verify Gap II project completion and MassDEP's processing of grant reimbursements. MassDEP also offered the option of a remote visual verification for facilities. In 2020, MassDEP's CERP reviewed and processed a total of 12 community Gap II reimbursement requests totaling, $1,318,801.

2. On September 24, 2021, during Climate Week, Energy and Environmental Affairs Secretary Kathleen Theoharides and MassDEP Commissioner Martin Suuberg announced that the Massachusetts Department of Environmental Protection would allocate a new $5 million round of Gap III energy grant funding, in early 2022, that will help additional drinking water and wastewater treatment facilities construct more energy efficiency and clean energy projects across the Commonwealth (see: press release).

3. In December of 2021, MassDEP allocated an additional $2.5 million of grant funds to expand the upcoming 2022 Gap III energy round to two new sectors, agriculture and multifamily affordable housing that will now provide a total of $7.5 million of funding for constructing energy efficiency and clean energy generation projects in Massachusetts at:
   - Municipal Drinking Water and Wastewater Facilities,
   - Nonprofit Multifamily Affordable Housing Organizations,
   - Nonprofit Food Agricultural and Food Producing Organizations,
   - Small Businesses Engaged in Food Distribution and Processing.

This expansion of the Gap funding model will enhance MassDEP's statewide reach and partnership assistance to eligible small businesses, community-based nonprofit and cooperative organizations focused on affordable housing, agricultural or food services, particularly those serving environmental justice populations.

4. In 2021, MassDEP also created a new GIS based Gap energy story map that shows MassDEP's and its statewide partnership efforts and results in the drinking water and wastewater sectors, including highlights of grants made to support projects in specific communities. The interactive story map can be found here: https://www.mass.gov/info-details/massachusetts-gap-energy-grant-program



5. MassDEP's Gap Energy Grant funding model for drinking water and wastewater treatment facilities has earned attention nationally with invitations to work with the US Department of Energy and the Pacific Northwest National Laboratory that provided additional outreach opportunities and benefits for Massachusetts' energy and water partnership work.

MassDEP continued to assist with development of clean energy projects across Massachusetts, and in 2020 and 2021 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.

Detailed Program Updates

Anaerobic Digestion/Organics Diversion

In 2020, food waste diversion in Massachusetts increased from an estimated 100,000 tons annually prior to implementation of the waste ban, to 320,000 tons, an increase of more than 200%. In the 2030 Solid Waste Master Plan, MassDEP set a goal to increase annual food waste diversion to 780,000 tons by 2030. Massachusetts Organics Action Plan lays out MassDEP's programs and strategies to achieve this goal.

Recycling Loan Fund

MassDEP continues to support recycling market development through its grant and loan programs. In 2021, the Recycling Loan Fund provided a loan of $75,000 to the Rockwood AG-Grid project in Granville to grow their food de-packaging operation. In 2021, MassDEP also awarded two Recycling Business Development Grants to support organics diversion. MassDEP awarded a grant of $65,000 to Black Earth Compost for equipment to start a food composting operation in Groton, MA.

MassDEP also awarded a grant of $100,000 to RecyclingWorks Inc. in Braintree to expand their food and beverage de-packaging operation. For municipalities, the Recycling Dividends Program (RDP) grant provides annual funding to cities and towns that offer their residents curbside collection of organics, drop-off collection of organics at a municipal location or for those that distribute low-cost home composting bins. RDP funding can be utilized for organics

collection and processing, for development costs for a new organics diversion program and for purchase of home compost bins.

RecyclingWorks in Massachusetts
The RecyclingWorks in Massachusetts (RecyclingWorks) program provides free assistance to Massachusetts businesses and institutions on recycling and waste reduction programs. RecyclingWorks has made food waste diversion a program priority. The Fall 2020 WasteWise Forum focused on strategies to maximize food waste diversion from businesses and institutions. In FY20 and 21, RecyclingWorks provided direct technical assistance to 160 businesses to help reduce and divert food waste from disposal. The program also continued to update and expand web-based resources to provide guidance to businesses and institutions on how to divert food waste from disposal.

Commercial Organics Waste Ban Compliance and Enforcement
MassDEP also continues to conduct inspections and issue enforcement relative to the commercial organics waste disposal ban, which bans the disposal of food materials from any business that disposes of 1 ton or more per week. In 2020 and 2021, MassDEP issued 12 notices of non-compliance and 1 administrative consent order with penalty for disposal of food waste. These totals are lower than prior years as MassDEP reduced waste ban inspections for health and safety reasons during the COVID 19 pandemic.

Anaerobic Digestion Facilities
Anaerobic digestion facilities in Massachusetts accept and digest food waste, often with agricultural materials, manure from dairy cows, and at wastewater treatment facilities to generate renewable energy. This energy can be used on site, and excess energy can be sent back into the grid. Facilities include:

- Barstow Farm in Hadley – 800 megawatts from two generators
- Barway Farm in Deerfield – 1 megawatt generator
- Belden Farm in Hadley – 335 kilowatts generators
- Crapo Hill Landfill in New Bedford – digester generates gas added to the landfill gas to energy system
- Crescent Farm in Haverhill – 1.0 megawatt generator
- Greater Lawrence Sanitary District – gas from food waste has enabled the wastewater treatment plant to be a “net-zero” energy facility, as well as providing 3.2 megawatts of combined heat and backup power in the event of a power outage
- Jordan Farm in Rutland – two generators produce 800 kilowatts
- Jordan Farm in Spencer – 1 megawatt generator
- Rockwood Ag Grid in Granville – 480 kilowatt generator installed with a 250 kilowatt generator to be added
- Stop and Shop digester in Freetown – 1.1 megawatt generator that powers the distribution center and provides backup power

Clean Energy at Drinking Water and Wastewater Utilities

Gap Energy Grant Program Project Results for 2020-2021 and Expansion and National Visibility in 2021
MassDEP, in collaboration with the Executive Office of Energy and Environmental Affairs, made significant progress in expanding the reach and on-going success of the Massachusetts Gap Energy Grant Program.

In 2020, MassDEP made it a priority to keep its Gap II energy grant reimbursements flowing to the communities during the COVID-19 Pandemic. Since the ongoing pandemic had an impact

on local fiscal revenues, MassDEP developed and implemented COVID-19 Guidance to ensure the timely review of projects and grant disbursements to communities. The following twelve[1] facilities (11 in 2020 and 1 in 2021) completed their efficiency or clean energy generation projects and received their grant reimbursement payments, totaling $1,518,801.

In 2020 the following facilities received reimbursements:

Charlemont Sewer District	$ 45,000
City of Chicopee	$ 200,000
Town of Dartmouth	$ 50,132
Town of Hatfield	$ 200,000
Town of Lenox	$ 98,542
North Carver Water District	$ 58,230
Town of Orange	$ 200,000
Town of Shrewsbury	$ 200,000
Town of Southwick	$ 40,546
Wareham Fire District	$ 200,000
Town of Webster	$ 26,351

In 2021, the City of Fitchburg received its $200,000 Gap Grant award after completing its inline hydropower project.

Gap Energy Grant Program Expansion
(see: press release).

In 2021, MassDEP allocated $7.5 million to the Gap Energy Grant Program which, combined with additional energy funding sources (such as Mass Save® and others), will jump-start more cost-effective, energy saving projects across the Commonwealth. This targeted effort will reduce the long-term carbon footprints of more facilities and buildings that will help the Commonwealth meet its 2030 emissions reduction goals.

National Visibility in 2021
MassDEP's Gap energy grant funding model for drinking water and wastewater treatment facilities earned attention and visibility nationally with the US Department of Energy and the Pacific Northwest National Laboratory.

In April 2021, a virtual national workshop titled "Coordination and Planning for Water and Power System Resilience" was held that brought together invited representatives from water, wastewater, and electric utilities; government organizations; water and electricity based professional associations; consulting firms; and research organizations to explore water and power system interdependencies and resilience. The workshop, organized by Pacific Northwest National Laboratory (PNNL) and funded by the United States Department of Energy (US DOE) Water-Power Technologies Office (WPTO), explored a vision for coordinated and resilient water and electric utilities of the future, and identified barriers and strategies for increased coordination and integrated planning between water and power utilities. Workshop participants suggested next steps and areas where federal research and support would be beneficial.

MassDEP's Clean Energy Results Program lead for the water sector, Mike DiBara, was one of four invited panelists who participated in national Solutions Panel on day #2 of the workshop. At

[1] In January 2020, prior to the Governor's declaration of the COVID pandemic in March, the town of Millbury completed its project installation and received its full Gap Grant reimbursement. Included with projects completed during the COVID pandemic period, 13 projects in total were completed in 2020-2021.

the workshop, panelist shared positive examples of water-power resilience and integration. In addition to a presentation on the Gap Grant funding model, these states from around the country gave highlights of their programs. These working state project examples were highlighted as a resource that could be emulated around the country:

- **Central Arizona Project (CAP)**, which delivers Colorado River water to 80% of Arizona's population through large CAP water pumping stations can coordinate with grid operations, reducing costs and improving reliability. Due to excess reservoir capacity, during the February 2021 Texas freeze, CAP was able to curtail and shift significant pumping loads from February to March and April, which saved CAP an estimated $2.2 million in electricity costs by avoiding pumping at times of extremely high market prices.

- **DC Water and Constellation Energy** enjoy a win-win contractual arrangement where Constellation operates a biogas power and steam plant on DC Water property. DC water also has an innovative thermal hydrolysis process (THP) they use to develop biogas and biosolids that they sell on the market. Heat from wastewater collection pipes is used to heat DC Water's headquarters building.

- **St. Cloud, Minnesota** described how their facility has achieved 92% energy self-sufficiency at their wastewater treatment plant and saves approximately $500,000 per year in energy costs. Their journey started with an energy neutrality goal and tracking their energy use and trends. It grew into a phased program that includes energy efficiency, solar power generation, advanced treatment of biosolids, biogas storage, and biogas power generation.

US DOE and PNNL - National Integrated Water-Power Resiliency

As a follow-up to the workshop in April 2021, The Pacific Northwest National Laboratory expressed interest in conducting a more comprehensive analysis of the Massachusetts Gap energy program.

As a result, the US DOE in conjunction with Pacific Northwest Laboratory is now conducting a focused cost-benefit analysis and case study of all the 67 Gap I and II grant funded energy-saving projects at no cost to the Commonwealth. This project is analyzing dollar investments, energy reductions, cost savings as well the benefits to the power grid operations and overall resilience.

This national project will:

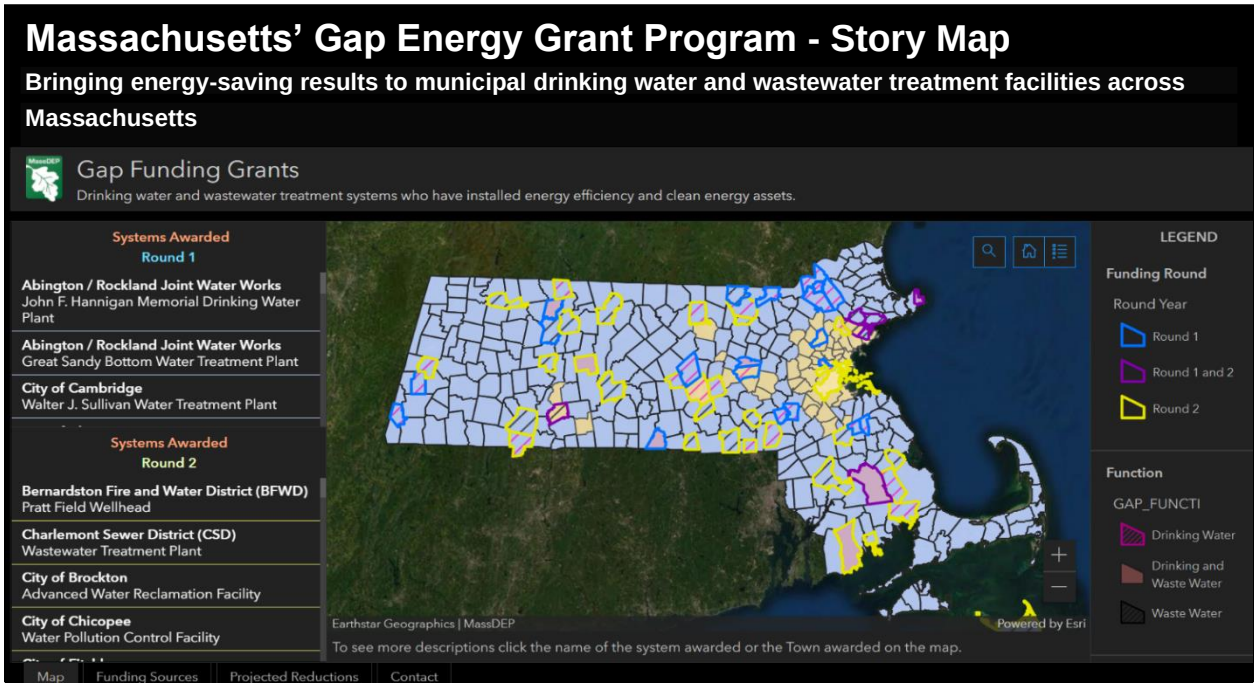
> *Evaluate the cumulative economic, environmental, and resilience impacts of the Gap Grant energy upgrades (67 project sites) on the ISO-New England power grid operations and individual water and wastewater facilities (since these municipal facilities are operating more efficiently and some facilities are generating clean energy on-site).*

A project kickoff meeting was held with 33 participants, including municipal water and wastewater operators and managers, National Grid, and project consultants. More information on the progress of this project will be highlighted in our 2022 annual report.

In December 2021, at the request of the Pacific Northwest National Laboratory and US DOE, MassDEP's Clean Energy Results Program and MA DOER met with the National Association of State Energy Office (NASEO) officials to present the Massachusetts Gap Energy Grant Funding Model. The PNNL, US DOE, and NASEO were interested in providing national outreach, in advance of the new infrastructure funding law, to make sure state energy offices are aware of this Massachusetts model in case they can learn from it and implement multi-benefit water-energy projects in their own states.

In October of 2021, the CERP Team worked in collaboration with MassDEP's GIS team to create a new GIS Gap energy story map https://www.mass.gov/info-details/massachusetts-gap-energy-grant-program This story map consists of seven tabs that present interactive maps, dashboards, photographs, and project press and articles that describe the efforts by MassDEP and its partners to reduce energy costs and greenhouse gas emissions at Massachusetts' drinking water and wastewater treatment facilities.

Captured below is the 4th tab "Gap Round II Results" in the story map, which allows a viewer to access the project description, costs, energy savings, greenhouse gas emission reductions, and a photograph of the 67 Gap-funded grant projects in Gap Rounds I and II.

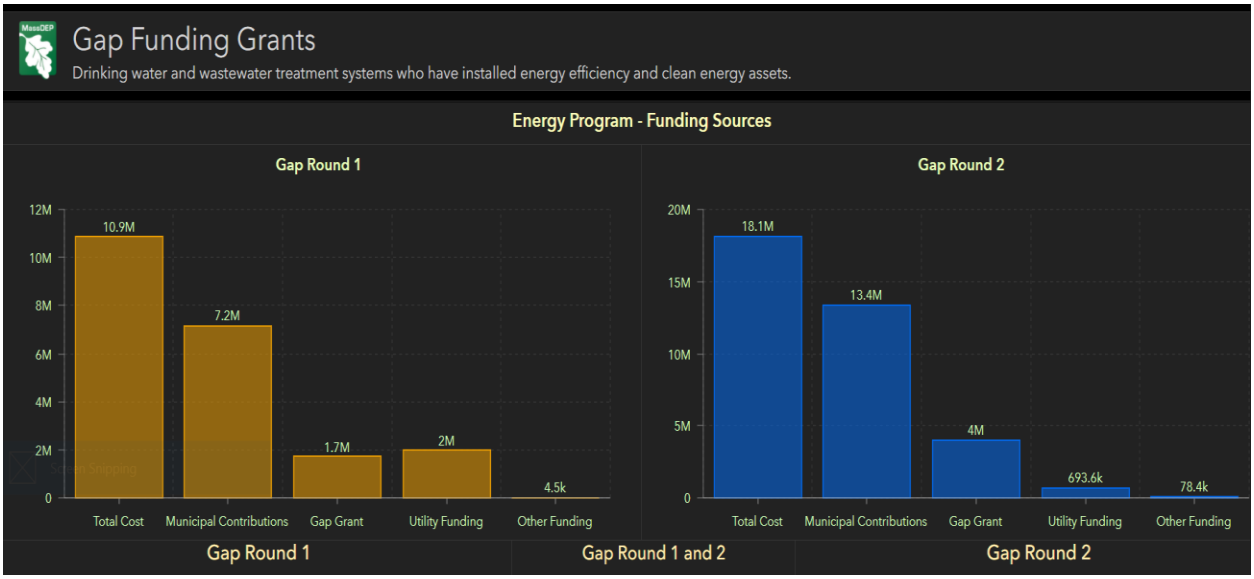


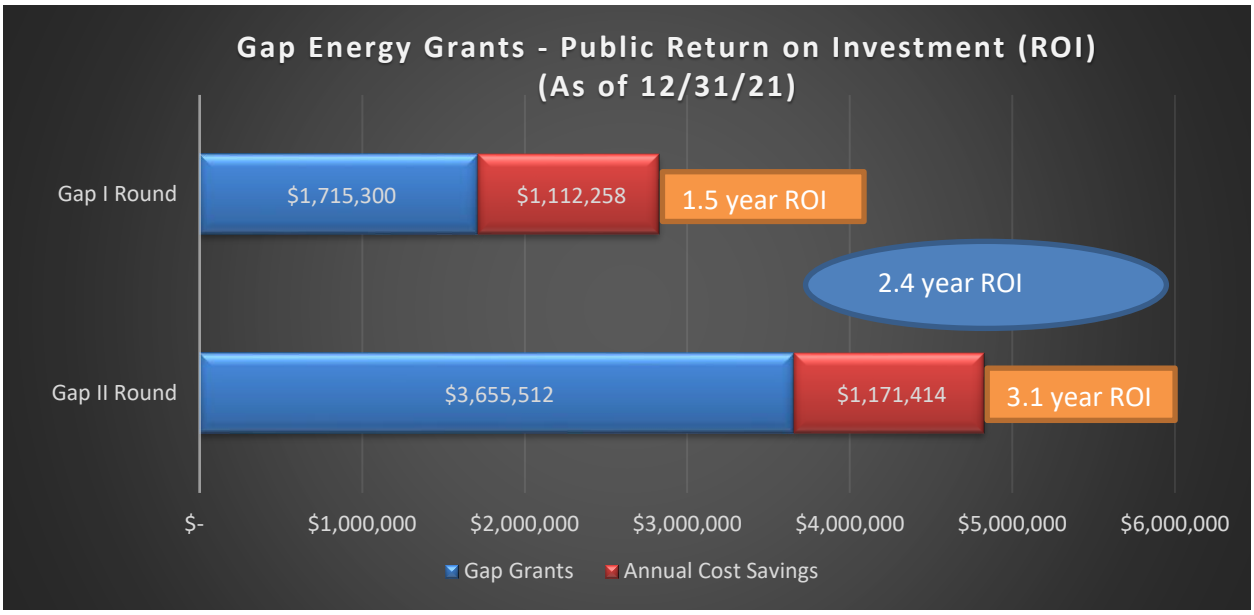
In 2020 - 2021, a total of 13 drinking water and wastewater treatment facilities across the state completed the construction of their Gap II energy-saving projects and are fully operational.

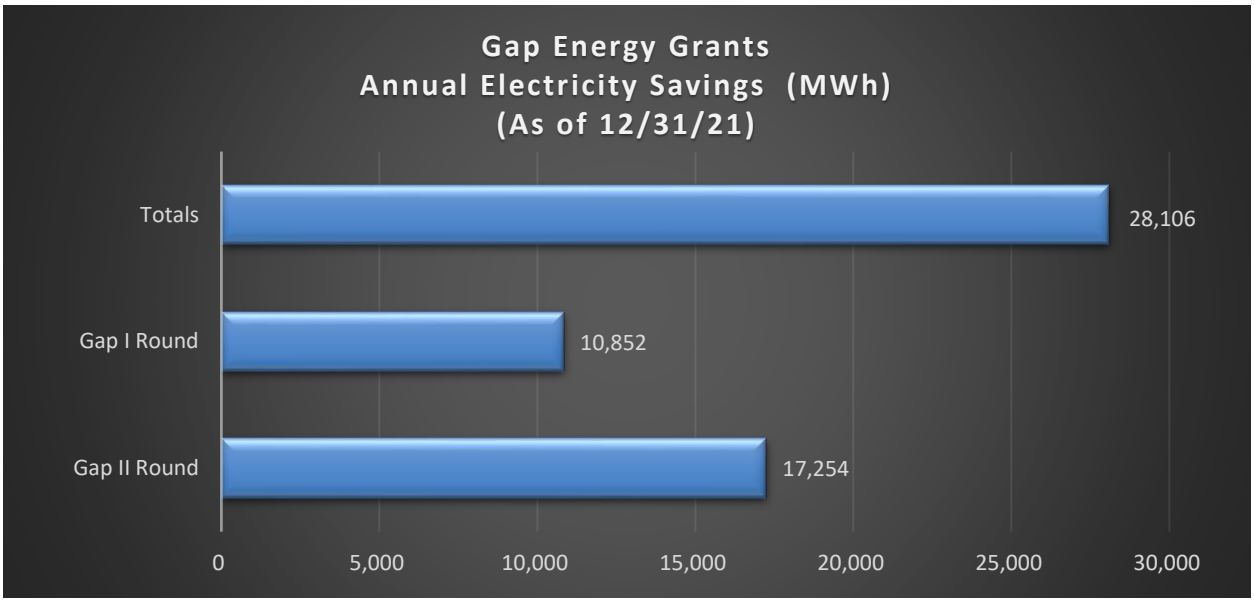
These grants jump-started nearly $5 million of new energy efficiency and clean energy construction activities that are saving these 13 facilities over $372,000 annually, reducing their energy consumption by 2,291 megawatt hours and CO_2 equivalent emissions by 672 metric tons annually. Additional project details are provided on pages 12-17.

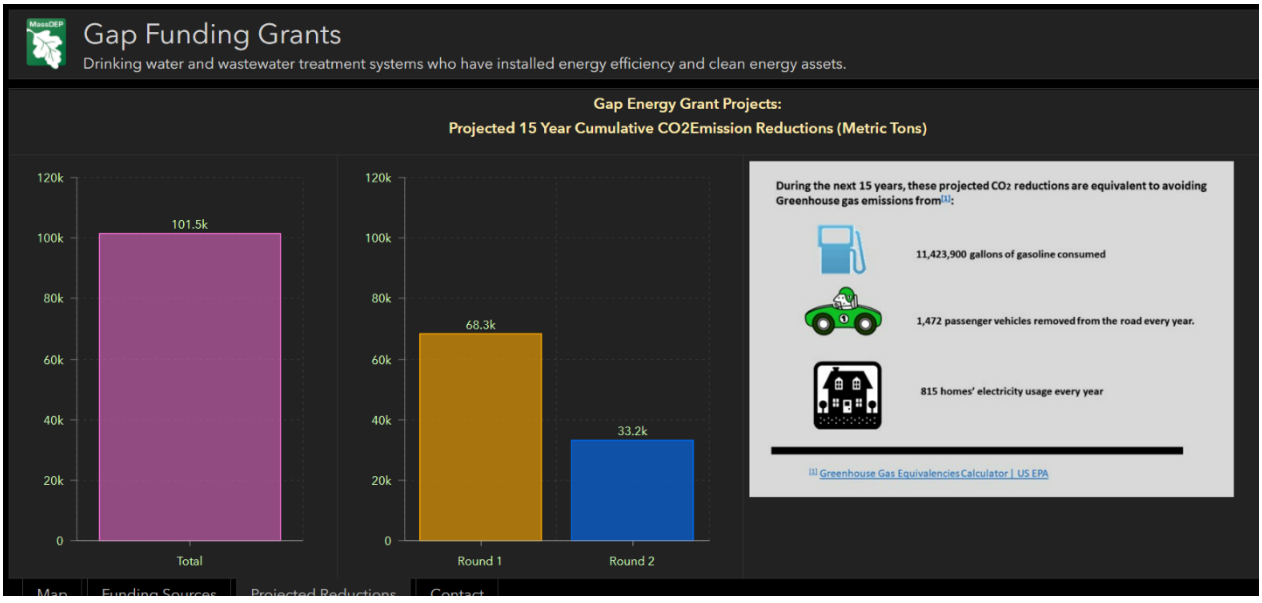
The completion of these 13 Gap grant projects now brings the cumulative Gap grant program total to 68 Gap I and II energy-saving projects constructed and fully operational at 34 treatment facilities across the Commonwealth (16 drinking water and 18 wastewater facilities).

The cumulative summaries of the Gap I and Gap II program results, as of December 31, 2021, are shown in the graphs below.









These projects will strengthen our clean water infrastructure, improve its reliability and resilience, reduce the use of fossil fuels, and allow energy savings to be reinvested back into municipal water operations.

Gap II Projects Summaries

The following Gap II energy-saving projects were completed in 2020 and 2021 resulting in a strong public return on investment for facilities and the Commonwealth. These cost-effective investments address needed work and efficiency upgrades on aging drinking water and wastewater infrastructure, while reducing the carbon footprint of the treatment plants and pumping stations.

Charlemont Sewer District: Wastewater

Project: Installation of a 11.7-kilowatt solar photovoltaic system at the wastewater treatment plant.

Results: The District achieved 'Net-Zero' energy status – generating enough clean renewable power to cover the plant's total annual electric demand.

Press Article: https://www.recorder.com/charlemont-solar-panel-project-generates-clean-energy-36145862

Total Project Costs:	$ 51,400
Less: Gap II Grant Award:	$ 45,000
Charlemont Sewer District (cost share amount):	**$ 6,400**
Annual Cost Savings:	**$ 2,100**
Annual Electricity Savings:	**13,000 kWh**

11.7-kilowatt rooftop solar array

City of Chicopee: Wastewater

Project: Replacement of two impellers and installation of variable frequency drives (VFDs) on two aerators. Installation of a second dissolved oxygen probe in the aeration basin and system control upgrades to automate aerator speed control.

Results: *Project will result in annual cost savings of $32,250 and 295,650 kWh / year and provide better oxygen transfer for sludge treatment to reduce disposal costs.*

Press Article: https://www.chicopeema.gov/DocumentCenter/View/10639/Chicopee-GAP-Grant-Project-Summary?bidId=

Total Project Costs:	$ 331,900
Less Gap II Grant Award:	$ 200,000
Chicopee Light & Power Incentive:	$ 50,000
Subtotal:	*$ 250,000*
City of Chicopee (cost share amount):	**$ 81,900**
Annual Cost Savings:	**$ 32,500**
Annual Electricity Savings:	**295,650 kWh**

Aerator with new controls

Town of Dartmouth: Drinking Water and Wastewater

Project: Performed 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 three emergency generator block heaters at the wastewater treatment plant.

Results: *Leveraged $138,917 of Eversource utility incentive funds with $107,057 of MassDEP's Gap energy grant funds to produce a 1.7-year project payback.*

Total Project Costs:	$ 389,329
Less Gap II Grant Award:	$ 107,057
Eversource Incentive:	$ 138,917
Subtotal:	*$ 245,974*
Town Dartmouth (cost share amount):	**$ 143,355**
Annual Cost Savings:	**$ 83,509**
Annual Electricity Savings:	**460,675 kWh**

Heat pump for emergency generator

City of Fitchburg: Drinking Water

Project: Replaced the existing drinking water pressure reducing valve at Narrows Road with a 10-kW hydroelectric "Pump as Turbine" (PAT) generation system.

Results: *Leveraged $78,357 of MassCEC's grant funds with $200,000 of MassDEP's Gap Energy grant funds to produce cost savings of $10,203 and 65,297 kWh/ year.*

Press Article: https://www.sentinelandenterprise.com/2021/05/18/fitchburg-installs-hydro-turbine-at-narrows-road-water-station/

Total Project Costs:	$ 362,481
Less Gap II Grant Award:	$ 200,000
Less MassCEC grant:	$ 78,357
Subtotal:	*$ 278,357*
City of Fitchburg (cost share amount):	**$ 82,124**
Annual Cost Savings:	**$ 10,203**
Annual Electricity Savings:	**65,297 kWh**

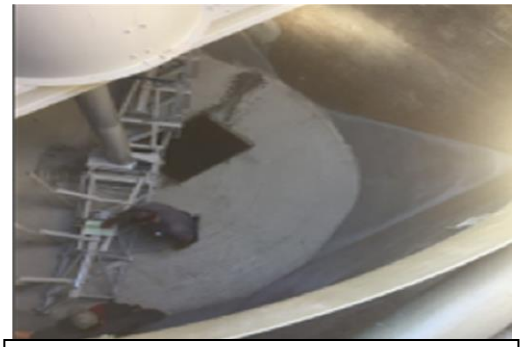
10-kW hydropower pump as turbine

Town of Hatfield: Wastewater

Project: Performed 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.

Results: *Increased plant efficiency of sludge solids processing and produced energy cost savings of $33,000 and 217,861 kWh / year.*

Total Project Costs:	$ 480,000
Less Gap II Grant Award:	$ 200,000
Town of Hatfield (cost share amount):	**$ 280,000**
Annual Cost Savings:	**$ 32,679**
Annual Electricity Savings:	**217,861 kWh**



New gravity thickener mechanism

Town of Lenox: Drinking Water

Project: Installed a variable speed drive to a low-lift pump at the Root Reservoir water treatment plant; and installed new solar-powered mixers to the Lower and Upper Root Reservoirs.

Results: *Energy cost savings of $56,221 and 443,093 kWh / year, while improving mixing of the raw water source.*

Press Article: https://www.berkshireeagle.com/archives/lenox-better-at-going-with-the-flow-using-new-pump/article_c39e883c-ff0d-5e33-b636-08caf5b8981b.html

Total Project Costs:	$ 123,242
Less Gap II Grant Award:	$ 98,542
Eversource Incentive:	$ 2,200
Subtotal:	$ 100,742
Town of Lenox (cost share amount):	**$ 22,500**
Annual Cost Savings:	**$ 56,221**
Annual Electricity Savings:	**443,093 kWh**

Solar-powered mixer in Root Reservoir

Town of Millbury: Wastewater

Project: Installed a 25-kW solar photovoltaic carport system and a 1.5-ton air source heat pump to the DPW office / sewer building.

Results: *Achieved energy cost savings of $17,500 and 32,410 kWh of clean energy generation / year; lifetime projected cost savings of $238,600 over the life of the solar array.*

Press Article: https://www.millburysutton.com/news/20200128/millbury-completes-first-municipal-solar-project

Total Project Costs:	$ 161,604
Less Gap II Grant Award:	$ 145,444
Town of Millbury (cost share amount):	**$ 16,160**
Annual Cost Savings:	**$ 17,541**
Annual Electricity Savings:	**32,408 kWh**

25-kW solar PV carport

North Carver Water District: Drinking Water

Project: Replaced the existing oversized 350 kW propane Pleasant Street emergency generator with a 125 kW generator at the plant.

Results: *Energy cost savings of $10,800 and 3,280 gallons of propane fuel savings / year.*

Total Project Costs:	$ 341,800
Less Gap II Grant Award:	$ 83,295
Town of Carver (cost share amount):	**$ 250,505**
Annual Cost Savings:	**$ 10,800**
Annual Propane Fuel Savings:	**3,280 gallons**

New 125-kW propane generator

Town of Orange: Wastewater

Project: Replaced the existing two 50 HP aeration blowers with energy efficient 35 HP mixer / blowers.

Results: *Energy cost savings of $11,655 and 77,701 kWh / year*

Total Project Costs:	$ 345,018
Less Gap II Grant Award:	$ 200,000
Town of Orange (cost share amount):	**$ 145,018**
Annual Cost Savings:	**$ 11,655**
Annual Electricity Savings:	**77,701 kWh**

New aeration blowers and controls

Town of Shrewsbury: Drinking Water

Project: Installed a 59-kW solar photovoltaic system (ground mounted) to the Home Farm water treatment plant. *Project savings of $10,956 and 75,581 kWh of clean energy generation / year.*

Results: *Achieved a 2.5-year payback with energy cost savings of $10,956 and 75,581 kWh of clean energy generation / year; lifetime projected cost savings of $153,384 over the life of the solar array.*

Press Article: https://patch.com/massachusetts/shrewsbury/shrewsbury-completes-solar-array-home-farm-water-treatment-plant

Total Project Costs:	$ 227,525
Less Gap II Grant Award:	$ 200,000
Town of Shrewsbury (cost share amount):	**$ 27,525**
Annual Cost Savings:	**$ 10,956**
Annual Electricity Savings:	**75,581 kWh**

59 kW solar PV array

Town of Southwick: Drinking Water

Project: Decommissioning the existing, older two pump stations on College Highway and North Longyard Road with 4 pumps and replacing them with a single, new larger and energy-efficient pumping station with 3 pumps on Jarry Drive in Southwick.

Results: *Reduce pumping electricity by 45% and achieve energy cost savings of $3,700 / year.*

Total Project Costs:	$ 1,488,000
Less Gap II Grant Award:	$ 40,546
Town of Southwick (cost share amount):	**$ 1,447,454**
Annual Cost Savings:	**$ 3,700**
Annual Electricity Savings:	**14,800 kWh**

New Jarry Drive PS pumps and controls

Wareham Fire District: Drinking Water

Project: Installed a 84.3 kW ground-mounted solar photovoltaic system at the Maple Springs Water Purification Plant.

Results: *Achieved a 4.9-year payback with energy cost savings of $16,500 and 101,300 kWh of clean energy generation / year; lifetime projected cost savings of $231,000 over the life of the solar array.*

Press Article: https://wareham.theweektoday.com/affiliate-post/pv-solar-installed-new-water-treatment-plant/497

Total Project Costs:	$ 291,816
Less Gap II Grant Award:	$ 200,000
Wareham Fire District (cost share amount):	**$ 91,816**
Annual Cost Savings:	**$ 16,500**
Annual Electricity Savings:	**101,300 kWh**

84.3 kW solar PV array

Town of Webster: Wastewater

Project: Refurbished 3 Return Activated Sludge (RAS) pumps at the wastewater treatment facility.

Results: *A 57% reduction in pump electricity use (78,652 kWh); annual energy cost savings of $10,225; and a 1.1-year payback for the town.*

Press Article: https://www.webster-ma.gov/DocumentCenter/View/9360/RAS-Refurb-Press-release

Total Project Costs:	$ 60,491
Less Gap II Grant Award:	$ 26,351
National Grid Incentive:	$ 23,100
Subtotal:	$ 49,451
Town of Webster (cost share amount)	**$ 11,040**
Annual Cost Savings:	**$ 10,225**
Simple Payback	**2.5 years**
Annual Electricity Savings:	**78,652 kWh**

Rebuilt Return Activated Sludge Pump

CERP Activities in 2020 and 2021 to Promote Innovative Energy Technology

HEET's GeoGrid (cc)[2]: Learning from the Ground up – Installations, Evaluation and Research

In 2020, MassDEP was part of a collaborative team and research effort (https://heet.org/geogrid/) that will help to evaluate the results of Massachusetts' first utility-scale geothermal pilot project in Eversource's natural gas territory.

The Home Energy Efficiency Team (HEET) has convened a multi-disciplinary team, that includes MIT, Harvard University C-Change Institute, Lawrence Berkley National Laboratory, MassDEP, and other partners, to provide a robust design review process, stakeholder engagement, data design and collection, as well as evaluation and research in system impacts and co-benefits results of Massachusetts' first utility-scale geothermal pilot project. This effort is intended to maximize the transparency of process and outcomes and the positive impact of these pilots for decision makers, researchers, and the public.

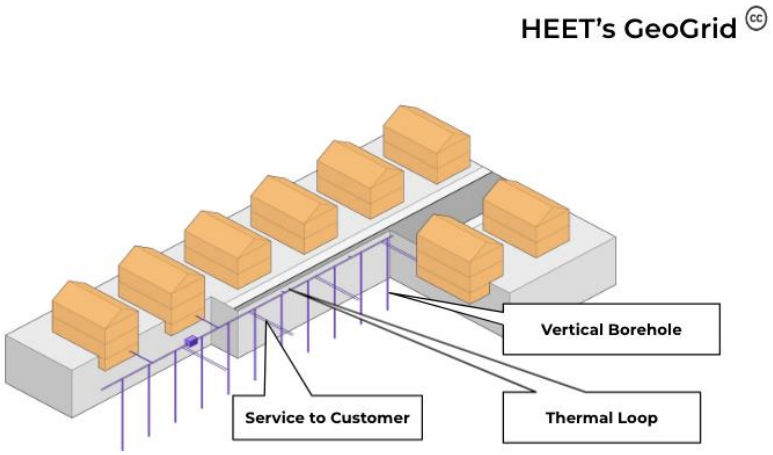
As part of this effort, MassDEP will be:

1. providing technical and regulatory assistance for geothermal borehole design and installations;
2. sharing and coordinating our publicly-available environmental data and information (e.g., Well Completion Reports for site geology, ground water information; waste sites and reportable releases to help identify pre-existing environmental issues) for site selection, engineering design, and system construction;

[2] The "CC" reference is a Creative Commons (CC) license, one of several public copyright licenses that enable the free distribution of an otherwise copyrighted "work". A CC license is used when an author wants to give other people the right to share, use, and build upon a work that the author has created. Wikipedia, Page last edited August 22, 2022.

3. providing streamlined state communication, integration of program resources, and energy technical assistance through our Clean Energy Results Program – a MassDEP-led statewide partnership with the Massachusetts Department of Energy Resources (DOER) and the Massachusetts Clean Energy Center (MassCEC).

Background: A 2019 statewide HEET feasibility study conducted by BuroHappold Engineering found that a utility-scale GeoGrid**(cc)** system is feasible in meet heating and cooling demands in a wide variety of street segments in Massachusetts. A GeoGrid**(cc)** system would deliver temperature to heat pumps for heating and cooling in customer buildings via ambient temperature water loops in the street. The temperature of these water loops is maintained by a combination of load cancelling and sharing between customers and long-term Borehole thermal energy storage (BTES) in the borehole system. Street-segments of this system are designed to interconnect like lego blocks to build thermal energy grids, combining the resilience of independent microdistricts and the efficiency of utility-scale load diversity and thermal management.



Massachusetts Continues to Optimize Pumping Systems in the Drinking Water and Wastewater Sectors

Over the course of four 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.

As a result of Massachusetts' energy-saving efforts and the issuance of our Gap II grant funding, two additional pumping system optimization projects were funded and were fully completed in 2020 - 2021. In total, these projects are now saving facilities $93,734 / year and reducing their annual electrical usage by over 697,000 kilowatt hours. The results for these optimization projects are described in Table 1 below.

Table 1. Pump System Optimization Projects

Facility	Electric Utility	Electricity Savings (kWh/year)	Project Cost	Annual Cost Savings	Utility Incentives	Gap II Grant	Simple Payback (years)[3]
Dartmouth – Wastewater & Drinking Water	Eversource	460,674	$389,329	$83,509	$138,917	$107,057	1.7
Webster – Wastewater	National Grid	78,652	$60,491	$10,225	$26,351	$23,100	1.1
Totals		**697,256**	**$449,820**	**$93,734**	**$130,157**	**$130,157**	**1.4 (average)**

Solar Projects Approved in Public Water Supply Areas

- 1/13/2021 – Drinking Water Program Approved Lenox (PWSID# 1152000) installation at Upper and Lower Root Reservoirs for solar powered mixers (solar power is on shore). MassDEP issued final inspection and approval on 6/15/2021.
- 08/31/2021 – Drinking Water Program Approved ~1.1 MW ground-mounted solar array off Boston Road in Southborough near the Sudbury Reservoir, an emergency source in the MWRA public water system
- 08/31/2021 – Drinking Water Program Approved ~1.3 MW ground-mounted solar array off Loring Road in Weston over two covered drinking water storage tanks; and
- 08/31/2021 – Drinking Water Program WP Approved ~113 kW ground-mounted solar array off the Park Avenue exit from Route 2 in Arlington over a covered drinking water storage tank.

Advancing MassCEC's Wastewater Innovation Program

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.

From 2016-2019, MassDEP served on the grant review team and evaluated innovative wastewater technology grant proposals – ranging from low-energy membrane biological wastewater treatment reactor, an artificial intelligence platform that would increase operational plant efficiency, a nitrogen-based aeration control system along with sampling equipment, a wastewater source heat pump for producing consistent heating, cooling, and hot water to the treatment plant, and optic nutrient sensors for enhanced process control for nutrient removal.

In 2020, MassCEC discontinued this grant program. Over the course of four years, MassCEC has provided $1.5 million in grants to 13 wastewater treatment plant pilot projects under their wastewater treatment innovation technology pilot grant program. Although MassCEC's is not currently accepting new grant applications, MassCEC has provided their recent program success stories and final reports at Water Innovation | MassCEC.

[3] 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.

Outreach and Technical Assistance in 2020, 2021

MassDEP's CERP continued to provide additional technical assistance and education to municipal drinking water and wastewater managers in Massachusetts, as well as water managers and policy decision-makers for other state and federal programs, on opportunities to reduce energy and greenhouse gas emissions at facilities.

During calendar years 2020 and 2021, the MassDEP CERP program provided the following outreach to advance our CERP goals and objectives in the water and wastewater sectors.

2020

- **January, 2020: Gap II Project Site Visits**– Millbury and Dartmouth (wastewater); Lynnfield Water District
- **January, 2020: HEET Charette** - MIT Cambridge
- **December, 2020: Sewer Heat Recovery from Wastewater Meeting –** Mass CEC, DEP-CERP, City of Boston
- **December, 2020: Energy Storage Meeting –** DOER, MassDEP

2021

- **January, 2021: King County, Washington Sewer Heat Recovery Pilot Project Meeting -** Mass CEC, MassDEP-CERP, City of Boston, MWRA, Boston Water and Sewer Commission
- **April, 2021: National workshop titled "Coordination and Planning for Water and Power System Resilience" –** *MassDEP's Gap Funding Model was one of four presentations highlighted during the "Solutions Panel" portion of the workshop.* The workshop, organized by Pacific Northwest National Laboratory (PNNL) and funded by the United States Department of Energy (DOE) Water-Power Technologies Office (WPTO), explored a vision for coordinated and resilient water and electric utilities of the future and identified barriers and strategies for increased coordination and integrated planning between water and power utilities.
- **July, 2021: US DOE and MassDEP Outreach Meeting with the Town of Charlton** – Sustainable Wastewater Infrastructure of the Future (SWIFt) Massachusetts cohort recruitment for "energy recovery" training" in the fall, 2022
- **September, 2021: US DOE and MassDEP Outreach Meeting with the Town of Amherst** – Sustainable Wastewater Infrastructure of the Future (SWIFt) Massachusetts cohort recruitment for "toolkit training" in the spring, 2022
- **September, 2021: US DOE and MassDEP Outreach Meeting with the Town of Merrimac** – Sustainable Wastewater Infrastructure of the Future (SWIFt) Massachusetts cohort recruitment for "toolkit training" in the spring, 2022
- **10/26/2021 & 11/30/2021 – EPA and Massachusetts Water and Energy Utility Resilience VIRTUAL Workshop:** MassDEP, in partnership with US EPA Headquarters and the New England Regional Office, conducted 2-days of three virtual, 3-hour workshop sessions on October 26 and November 30 titled: *Pathway to Resiliency: Preparation, Energy Efficiency, and Renewable Power.* The sessions included an interactive table top power outage exercise; technical and financial assistance panel speakers from MassDEP's Clean Energy Results (Water Utility Resilience, Gap Energy Grant) and State Revolving Fund programs, US EPA, US DOE, USDA – Rural Development, UMass Amherst's Industrial Assessment Center (IAC), MEMA, MA DOER, and National Grid; and utility case studies from (6) Massachusetts facilities -Hull Wastewater, Charlemont Sewer District, Greater Lawrence Sanitary District, MWRA, Stockbridge Water, and Fitchburg Water. A total of 65 participants attended, including 40 drinking water and wastewater representatives, agency officials, and several project consultants. (Project Team: Danah Tench and Michael DiBara)

- **December, 2021: Massachusetts Water Environment Association (MAWEA) Association's Quarterly "In-Person" Meeting** – Presentation on MassDEP's Gap Energy Grants
- **December, 2021: Massachusetts Gap Energy Funding Model for Municipal Drinking Water and Wastewater Facilities** – Presentation for the U.S. Department of Energy (U.S. DOE), Pacific Northwest National Laboratory (PNNL) and the National Association for State Energy Offices (NASEO*)*

EEA Environmental Justice (EJ) Policy Update – June 24, 2021

The Executive office of Energy and Environmental Affairs issued an updated policy on the Executive branch's considerations to "encourage sustained and continued efforts across Massachusetts in order to ensure that environmental justice remains a priority." This provides guidance to the divisions within the Executive branch in addressing the environmental and health impacts of siting decisions, remediation efforts, and resiliency plans in EJ communities, and provides direction to focus efforts to bring investment and economic development to these communities. Among the actions the policy sets forth are areas of particular focus for the work of the Clean Energy Results Program:

- Enhancing opportunities for residents to participate in environmental, energy, and climate change decision-making;
- Ensuring that residents are prepared for and resilient to the effects of climate change (such as heat island effect or flooding) and ensuring that these effects are minimized during development;
- Ensuring EJ neighborhoods benefit from positive impacts of environmental programs, grants and investments; and
- Encouraging investment in responsible economic growth in these neighborhoods where there is existing infrastructure, in particular where an opportunity exists to restore a degraded or contaminated site and encourage its clean, productive and sustainable use;
- Ensuring that positive economic development that is consistent with environmental protection is a chief priority for EJ populations throughout the Commonwealth.

The expansion of our Gap III Energy Grants is a response to the updated Environmental Justice policy. The newly eligible sectors for these grants in the 2022 grant opportunity intersect and overlap with EJ populations, while the energy savings, cost and emissions reductions, and potential for revenue generation will help further realize the goals set by the updated policy.

Renewable Energy on Closed Landfills

Throughout 2020 and 2021, MassDEP continued to provide assistance for solar photovoltaic (PV) and gas extraction projects at closed landfills. Through consultation with municipalities and developers, review of project plans, approval of permits and monitoring of existing systems MassDEP helps to ensure the safe construction and operation of clean energy projects, mitigating potential health and environmental impacts from development of these sites while helping municipalities meet their electrification and decarbonization goals. A map of the solar and wind projects can be seen at http://maps.env.state.ma.us/dep/arcgis/js/templates/RenewablesAtLandfills/

Below is a list of landfill projects that were supported by the agency in 2020-21:

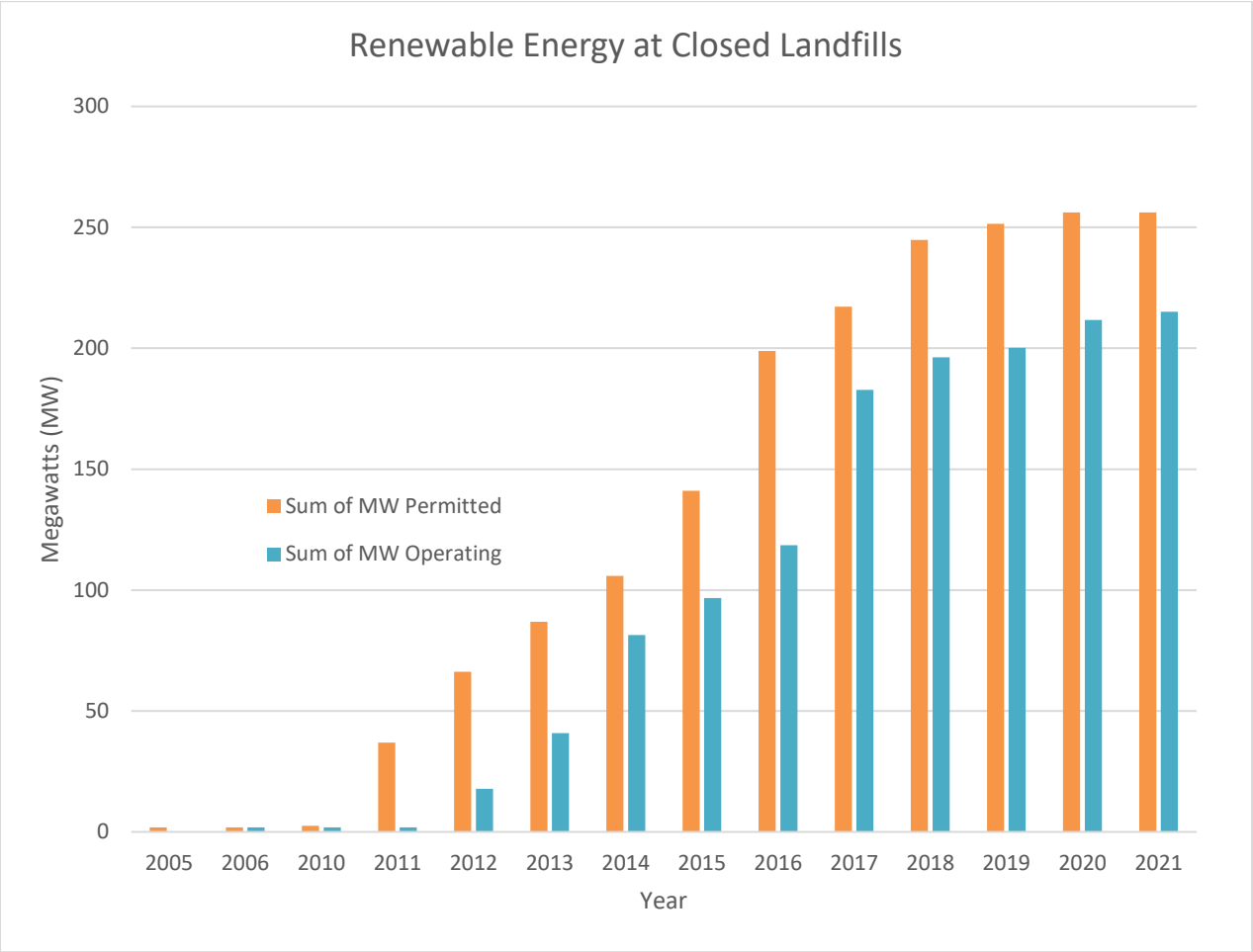
- **Town of Amherst Old Landfill, Amherst (WERO)**: MassDEP issued a permit to the Town of Amherst and their solar developer approving a perimeter fence at the Old Landfill (South) for the purpose of preserving/protecting endangered species habitat.

This protection area was developed in association with the Town's development of a solar project on the Town of Amherst New Landfill (North).

- **Town of Amherst Landfill, Amherst (WERO)**: 3.84 MW – MassDEP issued a Post-Closure Use permit to the Town of Amherst for the construction and operation of a solar array on the New Amherst Landfill.
- **Lenox DPW-Water Department, Lenox (WERO)**: MassDEP issued an approval for Solar Powered mixers in two reservoirs.
- **WMI/Granby Landfill, Granby (WERO)**: MassDEP issued a permit to WMI/Granby Landfill approving certain modifications to their permit relative to the operation of the landfill gas extraction system and associated notification requirements.
- **Town of Hampden and Hampden Landfill Solar, LLC, Hampden (WERO)**: 5.5 MW – MassDEP issued a permit to the Town of Hampden and Hampden Landfill Solar LLC approving the construction of a solar array on the property of the Town's former landfill operation.
- **Newburyport Landfill, Crow Lane, Newburyport (NERO)**: 1.7 MW – The MassDEP's NERO BAW Solid Waste Section issued a conditional approval to BWC Artichoke Reservoir, LLC (Blue Wave Solar) which permits the installation and operation of a solar photovoltaic power generating facility on the closed Newburyport Landfill.
- **4/9/2020, Pre-Application Meeting, Danvers Landfill, proposed soil fill and future solar development, Danvers (NERO)**: MassDEP's NERO BAW Solid Waste Section held a conference call meeting with Bobrek Engineering and Town representatives to discuss a proposed soil fill project at the Danvers Landfill.
- **7/8/2020, Chelmsford Landfill, BWC Stony Brook LLC, Chelmsford (NERO)**: 1.56 MW w/ 0.76 MW BESS – MassDEP's NERO BAW Solid Waste Section issued a conditional approval to BWC Stony Brook, LLC (Blue Wave Solar) for modifications to the approved design of a solar development located at the Town of Chelmsford's Swain Road Landfill located in Chelmsford.
- **6/3/2020, Rocco Landfill, Sutton Brook Disposal Area, Syncarpha Tewksbury, LLC Tewksbury (NERO)**: 3.0 MW w/ 2.0 MW BESS – MassDEP's NERO BAW Solid Waste Section issued a conditional approval to Syncarpha Tewksbury, LLC and the Town of Tewksbury which permits the installation and operation of a solar photovoltaic power generating facility and battery storage system at the Sutton Brook Disposal Area, which includes the closed Rocco Landfill located in Tewksbury.
- **Hamilton Landfill, Hamilton (NERO)**: 0.930 MW – MassDEP's NERO BAW Solid Waste Section approved an extension to the Town of Hamilton's existing Post-Closure Use Permit issued in 2018 for a power generating facility on a 3.1-acre portion of the closed Hamilton Landfill. **Haverhill Landfill, Old Groveland Road, Haverhill (NERO)**: 3.4 MW – MassDEP's NERO BAW Solid Waste Section issued a conditional approval to Kearsarge Haverhill, LLC (Kearsarge) and the City of Haverhill (City) for modifications to the approved design of a solar photovoltaic power generating facility on the closed Haverhill Landfill.
- **Chelmsford Landfill, BWC Stony Brook LLC (NERO):** 1.3 MW – MassDEP issued a conditional approval to BWC Stony Brook, LLC (Blue Wave Solar) for modifications to the approved design of a solar development located at the closed Chelmsford Landfill.
- **Town of Danvers, Danvers Landfill (NERO)**: MassDEP issued a decision to the Town of Danvers approving the Town's conceptual project plan for a soil filling project at the closed Danvers Landfill in October 2021 and in December 2021, MassDEP issued an Administrative Consent Order that includes a schedule for the project which anticipates the installation of a solar array. A separate application will be submitted to MassDEP for the project design.
- **Proposed 1.326 MW DC Solar Array on Landfill, Oak Bluffs (SERO)**: 1.326 MW – MassDEP's BAW's Solid Waste Section received an application for a Post-Closure Use

permit application to construct a 1.326 MW solar PV array on the Town of Oak Bluff's Landfill.

- **Approved 1.9 MW DC Solar Array on Landfill, Kingston (SERO)**: 1.9 MW DC – MassDEP's BAW's Solid Waste Section issued a Post-Closure Use permit to Advanced Solar Products, Inc. for construction of a solar PV array on the Town of Kingston's Landfill and intends to file a Post-Closure Use permit application to expand the solar array into the area currently occupied by the wind turbine system.
- **Approved 5.75 MW DC Battery Storage and Solar Array on Landfill, Marshfield (SERO)**: 5.75 MW DC – MassDEP's BAW's Solid Waste Section issued a Post-Closure Use permit to the Town of Marshfield and Next Grid NFF Marshfield LLC (NextGrid) for a photovoltaic (PV) array installation at the Marshfield Landfill. In addition to the PV array, a 2.5 MW DC battery storage system is proposed to be installed to store energy generated by the PV array to distribute into the electrical grid at times of need.
- **Approved Battery Storage and Solar Array on Landfill, Brewster (SERO)**: 3.2 MW – MassDEP's BAW's Solid Waste Section issued a Post-Closure Use permit to Next Grid Inc. (NextGrid) for a 3.2 MW DC photovoltaic (PV) array installation at the Daniels Antinarelli Stump Dump (Site). In addition to the PV array, a battery storage system will be installed to store energy generated by the PV array to distribute into grid at times of need.
- **Proposed 6.85 MW DC Solar Array on Landfill, Sharon (SERO)**: 6.91 MW w/ 5.0 MW Battery Electrical Storage System –MassDEP is currently conducting a review of the revised application. MassDEP's BAW's Solid Waste Section received an application for a Post-Closure Use permit application to construct a solar PV array on the Town of Sharon's Landfill with a proposed 5 MW battery storage system
- **Solar Array Modification on Landfill, Raynham (SERO)**: MassDEP's BAW's Solid Waste Section issued a Post Closure Use for construction modifications to the existing 3.0 MW DC photovoltaic (PV) array at the Raynhan Municipal Landfill.
- **Hingham Landfill and Transfer Station, Hingham (SERO)**: 0.43 MW – MassDEP's BAW's Solid Waste Section issued a Post Closure Use permit to Omni Navitas Holding LLC (Omni) for the array installation.
- **Norwood Landfill (SERO)**: 2.77 MW – MassDEP's BAW's Solid Waste Section is currently reviewing an application for a Post-Closure Use Permit for construction of a solar PV array, allowing the town's Municipal Light Department to enter a Power Purchase Agreement with Tangent Energy for the electricity produced by the array.
- **Indian Road Landfill Solar Array Project Post-Closure Use Permit, Dudley (CERO):** 1.25MW – MassDEP's CERO has been assisting Town of Dudley Officials and their consultants on a submission of a Major Post-Closure Use permit application for the construction of a ground mounted solar photovoltaic ("PV") array on the capped Indian Road Landfill.
- **Marshall Street Landfill Solar Array, Holliston (CERO):** 2.5 MW – MassDEP's CERO received and reviewed a Major Post-Closure Use permit application for an approximately 2.5-megawatt (direct current) ground mounted solar photovoltaic ("PV") array on the capped landfill, which is owned by the Town of Holliston.
- **Riverlin Street Landfill, Millbury (CERO):** 1 MW– MassDEP's CERO participated in a pre-application meeting with Town of Millbury Officials and their consultants to discuss the Town's plans for the construction of a 1 megawatt ground mounted solar photovoltaic ("PV") array on the capped landfill for which the Town expects to submit their permit application in late January 2022.
- **Provincetown Landfill and Transfer Station, Provincetown (SERO)**: 24.9MW Battery Energy Storage System] https://batteryindustry.tech/eversource-energy-24-9mw-38mwh-lithium-ion-battery-storage-project-in-massachusetts/


Renewable Energy at Closed Landfills
300
250
200
150
100
50
0
Megawatts (MW)
Sum of MW Permitted
Sum of MW Operating
2005
2006
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
Year

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- Exceeded.

MassDEP's 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 Brownfields.

Capacity as of December 16, 2021:

	Operational (MW)	**Proposed (MW)**	**TOTAL (MW)**
Solar Photovoltaics	91.16	79.36	**170.52**
Wind	6.5	0.0	**6.5**
Total	**97.66**	**79.36**	**177.02**

Below is a list of BWSC contaminated site renewable energy projects that had activity in 2020-21:

- **Town of Montague & Kearsarge Montague BD LLC, Montague (WERO)**: MassDEP issued a permit modifying the deadlines and certain design aspects of the closure of this former burn dump and construction of the solar array.
- **Kearsarge Energy and Town of Montague, Montague (WERO)**: MassDEP issued a permit to Kearsarge and the Town approving certain modifications to the 3rd party inspection frequency for the Phase I solar installation.
- **Syncharpha Acton Solar Project, Acton: 4.98MW (AC) (CERO)** - Syncharpha Solar/REM is developing a solar array on the Grace Superfund site following coordination, review, and permitting with the EPA and MassDEP, Acton Water District and the town.
- **Acton Water Solar Partners LLC Solar Project, Acton (CERO)**: 4.692 MW DC – EDF Renewables aiming for substantial completion of an array comprising 9.36 acres of the site in Jan 2022.
- **Acton Webo Solar Partners LLC Solar Project 16 Knox Trail and 284 High St, Acton (CERO)**: 0.996 MW AC + 0.5 MW BESS – Planning for a solar PV and battery energy storage system located within both Grace-Acton and Nuclear Metals Superfund site limits.
- **Former Agway-Kress site, 55 Knox Trail Rear, Acton (CERO)**: In 2020 and 2021 BWSC staff received and reviewed a proposed Environmental Monitoring Plan and a proposed cost estimate for funding. MassDEP continues to assist NextGrid, who hopes to have the proposed solar array installed and operational in the Spring of 2022.

- **Former Bird Property, Holliston (CERO)**: In 2021 BWSC staff reviewed and approved revised Implementation Plans at the site where bulk liquids and solid waste were disposed on the property. 32 acres of the site is being leased to construct and operate a 4.99-megawatt solar photovoltaic distributed energy generation facility. The site has been cleared and construction of the solar farm is underway.

Additional BWSC CERP activity during 2020-2021 includes the following:

PROJECTS: SMART "BROWNFIELD" PRE-DETERMINATION LETTERS FILED WITH DOER IN 2020-2021

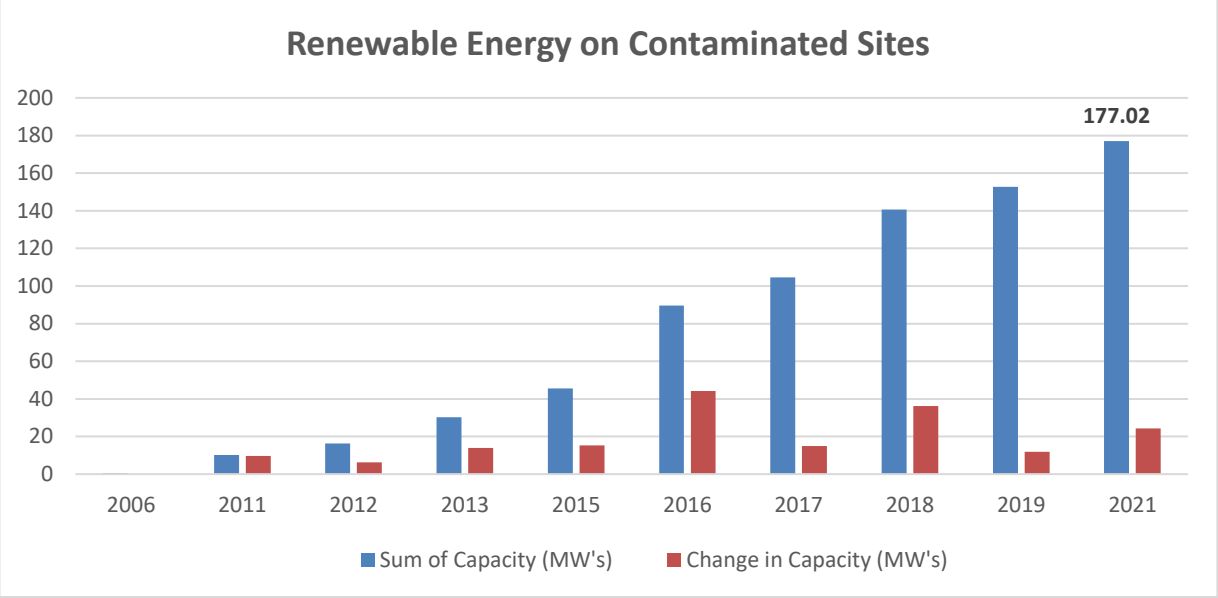
MassDEP issues pre-determination letters on proposed projects that may be located on a "Brownfield". These letters provide guidance to DOER as to whether a project is likely to qualify as being located on a Brownfield as that term is defined in 225 CMR 20.02. To facilitate PV development on Brownfields, DOER uses pre-determination letters to make decisions on Brownfield qualification after consultation with MassDEP. Letters recommending Brownfield designation were sent to DOER in 2020 and 2021 for the following projects.

Letters recommending Brownfield designation were sent to DOER in 2019 for the following 8 projects:

- Norfolk, FMR Call & Wait Auto, 6.9 acres, 1.0 MW, 3/5/20, RTN 2-0016473
- Concord, Nuclear Metals, 5 acres, 1.4 MW, 7/14/20, RTN 3-0000295
- Amherst, FMR Hickory Ridge Golf Club, 26 acres, 5.2 MW, 8/7/20, RTN 1-0021122
- Halifax, FMR Industrial, 56.5 acres, 4.95 MW, 10/30/20, RTN 4-0027311
- Holliston, FMR Corion Mfg, 0.6 acres, 0.21 MW, 5/7/21, RTN 2-0011053
- Acton, Agway Kress Property, 6 acres, 1.0 MW, 10/29/21, RTN 2-0000003
- Woburn, IndustriPlex, 15.5 acres, 2.8 MW, 11/1/21, RTN 3-0001731
- Woburn, IndustriPlex, 3.2 acres, 0.9 MW, 11/1/21, RTN 3-0001731

Brownfield Determination letters denied in 2020 and 2021: MassDEP sent pre-determination letters that did not support Brownfields designations for the following projects in 2020 and 2021:

- West Stockbridge, FMR ore bed, 8/11/20. No RTN number.
- Spencer, FMR Apex Junk Yard, 11/20/20, RTN 2-0000598
- Millis, FMR mfg., 4/22/21, RTN 2-3000380



	2006	2011	2012	2013	2015	2016	2017	2018	2019	2021
Sum of Capacity (MW's)	0.46	10.12	16.37	30.22	45.52	89.65	104.55	140.7	152.65	177.02
Change in Capacity (MW's)		9.66	6.25	13.85	15.3	44.13	14.9	36.15	11.95	24.37

Goal 2: 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.

BWSC Resilience activity during 2020 and 2021 includes the following:

PROJECTS: FINALIZING AMENDENTS TO MASSACHUSETTS CONTINGENCY PLAN (MCP)

BWSC has proposed amendments to the MCP at 310 CMR 40.0000 to:

1. Identify and assess foreseeable climate impacts that may affect the permanency and protectiveness of the cleanup at vulnerable sites; and
2. Take reasonable measures to reduce vulnerabilities and increase resilience.

MassDEP expects the regulations to be finalized in early 2023.

Regional Office and Boston Summaries

Western Region 2020-21 CERP Summary

- **4/16/20, Town of Amherst Old Landfill, Amherst (WERO):** MassDEP issued a permit to the Town of Amherst and their solar developer approving a perimeter fence at the Old Landfill (South) for the purpose of preserving/protecting endangered species habitat. This protection area was developed in association with the Town's development of a solar project on the Town of Amherst New Landfill (North).

- **5/11/20, CarbonX Pre-permitting Meeting, Springfield (WERO):** MassDEP held a pre-permit meeting to discuss the CarbonX proposal to locate a unit which will create biochar through the oxygen-controlled pyrolysis of virgin waste wood products. This process will create biochar and a gas product. Facility is proposed to be located in Springfield, but it may shift since the proponents are also looking to send waste heat to an off-property source, like a greenhouse or manufacturing facility, to generate greenhouse gas credits.

- **6/3/20, Proposed Hampden Landfill Solar Project, Hampden (WERO):** MassDEP held a pre-permitting meeting with Ameresco and their consultant relative to the development of a 3.8 MW array at the Cross Road Landfill property. The array is proposed to be both on and off the landfill footprint and is proposed to encompass the clearing of about 10 acres of woodland. The proponent is planning to permit and commence construction in 2021.

- **6/5/20, Town of Amherst Landfill, Amherst (WERO):** MassDEP issued a Post-Closure Use permit to the Town of Amherst for the construction and operation of a solar array on the New Amherst Landfill. The array will comprise an area of approximately 13.1 acres and is rated at 3.84 MW AC.

- **6/15/20, Lenox DPW-Water Department, Lenox (WERO):** MassDEP issued an approval for Solar Powered mixers in two reservoirs. Solar Panels are on shore, and the mixers are within the reservoirs.

- **7/23/20, Town of Montague & Kearsarge Montague BD LLC, Montague (WERO):** MassDEP issued a permit modifying the deadlines and certain design aspects of the closure of this former burn dump and construction of the solar array.

- **8/28/20, Pine Island Farm, Sheffield (WERO):** MassDEP has entered an Administrative Consent Order with Penalty (ACOP) with the owner of Pine Island Farm (PIF) of Sheffield, MA. PIF owns and operates a farm and an associated anaerobic digester. The ACOP resulted from an inspection of the facility which revealed violations of the MassDEP hazardous waste regulations related to waste oil management. In addition, a subsequent review of PIF's records indicated that the facility was not in compliance with its air pollution control Plan Approval and Air Quality Stage I requirements for gasoline dispensing. As part of the settlement agreement, the entire civil administrative penalty of $5,000 is suspended, provided that the facility complies with the conditions of the ACOP.

- **9/24/20, Pioneer Valley Planning Commission, (WERO):** The MassDEP Wetlands Circuit Rider for the WERO participated in a webinar related to commercial solar projects and the Wetlands Protection Act.

- **9/28/20, Hadley AD 1, LLC, Hadley (WERO):** MassDEP issued an Administrative Consent Order with Penalty (ACOP) to Hadley AD 1, LLC, which owns and operates an anaerobic digester system in Hadley, with its principal office in Wellesley, MA. The ACOP resulted from an inspection of the facility which revealed violations of the MassDEP hazardous waste regulations related to waste oil management. In addition, onsite observations and a subsequent review of records indicated that the facility was not in compliance with conditions of its Air Quality Plan Approval. As part of the settlement agreement, Hadley AD 1, LLC will pay a civil administrative penalty of $2,000 to the Commonwealth.

- **9/28/20, Deerfield AD 1, LLC, Deerfield (WERO):** MassDEP issued an Administrative Consent Order with Penalty (ACOP) to the owner of Deerfield AD 1, LLC, which owns and operates an anaerobic digester system in Deerfield, with its principal office in Wellesley, MA. The ACOP resulted from an inspection of the facility which revealed violations of the MassDEP hazardous waste regulations related to waste oil management. In addition, onsite observations and a subsequent review of records indicated that the facility was not in compliance with conditions of its Air Quality Plan Approval. As part of the settlement agreement, Deerfield AD 1 will pay a civil administrative penalty of $2,000 to the Commonwealth.

- **12/1/20, FERC Relicensing, Northfield (WERO):** MassDEP staff met with members of the Legislative Delegation in the Western Region relative to FERC Relicensing of projects in Northfield and Turner's Falls.

- **1/5/21, Great Fall Aquaculture LLC., Montague (WERO):** MassDEP issued a Non-Major Comprehensive Plan Approval to Great Fall Aquaculture, LLC for an anaerobic digester (AD) system at 1 Australia Way in Montague. The AD system will generate biogas to fuel a 600-kilowatt combined heat and power generator set with a back-up flare installed to consume any gas not used in the generator. The Facility will use most, if not all, the heat and energy from the generator to heat tanks and power the process. The Facility will accept processed waste from the aquaculture fish farm and locally generated Source Separated Organics for digestion.

- **2/8/21, WMI/Granby Landfill, Granby (WERO):** MassDEP issued a permit to WMI/Granby Landfill approving certain modifications to their permit relative to the operation of the landfill gas extraction system and associated notification requirements.

- **2/8/21, Kearsarge Energy and Town of Montague, Montague (WERO):** MassDEP issued a permit to Kearsarge and the Town approving certain modifications to the 3rd party inspection frequency for the Phase I solar installation.

- **2/2/21, Dynamic Energy, LLC., Williamsburg, (WERO):** A Pennsylvania-based solar energy development company has agreed to pay a total of approximately $1.14 million to settle allegations brought in a suit in Federal Court of violations of federal stormwater requirements that damaged protected wetland resources (97,000 sf wetlands and 41,000 feet or Riverfront Area) in the town of Williamsburg and polluted the West Branch Mill River, a cold-water fishery. The consent decree, filed with the United States District Court for the District of Massachusetts and pending court approval, settles an April 2020 lawsuit filed by the Attorney General's Office alleging that Dynamic Energy Solutions, LLC (Dynamic) disregarded fundamental pollution control requirements for construction

sites under federal and state law when it constructed an 18.5-acre solar array on a steep hillside above the West Branch Mill River in Williamsburg. The $1.14 million will be directed to restoration costs ($530,000), land conservation ($210,000), land acquisition by a land trust ($215,000), a $100,000 penalty, and $80,000 for attorney fees that will go to the Attorney General's Office.

- **3/10, Rockwood AG-Grid, LLC, Granville (WERO):** MassDEP issued a Non-Major Comprehensive Plan Approval for the proposed construction of a new engine and substantial reconstruction of an existing engine at Rockwood Farm's Anaerobic Digester located at 355 Granby Road in Granville. This upgrade was proposed due to projected increase in material received and gas produced by the facility. The engines will comply with farm Anaerobic Digester Best Available Control Technology.

- **3/11/21, Town of Montague and Kearsage, Montague (WERO):** MassDEP issued a permit to the Town of Montague and Kearsarge relative to the closure and solar development on the old Montague Burn Dump. The permit was necessary to address issues which came to light during construction related to additional areas of buried waste.

- **3/24/21, City of Springfield Environmental Roundtable (WERO):** MassDEP - WERO participated in a public meeting hosted by ReGreen Springfield and other agency partners to discuss air quality initiatives and concerns in the City.

- **3/19/21, Grasshopper Energy, LLC., Granville (WERO):** MassDEP issued a Unilateral Order to Grasshopper Energy LLC directing it to stabilize its solar construction site and access road to prevent further discharges to wetlands resource areas. The Order was issued to Grasshopper Energy, the project developer, following an inspection by wetlands staff that confirmed impacts to regulated resource areas.

- **3/26/21, Charles Sheets, Granville (WERO):** MassDEP issued a Unilateral Order to Charles Sheets as property owner directing him to stabilize its solar construction site and access road to prevent further discharges to wetlands resource areas. An Order was also issued to the project developer (Grasshopper Solar Energy) on March 19, 2021 following an inspection by wetlands staff that confirmed impacts to regulated resource areas.

- **7/16/21, Proposed Pyrolysis Unit, Ashfield (WERO):** A pre-permitting meeting was held with a group (CETY) that is proposing a biomass pyrolysis unit in Ashfield. The facility is proposing to take scrap wood material from the adjacent Roberts Brothers Lumber and other outside sources. They will process the wood scrap in a pyrolysis unit which will supply a gaseous fuel to three generators with a total potential power output of 2.4 MW. Drying the wood is a potential source of PM and VOC emissions and will therefore require permitting.

- **8/16/21, Ameresco Chicopee Energy, LLC, Chicopee (WERO):** MassDEP issued an Operating Permit Renewal to Ameresco Chicopee Energy, LLC. The facility is a landfill gas to energy facility located on the closed Chicopee Landfill located at 161 New Lombard Road in Chicopee. The facility consists of 4 landfill gas to energy engines which produce a total of 5.6 Megawatts.

- **10/8/21, Town of Hampden and Hampden Landfill Solar, LLC, Hampden (WERO):** MassDEP issued a permit to the Town of Hampden and Hampden Landfill Solar LLC approving the construction of a 5.5 MW solar array on the property of the Town's former

landfill operation. The solar array will be constructed both on and off the landfill final cover system.

Northeast Region 2020-21 CERP Summary

- **3/11/2020, Newburyport Landfill, Crow Lane, Newburyport**: The NERO BAW Solid Waste Section issued a conditional approval to BWC Artichoke Reservoir, LLC (Blue Wave Solar) which permits the installation and operation of a 1.7-megawatt (MW DC) solar photovoltaic power generating facility on the closed Newburyport Landfill (Landfill), located off of Crow Lane. New Ventures, LLC owns the Landfill. Blue Wave will install and operate the solar facility. Capping of the Landfill was substantially completed in June 2019, and certified closed pursuant to the Solid Waste Regulations in February 2020. The City has approved the solar project at the local level. The proposed facility will be constructed on a 6.74-acre portion of the Landfill and will be connected to the utility grid. Blue Wave will maintain the area of the Landfill inside the fenced solar facility and will establish a financial assurance mechanism (FAM) to provide funds to properly decommission the solar system. Some proceeds from the solar project are designed to fund Operation and Maintenance of the Landfill during the Post-Closure period.

- **4/9/2020, Pre-Application Meeting, Danvers Landfill, proposed soil fill and future solar development, Danvers**: The NERO BAW Solid Waste Section held a conference call meeting with Bobrek Engineering and Town representatives to discuss a proposed soil fill project at the Danvers Landfill. The proposed filling and grading of the capped area was discussed for development of a future solar project.

- **7/8/2020, Chelmsford Landfill, BWC Stony Brook LLC, Chelmsford**: The NERO BAW Solid Waste Section issued a conditional approval to BWC Stony Brook, LLC (Blue Wave Solar) for modifications to the approved design of a solar development located at the Town of Chelmsford's Swain Road Landfill located in Chelmsford. The approved changes include adjustments to the facility layout to optimize the photovoltaic (PV) array; two new equipment pads, both located off the capped landfill, to support a Battery Energy Storage System (BESS), transformers and an invertor; and a slight realignment of the access road located off of the capped area of the landfill. The new layout will have a direct current (DC) power output of 1.56 MW. The BESS unit has a rated capacity of 760 kW DC for two hours. These minor changes do not affect the design of the previously approved stormwater system.

- **6/3/2020, Rocco Landfill, Sutton Brook Disposal Area, Syncarpha Tewksbury, LLC Tewksbury**: The NERO BAW Solid Waste Section issued a conditional approval to Syncarpha Tewksbury, LLC and the Town of Tewksbury which permits the installation and operation of a 3.0-megawatt (MW AC) solar photovoltaic power generating facility and 2.0-MW AC battery storage system at the Sutton Brook Disposal Area, which includes the closed Rocco Landfill (the Landfill) located in Tewksbury. The Landfill began accepting waste around 1957 and continued until 1988. The Sutton Brook Disposal Area, including the Landfill, is listed on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation and Liability Act

(CERCLA). In February 2004, the United States Environmental Protection Agency (USEPA) and the Commonwealth of Massachusetts entered into an agreement with 27 potentially responsible parties, referred to as the Participating Settling Defendants (PSDs) to remediate the site. Capping of the Landfill was completed in June 2015, and USEPA issued approval of the Completion of Construction Certification in 2016. The proposed facility will be constructed on a portion of the capped and uncapped areas at the Landfill and will be connected to the National Grid utility grid. The Town is one of the PSDs and owns the Landfill; Syncarpha will install, operate and maintain the solar facility. The long-term maintenance and monitoring of the site and the Selected Remedy will continue to be performed by the PSDs as required under the Consent Decree. MassDEP-NERO staff coordinated with BWSC federal facilities staff and also consulted USEPA in its review of the post-closure use solar application.

- **10/30/2020, Hamilton Landfill, Hamilton**: The NERO BAW Solid Waste Section approved an extension to the Town of Hamilton's existing Post-Closure Use Permit issued in 2018 for a 930 kW DC solar photovoltaic power generating facility on a 3.1-acre portion of the closed Hamilton Landfill located in Hamilton. The Town entered into a Power Purchase Agreement (PPA) with Chebacco Road Solar, LLC (the Developer) for the installation and operation of the PV Facility. The 20-year PPA begins on commencement of the operation of the PV Facility. The PV Facility has been constructed but is not expected to begin operation until late 2020 or early 2021 due to delays associated with installation of the utility poles for interconnection of the PV Facility to the electric grid. The Town also requested an additional year be included in the extension to allow for further assessment of either continued operation of the system or decommissioning at the end of the PPA agreement. The approval extends the Post-Closure Use Permit to December 31, 2042.

- **12/1/2020, Haverhill Landfill, Old Groveland Road, Haverhill**: The NERO BAW Solid Waste Section issued a conditional approval to Kearsarge Haverhill, LLC (Kearsarge)

and the City of Haverhill (City) for modifications to the approved design of a 3.4 megawatt (MW DC) solar photovoltaic power generating facility on the closed Haverhill Landfill, located off of Old Groveland Road. In 2019, BAW approved the post-closure use design for the solar facility. The City and Aggregate Industries-Northeast Region, Inc. own the Landfill. Kearsarge will install and operate the solar facility. The proposed solar facility will be constructed on a 7.8-acre portion of the Southern Mound area of the Landfill and will be connected to the National Grid electric utility grid. The approved design allowed the placement of ballast blocks and solar panels on landfill slopes of less than 15 percent. Construction began in 2020 and the developer determined that the proposed locations of 22 ballast blocks were on slopes ranging from 15 to 37 percent. Subject to conditions set forth in the approval, additional construction methods will be utilized to install blocks on areas with steeper slopes up to and including 33 percent, with certain modifications to the block foundations and landfill cover above the FML. Three ballast blocks have been eliminated from the design. The approval requires evaluation of blocks placed on the steeper slopes as part of the routine third-party inspections following completion of the solar facility. The Landfill is listed on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, also known as Superfund). MassDEP-NERO staff coordinated with BWSC federal facilities staff and also consulted EPA in its review of the solar application. Capping and closure of the Northern Mound of the Landfill and the adjacent ash disposal area will be the subject of a separate review by MassDEP and U.S. EPA Region I.

- **3/8/2021 Chelmsford Landfill, BWC Stony Brook LLC (NERO BAW Solid Waste):** MassDEP issued a conditional approval to BWC Stony Brook, LLC (Blue Wave Solar) for modifications to the approved design of a solar development located at the closed Chelmsford Landfill located on Swain Road in Chelmsford. The project consists of a 1.3-megawatt direct current (MW_{DC}) solar photovoltaic power generating facility (PV Facility) and battery storage system on a 6.8-acre portion of the landfill. Modification of the approved design will include the installation of a landfill cap over an area of waste discovered during construction of the project.

- **7/15/2021 Greater Lawrence Sanitary District (NERO BWR)** MassDEP/NERO's wastewater unit conducted a joint inspection with EPA of the Greater Lawrence Sanitary District's regional wastewater treatment facility, including an inspection of the Organics to Energy Heat and Power Generation System at GLSD. This system, a $27 million system, completed in 2019, included upgrades to the sludge digesters, and construction of two biogas-fed engines, which each produce 1.6 megawatts of power, sufficient to provide power to all of the facilities at GLSD needed to treat the wastewater from 6 communities in Merrimack Valley. The digestion process to generate the biogas is not only fueled by wastewater sludge generated at the wastewater treatment plant, but also is augmented by a constant supply of food waste (collected in the City of Cambridge) which makes the biogas generation project more efficient and provides for excellent reuse of food waste. MassDEP observed the system to be in excellent working condition, generating 1.6 MW of power at the time of the inspection.

- **9/14/2021 Town of Rockport, Rockport Landfill (NERO BAW Solid Waste):** MassDEP issued a conditional approval to the Town of Rockport for the installation of

three electric vehicle charging stations at an existing Park-and-Ride lot at the Rockport Landfill.

- **10/27/2021 Town of Danvers, Danvers Landfill (NERO BAW Solid Waste):** MassDEP issued a decision to the Town of Danvers approving the Town's conceptual project plan for a soil filling project at the closed Danvers Landfill located off East Coast Road in Danvers. The project will use soils for grading and shaping to prepare the site for a solar photovoltaic power generating facility (PV Facility). A separate application will be submitted to MassDEP for the project design.

Southeast Region 2020-21 CERP Summary

- **4/29/2020 Proposed 1.326 MW DC Solar Array on Landfill, Oak Bluffs (SERO)**: MassDEP's BAW Solid Waste Section received an application for a Post-Closure Use permit application to construct a 1.326 MW DC solar PV array on the Town of Oak Bluff's Landfill located off Pennsylvania Avenue. MassDEP has provided written comments on the application; however, the application is currently on hold pending potential grid upgrades.

- **10/08/2020 Approved 1.9 MW DC Solar Array on Landfill, Kingston (SERO)**: MassDEP BAW Solid Waste Section issued a Post-Closure Use permit to Advanced Solar Products, Inc. for construction of a 1.9 MW DC solar PV array on the Town of Kingston's Landfill located off Cranberry Road. The solar PV array will cover approximately 7.63 acres of the closed Landfill. There are two additional post-closure uses at the Landfill: a wind turbine that was installed in 2012 and a dog park that was constructed in 2017. 2021 Update: A representative for the Town of Kingston has informed MassDEP that they intend to remove the wind turbine which was installed on the Landfill final cover system. The wind turbine removal will require a Post-Closure Use permit from MassDEP. Additionally, the solar developer intends to file a Post-Closure Use permit application to expand the solar array into the area currently occupied by the wind turbine system.

- **12/22/2020 Approved 5.75 MW DC Solar Array and Battery Storage on Landfill, Marshfield (SERO)**: MassDEP BAW Solid Waste Section issued a Post-Closure Use permit to the Town of Marshfield and NextGrid NFF Marshfield LLC (NextGrid) for a photovoltaic (PV) array installation at the Marshfield Landfill located at 23 Clay Pit Road in Marshfield. The Town of Marshfield, as the owner of the Landfill, has entered a long-term ground lease with NextGrid who will develop, build, own, and operate a 5.75 MW DC (4.6 MW AC) PV array on the approximate 22-acre portion of the Landfill. In addition to the PV array, a 2.5 MW DC battery energy storage system is proposed to be installed to store energy generated by the PV array to distribute into grid at times of need.

- **01/12/2021 Approved 3.2 MW DC Solar Array and Battery Storage on Landfill, Brewster (SERO)**: MassDEP BAW Solid Waste Section issued a Post-Closure Use permit to NextGrid Inc. (NextGrid) for a 3.2 MW DC photovoltaic (PV) array installation at the Daniels Antinarelli Stump Dump (Site) located at 443 Freemans in Brewster. With the issuance of the permit for the proposed project, NextGrid, as the prospective buyer

for the Site, will address the outstanding non-compliance associated with past uses of the Site as an unpermitted stump dump. Prior to construction of the PV array, MassDEP is requiring that NextGrid remove all buried woodwaste from the Site and submit a Closure Certification permit application to MassDEP documenting the woodwaste removal activity. In addition to the PV array, a battery energy storage system will be installed to store energy generated by the PV array to distribute into grid at times of need.

- **06/15/2021 Proposed 6.85 MW DC Solar Array and Battery Storage on Landfill, Sharon (SERO)**: MassDEP BAW Solid Waste Section received an application for a Post-Closure Use permit application to construct a 6.85 MW DC solar PV array on the Town of Sharon's Landfill. The Town of Sharon, as the owner of the Sharon Landfill located at 156 Mountain Street in the Town of Sharon, Massachusetts has entered into a lease agreement with Mountain Street Solar Project 2019, LLC to develop a proposed solar photovoltaic (PV) and battery energy storage system (BESS) on the existing Landfill property. The proposed Project is approximately 6.91 MW DC grid interactive photovoltaic (PV) system with two 2.5 MW/ 5.0 MW hour DC coupled Battery Energy Storage System units. The Proponent submitted a revised application in November 2021 in response to written comments from MassDEP. MassDEP is currently conducting a review of the revised application.

- **07/29/2021 Solar Array Modification on Landfill, Raynham (SERO)**: MassDEP BAW Solid Waste Section issued a Post Closure Use permit to Green Street Solar Power for construction modifications to the existing 3.0 MW DC photovoltaic (PV) array at the Raynhan Municipal Landfill located at 1555 King Philip Street in Raynham. With the issuance of the permit for the modification, Green Street Solar Power will correct the previously constructed ballasts that were found to have been installed on ground slopes of up to 24.4%. MassDEP's Post Closure Permit approved on May 16, 2018 to Green Street Solar required the ballasts be installed on slopes less than 15%. Modifications include: ballast removal and relocation to areas with slopes less than 17% and installation of concrete collars as a reinforcement mechanism. As a condition of this permit, within ninety (90) days of completing the modifications, MassDEP is requiring Green Street Solar Power submit a BWP SW43, Landfill Closure Completion permit application for a formal review and written approval of the certification report.

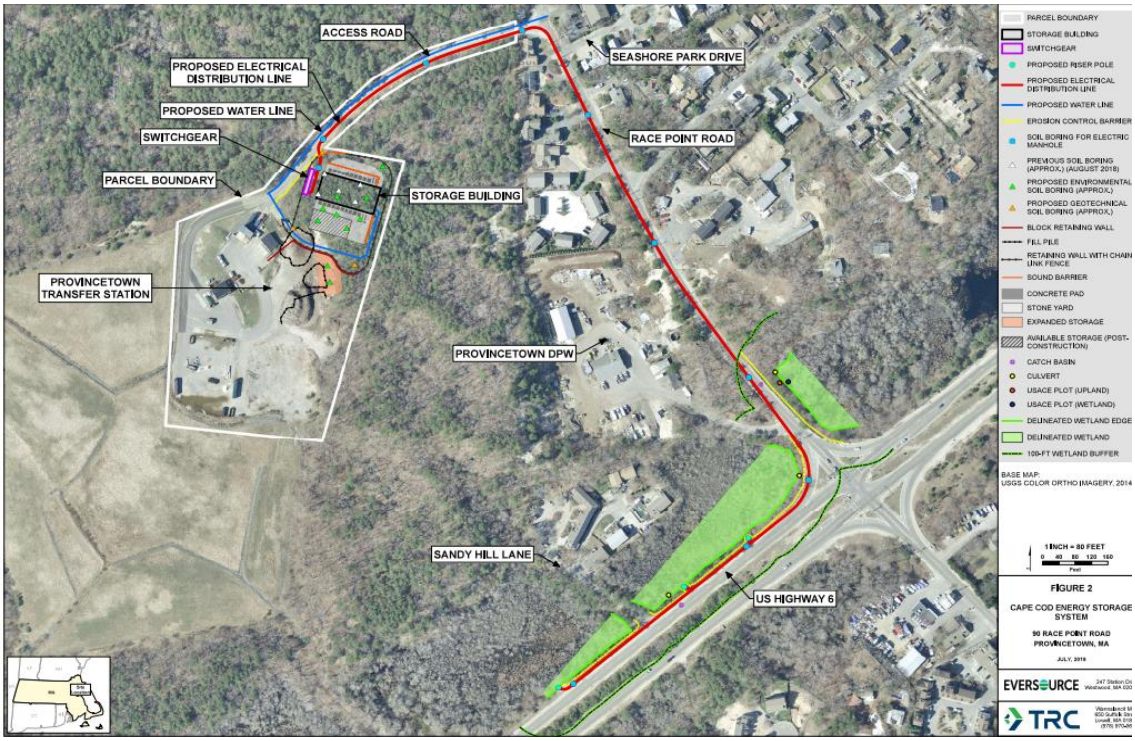
- **08/04/2021 Approved 0.430 MW DC Solar Array on Landfill, Hingham (SERO)**: MassDEP BAW's Solid Waste Section issued a Post Closure Use permit to Omni Navitas Holding LLC (Omni) for a 430-kilowatt photovoltaic (PV) array installation at the Hingham Landfill and Transfer Station located at 206 Hobart Street in Hingham. The Town of Hingham has entered a long-term ground lease with Omni who will develop, build, own, and operate the PV array on the Landfill. MassDEP's review of the proposed design is to ensure that the final cover system and the existing elevation and grade of the Landfill will not be altered, which includes, and not limited to, a review of the stormwater analysis, geotechnical evaluation and structural design analysis such as bearing capacity, settlement analysis, sliding calculations and overturning analysis to ensure that the solar panels will withstand the downward and uplift wind load.

- **11/18/2021 Landfill Closure Completion of Solar Array Construction with Battery Storage, Freetown (SERO)**: MassDEP BAW's Solid Waste Management Section issued a Landfill Closure Completion approval to Borrego Solar Systems, Inc. for completion of an 11-MW DC solar array installation at the Rezendes Ash Landfill located on South Main Street in Freetown. The construction commenced on November 14, 2019 and final inspection of the completed work was conducted on June 9, 2020. In addition to the solar array, battery energy storage system consisting of two (2) battery containers was also installed. MassDEP's review of the closure completion application is to ensure that the construction and installation of the solar array met all the requirements in the MassDEP's Post Closure Use (Major) permit approved on December 24, 2018. MassDEP generally requires that a Certification Report be submitted after completing construction; however, applicants can also request a formal review and written approval of the certification report by submitting a formal Landfill Closure Completion permit application.

- **12/01/2021 Proposed 2.77 MW DC Solar Array on Landfill, Norwood (SERO)**: MassDEP BAW Solid Waste Section received an application for a Post-Closure Use permit application to construct a 2.77 MW DC solar PV array on the Town of Norwood's Landfill located on Winter Street in Norwood. The Town Municipal Light Department intends to enter into a Power Purchase Agreement (PPA) with Tangent Energy for a term of 25 years. The PPA will allow Tangent Energy to construct a solar array on top of the Norwood Landfill to generate electricity, which will be sold back to the Town at a reduced rate. As proposed, the solar array will occupy approximately 10 acres of the Landfill. MassDEP is currently conducting a review of the application.

- **Provincetown Battery Energy Storage System**: On December 13, 2019, MassDEP issued a BWP SW37 permit approval to Eversource Energy for the construction and operation of a 24.9 megawatt battery energy storage system ("BESS") located at the Provincetown Landfill and Transfer Station. Construction began in March 2020 and is currently nearing completion. The BESS should be in operation in 2022. The Provincetown energy storage system will become the Commonwealth's first energy storage facility.

  The BESS building and associated components are approximately 230 feet from the Landfill's limit of waste. However, the proposed water line and fire hydrant are located approximately 140 feet from the Landfill's limit of waste at the closest point. Due to the proximity of the proposed water line and fire hydrant to the Landfill, MassDEP required the installation of clay plugs in the water line trench to act as a barrier to landfill gas migration and the installation of a new soil-gas monitoring probe be installed between the new water hydrant and the Landfill. In November 2021, Eversource Energy submitted a revised Post-Closure Environmental Monitoring Plan to MassDEP incorporating the new monitoring probe. Eversource Energy is required to submit to MassDEP a construction certification report within ninety (90) days of completing construction of the BESS. Additionally, MassDEP is requiring the energy storage system to be inspected on an annual basis.



- **Enforcement (SERO)**: MassDEP BAW' Solid Waste Section is currently pursuing enforcement against a solar developer for failure to comply with conditions of the Post-Closure Use permit.

Central Region 2020-21 CERP Summary

- **12/1/20 – Indian Road Landfill Solar Array Project Post-Closure Use Permit, Dudley (CERO)**: MassDEP's CERO has been providing pre-permitting assistance, including an initial pre-application meeting on 12/1/20, to Town of Dudley officials and their consultants on the Town's plans to submit a Major Post-Closure Use permit application for the construction of an approximately 1.25-megawatt (alternating current) ground mounted solar photovoltaic ("PV") array on the capped Indian Road Landfill, which is owned by the Town of Dudley. As of December 2021, the Town is working to get the landfill back into compliance with existing environmental monitoring requirements prior to submitting their Post Closure Use permit application.

- **04/5/21 – Temporary Modification of Vanguard Renewable's Anaerobic Digestion Permit, Rutland & Spencer (CERO)**: MassDEP CERO authorized a temporary modification to Vanguard Renewable's Recycling, Composting, and Conversion (RCC) permit for their Rutland and Spencer operations to allow the acceptance of waste milk on Sunday April 5th. As initially requested by the applicant, the current permits for these facilities do not allow the acceptance of Source Separated Organics (SSO), including milk, on Sundays. However, based on the extenuating circumstances at the time where dairy farmers had a significant excess of milk which needed to be disposed of, MassDEP approved the temporary modification.

- **5/1/21 – Pre-Permit Assistance re: Proposed Aries Wastewater Treatment Plant Residuals Gasification Facility at Devens (CERO)**: MassDEP CERO provided pre-permit assistance to representatives from Aries Clean Energy on a wastewater treatment plant (WWTP) residuals gasification facility that they were seeking to site at Devens. The proposed facility would have taken approximately 450 tons/day of biosolids from various vendors and use a fluidized bed gasification technology to convert the biosolids to a synthetic gas. The gas produced can be used for thermal applications or energy production. Subsequently, Aries decided to abandon plans to site the facility at Devens and instead decided to pursue a location in SERO.

- **03/16/21 – Marshall Street Landfill Solar Array Project Post-Closure Use Permit, Holliston (CERO)**: MassDEP CERO received and reviewed a Major Post-Closure Use permit application for an approximately 2.5-megawatt (direct current) ground mounted solar photovoltaic ("PV") array on the capped Marshall Street Landfill, which is owned by the Town of Holliston. The proposed solar array project, including solar panels and the rack/rail systems, will encompass approximately 9.4 acres of the 15-acre capped landfill.

- **08/12/21 – Liberty Environmental Inc, Leicester (CERO)**: MassDEP CERO provided air permitting information to a proponent planning to install a Combined Heat and Power (CHP) system at a new cannabis cultivation facility in Leicester. The proposed CHP will be two 1,200 kW natural gas-fired Internal Combustion engines with a possibility to install a third engine in the future. The proposed CHP will provide power and chilled water to the facility.

- **08/26/21 – Saint Gobain Abrasives, Inc, Worcester (CERO)**: On August 26, 2021, MassDEP issued an air permit to Saint Gobain Abrasives Inc, "SGA". SGA proposed to install a new natural-gas-fired combined heat and power ("CHP") facility consisting of natural gas fueled equipment: a 4.7-megawatt (MW) combustion turbine, a 9.9 million British thermal units per hour (MMBtu/hr) duct burner (to produce supplemental steam), two 600 horsepower (HP) / 25 MMBtu/hr steam-producing boilers, and a 0.5 MW ultra-low-sulfur-diesel (ULSD) fueled emergency generator. The proposed CHP Facility will replace less efficient and aging steam heat and electricity-producing boilers with more environmentally sustainable and efficient equipment, which will result in an overall reduction of energy use and air pollutant emissions.

- **10/28/21 - City of Fitchburg Biosolids Treatment Facility, Fitchburg (CERO)**: MassDEP CERO participated in a pre-permitting meeting with an entity seeking to site a new facility for the management of the City of Fitchburg's wastewater treatment plant biosolids. The proposed facility will also receive biosolids from other municipalities. The biosolids will be treated via a thermal hydrolysis process (THP) and then will be anaerobically digested. The final biosolids will provide some beneficial reuse via soil blending or similar processes. All biogas generated within the anaerobic digesters will cleaned, compressed, and injected into a nearby natural gas pipeline as renewable natural gas.

- **12/01/21 – Innovus Power, Clinton (CERO)**: MassDEP CERO participated in a pre-application meeting with Innovus Power of California regarding the proposed installation of at least 2 engines for a Combined Heat and Power (CHP) system to service a new cannabis cultivation facility to be located in Clinton.

- **12/6/21 – Riverlin Street Landfill Solar Array Project Post-Closure Use Permit Pre-Application Meeting, Millbury (CERO)**: MassDEP CERO participated in a pre-application meeting with Town of Millbury officials and their consultants to discuss the Town's plans to submit a Major Post-Closure Use permit application for the construction of a 1 megawatt (alternating current) ground mounted solar photovoltaic ("PV") array on the capped Riverlin Street Landfill, which is owned by the Town of Millbury. The Town said they expected to submit their permit application in late January 2022.

Bureau of Waste Site Clean up (BWSC) 2020-21 CERP Summary

- **2020 & 2021 – Former Agway-Kress site, 55 Knox Trail Rear (RTN 2-0000003), Acton (CERO)**: MassDEP BWSC staff are providing compliance assistance to NextGrid, Inc., a renewable power company that is planning to purchase a disposal site property that was historically owned by Agway, whose site operations involved formulation of pesticides, insecticidal soaps, residential cleaners, and livestock cleaners. Soil and groundwater are impacted with metals and pesticides, and the disposal site was closed with a Class A-4 Response Action Outcome (RAO) and an Engineered Barrier. Unfortunately, the required affiliated Financial Assurance Mechanism (FAM) was not implemented prior to Agway filing for bankruptcy. NextGrid intends purchase the property and return the disposal site to compliance with the MCP (per a 2014 Notice of Noncompliance), create/fund a Financial Assurance Mechanism (FAM) and install a photovoltaic solar array at the site. The project includes construction of a ballasted array system that will not penetrate the Engineered Barrier and associated infrastructure (access road, utility poles, ground mounted equipment, concrete pads, fencing, etc.). Returning the disposal site to compliance with the MCP also requires performance of certain Release Abatement Measure (RAM) activities, submittal of a revised Permanent Solution Statement and recording an amended Activity and Use Limitation (AUL). In 2020 and 2021 BWSC staff received and reviewed a proposed Environmental Monitoring Plan and a proposed cost estimate for funding the FAM and participated in multiple conference calls with a representative of NextGrid and an LSP that is working with NextGrid on the project. MassDEP continues to assist NextGrid, on planning to have the solar array installed and operational in the Spring of 2022. MassDEP does not yet have details of the anticipated total energy generation capacity for this project.

- **11/02/2021 – Northeast Energy Center, LLC, Charlton (CERO)**: MassDEP issued a Non-major Comprehensive Plan Approval for the construction and operation of a Natural Gas liquefaction, storage, and truck loading Facility at 304 Southbridge Road, Charlton. The Facility will provide liquefied natural gas (LNG) for natural gas distribution companies, electrical generation facilities, and potentially for industrial, educational, and agricultural facilities. The main components of the project consist of a hybrid gas-

turbine/electric motor driven nitrogen recycle compressor, an amine reboiler, emergency flare, two internal combustion engines, a vertical, full containment LNG storage tank and a four-bay truck loading station. Air emissions and noise modeling was done for the project and extensive noise mitigation will be required. Leading up to and during the public comment period, enhanced outreach was performed to stakeholders in the nearby designated Environmental Justice (EJ) area in Southbridge, which included a creation of a fact sheet, translation of documents, conducting a public hearing, and direct communication with EJ area stakeholders. During the public comment period, comments were received from two citizens as well as the Pipe Line Awareness Network (PLAN) and the Berkshire Environmental Action Team (BEAT). Comments included questions about the permit in relation to the Global Warming Solutions Act and the Commonwealth's greenhouse gas goals, as well as about the Best Available Control Technology review, emissions modeling, noise issues, public safety concerns, and impacts on the EJ populations. In accordance with state regulations, MassDEP's final permit decision was issued after the Energy Facility Siting Board issued their final approval of the Facility.

- **08/19/2021 – 111 & 117 Hospital Road (RTN 2-0000662), Devens (CERO)**: MassDEP BWSC staff received and reviewed the Soil Management Plan Status reports for former Oak-Maple-Grant housing area (HA) where Commonwealth Fusion Systems (CFS) is developing a campus. The CFS campus will include a research and development facility, a manufacturing facility, and company headquarters. CFS was spun out of MIT's Plasma Science and Fusion Center with support from the private sector. CFS is collaborating with MIT to design and build fusion systems that will provide the world with limitless, clean fusion energy to combat climate change. Currently, the property is being developed by two different entities simultaneously and identified as CFS-1 and CFS-2. Activities by both entities have encountered contaminated soils regulated by the Activity and Use Limitation (AUL) and Land Use Control Implementation Plan (LUCIP). The contaminated soils remained on-site and were relocated within the AUL area as per the Soil Management Plan.

- **May and August 2021 (RTN 2-0000060) Former Bird Property, Holliston (CERO)**: MassDEP BWSC Staff reviewed and approved a revised Phase II Addendum, Phase III Remedial Action Plan and Phase IV Remedy Implementation Plan. The Site is an approximately 52.5-acre property that was historically used for gravel mining and waste disposal. Bulk liquids and solid waste (primarily construction debris, drums, tanks, and used tires) were disposed on the property from at least 1967 to 1983. Investigations at the Site documented chlorinated volatile organic compound (CVOC) impacts to overburden and bedrock groundwater as well as on-site surface water. Site soils have been primarily impacted by polycyclic aromatic hydrocarbons (PAHs) and lead. Residential homes along Prentice and Marshall Streets were connected to public water due to CVOCs detected in drinking water wells. Approximately 32 acres of the former Bird property is being leased to a company to construct and operate a 4.99-megawatt solar photovoltaic distributed energy generation facility. The approximate 32-acre portion of the property has been cleared and construction of the solar farm is underway.

- **5/2021 Fitchburg Water Department Hydro power (CERO)** – MassDEP CERO staff assisted in permitting of a new hydro turbine that replaced one of two pressure reduction valves at the Narrows Road water station in Westminster. The project involved replacing one of the existing pressure reduction valves at the Narrows Road Station with a hydro turbine unit to recover the hydraulic energy of water flowing through this facility to generate about 10 kilowatts of electricity daily with an average annual output of about 65,000 kilowatt hours.

Boston 2020-21 CERP Summary

2020

- **HEET's GeoGrid** – MassDEP joined the collaborative research team to help evaluate Massachusetts first utility-scale geothermal pilot project.

- **Gap II Energy Grant Completions** – projects funded under the Gap II Grant continued to be completed in 2020 and 2021, bringing the total operational projects to 68 across 34 facilities.

- **MassDEP Food Waste Diversion Increase** – Implementation of the waste ban increased diversion from 100,000 tons to 320,000 annually.

- **RecyclingWorks Direct Technical Assistance** – The program provided assistance to 160 businesses to help reduce and divert food waste from disposal throughout 2020 and 2021.

- **Commercial Organics Waste Ban Compliance and Enforcement** – MassDEP issued 12 non-compliance notices and 1 administrative consent order throughout 2020 and 2021.

- **Fall 2020 WasteWise Forum** – RecyclingWorks food diversion priority used the forum to further assess ways to maximize diversion.

- **Solid Waste Master Plan** – MassDEP released in 2022 the 2030 Waste Master Plan updating the Commonwealth's agenda for preventing, rescuing and diverting food waste and set targets for these sections along with infrastructure and market development goals.

2021

- **February 2021 MassDEP announces new Clean Energy Results Program Director.** Danah Tench joined the Bureau of Planning and Evaluation (BPE) as the Director of Clean Energy and Climate Resilient Programs from her position as Deputy General Counsel for Policy and Program Development at MassDEP. In her new position Danah leads the work to support energy efficiency improvements, facilitate development of clean energy generation projects, as well as support climate adaptation and resiliency work both within the agency and by our regulated community and municipal partners. Danah also leads the agency and work with EOEEA and other partners to proactively evaluate protective measures to minimize and mitigate impacts of climate change, serving as a critical point of contact for climate resilience and clean energy work.

- Prior to her experience in the Office of General Counsel, Danah worked at the Acadia Center, formerly Environment Northeast, focused on energy and climate policy, litigation and community engagement. Prior to joining Acadia, Danah spearheaded the creation of a community-owned sustainable energy cooperative within the greater Boston area. Danah also served for eight years as an assistant attorney general in the Environmental Protection Division of the Massachusetts Attorney General's Office where she litigated state and federal law cases on air, hazardous waste, wetlands protection, clean water, oil and hazardous materials, asbestos and lead paint matters. Danah serves as the Commissioner's designee and Secretary of the Mass Food Policy Council and has also served on a number of local environmental and community boards. She is a 2006 Environmental Leadership Program – New England Regional Fellow, and a graduate of Wellesley College and Tulane Law School.

- **Recycling Load Fund Rockwood AG-Grid Project, Granville** – MassDEP's BAW Solid Waste program awarded a $75,000 grant to expand the project's food de-packaging operation.

- **Recycling Business Development Grants** – MassDEP BAW Solid Waste Program awarded two recycling business development grants: $65,000 to Black Earth Composting in Groton for a composting operation, and $100,000 to Recycleworks Inc. in Braintree for a food and beverage de-packaging operation.

- **April 2021 Gap Grant national exposure** – MassDEP CERP Program Manager Mike DiBara shared the Gap Grant success story at DOE/PNNL national water and energy utility webinar, "Coordination and Planning for Water and Power System Resilience". This event brought together invited representatives from water, wastewater, and electric utilities; government organizations; water and electricity based professional associations; consulting firms; and researcher organizations to explore water and power system interdependencies and resilience.

- **Department of Energy/ /Pacific Northwest National Laboratory (PNNL) Cost-Benefit Analysis of Gap Energy Grant program** – following the webinar, PNNL offered to conduct a no cost assessment of the Gap Energy Grant program's funded projects.

- **June 2021 EEA Issues Updated Environmental Justice (EJ) Policy** – MassDEP began implementing the guidance of the updated EJ policy throughout its array of programs and explore avenues to enact the policy's goals.

- **August 2021 MassDEP BWR Drinking Water Program Approves Solar Projects in Public Water Supply areas** – The Bureau of Water Resources approved three MWRA solar projects of ~2.5 MW including – a ~1.1 MW array in Southborough, a ~1.3 MW array in Weston, and a ~0.113 MW array in Arlington.

- **September 2021 Gap Energy Grant Announcement** – Energy and Environmental Affairs Secretary Kathleen Theoharides and MassDEP Commissioner Martin Suuberg announced the funding of a new round of Gap Energy Grants to support energy efficiency projects, energy savings, clean energy generation and greenhouse gas emissions reductions.

- **October 2021 Massachusetts Gap Energy Grant Energy Story Map** – the MassDEP GIS team collaborated with MassDEP's CERP on the creation of a dynamic, interactive on – line story map showcasing the results of Gap Energy Grant projects to date.

- **December 2021 Gap Energy Grant Expansion** – MassDEP added $2.5 million to the Gap III Energy Grants, bringing to $7.5 million the total funding being made available in for clean energy and energy efficiency projects. The additional funds will allow the Gap Energy Grants to be offered to new sectors: Nonprofit Affordable Housing, Nonprofit Food Distribution, and Small Businesses Supporting Food Distribution and Processing.

- **December 2021 Gap Energy Grant presentation to the National Association of State Energy Office (NASEO)** – MassDEP's CERP and MA DOER presented the Massachusetts Gap Energy Grant Funding Model to the National Association of State Energy Office officials.

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