KEY FACTS

On the Road to 100 Percent Renewables for Massachusetts

Building on the Massachusetts Climate Roadmap

With the right policies and priorities, Massachusetts can meet its electricity needs completely and equitably with renewable energy by 2035 and dramatically reduce its use of fossil fuels in vehicles and buildings.

✔ **Less fossil fuel generation = better health**
More than **$1.7 billion** in public health savings by 2040

✔ **More renewable energy = more jobs and other economic benefits**
$6.8 billion in net labor income by 2040

✔ **We must act now to avert the worst of climate change**
An **85 percent** drop in heat-trapping emissions from the power sector between 2020 and 2040

✔ **A clean energy future for all**
To advance racial and economic justice in the transition to clean energy, Massachusetts policymakers must ensure **traditionally excluded groups**—including Black, Brown, Indigenous, immigrant, and low-income communities—and fossil fuel–dependent workers **have power in decisionmaking**, and receive direct benefits from the transition.

GreenRoots

Union of Concerned Scientists

Massachusetts Needs a Renewable Electricity Future—and It Is Possible

Climate change already affects Massachusetts, and insufficient action to address this crisis will mean more harm to the state's residents. Rising sea level is expected to expose nearly 3,000 homes along the coast—worth about $2 billion today—to chronic flooding during high tides (Dahl et al. 2018). In Boston, in a worst-case scenario, sea level could rise more than 7 feet above 2000 levels by this century's end (Sweet 2022).

To act on climate change, Massachusetts must eliminate heat-trapping emissions from how we generate electricity. At the same time, the state must convert transportation, heating, and other sectors to run on carbon-free electricity instead of fossil fuels.

In considering the path forward, Massachusetts must account for effects of our energy choices beyond climate change so that the benefits of cleaning our electricity grid reach everyone. Specifically, the transition to clean energy must end historic inequities that have overexposed low-income communities and communities of color to air pollution.

Recognizing the urgent need for action, the 2021 Climate Roadmap law commits the Bay State to net-zero emissions across the economy by 2050. As the state decarbonizes its economy, the electricity sector plays a key role given the adverse climate and health consequences of burning gas[1] and other fossil fuels to generate electricity, and given the importance of electrifying heating and transportation. Proposed legislation would commit the state to transition to 100 percent clean electricity by 2035 and 100 percent clean heating and transportation by 2045, steps that would rapidly decrease heat-trapping emissions and air pollution.

Nikolai Hamel/Alamy

As Massachusetts decarbonizes its economy, the electricity sector plays a key role given the adverse climate and health consequences of fossil fuel–fired power plants (such as the gas-fired Mystic plant in Everett, one of the state's most polluting facilities). Our modeling research shows that Massachusetts can meet 100 percent of its electricity needs by 2035 using renewable resources.

The Union of Concerned Scientists partnered with GreenRoots, a local environmental justice group, to explore potential pathways to reach 100 percent renewable electricity in Massachusetts on a timely basis. Using the Regional Energy Deployment System (ReEDS) electricity model from the National Renewable Energy Laboratory, we examined how a portfolio of resources under a strengthened renewable electricity standard (RES) could meet 100 percent of the state's electricity needs by 2035. Our "100% RES" scenario also modeled high levels of electrification as the state works to meet its overall climate goals given the need to decarbonize sectors like transportation and heating. In addition, we partnered with the research nonprofit Greenlink Analytics to assess how a transition to renewable energy most directly affects everyday lives, in terms of changes in public health, jobs, and household energy bills.

A Faster Move to Renewable Electricity Brings Many More Benefits

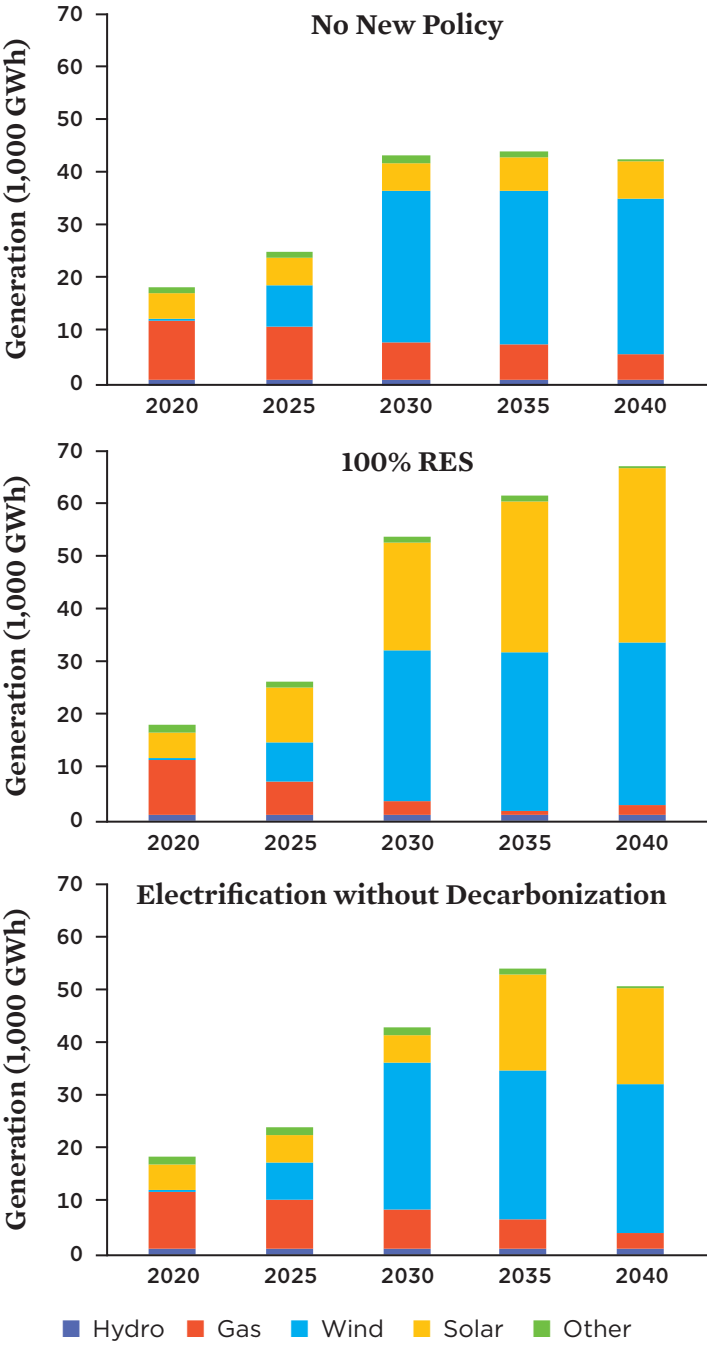
Energy Capacity and Generation

Under current policies and plans—the "No New Policy" scenario in our analysis—the state has about 7 gigawatts (GW) of wind capacity in 2040, producing about 30,000 gigawatt-hours (GWh) in that year; 4.6 GW of solar produces about 7,000 GWh. Wind and solar go from 28 percent of the state's electricity supply in 2020 to 85 percent in 2040. However, that increase displaces only some fossil fuel generation. Electricity from gas drops 56 percent by 2040.

By building out wind, solar, and batteries for energy storage more aggressively, Massachusetts can meet 100 percent of its electricity consumption with renewable energy by 2035, even with high electrification. By 2040, the 100% RES scenario yields slightly more wind, more than 7.5 GW of capacity; much of this is offshore wind capacity required by existing legislation. In addition, this scenario drives up solar capacity to nearly 17 GW and batteries to more than 4.5 GW by 2040. Wind generation rises slightly, to more than 30,000 GWh. Solar produces more than 32,000 GWh—close to five times as much as in the No New Policy scenario. Generation of wind and solar together soars from 34 percent of the state electricity supply in 2020 to nearly 100 percent in 2040, helping meet growth in electricity demand (Figure 1).

While renewable resources meet all of Massachusetts electricity consumption needs in the 100% RES scenario, gas plants continue operating. This is because the power grid in New England, like grids in much of the United States, is interconnected across states and power is exported across state lines.

FIGURE 1. Massachusetts Electricity Generation in Three Scenarios, 2020–2040



Considerable development of wind power takes place under each of the scenarios because of the state's offshore wind requirements. The 100% RES scenario, however, leads to much more solar and a faster phaseout of gas. Advancing electrification without cleaning the electricity grid perpetuates the state's overreliance on gas.

Notes: "Solar" includes utility scale and distributed solar. "Wind" includes land-based and offshore wind. "Gas" includes combined-cycle and combustion turbine. "Other" includes biopower, landfill gas, and oil-gas-steam.

TABLE 1. Health Benefits from a Renewable Energy Transition in Massachusetts

Health Impact	Cumulative Avoided Numbers, 2022–2040
Premature Deaths	170–400
Asthma Exacerbations	4,200
Lost Workdays	22,400

We also analyzed the impacts of electrifying the transportation and building sectors without cleaning the electricity grid. In this "Electrification Without Decarbonization" scenario, solar generation is 45 percent lower by 2040 than in the 100% RES scenario and fossil fuel generation is more than 60 percent higher.

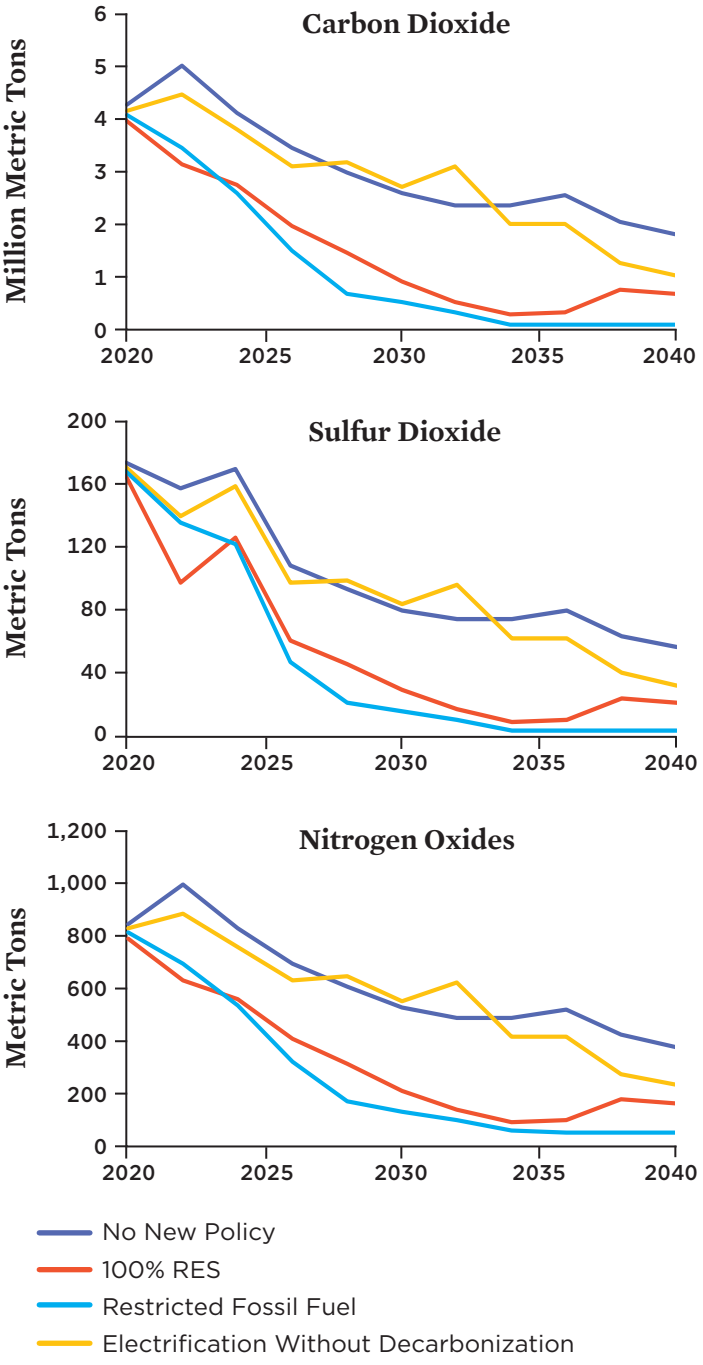
Public Health Benefits

Replacing electricity generated by burning fossil fuels with renewables in the 100% RES scenario reduces the amount of air pollution that power plants and vehicles emit, such as sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter, and mercury and other toxic pollutants. Improvements in air quality yield substantial health benefits, including reductions in lung and heart ailments, asthma, diabetes, and developmental problems in children. The avoided health impacts from the electricity sector alone would save Massachusetts more than $1.7 billion[2] in public health costs from 2022 to 2040, largely due to significantly reducing carbon dioxide (CO_2) and particulate matter pollution from power plants (Table 1).

Emissions Reductions

Cleaning up the power sector can decrease emissions of CO_2. While emissions from Massachusetts's power sector will likely decline under current plans to retire fossil fuel plants, reductions are faster and greater in a "Restricted Fossil Fuel" scenario, which limits the construction of new gas-fueled plants while the state simultaneously transitions to 100 percent renewable energy (Figure 2). This approach drastically reduces heat-trapping emissions even before 2030, saving more than a decade of harmful emissions compared with the "No New Policy" scenario. The "Restricted Fossil Fuel" scenario increases the price of electricity between 2026 and 2032, but that is without taking into account savings that come from improving public health or from reducing heat-trapping emissions almost to zero by 2035—a 98 percent reduction from the No New Policy Scenario. By contrast, pushing for electrification without a strong focus on decarbonization—the Electrification Without Decarbonization scenario—leaves power-sector CO_2 emissions close to or even higher than in the No New Policy scenario.

FIGURE 2. Emissions Reductions in Four Scenarios, 2020–2040



Renewable energy's displacement of fossil fuels leads to much faster declines in CO_2, SO_2, and NO_x pollution from the power sector and other emissions sources in the 100% RES and Restricted Fossil Fuel scenarios. The Electrification Without Decarbonization scenario maintains emissions levels close to those in the No New Policy scenario. Potential increases after 2035 under the 100% RES scenario show the importance of continued attention to sustained decarbonization.

Economic Benefits

The 100% RES scenario yields significant economic benefits, with substantial net growth in three key economic categories above those in the No New Policy scenario.

- **Jobs:** Massachusetts gains more than *180,000 additional job-years*—meaning 45,000 additional jobs[3]—in the construction or installation of new power capacity, chiefly solar, from 2022 to 2040. Thousands of additional jobs are created in most years, offsetting by far any jobs lost in retiring fossil fuel plants.[4]
- **Labor Income:** Cumulatively, labor income in Massachusetts increases *$6.8 billion* by 2040. Labor income includes wages and salaries, benefits, and payroll taxes, as well as income earned by self-employed individuals and unincorporated business owners.
- **Gross Domestic Product (GDP):** The jobs increase fuels *$13 billion* in additional growth of the state's GDP by 2040.

Affordability

Consumers must be able to afford a renewable energy transition. One key metric is "energy burden," the percentage of income a household or individual spends on electricity and gas. Based on considering only electricity and gas expenses, the average residential energy burden rises from 3.2 percent to 3.8 percent in the 100% RES scenario, compared with 3.5 percent in the No New Policy scenario in 2040, though the burden is equal or lower in the 100% RES scenario through 2035. Yet the strong electrification push in the 100% RES scenario brings substantial savings not reflected in those calculations. Those include savings for households switching to electric heat pumps from the oil or propane heating systems used by almost 30 percent of Massachusetts households (Commonwealth of Massachusetts, n.d.), and from reduced gasoline use for households switching to electric vehicles.

Recommendations: Ensuring a Just and Equitable Energy Transition

Massachusetts, like other states that pledge to reduce carbon emissions, has technically feasible and highly beneficial paths to achieving 100 percent renewable energy. A transition away from fossil fuels can yield cleaner air, better health, and more jobs. However, the outcomes can be unequitable if Massachusetts does not implement the transition with care. We must ensure that everyone reaps the benefits and that the transition does not perpetuate historic inequities in the energy sector.

Here are key recommendations as Massachusetts moves away from fossil fuels and toward renewable energy, improves affordability for low- and moderate-income households, and ensures good decisionmaking throughout:

- **Target reductions in power plant pollution.** State policy should prioritize reducing pollution in already overburdened communities, deter new investments in the infrastructure for fossil fuel power, and avoid dangerous overreliance on gas. For example, clean energy sources—offshore wind, solar, and battery energy storage—should replace generation from fossil fuel sources, such as the Mystic gas-fueled power plant in Everett, one of the state's most polluting facilities.
- **Promote just transitions for fossil fuel workers and frontline communities.** The state's last coal plant and the largest in New England, Brayton Point, closed in 2017, but several gas- and oil-fueled facilities remain. As fossil fuel power plants close, job training, income support, and other protections are key to a successful transition for workers and fossil fuel–dependent communities.
- **Broaden access to clean energy.** State policies designed to broaden access to rooftop solar, energy efficiency, and the electrification of transportation and heating should prioritize historically underserved people and communities. Although Massachusetts is a leader in energy efficiency, a high proportion of renters and non-English speakers have yet to be able to insulate their homes, upgrade their appliances, and reduce their electricity bills. In Fall River, for example, where 65 percent of homes are renter-occupied, only 13 percent of residents participate in energy efficiency services; in contrast, 46 percent of residents participate in Acton, where the median household income tops $120,000 (Shemkus 2020).
- **Reduce energy burdens.** The move to clean energy will likely reduce average residential energy costs in most or all years compared with the No New Policy scenario, but, without due attention, it could increase burdens for low- and moderate-income households at some points. The Bay State should ensure that costs incurred by electric utilities for clean energy—and legacy costs spread over declining numbers of gas users (Dyson, Glazer, and Tepin 2019)—are addressed through either targeted energy rates or statewide policies, including energy-efficiency measures to reduce consumption.
- **Develop workforce programs and entrepreneurship initiatives in renewable energy to foster high-quality, good-paying jobs.** The state should build on the efforts of the Massachusetts Clean Energy Center to advance a diverse, equitable, and inclusive workforce in the nascent offshore wind industry, expanding that commitment to other technologies. Everyone should be able to participate in and benefit from growth in the many sectors of the clean energy industry.

Walt Musial/NREL

By building out wind—primarily offshore wind—along with solar power and battery energy storage more aggressively, Massachusetts can meet 100 percent of its electricity consumption with renewable energy by 2035. As the industry takes off, initiatives to ensure a diverse clean energy workforce are needed now more than ever.

- **Ensure that frontline communities have power in decisionmaking.** The Massachusetts Environmental Justice Council, required under the 2021 Climate Roadmap law, will illustrate how to give decisionmaking power to historically sidelined communities (Noor 2022). The Baker administration should set up a well-qualified Council in the very near term.
- **Target transmission additions and "non-wires" alternatives at reducing reliance on urban-based fossil fuel plants.** Responsibly sited electric transmission and non-wires alternatives, such as distributed generation, energy storage, and energy efficiency, are needed to expand renewable electricity, accelerate the closure of fossil plants, and mitigate the harms in communities most exposed to power plant pollution. Legislators and other state leaders should enact policies that promote equitable siting while advancing clean energy.
- **Ensure sustainable and responsible life cycles for clean energy technologies.** Massachusetts should encourage responsible supply chains, incentivize the use of local manufacturers of renewable equipment, and enact policies to require recycling and reuse opportunities statewide.
- **Support strong federal policies.** State leaders should advocate for a strong national clean electricity standard to accelerate decarbonization in *all* states and drive a swift transition to a clean, carbon-free electricity system.

This fact sheet is part of a multi-state analysis of the potential effects of bold clean energy action by leadership states. Learn more at www.ucsusa.org/resources/road-100-percent-renewables.

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Endnotes

1. "Gas" in this document refers to what is traditionally called natural gas.
2. Findings from our analysis are expressed in 2020 dollars.
3. A job-year is defined as a full-time position held by one person for one year. A person holds a job for an average of four years (BLS 2020).
4. Massachusetts fossil fuel–fired power plants employed 6,200 people in 2021 (DOE 2021).

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GreenRoots is a community-based organization dedicated to improving and enhancing the urban environment and public health in Chelsea and surrounding communities. We do so through deep community engagement and empowerment, youth leadership and implementation of innovative projects and campaigns.

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