
About the Massachusetts Clean Energy Center

Presentation to the Clean Energy Caucus February 6, 2023



Team



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Mission:

The Massachusetts Clean Energy Center's mission is to accelerate the clean energy and climate solution innovation that is critical to meeting the Commonwealth's climate goals, advancing Massachusetts' position as an international climate leader while growing the state's clean energy economy.

How we approach our work:



Innovation

MassCEC supports innovation to develop new solutions to unmet challenges, and reduce cost and increase performance of existing solutions.



Workforce Development

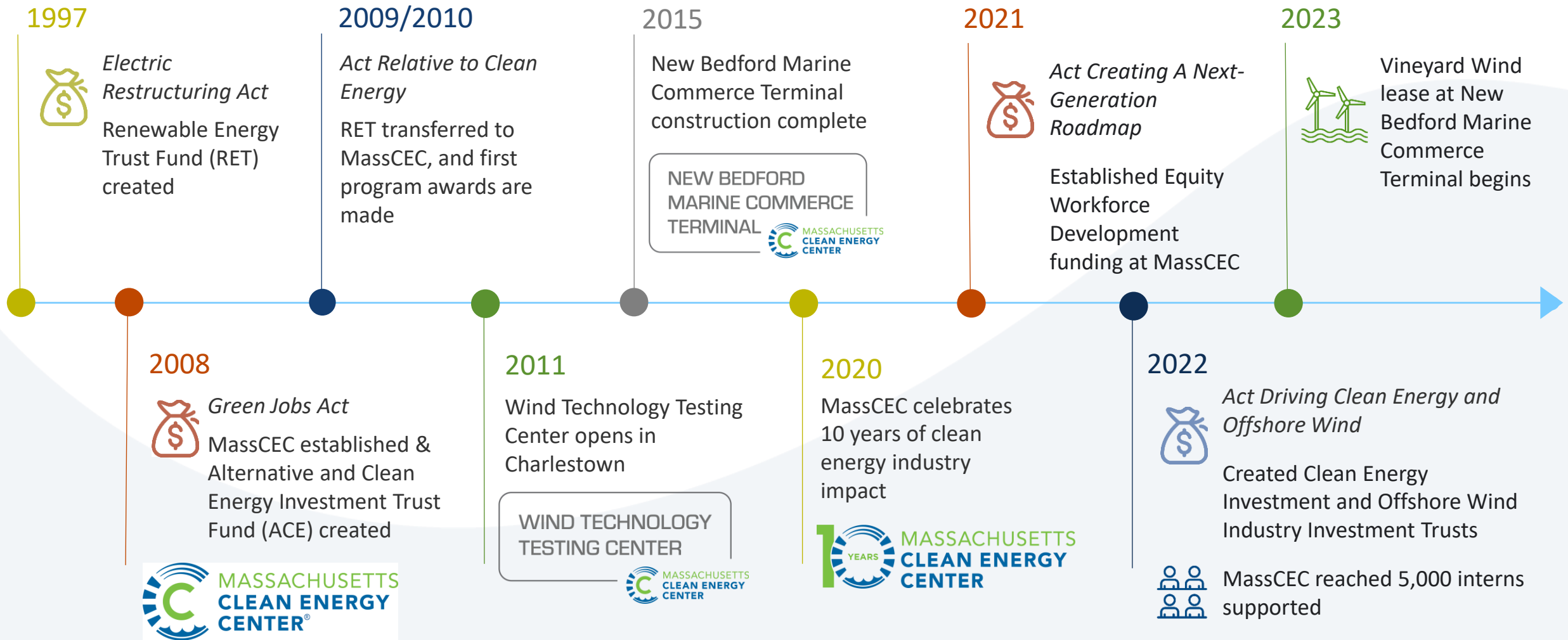
MassCEC ensures we have a diverse and equitable workforce that is trained and ready to take part in the growing clean energy industry.



Market Development

MassCEC de-risks commercially ready technologies paving the way for broad adoption, filling gaps unmet by the private sector.

Our History





MassCEC's clean energy programs and investments have awarded over **\$442M** and attracted over **\$2.5B** in private and federal capital



SINCE 2010 MASSCEC HAS:

Awarded **\$159M** for technology innovation and company growth

Enabled a **73%** increase in clean energy jobs

Awarded over **47,000** clean energy projects

Supported over **900** companies

Built the **1st** U.S. offshore wind port in New Bedford

Tested **52** wind turbine blades at the Wind Technology Testing Center



Massachusetts' Clean Energy Industry is Robust

44,000 direct jobs added since 2010, totaling **104,000+** workers in 2022

Economic contribution of **\$1.8B** in state and local taxes, and **\$3.5B** in federal taxes in 2022

\$14.2B contributed to the Gross State Product in 2021



MassCEC has Trained Tomorrow's Clean Energy Workforce

5,400+ college and vocational internships

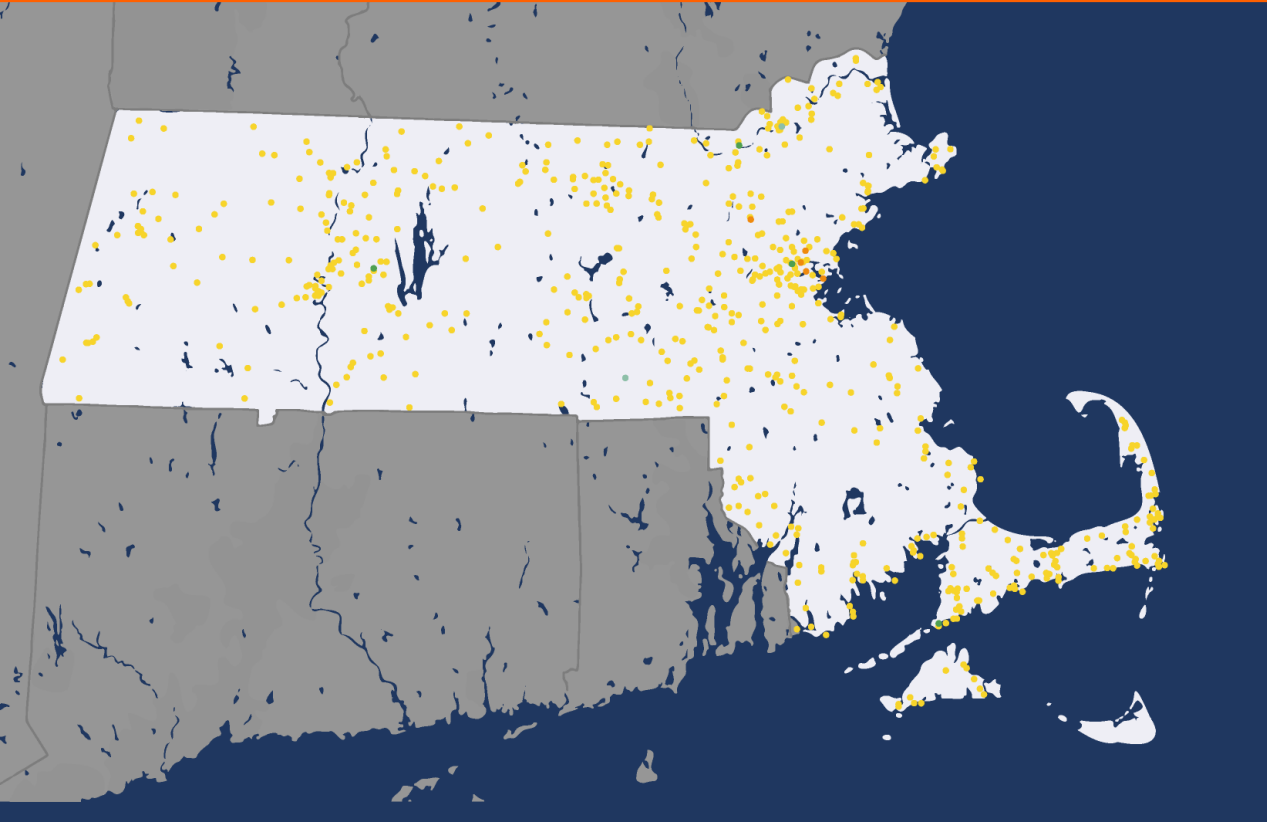
600+ employers offering internship opportunities

3,600+ certificate trainees

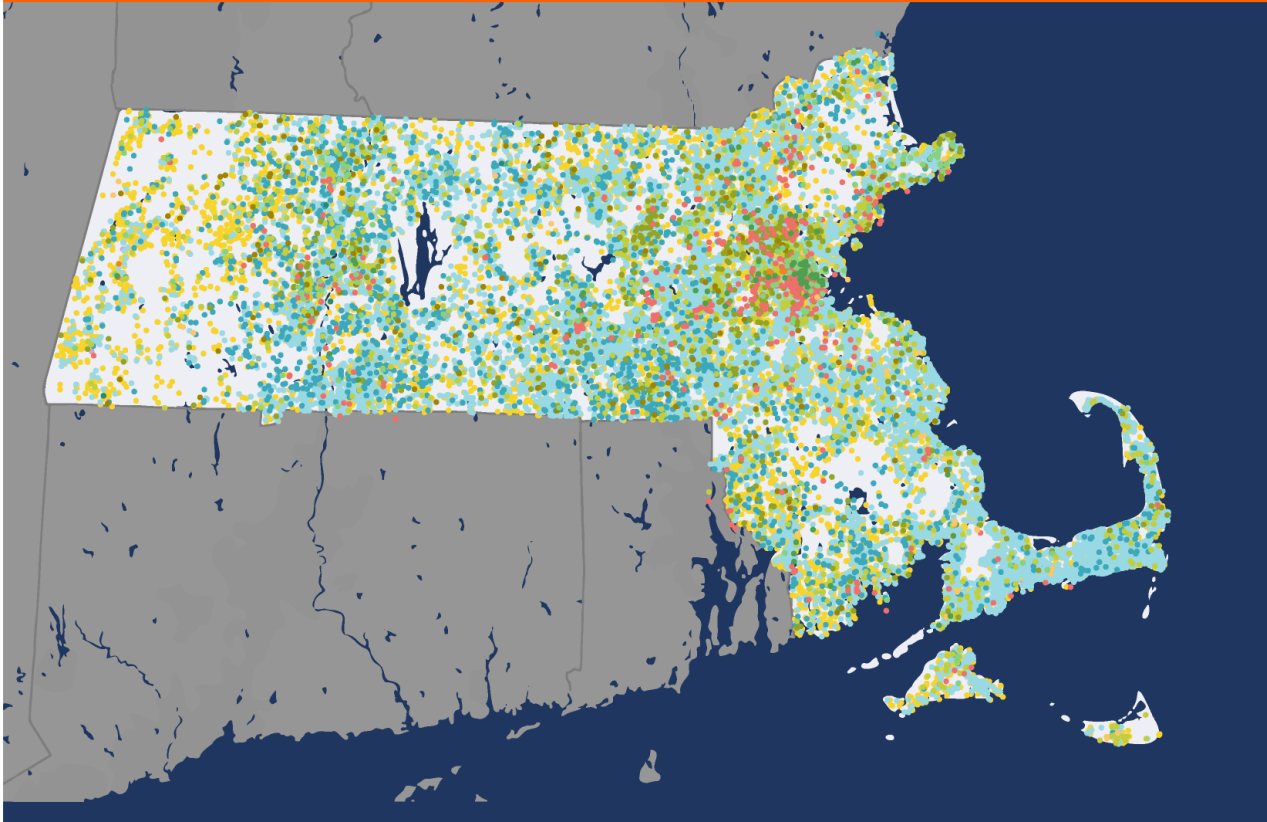
64% of interns are women or minorities

MassCEC Support for Clean Energy Projects

2010



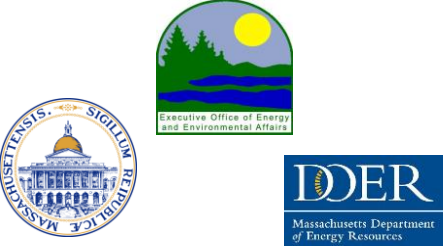



2022



Program Type

- Air Source Heat Pump
- Workforce Development
- Woodstove Changeout
- Wind
- Automated Wood Heat
- Solar Hot Water
- Solar Electricity
- Research & Prototyping
- Organics to Energy
- Hydropower
- Ground Source Heat Pump
- Demonstration & Acceleration
- Commercialization & Growth
- Variable Refrigerant Flow Heat Pump

Four Key Roles In Massachusetts Climate & Clean Energy Landscape

Policy Frameworks	Innovate, Collaborate, Demonstrate	Regulate Utilities	Implement Proven Solutions
 <p>Legislature/EEA/DOER What do we need to do?</p> <p>Establishes long-term goals and set policies to help achieve those goals (e.g., Net-zero by 2050; 5,600 MW of offshore wind by 2027; Renewable Portfolio Standard)</p>	 <p>MassCEC How do we do it?</p> <p>Works at the intersection of the public and private sector to kick start new markets, invest in new technologies and train workforce.* De-risks models paving the way for broad adoption and leverage private capital (e.g. MassSave incentives and private market adoption)</p>	 <p>DPU Who pays for it & how much?</p> <p>Works to ensure reliable electricity service at lowest possible cost. Reviews utility plans and determines how much the utilities can charge for a particular product, investment or service.</p>	 <p>Utilities/Mass Save How do we distribute solutions to as many electricity customers as possible?</p> <p>Once proven solutions are identified, utilities, Mass Save, and private sector administer at scale (e.g., energy audits, rebates for insulation, and high efficiency appliances).</p>

* In addition, Executive Office of Labor & Workforce Development is focused on workforce development

MASSCEC's Unique Role

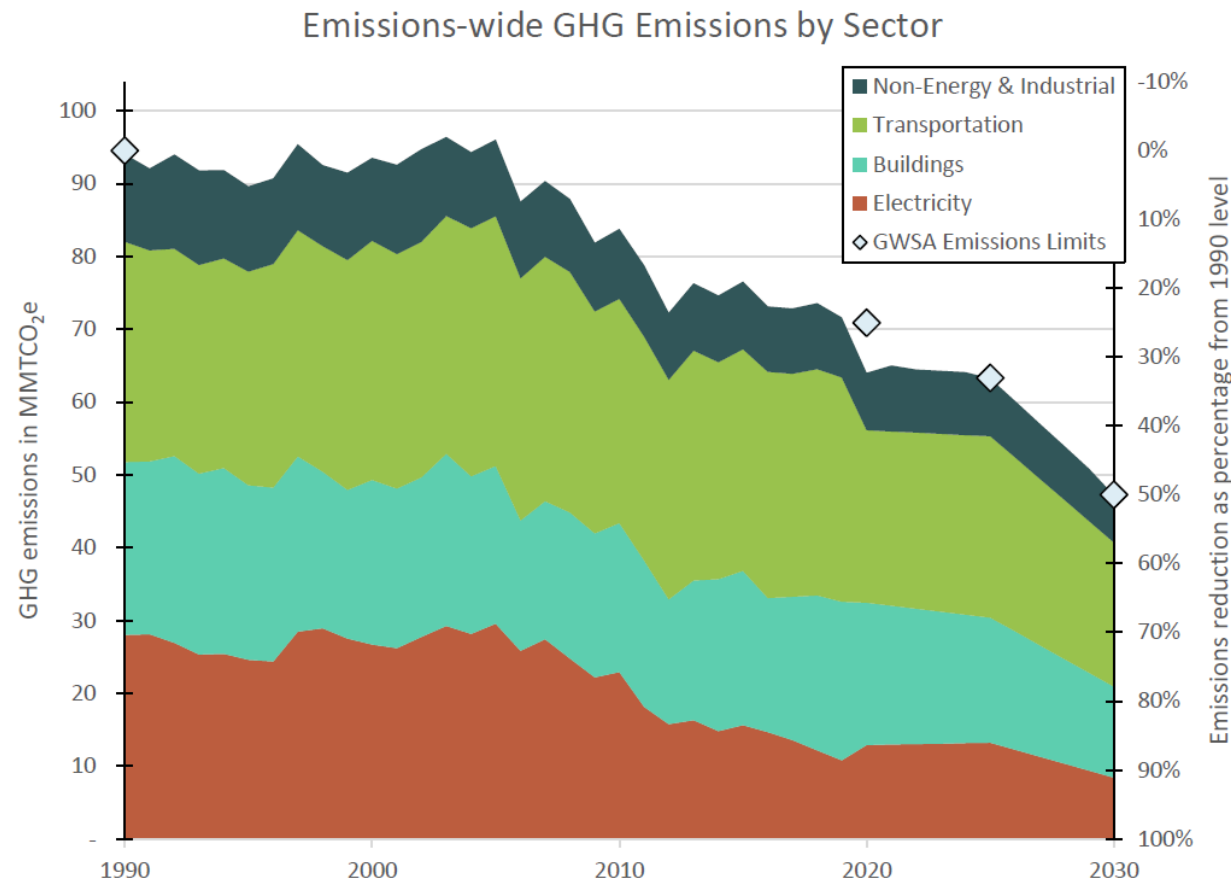
MassCEC works by:

- Confronting our most difficult climate challenges
 - Understanding barriers
 - Addressing barriers and gaps in marketplace
- Utilizing program design excellence
- Leveraging private and federal capital
- Centering equity and environmental justice
- Bridging public and private sector – trusted relationships

Efforts are focused on:

- Alignment with state's climate goals & hardest to decarbonize sectors
- Growing clean energy economy and workforce
- Equitable access to benefits of clean energy and jobs

Figure ES.1. Historical and Modeled GHG Emissions and Statutorily Required Emissions Reduction

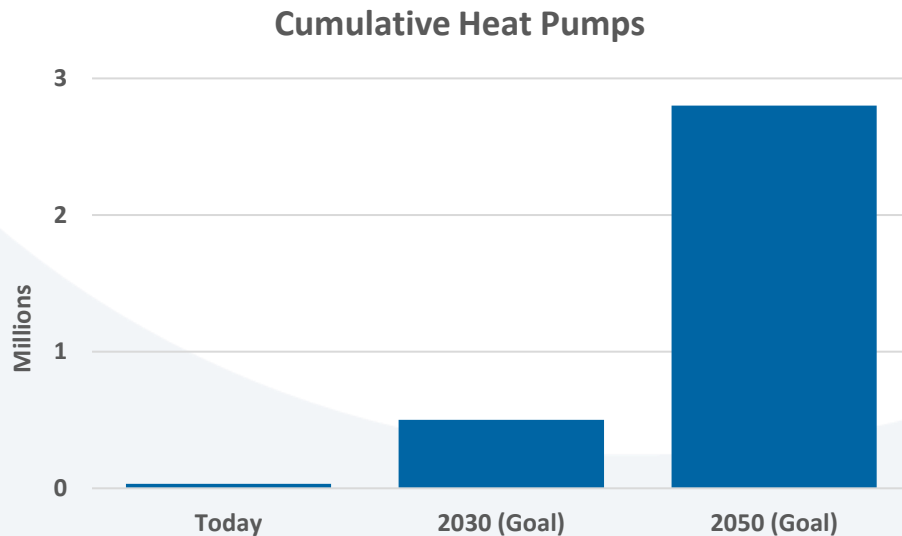


Programs: Informed by State Targets

THE CLEAN ENERGY AND CLIMATE PLANS OUTLINE TARGETS:

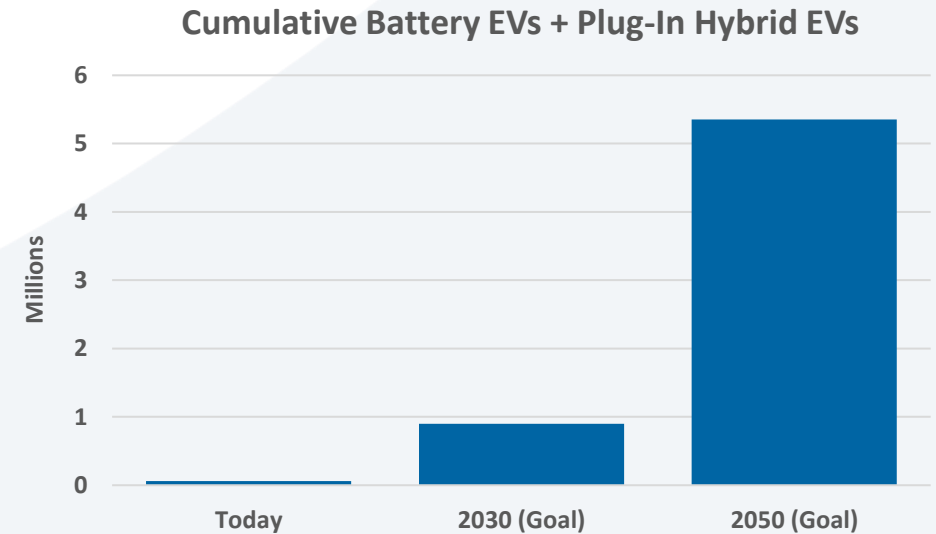
Buildings

Today: <35,000 heat pumps
2030 Goal: 500,000 additional heat pumps
2050 Goal: >2,800,000 homes with heat pumps

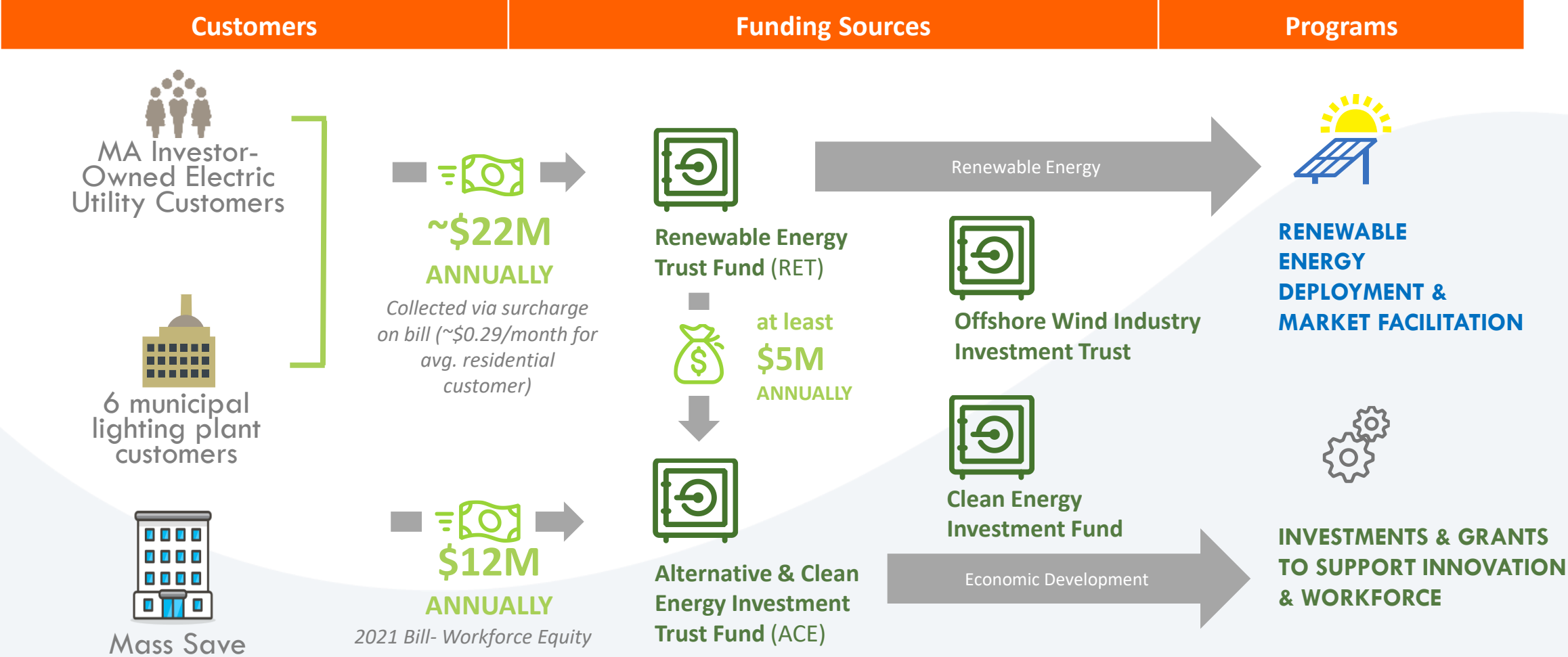


Transportation

Today: <60,000 EVs as of Q3 2022
2030 Goal: 900,000 total EVs
2050 Goal: 5,350,000 total EVs



How MassCEC is Funded



Other Revenue:

- The Wind Technology Testing Center and the New Bedford Marine Commerce Terminal have revenue from third party customers.
- The Production Tracking System and associated work is fully reimbursed by the Department of Energy Resources.

Putting Recent Funding to Work

OSW Ports and Infrastructure Awards*	\$180,000,000
➤ Crowley Wind Services LLC / City of Salem (co-applicants)	\$75,000,000
➤ Prysmian Projects North America, LLC	\$25,000,000
➤ New Bedford Port Authority	\$15,000,000
➤ New Bedford Foss Marine Terminal, LLC	\$15,000,000
➤ Shoreline Offshore LLC	\$4,639,200
➤ Gladding-Hearn Shipbuilding Corporation	\$360,800
➤ New Bedford Marine Commerce Terminal	\$45,000,000

*Made in December 2022

OSW Career Training	\$13,000,000
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- 9 total awards made to institutions and unions across the Commonwealth

Networked Geothermal	\$5,000,000
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- Awarded in 2022, project underway

Workforce- Equity / MWBE	\$12,000,000
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- Annual funding, \$3.6M awarded in 2022

Clean Energy Investment Fund	\$50,000,000
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- Planning underway

INNOVATION: MassCEC's Work in Practice – Spotlight on Technology Development and Investment Programs



Ascend Elements Funding Support

Challenge: What to do with all the used lithium-ion batteries created through energy storage and electric vehicles?

MassCEC Approach: MassCEC provided grants and investments to Ascend Elements, which developed a process to recycle lithium-ion batteries, creating a recycled material that has excellent performance at a low price.

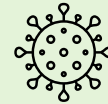
“MassCEC stepped up to ensure our success in 2020 when the rest of the market had pulled back. They recognized the importance of our model before most others did, and their well-timed support was crucial to getting us where we are today.”

- Mike O'Kronley, CEO of [Ascend Elements](#)

Initial Results



Awarded via Tech Dev Programs
+ Company Investment



Sustained through
COVID-19



Due to MassCEC support, leveraged
private capital 27:1, raising over \$90M

Broader Impacts

MassCEC's support helped sustain the company at times when funding was most critical:



Building new
factory in the U.S.



2 car company
deals



Awarded 2 DOE
grants for \$480M



Created 23+
jobs in MA

MARKET DEVELOPMENT:

MassCEC Infrastructure: New Bedford Marine Commerce Terminal

- 1st purpose-built OSW port in the U.S. for project staging, pre-assembly, and installation
- Design based on European OSW ports; engineered to sustain loads comparable to highest capacity ports
- 30-acre facility, 1200' quayside, and 300' wide deep draft channel
- Leases:
 - Vineyard Wind
 - Mayflower Wind
- Capital improvement initiative underway to ensure facility can accommodate the rapidly expanding scale of turbines and projects



MARKET DEVELOPMENT:

MassCEC Infrastructure: Wind Technology Testing Center

- Opened in 2011 in Charlestown, MA
- Built with DOE funding and state match
- Only commercial-scale wind blade testing facility in North America (1 of 6 in the world) to test blades up to 90 meters
- Simulates the 20-year life-cycle of a blade and tests against hurricane force winds
- Helps industry drive blade design innovation to:
 - Increase energy produced per turbine
 - Decrease cost and environmental impact of blades
- Has tested 50+ blades and run 35 distinct blade testing programs



MARKET DEVELOPMENT:

MassCEC Infrastructure: Wind Technology Testing Center

FUTURE OF WTTC

Expansion Needs:

- Expansion of the facility to accommodate blades up to 150m is necessary to maintain competitiveness and keep pace with technology demand from OEMs.
- Cutting-edge blade testing in the US is essential to supporting the offshore wind domestic supply chain.
- Shipping blades is cost-prohibitive. Europe and China are actively expanding their blade testing for longer blades.
- Without WTTC, OEMs will send their next generation blades to Europe or China for testing.
- WTTC is a resource for innovation and research, contributing to our offshore wind leadership.

Expansion Status:

- Initial design work completed
- Total cost estimate: \$60-70M



Proposed expansion

MARKET DEVELOPMENT: MassCEC's Work in Practice Spotlight on Buildings

Passive House Design Challenge

Challenge: Industry assumed that highly efficient Passive House projects are expensive.

MassCEC Approach: Demonstrated that Passive House affordable housing multi-family new construction can be built with minimal incremental cost and that built Passive House projects in the northeast use half or less energy as comparable, code-built buildings.



Cambridge Finch – 98 units

Program Results



\$1.8M
Awarded



8 Projects totaling
540 units



86 developer &
architect collaborations



2.4% avg. incremental
cost for PH

Broader Impacts

De-risked concept of PH, leading to dramatic increase in PH design and construction:



Now Mass Save incentivizes PH and there are 10,000+ units in pipeline



Added PH incentives to tax credit program

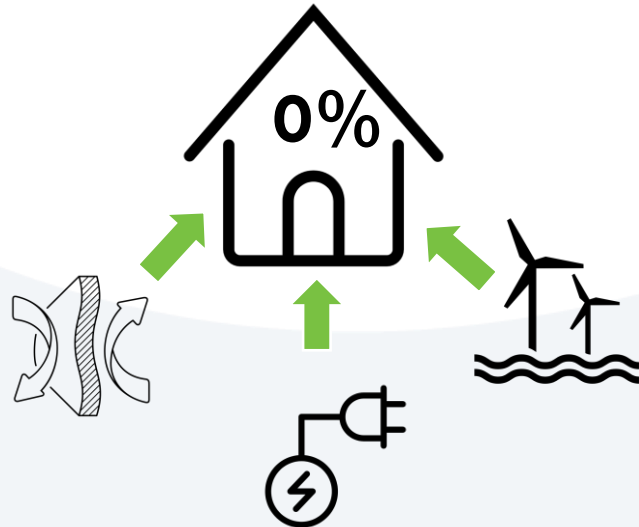


Stretch Code requires PH for multifamily buildings

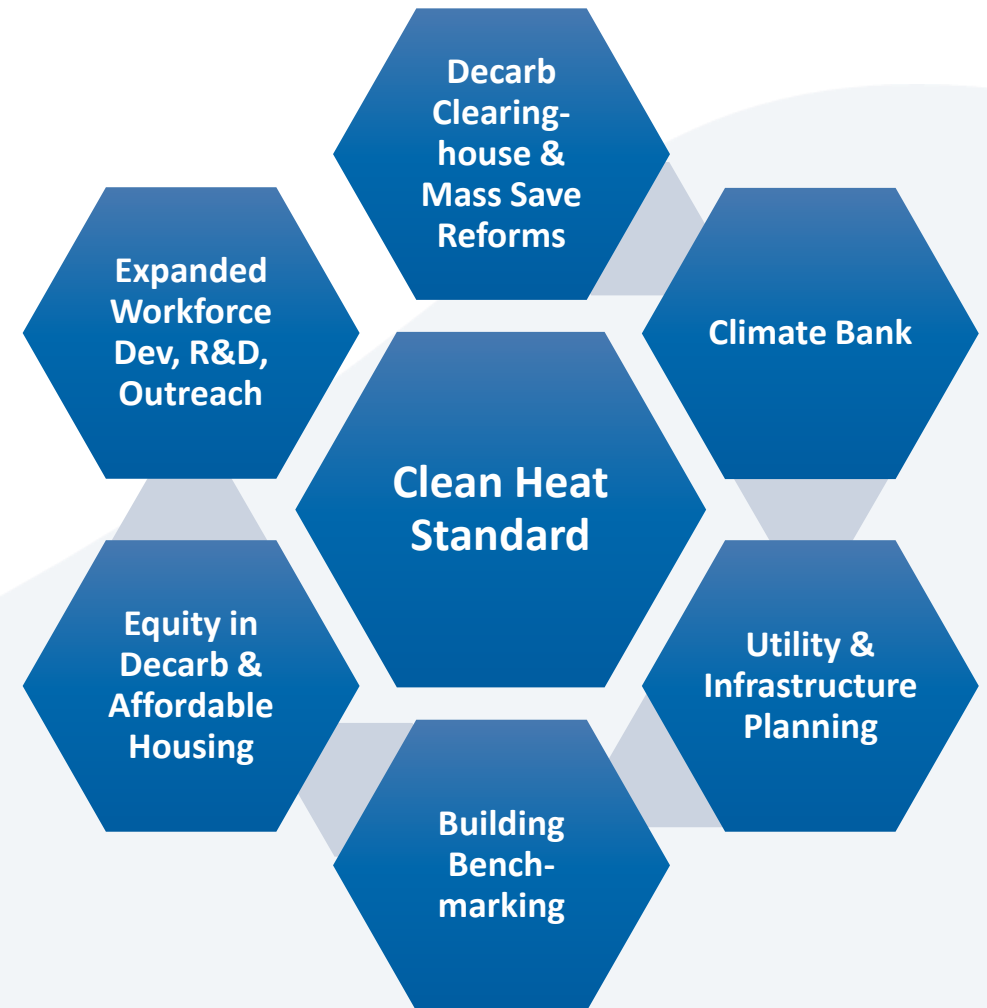
Key Developments in Building Decarbonization

- ▶ Massachusetts has a strategy for decarbonizing our buildings
 - ▶ 2025, 2030, 2050 Clean Energy & Climate Plans
 - ▶ Clean Heat Commission Recommendations
 - ▶ Boston's BERDO 2.0

Efficiency, Electrification, Clean Energy



Clean Heat Commission Recommendations



MassCEC's Building Decarbonization Initiatives

Core Building Decarbonization Programs

BETA
Programs

Climate
Finance

EmPower

Clean Energy
Lives Here

Embodied
Carbon

- Since 2013, MassCEC's Buildings programs have laid the groundwork for decarbonizing the building sector, including how to:
 - electrify existing buildings
 - take a "whole building" approach
 - finance building transitions
 - facilitate clean energy adoption in EJ communities
- MassCEC's flagship buildings programs provide basis for upcoming policy actions
- Buildings staff preparing to support transformational initiatives in 2023/2024



Clean energy jobs represent **3%** of all jobs in MA



59% of firms are small businesses (≤ ten workers)



Companies represent more than **\$14 billion** in Gross State Product (GSP)



Industry GSP increased by **\$5.1 billion** since 2012, a **55%** increase that outpaced growth in MA's overall GSP, which grew by **43%** over the same time



While Boston is a hub for clean energy, **70%** of clean energy workers are based outside of Route 128



71% of workers are employed in the Energy Efficiency, Demand Management, and Clean Heating and Cooling sector



MA has **4%** of all clean energy jobs in the U.S., while being home to only **2%** of the country's population.

Sub-sectors that experienced the greatest rate of job growth between 2021 and 2022 reports



Electric Vehicles **26%**



Wind **7%**



Smart Grid **6%**



Solar **5%**

CLEAN ENERGY INDUSTRY HIGHLIGHTS

CLEAN ENERGY INDUSTRY JOBS

Since 2010, the Massachusetts clean energy industry has experienced:

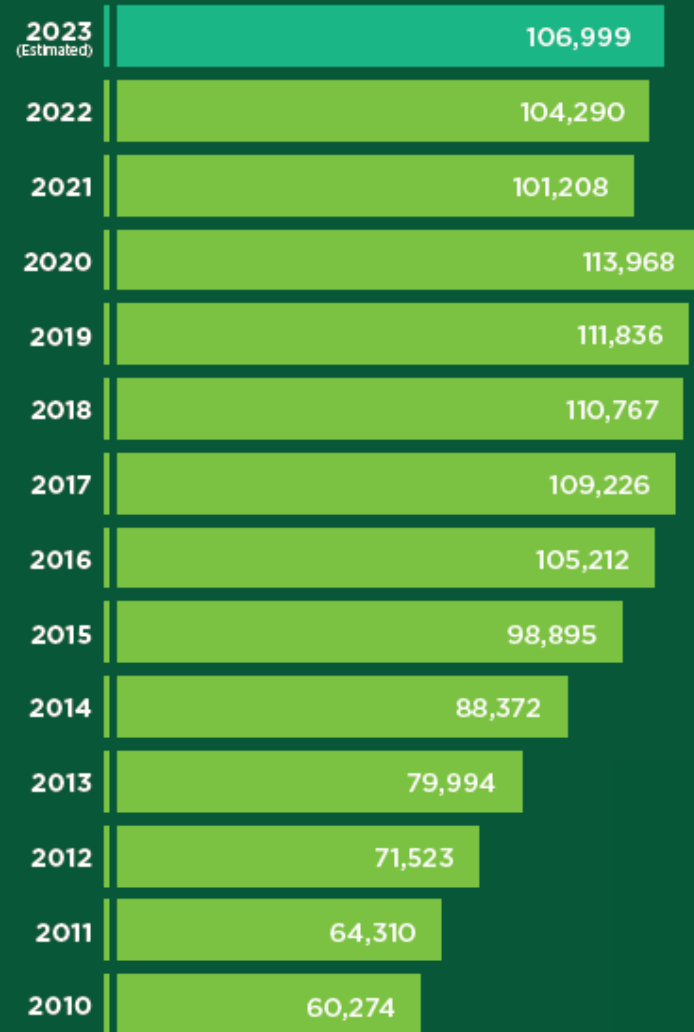
73%
job growth

ADDING

44,016
new workers

65% of clean energy jobs have been recovered from the height of COVID-19 job losses in Massachusetts
(*estimated as of September 2022)

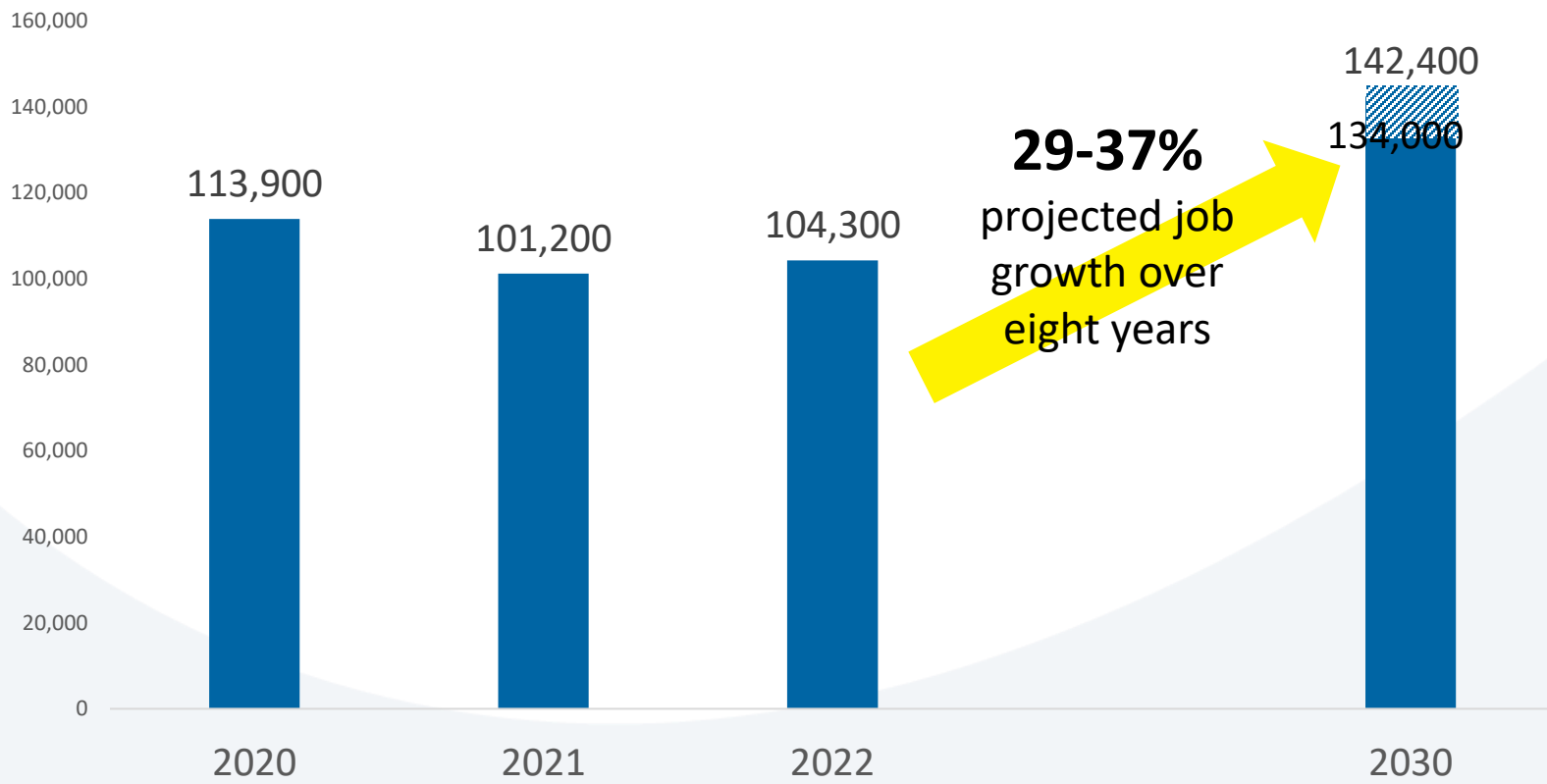
TOTAL CLEAN ENERGY EMPLOYMENT REPORT YEARS 2010-2022



The 2022 report job numbers were collected as of December 2021. The 2023 estimated report job numbers are based on a separate methodology and were calculated as of September 2022.

Our Clean energy workforce Today & Tomorrow

MA Clean Energy Jobs



Clean energy sector employers are already citing **insufficient employee pipelines as a limiting factor** slowing growth

Many of the **fastest growing jobs** in the clean energy industry from Electricians to Plumbers to General Managers are also growing in the broader economy and have **existing supply gaps**.

Strong numbers of new entrants to the industry are needed. Training providers consistently report recruitment challenges, and many programs have unfilled seats.

Sources: 2021 MA Clean Energy Industry Report and preliminary data from forthcoming Clean Energy Workforce Needs Assessment from BW Research

Workforce Development: MassCEC's Role

Increase equitable opportunities for residents to access the clean energy industry:

- Support programs in under-resourced communities
- Connect community-based organizations and training providers with employers
- Develop programs responsive to feedback from the communities and individuals we seek to engage

Support Clean Energy Employers:

- Expand awareness and increased use of existing workforce programs

Build capacity within existing systems:

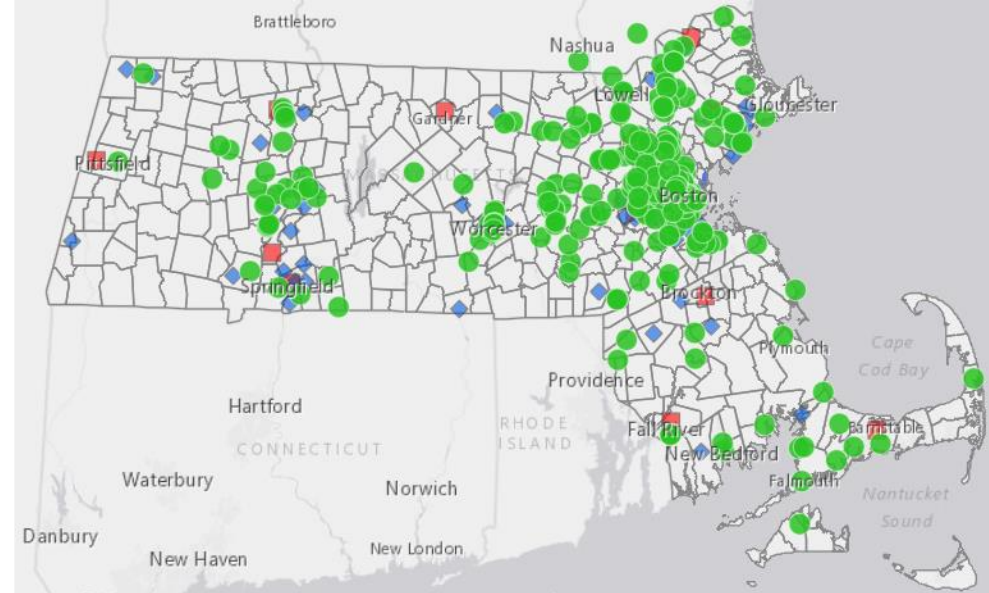
- Understand industry trends
- Form partnerships
- Develop and revise curricula to address skills needs
- Expand support services to broader populations

WORKFORCE DEVELOPMENT: MassCEC's Work in Practice –

Clean Energy Internship Program

Challenge: MA clean energy businesses, many of which are small, need help accessing robust talent pipelines to remain competitive with more established industries with stronger career awareness.

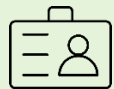
MassCEC Approach: MassCEC developed the Clean Energy Internship program to expand paid career exploration opportunities among students and provide clean energy employers with an active marketplace to discover talent and funding to subsidize internships.



“MassCEC’s Clean Energy Internship Program has a generational impact on clean energy careers and enables talented students to stay in Massachusetts.”

- Matthew Nordan, Managing Director at Prime Impact Fund

Program Results



5,459 Internships Supported



600+ Unique Employers



64% of Participants are Women and Minorities



\$26.5M+ Awarded and **\$6.8M+** Leveraged

Broader Impacts



1,033 Interns Hired Permanently



Tool for **64%** of employers that are smaller, with fewer resources, to access and diversify new hires

DEI

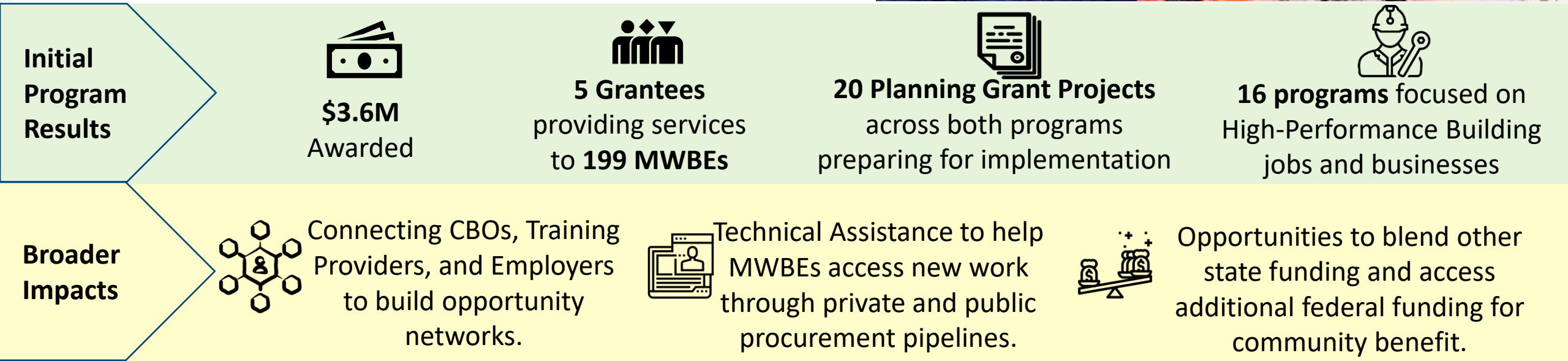
Increased engagement on diversity, equity, and inclusion training

WORKFORCE DEVELOPMENT: MassCEC's Work in Practice –

Workforce Equity Programs

Challenge: To achieve and sustain the Commonwealth's climate goals, Massachusetts needs a robust, well-trained, and inclusive clean energy workforce.

MassCEC Approach: MassCEC paired equity workforce training and support programs for minority and women-owned businesses. These programs will yield an increasingly diverse bench of highly trained new workers and a wider array of thriving minority and women-owned business enterprises to help lead climate-critical work.



Questions