

MassCEC Emerging Initiatives

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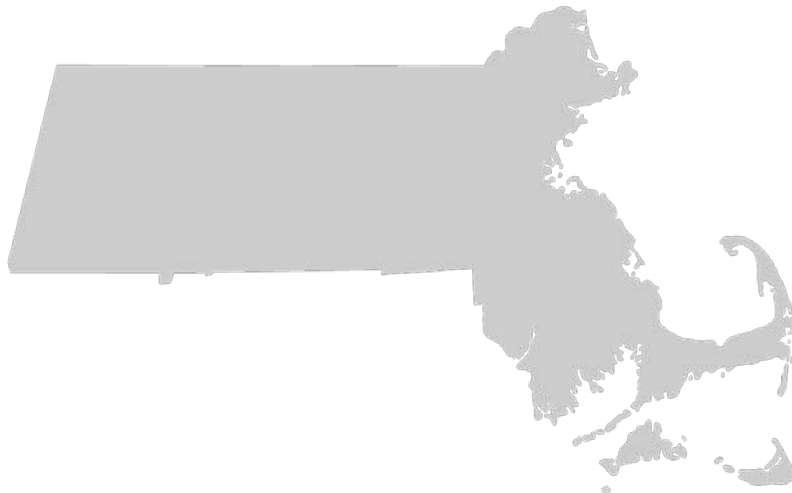
Economic Impact

109,226
Jobs



\$50,000

68% of workers earn more than \$50,000



81%

Job growth since 2010



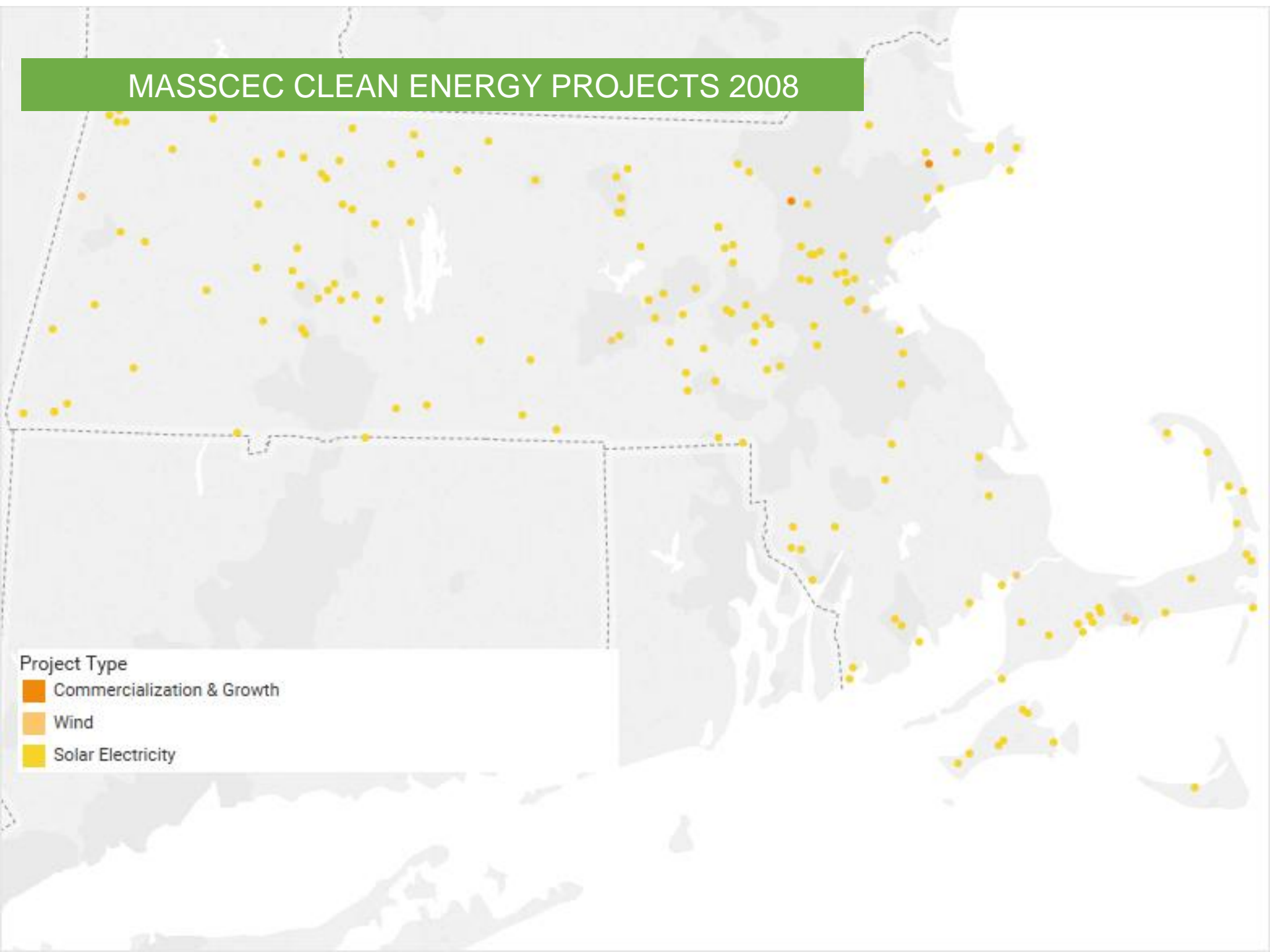
\$11.4B

in economic activity

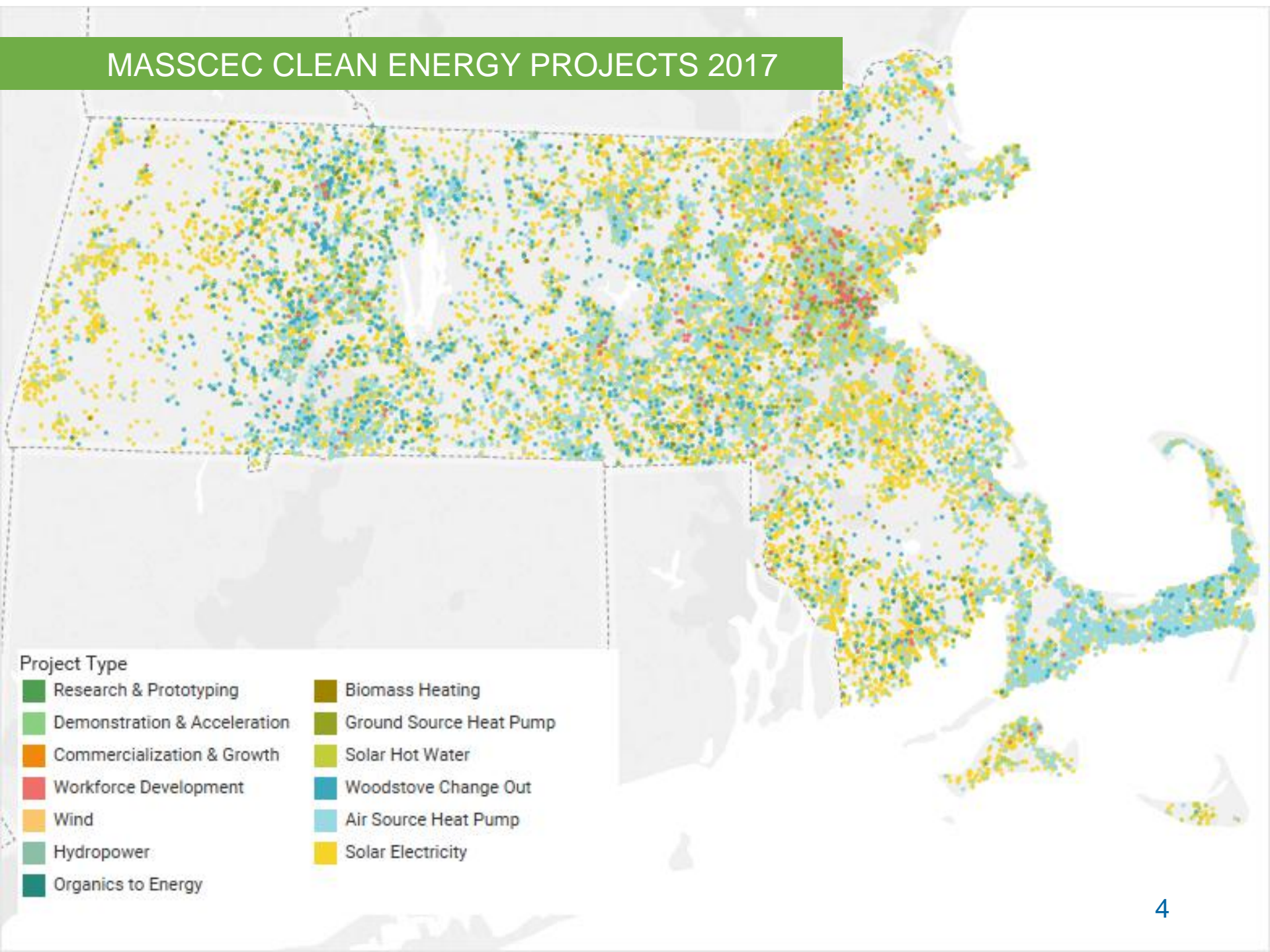
2.3%

of Massachusetts
Gross State Product

MASSCEC CLEAN ENERGY PROJECTS 2008



MASSCEC CLEAN ENERGY PROJECTS 2017



Our Mission

Grow the state's clean energy industry while helping to meet the Commonwealth's clean energy, climate and economic development goals.

INVEST

Invest in programs that increase renewable energy adoption by residents, businesses and communities.

CONNECT

Connect employers, job seekers, students, communities and investors to the clean energy industry.

INNOVATE

Help to spur innovation through infrastructure, funding and technology development support.

MassCEC Key Facts

- **Small agency, big impact.** Our 60+ employees run 40+ funding programs that support clean energy innovation, deployment, and workforce training.
- **Our Facilities:** WTTC & Marine Commerce Terminal in New Bedford
- **Award-Winning Programs.** MassCEC has pioneered innovative, efficient and successful national award-winning programs like Solarize Massachusetts, Clean Energy Internship Program, and Advancing Commonwealth Energy Storage (ACES).
- **Industry Report.** Our Clean Energy Industry Report is a key resource for measuring industry growth and reporting on industry needs.

How MassCEC Operates

FUNDING SOURCE



Massachusetts
Utility Customers



5 Municipal
Lighting Plant
Customers

\$22M annually

*Collected via a surcharge
equal to \$.29/month for an
average residential customer*

CORE ACTIVITIES



Renewable
Energy
Generation



Investments



Innovation &
Industry Support



Wind Technology
Testing Center



Marine
Commerce
Terminal

Deployment Programs

- **Clean Heating and Cooling:** more than 13,000 projects installed and \$30.5 million in awards, leveraging over \$122 million in private investment
- **Woodstove Changeout Program:** Rebates to swap out old woodstoves for new, efficient wood or pellet stoves
- **Mass Solar Loan:** 3,328 loans closed, \$23.5 million in awards, and over \$108.4 million in total loan values supported
- **SolarizeMass:** 58 communities and 3,400 homes served (20.6MW of solar)



Innovation Programs

- Since 2010, MassCEC has provided over \$72 million in funding to local clean energy companies to drive innovation and early stage company growth.
- MassCEC funds:
 - Pilots and Demonstration Projects
 - Business Incubators and Accelerators
 - Early stage companies
 - Research institutions and academics



2017 Greentown Labs expansion Somerville



2017 XL Hybrids Brighton



MassCEC Resources Available to All MLPs

Via its **DeployMass** and **InnovateMass** programs, MassCEC connects MLPs with clean energy companies that provide energy efficiency, alternative transportation and renewable energy technology products or services.

DeployMass

Who: Clean energy and water innovation technology companies seeking to do business with public entities and have a commercialized technology that can provide significant and demonstrable savings to public customers through energy/cost reductions.

What: Facilitate the adoption of clean energy or water innovation technologies at public agencies, public academic institutions and municipalities.

Goal: Support the growth and development of Massachusetts-based companies while saving taxpayer dollars.

Next Round: **Applications accepted on a rolling basis.**

Program Metrics: 19 technologies on CRT List, 9 projects funded

FIRSTFUEL

 CoolGreenPower

 Smart
Cloud

 XL

 bevi

 Phoenix  Revolution

Phoenix Revolution

Product: Ocean Pure Water System water treatment technology

Project: City of Newburyport – Frog Pond cleanup

Support: \$40,500 grant with \$49,500 in cost share from Phoenix & Newburyport

FEATURED

Newburyport Parks Commission chair seeks more green space, cleaner water

By Dyke Hendrickson Staff Writer Aug 29, 2017



BRYAN EATON/Staff photo Kim Turner, who chairs the Newburyport Parks Commission, stands near the Frog Pond at Bartlet Mall.

Bryan Eaton

InnovateMass

Who: New clean energy technologies or innovative combinations of existing technologies with a strong potential for commercialization

What: Up to \$250,000 in grant funding and technical support

Goal: Fill funding gaps to demonstrate early-to-mid-stage technologies in preparation for commercialization and help teams reach specific milestones to attract follow-on financing and future customers

Next Round: **Program is currently open until Friday, June 1st by 4pm**

Program metrics: \$4M awarded to 34 companies since 2013. \$5.5M in public and private matching funds.

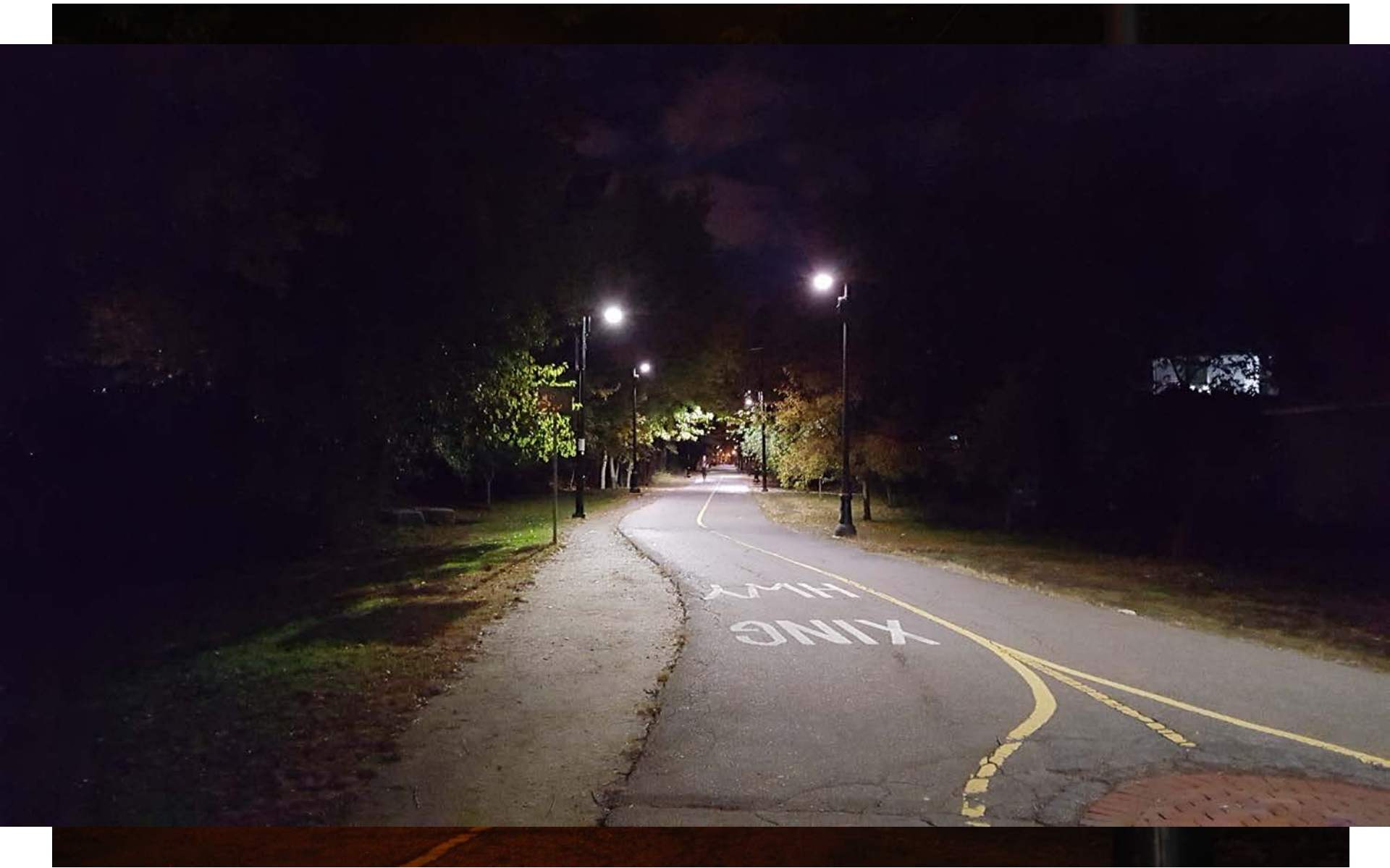


SolarOne Solutions & City of Somerville

- \$88,779 Grant (with \$57,772 match) to prove commercial viability of solar-powered, off-grid, smart networked solar lighting
- Installation on Somerville's Community Bike Path
- 7 new lights and retrofits to 18 existing fixtures



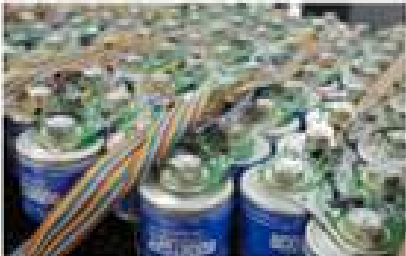
City of Somerville workers helped install the SolarOne LED lights



Our Emerging Initiatives



OFFSHORE WIND



ENERGY STORAGE



ENERGY RESILIENCE



MICROGRIDS



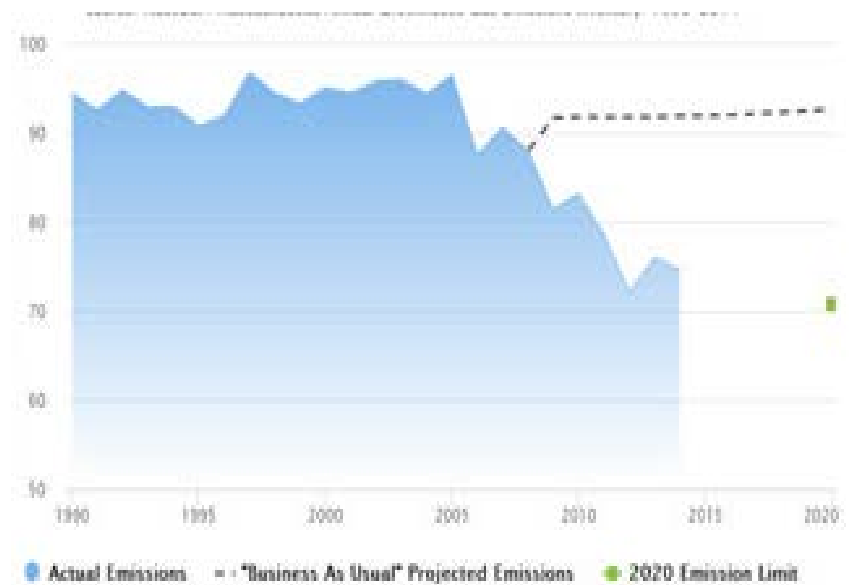
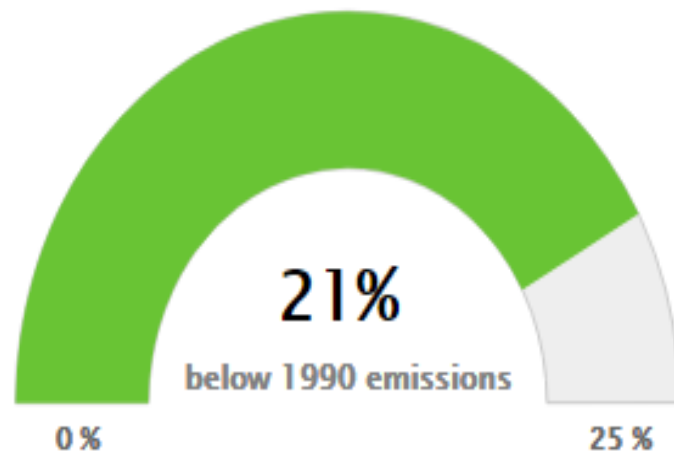
CLEAN TRANSPORTATION



WATER INNOVATION

Massachusetts GHG reduction progress

Progress in 2014 toward GWSA Goal for 2020



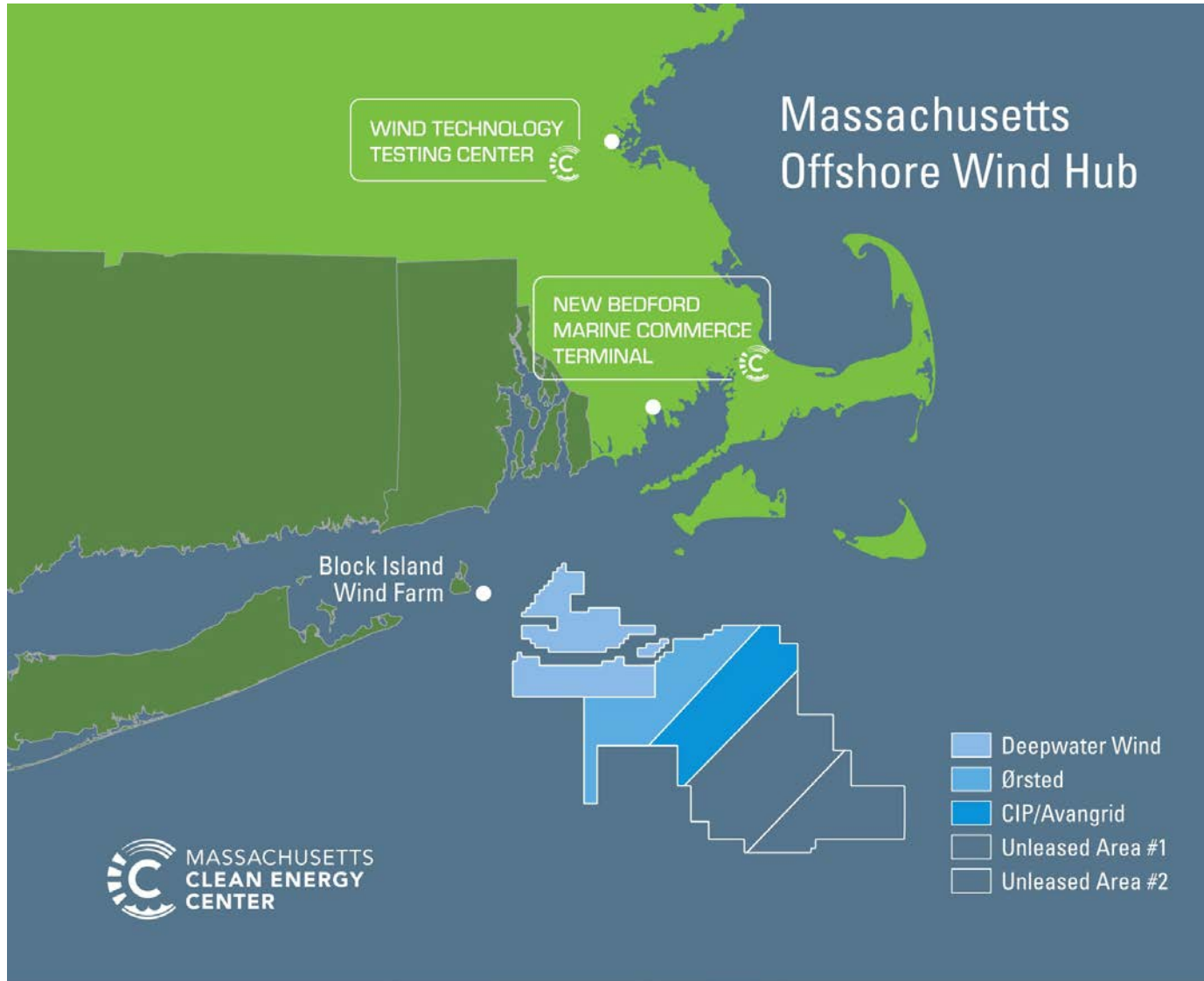
Massachusetts Policy Initiatives

- **Executive Order 569**
- **Energy Diversification Legislation**
 - **83D Clean Energy**
 - **83C Offshore Wind**
- **Energy Storage Target**
- **Commission on the Future of Clean Transportation**



How Much is 1,600 MW?

- 1,600 MW =
 - Enough electricity to power over 1/3 of all residential homes in MA
 - Equivalent to 2.4 million tons of greenhouse gas emissions reductions per year
 - Over 11% of annual Massachusetts electricity consumption



Offshore Wind Lease Area Map

Offshore Wind Sector Development

Stakeholder Engagement

- Public and stakeholder meetings between Federal Agencies, Native American Tribes, State, Local, Lead Fisheries & Habitat Working Groups

Supply Chain

- Maximize economic development

Infrastructure

- Wind Technology Testing Center
- Marine Commerce Terminal

Workforce Development

- Offshore Wind Workforce Report



Planning, Permitting & Research

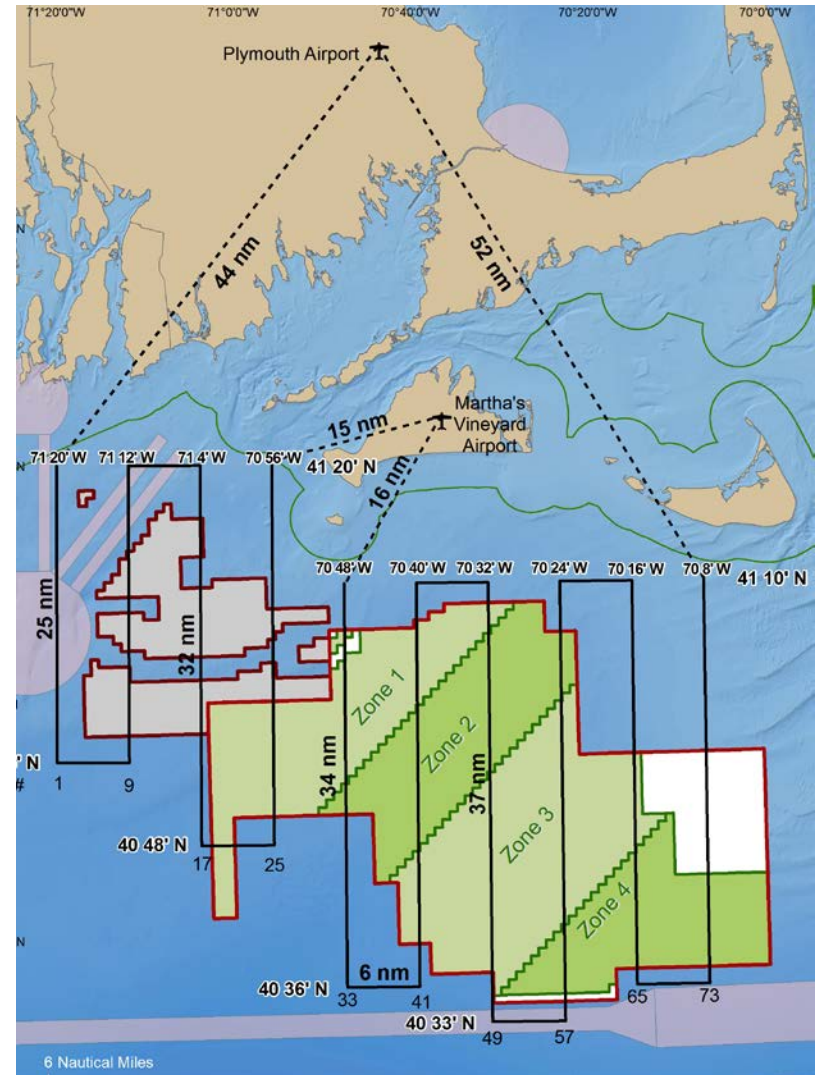
Wildlife Surveys

- Large Whales and Turtles
- New England Aquarium & WHOI
- 5 phase effort since 2011 with cost share with U.S. BOEM
- Aerial Surveys and oceanographic sampling

Metocean Data Initiatives

Transmission Planning

Offshore Wind Research



Ports & Infrastructure Assessment

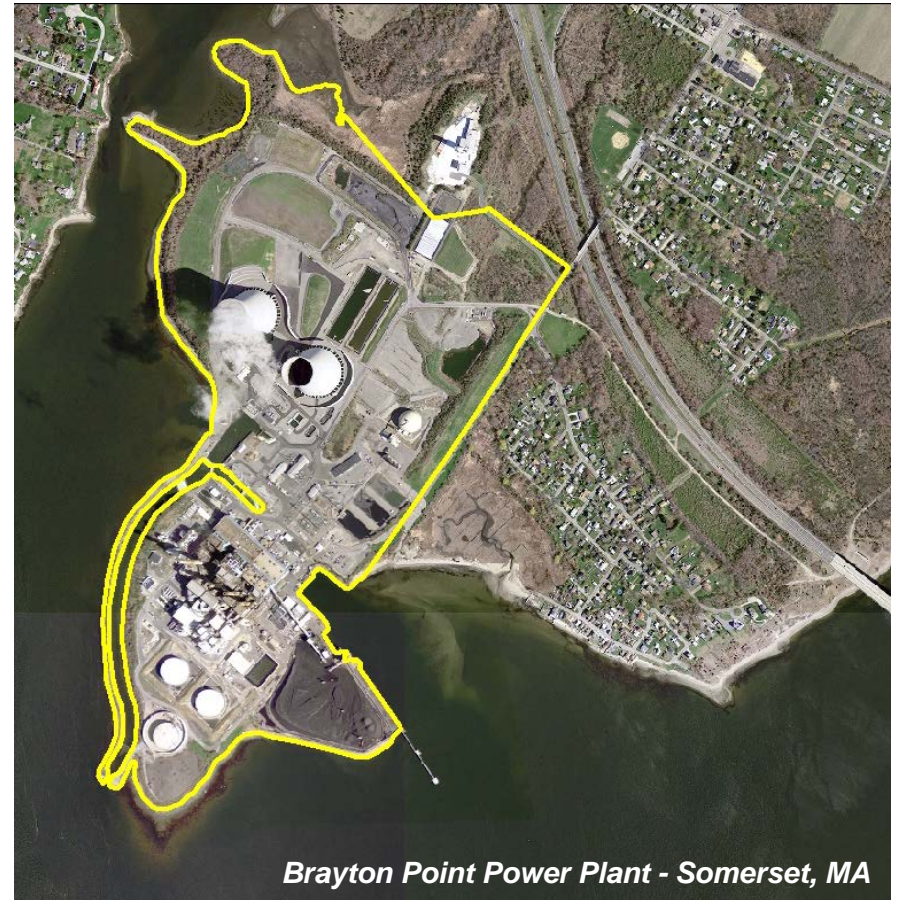
- Evaluating existing port and waterfront infrastructure in MA for potential industry led investment

• Near Term

- | |
|--|
| <ul style="list-style-type: none">• Foundations (monopiles, jackets, gravity-based)• Tower sections• O&M base facilities |
|--|

Longer Term

- | |
|---|
| <ul style="list-style-type: none">• Transmission cables• Nacelles• Substations• Blades |
|---|

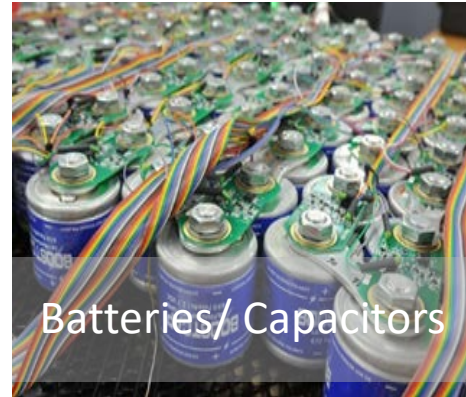


Brayton Point Power Plant - Somerset, MA

Energy Storage

Energy storage encompasses a range of technologies that use mechanical, chemical, or thermal processes to absorb energy, store it, and then dispatch it as useful.

Benefits of Energy Storage: Energy storage offers reliability, flexibility, and efficiency of usage, which makes it easier to integrate clean energy sources in the electrical grid system.



Advancing Commonwealth Energy Storage (ACES)

\$20 million to promote the deployment of energy storage projects across the Commonwealth.

Goals of the Energy Storage Initiative



Find the most cost efficient and effective way to help transform the Commonwealth's energy market.



Expand markets for storage technologies, and valuing storage benefits to clean energy integration, grid reliability, system wide efficiency, and peak demand reduction



Accelerate the development of early commercial storage technologies



Recommend and develop policies, regulations and programs that help achieve those objectives.

Use Cases: MLP Asset

AWARDEE	CAPACITY	SUMMARY
Braintree Electric Light Plant (BELD)	2000kW/ 4200kwh	<ul style="list-style-type: none">• System will reduce generation and transmission capacity charges, load shifting for time-of-use optimization• Integration of renewable generation• Innovative community storage
Massachusetts Municipal Wholesale Electric Company (Ashburnham Municipal Light Plant)	2000kW/ 4000kwh	<ul style="list-style-type: none">• System will enable additional residential and commercial solar and 200kw or more of wind, which currently cannot interconnect
Reading Municipal Light Department	5,000kW/ 10,000kWh	<ul style="list-style-type: none">• System for peak demand management that will be co-located with a 2.5 MW natural gas fueled generator, potentially supporting a future microgrid for RMLD's critical loads

Other Clean Resilient Energy Technologies

Solar Plus Storage: Storage improves solar project economics, provides resilient power to low to moderate income and vulnerable communities.

Microgrids: Anchored by combined heat and power systems, provide uninterrupted power for critical facilities, reduce energy costs, contribute to GHG emission reduction goals.

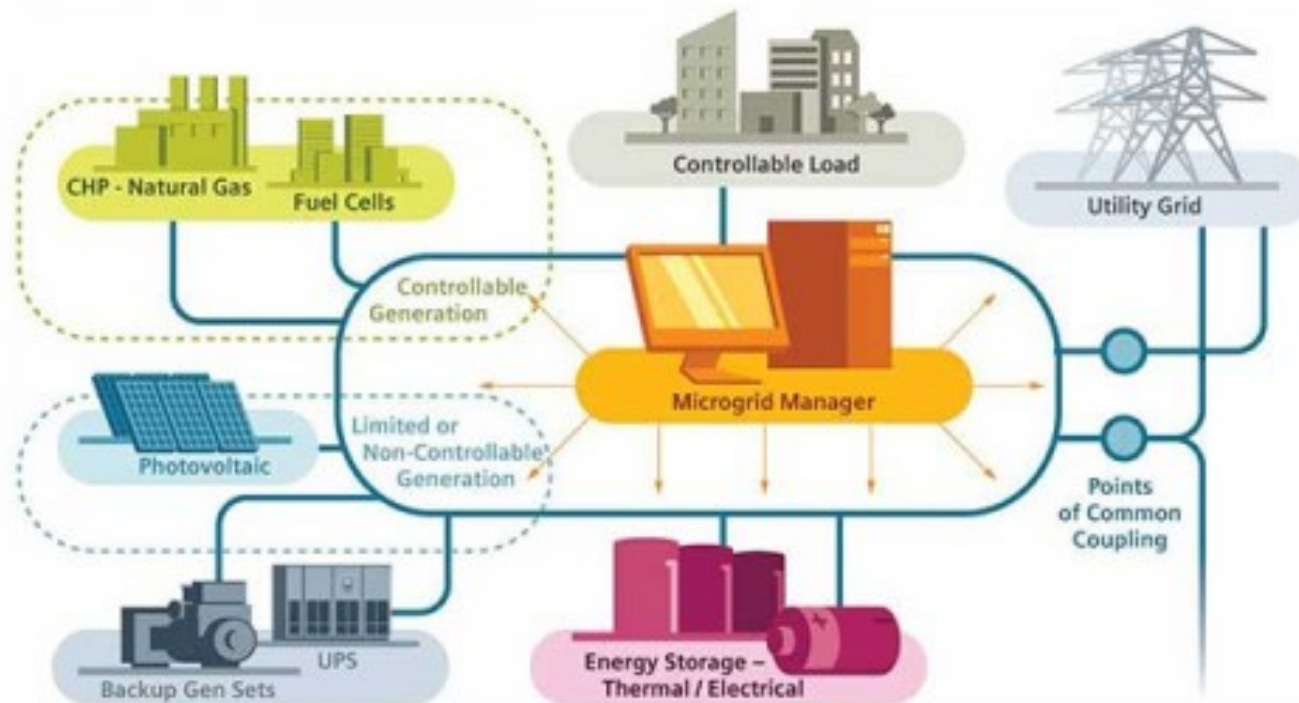




Image: Boston Globe



Massachusetts Power Outages

432723

customers without power as of Friday, March 02, 2018 8:32:08 PM

The map represents power outages for four power companies in Massachusetts. Data is provided by utilities every 15 - 30 minutes.

- NO REPORTED OUTAGES
- < 5% OF CUSTOMERS WITHOUT POWER
- 5% - 10% OF CUSTOMERS WITHOUT POWER
- 10% - 25% OF CUSTOMERS WITHOUT POWER
- 25% - 50% OF CUSTOMERS WITHOUT POWER
- 50% - 75% OF CUSTOMERS WITHOUT POWER
- > 75% OF CUSTOMERS WITHOUT POWER

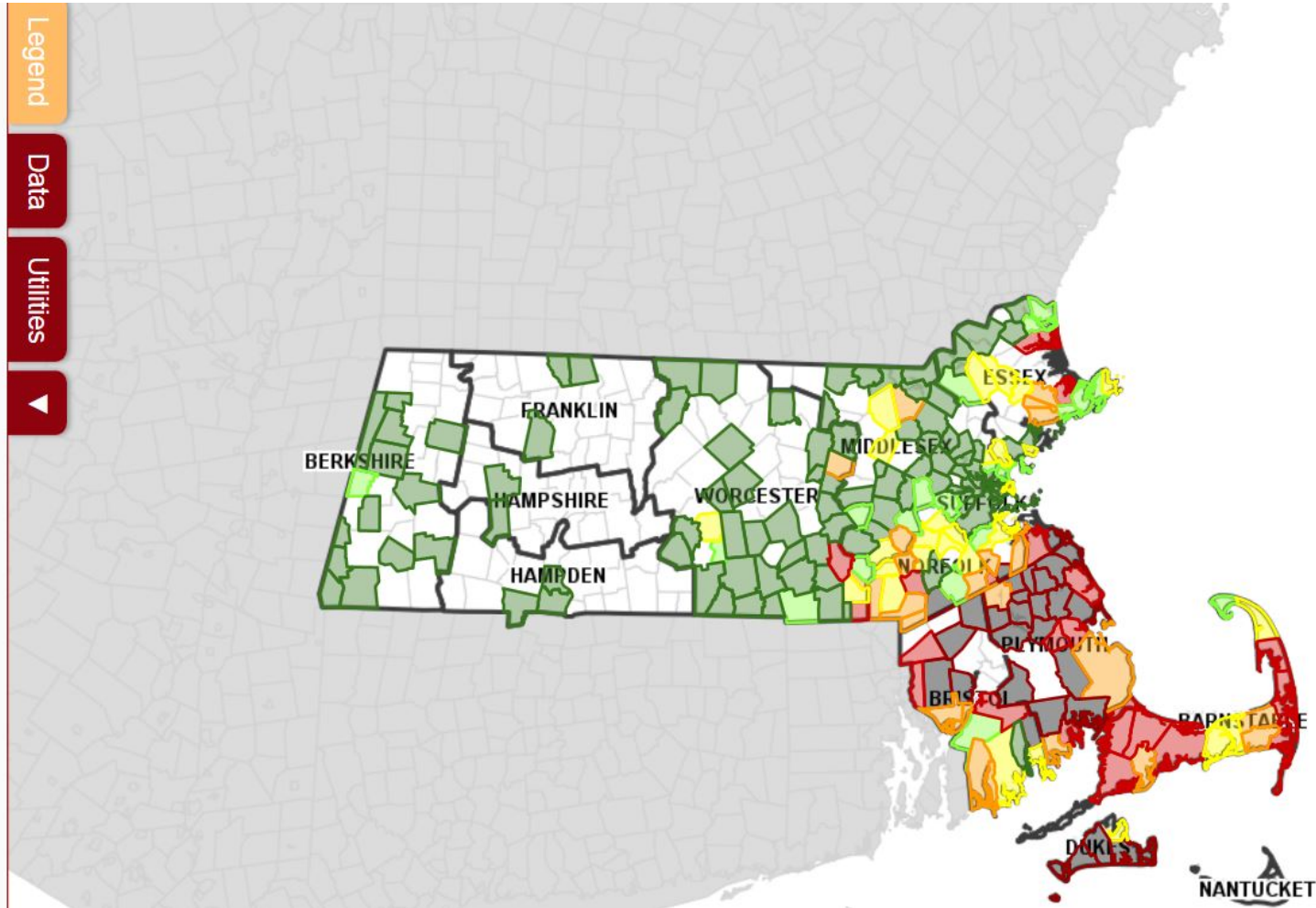
Zoom Map to a Town:

The information contained on this website is for general information purpose only. The data is provided automatically by utilities and while we endeavor to keep it up to date, the Massachusetts Emergency Management Agency takes no responsibilities for this

Legend

Data

Utilities



Images: MEMA

Community Microgrid Program

Awards to 14 projects in 12 communities

Amount: \$1,050,000 (\$75,000 per study)

Purpose: Catalyze development of resilient, clean energy community microgrids in MA by funding feasibility studies to assess project viability and identify scalable, replicable microgrid business and ownership models

Key Highlight: All projects support one or more critical facilities including hospitals, grocery stores, a military base, a produce distribution center, and emergency operations (police & fire)

Hull Community Microgrid Feasibility Project

Awardee: MMWEC + Hull Light Department (HLD)

Assets: Existing 1.7MW wind turbine and backup diesel generators along with a new energy storage system and solar, to fuel a microgrid

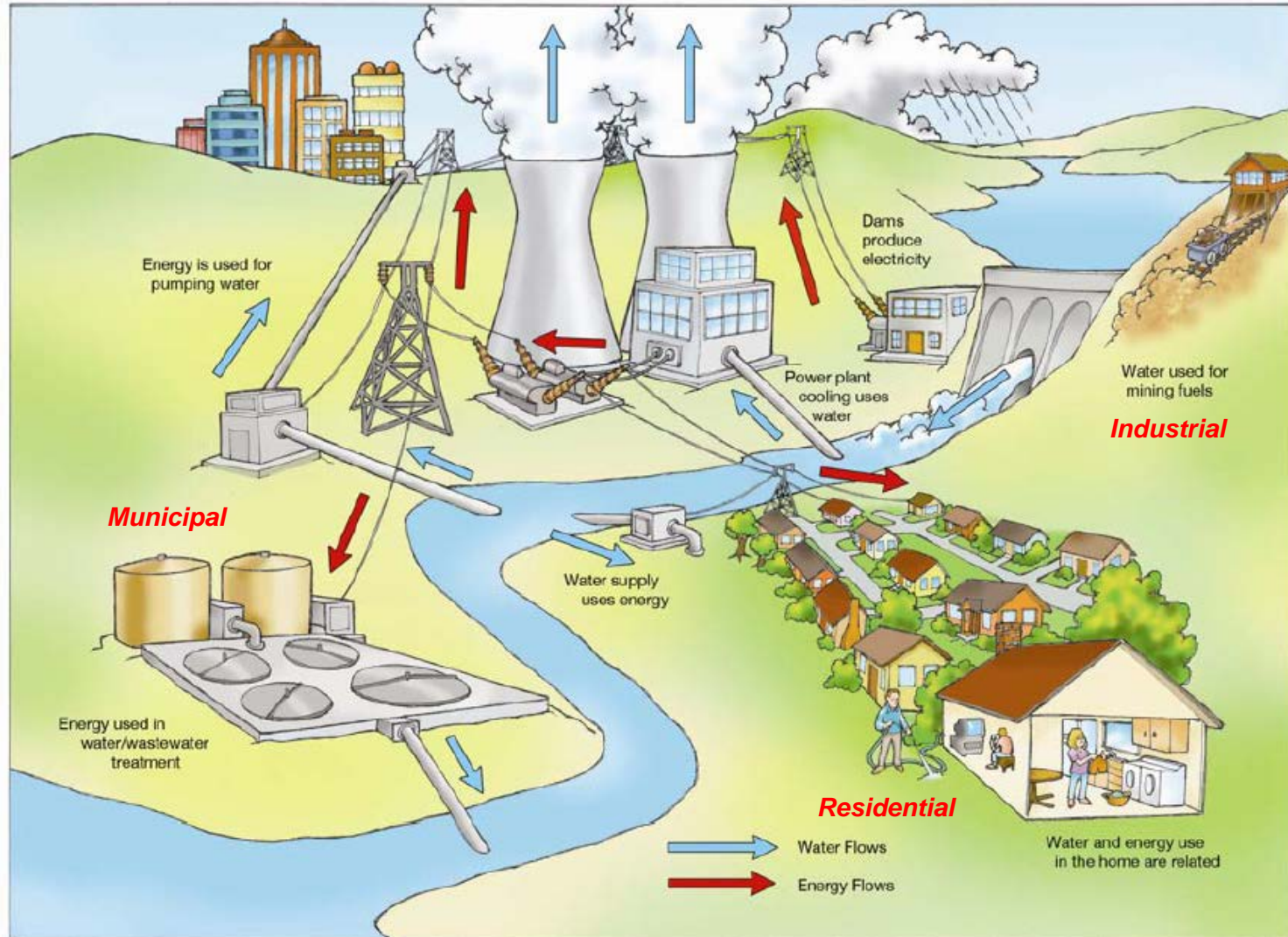
Project Attributes: Serves affordable housing; serves an emergency shelter, area vulnerable to flooding and storm damage

Critical Facilities: Hull Town Hall; Atlantic Court Housing; Public Works Garage



Water-Energy Nexus

Energy and water intersect across the value chain, and this intersection can be evaluated across the municipal, industrial, and residential sectors.



Wastewater Treatment Pilot Program

Who: Municipalities working with wastewater treatment technology providers to implement new and innovative ways to increase quality and energy efficiency of wastewater treatment plants.

What: Funding for wastewater treatment pilot projects up to \$150,000.

Goal: Supports the piloting of innovative water technologies that increase energy efficiency. Additional benefits include recovering re-usable resources or removing nutrients.

Next Round: **Accepting applications until April 30, 2018.**

Completed Projects: The Town of Amherst and Clean Membranes. Upper Blackstone Water Pollution Abatement District and Clearas.



Amherst Public Works Project

Goal: Water reuse for surface irrigation.

Objectives: 1) Cost-effectively treat municipal water effluent to irrigate athletic fields, and 2) collect data on operating costs

Pilot Duration: 4.5 Months

Results: Class A reuse standards met. 4.5m gallons of water treated. Module meets the effluent limits for the six parameters (pH, BOD5, TSS, turbidity, fecal coliform, and total nitrogen)



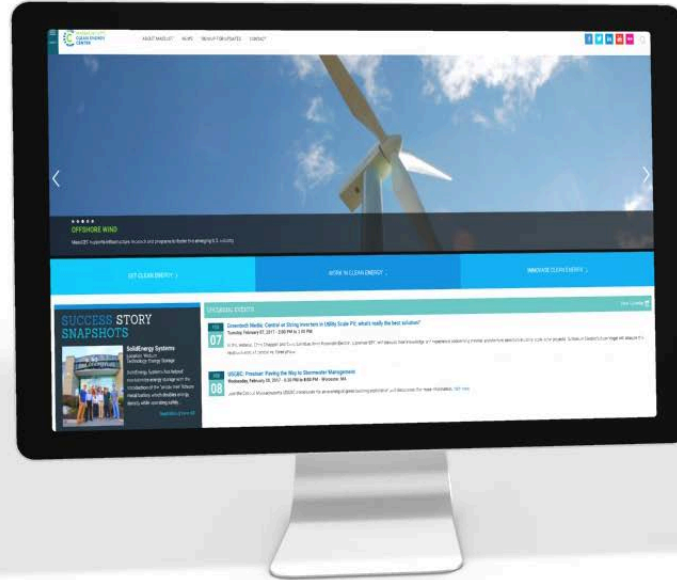
Guy Marchesseault, VP and CCO,
Clean Membranes, Inc.



Amherst Wastewater Treatment Plant and Clean Membranes Pilot Site



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