Embedding Equity into Energy Regulatory Decisions

Authors:

Bryndis Woods, PhD

Sachin Peddada
Sagal Alisalad
Jordan Burt
Elisabeth Seliga

Tanya Stasio, PhD
Eliandro Tavares
Grace Wu
Elizabeth A. Stanton, PhD

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Image Credit: J. Scott Applewhite/AP

Executive Summary

Reliability and equity are equal co-foundations necessary to provide high-quality energy services. Reliability planning cannot be successful if energy projects are considered in a vacuum, without accounting for—and consulting with—impacted communities; meaningful community engagement must be "baked into" the evaluation and planning process and not just sprinkled on afterward. Credible energy system reliability assessments include explicit consideration of both reliable customer service and equitable outcomes. Energy system investments aimed at enhancing reliability cannot ignore expected impacts and policies related to climate change, evolution of the energy system over time, or the likely equity impacts of these changes.

This Applied Economics Clinic report, prepared on behalf of the Environmental Defense Fund, analyzes the inextricable links between energy system reliability and equity issues. The report assesses how regulators, legislators, city councilors, and other decision-makers should account for equity when making decisions regarding system reliability and provides recommendations to help decision-making bodies change in ways that have the potential to enhance equitable outcomes.

This report lays out eight core tenets of credible and equitable energy system reliability investments (see Table ES-1), driven by data and informed by the lived experiences of on-the-ground activists and advocates for more equitable energy systems throughout New England. Each of the core tenets is detailed, analyzed from an equity perspective, and accompanied by case studies presented through the lens of the corresponding attribute of credible and equitable energy system planning.

A common theme across the real-world experiences of the advocates discussed in this report is the ways in which community engagement efforts in energy system decision-making often fall short of creating real change in energy sector decisions, and environmental justice and other under-resourced and underserved communities are often left out and left behind in decisions that directly disproportionately harm the health and wealth of their communities. Existing channels for soliciting public input remain exceedingly opaque, convoluted, inaccessible, and, ultimately, ineffective at representing communities' needs in energy decision-making.

Another common thread across the experiences of advocates for more equitable energy systems is the critical role played by decision-making bodies like the Federal Energy Regulatory Commission, grid operators, Governors and state legislatures, and state and city agencies involved in energy system decisions, like Public Service Commissions, Departments of Environmental Protection, and Siting Boards/Councils. The final section of this report outlines how these decision-making bodies could change in ways that have the potential to benefit equity in decision-making about reliability, such as by enhancing consumer and community representation or strengthening equity and environmental justice policy mandates.

Table ES-1. Accounting for equity in reliability assessments

I.	**Accelerating climate change impacts and worst-case scenarios**: Climate change has rapid and unpredictable impacts. Underserved communities suffer the first and worst impacts of climate change. These communities are the most vulnerable to energy service disruptions, the most burdened by fossil fuel infrastructure and pollution, and the most burdened with current-day energy costs. Energy system planning must account for the unprecedented nature of rapidly shifting climatic conditions.
II.	**Greenhouse gas emission reduction requirements**: An equitable distribution of costs and benefits of emission reduction measures is necessary for the transition away from fossil fuels to a clean energy economy. This will have the greatest positive impact on underserved communities experiencing the brunt of pollution from facilities that are retired or never built.
III.	**Increasing penetration of renewable energy and energy storage**: The financial and personal costs of power outages primarily falls on workers, commuters, low-income households, and patients reliant on medical equipment. Reducing outage frequency by increasing access to renewable energy resources and storage can benefit to residents in underserved communities. Energy system assessments must account for the existing distribution of benefits and burdens from renewable generation in addition to potential disruptions and negative impacts that would be created by a proposed project.
IV.	**Increasing amounts of distributed energy resources**: Distributed energy resources reduce energy bills and enhance energy resiliency and reliability, which provide the greatest benefit to low-income and other underserved households. Credible reliability assessments account for the development of distributed energy resources that can facilitate an equitable distribution of both the costs and the reduced risks of power shutoffs.
V.	**Energy efficiency potential**: Reducing energy use lowers efficiency program participants' bills. Underserved populations tend to have worse indoor and outdoor air quality and benefit most from improved air quality from energy efficiency measures. Pursuing energy efficiency not only enhances system reliability, but with careful and inclusive planning, can provide deep equity benefits.
VI.	**Increasing levels of electrification**: Equity benefits of widely available and affordable electrification include safer buildings with improved air quality, and lower utility bills from more efficient technologies. If high upfront costs for low-income and other underserved populations persist, customers unable to make the switch from gas will face a greater energy burden. Credible and equitable reliability assessments account for both increasing levels of electrification and customer cost barriers to electrification.
VII.	**Volatile gas prices and flat gas demand**: Rising gas prices have the greatest impact on already energy-burdened and low- to moderate-income households. As gas costs increase, more customers will electrify, leaving those who cannot afford to shouldering the costs of the entire gas system.
VIII.	**Meaningful, influential, and inclusive community engagement**: The inclusion of communities that are disproportionately affected by environmental hazards and energy burdens in decision-making promotes fairness and a full understanding of the benefits and costs experienced by the communities most impacted by reliability issues.

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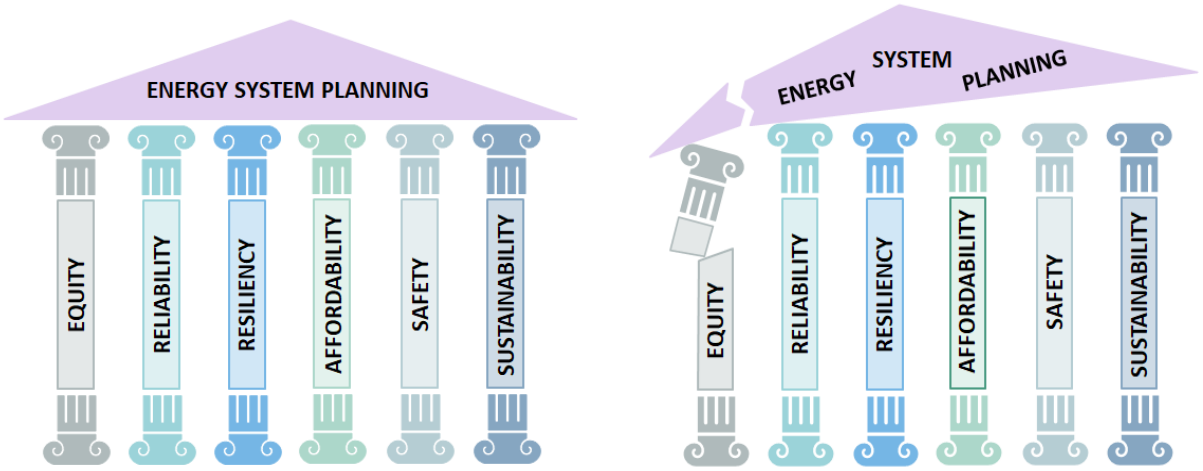
1. Introduction

As climate change accelerates and its adverse impacts worsen, damage and disruption to our energy systems have become commonplace. The resulting costs of these harmful impacts, however, are not distributed evenly across all members of society. Adverse weather events—such as the 2021 winter storms in Texas—and their destructive consequences demonstrate gaping inequities in energy system reliability. As illustrated by the case in Texas, climate change events inflict the most damage on energy infrastructure in low-income areas, Black, Indigenous, and people of color (BIPOC) households,[1] and other overburdened communities, while wealthier and whiter communities benefit from enhanced reliability and protections during and in the wake of disasters. This stark disparity demonstrates not only a need for improved system reliability assessments, but also an urgency for more equitable energy system design and decision-making.[2]

A well-functioning energy services system is held up by the following pillars (see Figure 1):

Figure 1. Pillars of energy system planning



- **Equity:** Both the costs and the benefits of the energy system must be equitably distributed across society. Without equity, some energy users face greater burdens than others with respect to their income levels, access to services, and other indications of vulnerability or marginalization.
- **Reliability:** The energy system must be able to operate with limited interruptions to service.

[1] We use the term "BIPOC" to refer to all non-white peoples, with an emphasis on the unique experiences of Black and Indigenous U.S. residents. The term "BIPOC" uses person-first language, in contrast to terms such as "minority" or "marginalized" which may lack humanity, suggest inferiority, or reinforce bias. However, "BIPOC" is an umbrella term and should not be used for individuals or smaller groups where more specific language is applicable. Source: Raypole, C. November 9, 2021. "BIPOC: What it Means and Why it Matters." *Healthline*. Available at: https://www.healthline.com/health/bipoc-meaning.

[2] Carvallo, JP, et al. 2021. *Frozen Out in Texas: Blackouts and Inequality.* The Rockefeller Foundation. Available at: https://www.rockefellerfoundation.org/case-study/frozen-out-in-texas-blackouts-and-inequity/.

Without reliability, energy service will experience interruptions that are most damaging to the most institutionally overlooked groups.

- **Resiliency:** The energy system must be able to bounce back after disruptions. Without resiliency, energy customers will experience outages that negatively affect human and economic wellbeing.
- **Affordability:** Access to energy is a basic human right. Energy must be affordable and available to all. Without affordability, energy services will be the privilege of some rather than a basic right for all, as lower-income families forego other necessities to pay their energy bills or figure out how to adapt to a lack of energy services.
- **Safety:** The energy system must be safe for both its workers and the broader public. Without safety, energy infrastructure—which tends to be located in lower-income and racialized communities—is at risk of accidents that harm local environments, damage public health, and are even potentially fatal.
- **Sustainability:** The energy system must minimize its negative impacts on the environment by transitioning away from polluting fossil fuels and towards clean and sustainable renewable energy. Without sustainability, the energy system will continue to contribute to the emissions that cause climate change and will become more and more ill-equipped to deal with climate impacts.

Failing to maintain and strengthen any one of these pillars can result in serious disruptions to the entire energy system. When equity in energy planning is treated as an afterthought, and not an essential element necessary to system integrity, outcomes across the energy system fall short of equitable expectations, leading to issues like disproportionate energy burdens and power outages in overburdened communities. Without equity, system reliability suffers. Overburdened populations cannot rely on an energy system that disproportionately subjects them to costs and disproportionately denies them benefits; an energy system that is not reliable for some is not reliable for all.

This AEC report, prepared on behalf of Environmental Defense Fund, reviews and analyzes how legislators, city councilors, regulators, and other policymakers account for issues of equity in energy system decision-making. Section 2 of this report focuses on the interconnections, synergies, and mismatches between reliability and equity, two of the essential pillars holding up the energy system, and presents important characteristics of credible and equitable reliability assessments. Reliability and equity are equal co-pillars necessary to provide good energy services. Too often, efforts intended to enhance energy system reliability have inequitable impacts due to a lack of concerted, conscientious planning around communities' needs. For example: Racial/ethnic minorities are more likely than white Americans to: live near, be exposed to, and even die from fossil fuel pollution and fossil fuel infrastructure; be energy insecure; and have health complications linked to poor air quality and pollution.[3] Underserved, frontline communities like environmental justice (EJ) communities—defined as those in which residents are predominantly low-income, BIPOC, and/or English-isolated—are often subjected to disproportionate degrees of climate

[3] Partin, M. 2020. "The Health, Safety, Climate, and Economic Risks of Fossil Fuel Gas Extraction and Use." Prepared for Sierra Club North Star Chapter and MN350. Available at: https://energywecantafford.org/wp-content/uploads/2020/10/Gas-Brief_revisions4.pdf.

damages from energy infrastructure, fuels and system management they cannot control.

Better reliability does not need to come at the expense of equity, and vice versa. For example, reliability as an argument for new, polluting infrastructure becomes less and less convincing as renewables get cheaper, climate change accelerates, and popular dissent makes inequities increasingly difficult to ignore. Calls for greater investment in energy reliability must be clearly defined, robustly assessed, context-specific, and should not come at the expense of equity or affordability. Credible energy systems assessment—ensuring that reliability and equity go together—must entail applying an equity "lens" to reliability assessments and ensuring robust community engagement.

The *Case Studies* included throughout Section 2 describe the real-world experiences of New England-based advocates for more equitable energy systems. Many of these examples are taken from interviews aired on the podcast *Stories from the Frontlines*,[4] conducted between October and December 2021 by Community Action Works—a New England-based organization working with communities to prevent and clean up pollution at the local level.[5] As part of its efforts to bring a more heightened awareness to the barriers that communities are facing when trying to engage in energy matters, Community Action Works provided AEC with access to these interview transcripts. The remaining quotations from advocates whose campaigns are highlighted in the *Case Study* sections come from recent news articles and public testimony. A central theme across these case studies is how engagement efforts often fall short, and under-resourced and underserved communities are often shut out of decisions that are intended to enhance or preserve energy system reliability but directly impact the health of their communities.

Section 3 of this report provides recommendations to help decision-making bodies change in ways that have the potential to enhance equity in critical choices made regarding reliability, for example, by increasing consumer and community representation or strengthening equity and EJ policy mandates. Decisions made by grid operators often set the stage for the energy decisions made by public utilities and state governing bodies, and vice versa. Many state energy policies and utility actions cannot be implemented with action from regional grid operators that may not have a comprehensive understanding of the unique needs of consumers and local communities. Energy decisions have environmental, societal, and direct costs that can disproportionately impact communities unable to access decision-making venues and stakeholder processes. Recommendations made in this section aim to catalyze more meaningful participation in decision-making processes to facilitate equitable and climate-minded energy trajectories.

2. Assessing credible and equitable resiliency investments

A credible reliability assessment accounts for all elements of the energy system: equity, reliability, resiliency, sustainability, safety, and affordability. In this report, we focus on the interplay between

[4] Community Action Works. *Stories from the Frontlines*. Podcast. Available on Apple and Spotify. https://podcasts.apple.com/us/podcast/stories-from-the-frontlines/id1590558244 and https://open.spotify.com/show/6JyiqX05XoSXS78GKZe4ju.
[5] Community Action Works. Homepage. Available at: https://communityactionworks.org/.

reliability and equity in an era of rapidly shifting energy market and policy conditions.

The North American Electric Reliability Corporation (NERC) is the federally designated electric reliability organization and is responsible for developing reliability standards for approval by the Federal Energy Regulatory Commission (FERC). NERC sets the standards for reliability in the U.S. electric system[6] and is also responsible for monitoring compliance with these reliability standards across its eight regional entities and conducting reliability assessments of existing and planned generation and transmission. NERC's reliability standards are intended to reduce the likelihood and severity of energy service disruptions, which currently average almost 5 hours per customer per year in the United States.[7]

There are no equivalent reliability organizations or reliability standards for the nation's utility gas system, and FERC does not have the authority to mandate reliability standards or reliability reporting for gas distribution.[8] The most comprehensive source of information about the reliability performance of the gas system is the inter- and intrastate gas pipelines required reporting of safety violations to the Pipeline and Hazardous Materials Safety Administration, including any event that results in a gas release, a death, personal injury, and property damage exceeding $50,000.[9]

A February 2021 report from the National Academies of Sciences, Engineering, and Medicine on *The Future of Electric Power in the United States*[10] provided a Congressionally mandated evaluation of the nation's electric grid into the future. The report includes comprehensive recommendations for ways to make the energy system more equitable and more reliable, including FERC regulation over gas distribution:

> *Congress should build on the example it set in the electric power system when it established in the Energy Policy Act of 2005, an Electric Reliability Organization with responsibility to set and enforce reliability standards for the electric industry, and authorize the Federal Energy Regulatory Commission (FERC) to designate a central entity to establish standards for and otherwise oversee the reliability of the nation's natural gas delivery system. Congress should also authorize FERC to require greater transparency and reporting of conditions occurring on the natural gas delivery system to allow for better situational awareness as to the operational circumstances needed to help support electric system reliability.*[11]

[6] North American Electric Reliability Corporation. 2014. "Reliability Principles." NERC. Available at: https://www.nerc.com/pa/Stand/Resources/Documents/Reliability_Principles.pdf.
[7] U.S. Energy Information Administration. November 6, 2020. "U.S. power customers experienced an average of nearly five hours of interruptions in 2019." Available at: https://www.eia.gov/todayinenergy/detail.php?id=45796.
[8] National Academies of Sciences, Engineering, and Medicine. 2021. "The Future of Electric Power in the United States." Available at: https://www.nap.edu/catalog/25968/the-future-of-electric-power-in-the-united-states. p.109.
[9] Freeman, G. et al. 2018. "The Natural Gas Grid Needs Better Monitoring." *Issues in Science and Technology 34, 4.* Available at: https://issues.org/the-natural-gas-grid-needs-better-monitoring/.
[10] National Academies of Sciences, Engineering, and Medicine. 2021. "The Future of Electric Power in the United States." Available at: https://www.nap.edu/catalog/25968/the-future-of-electric-power-in-the-united-states.
[11] Ibid. p. 7.

Table 1. Accounting for equity in reliability assessments

For a reliability assessment to be credible, it must account for…	
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II.	**Greenhouse gas emission reduction requirements**: An equitable distribution of costs and benefits of emission reduction measures is necessary for the transition away from fossil fuels to a clean energy economy. This will have the greatest positive impact on underserved communities experiencing the brunt of pollution from facilities that are retired or never built.
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VIII.	**Meaningful, influential, and inclusive community engagement**: The inclusion of communities that are disproportionately affected by environmental hazards and energy burdens in decision-making promotes fairness and a full understanding of the benefits and costs experienced by the communities most impacted by reliability issues.

The National Academies report concludes that today's electric grid is not optimal for reliability:

> *It is likely that if the grid were being built today from the ground up, it would be built from the bottom up as a cluster of microgrids, which can operate connected to or independent of, with automatic fail-over from, the bulk power system. In such a system, reliability and resiliency at the grid edge would be baked into the distribution system itself, while bulk power is transacted whenever it is available at lower cost.*[12]

To improve the accuracy and credibility of reliability assessments of both energy delivery services and individual energy projects, reliability assessments must account for major energy system changes and conduct meaningful, influential, and inclusive community engagement (see **Error! Reference source not found.** above).

Reliability planning cannot be successful if electric generating capacity and transmission are simply built to satisfy customers' peak demand in a vacuum. To achieve reliability without sacrificing equity, power system planning must take place in partnership with local communities. The following subsections present eight characteristics of credible reliability assessments and their equity implications in detail, together with case studies providing examples of these issues in New England.

I. Accelerating climate change impacts and worst-case scenarios

Equity implications: Accelerating climate change impacts and worst-case scenarios
• While climate change is caused by the wealthy, its first and worst impacts are experienced by the poor.
• The impacts of climate change on energy systems are disproportionately concentrated among poorer populations.
• **New infrastructure aimed at enhancing reliability should take into account impacts on under-resourced and undeserved communities, including the effects of expected climate damages like coastal flooding.**

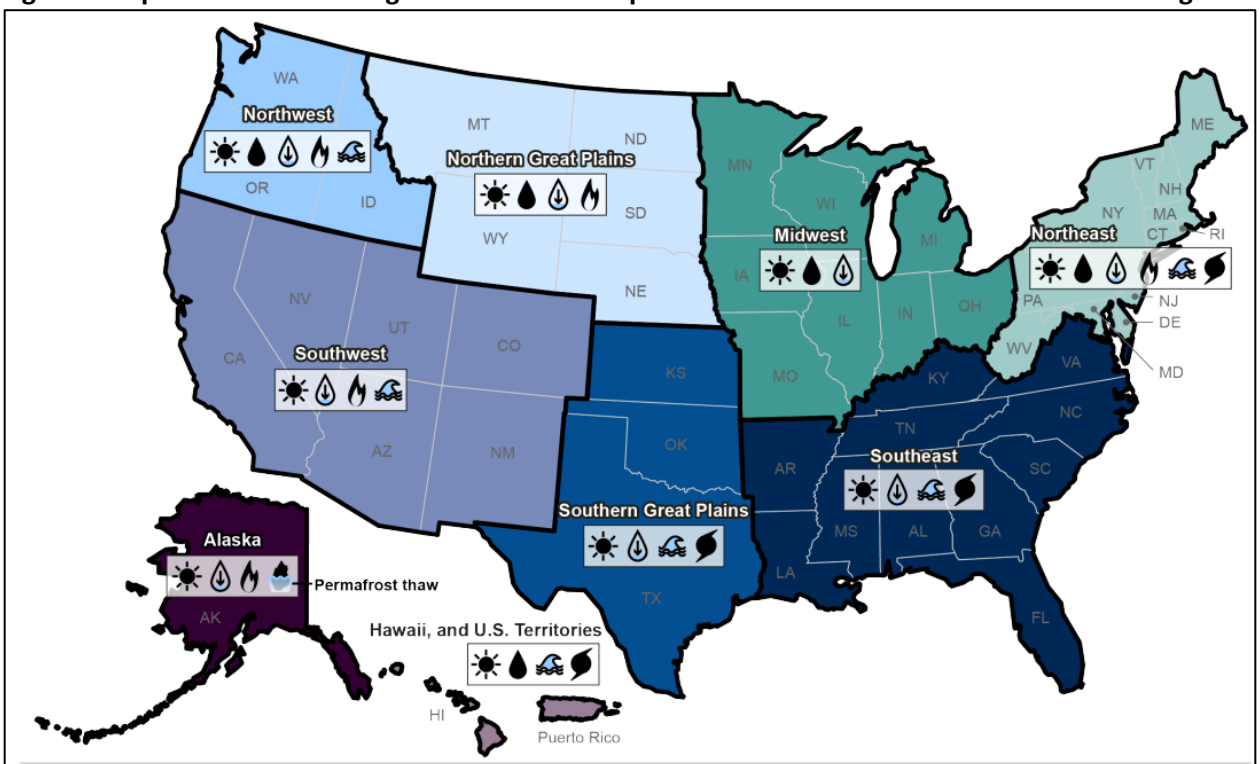
A credible assessment of energy projects intended to enhance reliability requires consideration of the observed and anticipated effects of climate change—such as extreme weather, sea-level rise and increased occurrence of floods and drought. With climate change and its impact on human communities and natural ecosystems becoming more apparent every year, reliability assessments cannot omit explicit valuation of climate impacts based on the most up-to-date climate projections, including worst-case scenarios (more rapid than expected climatic changes from emissions, more severe than expected weather impacts, etc.).[13]

The reliability of the nation's energy system is already suffering from climate impacts. A March 2021 report by the U.S. Government Accountability Office (GAO)—*Electricity Grid Resilience: Climate Change Is Expected*

[12] Ibid. p.191.
[13] Machemer, T. June 1, 2021. "United Nations Report Shows That Climate Change Is Accelerating." *Smithsonian Magazine.* Available at: https://www.smithsonianmag.com/smart-news/united-nations-report-shows-climate-change-accelerating-180977860/.

to Have Far-reaching Effects and DOE and FERC Should Take Actions[14]—examined the electric grid's

Figure 2. Expected climate change effects and examples of climate-related events on the electric grid



Key potential climate change effects examples:

Warmer temperatures and more heat waves:	Increasing precipitation or heavy downpours:	Decreasing water availability:	Increasing wildfires:	Increasing sea-level rise and storm surge:	Increasing frequency and intensity of hurricanes:
Warmer temperatures and more heat waves can reduce the transmission capacity of power lines. This reduced capacity, combined with an increased demand for electricity for cooling, can contribute to power outages. For example, a 2019 heat wave affected the Northeast, resulting in 100,000 customers in New York City losing power.	Increasing frequency and severity of heavy precipitation will increase heavy runoff and the risk of flooding. Floods can threaten low-lying grid structures. For example, in 2011, Missouri River floodwaters surrounded Nebraska's Fort Calhoun nuclear power plant, causing the reactor to remain closed during the summer because of flood waters.	Decreasing water availability may reduce downstream hydropower production. For example, in the summer of 2015, below-average precipitation, combined with above-average temperatures in the Northwest, resulted in lower-than-average runoff in the Columbia River Basin, which affected hydropower generation.	Increasing wildfires may damage critical transmission infrastructure and disrupt power supply. Warmer and drier conditions are projected to increase the risk of wildfires and lengthen the fire season. Based on increasing wildfire risk, a utility in California conducted public safety power shutoffs that affected more than 1 million customers in 2019.	Increasing sea-level rise and storm surge threatens low-lying coastal power plants in California. Rising sea-levels accelerate erosion and can increase flood risk during high tides and storm surges.	Increasing frequency and intensity of Category 4 and 5 hurricanes may increase the risk of physical damage to grid transmission and distribution infrastructure near the coasts. For example, in August 2020, Category 4 Hurricane Laura damaged low-lying grid infrastructure and caused outages for 616,000 customers in Arkansas, Louisiana, Mississippi, and Texas.

Source: Reproduced from U.S. Government Accountability Office. March 2021. "Electricity Grid Resilience: Climate Change is Expected to Have Far-reaching Effects and DOE and FERC Should Take Actions." Available at: https://perma.cc/Z9WA-FRLC.

resilience to climate change and found that flooding, heat waves, and storm events are already having negative effects on the electric services and will continue to impact every aspect of the grid:

[14] United States Government Accountability Office. March 2021. "Electricity Grid Resilience: Climate Change is Expected to Have Far-reaching Effects and DOE and FERC Should Take Actions." Report to Congressional Requesters. Available at: https://perma.cc/Z9WA-FRLC.

> *Extreme weather events have been the principal contributors to an increase in the frequency and duration of power outages in the United States.*[15]

The GAO report notes a broad consensus among researchers that—absent changes to the way gas and electric systems are designed, operated, and regulated—as climate change continues and accelerates, impacts like wildfires, extreme heat and cold, sea-level rise, and storm surges will lead to increased energy service disruptions. The United States' current electric infrastructure is designed to operate reliably given the baseline weather and climate conditions of the past but may be ill-equipped to deal with today's rapidly accelerating climate change. The 2021 Texas energy crisis (discussed in detail below) offers a tragic example of what can happen when the electric system is unable to operate reliably during extreme weather conditions. While the exact type and extent of climate impacts will vary depending on location, all U.S. regions are experiencing multiple climate impacts including warmer average temperatures and more frequent heat waves (see Figure 2 above). Any necessary additions of new fossil fuel resources to enhance gas or electric reliability require detailed assessment of location-specific climate change impacts, including worst-case scenarios. New infrastructure should be added only after a comprehensive assessment of the viability of alternatives to pipeline expansion.

Equity implications

Climate change is inextricably intertwined with equity: Wealthy individuals in wealthy countries are responsible for the majority of historical and current greenhouse gas emissions that lead to climate change damages,[16] which hit frontline communities the hardest.[17] When climate change impacts our current energy systems, as in the case of the weather-induced blackouts in Texas in February 2021, BIPOC and low-income communities suffer the first and worst effects while more affluent residents are largely insulated from the most severe damages.[18]

Successful energy system planning must account for the unprecedented nature of rapidly shifting climatic conditions. Credible assessments of energy system reliability include detailed modeling of the energy services needed to withstand worst-case scenarios and climate extremes as well as the equity impacts of that infrastructure. Not only do under-resourced and underserved communities suffer the first and worst impacts of climate change, but they are also the most susceptible to energy service disruptions,[19] the most

[15] Ibid. page 1.
[16] Center for Climate and Energy Solutions. N.d. "Global Emissions." *International Emissions.* Available at: https://www.c2es.org/content/international-emissions/.
[17] Matthews, N. and Nel, D. September 26, 2019. "Climate Change Hits Vulnerable Communities First and Hardest." *International Institute for Sustainable Development.* Available at: https://www.iisd.org/articles/climate-change-hits-vulnerable-communities-first-and-hardest.
[18] Foster-Frau, S. and Hernandez, A.R. February 16, 2021. "Freezing temperatures and power outages hurt Texas's most vulnerable yet again." *Washington Post*. Available at: https://www.washingtonpost.com/national/texas-storm-hurts-most-vulnerable-again/2021/02/16/fe3c8fd4-707b-11eb-93be-c10813e358a2_story.html
[19] Huff, C. May 15, 2021. "Growing Power Outages Pose Grave Threat To People Who Need Medical Equipment to Live." *National Public Radio.* Available at: https://www.npr.org/sections/health-shots/2021/05/15/996872685/growing-power-outages-pose-grave-threat-to-people-who-need-medical-equipment-to-.

burdened by fossil fuel infrastructure and pollution,[20] and the most burdened with current-day energy costs.[21]

Case Study: East Eagle Street Substation (East Boston, MA)

The East Eagle Street Substation in East Boston, Massachusetts is an approved, but not yet constructed, 115-kilovolt (kV) electric substation sited in a densely populated EJ neighborhood.[22] The siting of the substation—which Eversource Energy, the local electric utility, says is needed to support growing electric demand due to vehicle and building electrification—is an unplanned and undesirable consequence of Massachusetts' ambitious climate programs resulting in an unintentional burden on an already under-resourced and underserved community. At the same time, the choice of site fails to consider well-known expected impacts of adverse climate change events like sea-level rise and storm surges on places like East Boston and its climate-vulnerable communities.

The substation was first proposed in 2014, when Eversource requested approval of the Massachusetts Energy Facilities Siting Board (EFSB) and Department of Public Utilities (DPU) to construct and operate the substation and two new 115-kV underground transmission lines in Everett, Chelsea, and East Boston. Eversource claims that the existing Chelsea substation is insufficient to maintain reliable electric service in the Chelsea/East Boston/Lynn area based on the Company's prediction of growing peak demand as Massachusetts electrifies its transportation and buildings in order to achieve its greenhouse gas emission reduction targets.[23]

In December 2017, the EFSB and DPU approved the need for the substation to maintain electric reliability but asked the Company to relocate the facility to protect a nearby fish processing plant from radiation.[24] In November 2018, Eversource filed another petition with EFSB, to move the substation west by 190 feet.[25] John Walkey is the Director of Waterfront and Climate Justice Initiatives at GreenRoots, an EJ organization that—among many other things—is fighting against the East Eagle Substation:

> ***John:*** *They decided that East Boston needed one of these [substations]. And they proposed*

[20] Donaghy, T. and Jiang, C. April 13, 2021. "Fossil Fuel Racism: How Phasing Out Oil, Gas, and Coal Can Protect Communities." *Greenpeace, Gulf Cost Center for Law and Policy, The Movement for Black Lives.* Available at: https://www.greenpeace.org/usa/reports/fossil-fuel-racism/.

[21] National Low Income Housing Coalition. May 9, 2016. "Low Income, African American, and Renter Households Have Highest Energy Cost Burdens." Available at: https://nlihc.org/resource/low-income-african-american-and-renter-households-have-highest-energy-cost-burdens.

[22] Eversource. n.d. "Mystic - East Eagle - Chelsea Reliability Project." Available at: https://www.eversource.com/content/nh/residential/about/transmission-distribution/projects/massachusetts-projects/mystic---east-eagle---chelsea-reliability-project.

[23] Commonwealth of Massachusetts Energy Facilities Siting Board. December 1, 2017. Final Decision. EFSB 14-04, D.P.U. 14-153 and D.P.U. 14-154. Page 165.

[24] (1) Ibid. Page 165. (2) Wasser, M. February 22, 2021. "In A Blow To Environmental Justice Advocates, State Regulators Approve Controversial East Boston Substation." *WBUR*. Available at: https://www.wbur.org/news/2021/02/22/east-boston-substation-final-approval-eversource-environmental-justice.

[25] Wasser, M. February 22, 2021. "In a Blow to Environmental Justice Advocates, State Regulators Approve Controversial East Boston Substation." *WBUR*. Available at: https://static1.squarespace.com/static/5936d98f6a4963bcd1ed94d3/t/5cffcb70771cbf00015edeba/1560267632700/Woods+testimony+7June2019+%281%29.pdf.

> *it for a spot, and this is sort of where people start saying, "What are you talking about?" Because they proposed it for a piece of property that's right on the Chelsea Creek, which is a marine estuary, so we get a lot of, with climate change, sea-level rise, and we're concerned about flooding along our coastline. With increased storm surge we're concerned about erosion, and this is a property that has erosion along the front of it. And its location is pretty specific. It's right across the street from a playground, where a lot of the kids in the neighborhood are all going to play. And it is about 100 meters away from one of those huge 8-million-gallon tanks of jet fuel.*[26]

The communities surrounding the Chelsea Creek already experience acute effects of sea-level rise and other climate change impacts, and the creation of a polluting energy facility on the creek stands to exacerbate existing harms. To make matters worse, announcements about the project were not adequately publicized or translated into languages spoken in the affected communities.[27] In June 2020, GreenRoots, Conservation Law Foundation (CLF), and Lawyers for Civil Rights filed a complaint with the Environmental Protection Agency (EPA)[28] under Title VI of the Civil Rights Act of 1964 against Massachusetts' Executive Office of Energy and Environmental Affairs (EEA), DPU and EFSB for failing to make meetings about the project accessible with adequate translation services. That same month, EPA rejected the complaint and declined to investigate the claims of discrimination, alleging a lack of jurisdiction over the three state bodies cited in the complaint.[29]

In January 2021, GreenRoots, CLF, and Lawyers for Civil Rights filed a federal lawsuit against EPA for failing to investigate the discrimination concerns voiced in its June 2020 Title VI complaint.[30] The proposed location of the East Boston substation is in close proximity to communities with high shares of racial/ethnic minorities, low-income households, and English-isolated populations protected by the Commonwealth as EJ populations (see Figure 3 below).[31]

> ***John:*** *The neighborhood of East Boston is the only majority Latino neighborhood in Boston. And Chelsea is densely packed just like East Boston, a little over two square miles of about 50,000 or so folks, a little more now with this latest census. And the majority of those folks*

[26] Community Action Works. November 22, 2021. "Alien Language." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/4cdTjAnqfrQLOdockRs6z6?si=22f10dce757e47e5

[27] CLF. November 13, 2020. "Eversource, State Plow Ahead with East Boston Substation Plans." Available at: https://www.clf.org/newsroom/eversource-state-plow-ahead-with-east-boston-substation-plans/.

[28] U.S. District Court of Massachusetts. June 1, 2020. *Complaint under Title VI of the Civil Rights Act of 1964.* Before the EPA. Available at: https://www.clf.org/wp-content/uploads/2020/06/Consolidated-Title-VI-Complaint-06-01-2020.pdf.

[29] U.S. EPA. June 29, 2020. "Re: Administrative Complaints 01NO-20-R1, 02NO-20-R1, and 03NO-20-R." Available at: https://d279m997dpfwgl.cloudfront.net/wp/2020/07/2020-06-29-Complainant-Letter-FINAL-01NO-20-R1-02NO-20-R1-03NO-20-R1.pdf.

[30] (1) U.S. District Court of Massachusetts. January 13, 2021. Case 1:21-cv-10065. "Complaint for Declaratory and Injunctive Relief." Available at: http://lawyersforcivilrights.org/wp-content/uploads/2021/01/GreenRoots-v.-epa-no.-21-cv-10065-d.-mass-.pdf. (2) Lynds, J. January 20, 2021. "EPA Sued by CLF for Refusing to Investigate Discrimination Claims as Part of the East Boston Substation Project." *East Boston Times – Free Press*. Available at: https://eastietimes.com/2021/01/20/epa-sued-by-clf-for-refusing-to-investigate-discrimination-claims-as-part-of-the-east-boston-substation-project/.

[31] Massachusetts Executive Office of Energy and Environmental Affairs. 2020. "Massachusetts 2020 Environmental Justice Populations". *Esri GIS map*. Available at: https://mass-eoeea.maps.arcgis.com/apps/webappviewer/index.html?id=1d6f63e7762a48e5930de84ed4849212.

are very diverse—a lot of immigrants, a lot of different languages spoken, about three quarters of the population are ethnic minorities, and about a quarter of the population live below the poverty line.

And a similar situation for East Boston…East Boston [is] the home to Logan International Airport, and all those planes have to fly somehow. And 100 percent of the jet fuel that goes into those planes comes up on tankers on the Chelsea Creek and [is] stored on tanks along the banks of the creek. Over 60 percent of the gasoline used around Massachusetts comes up through the Chelsea Creek, 80 percent of the home heating oil is stored along the Chelsea Creek. We have a huge mountainous pile of road salt in Chelsea; a big, about five-story tall pile of salt. And that goes out to over 350 communities around Massachusetts and beyond in New England.

And then on the Chelsea-Everett border, the New England Produce Center is the largest produce distribution point on the East Coast…And this is not even to mention the other transportation infrastructure like the [Tobin] bridge and three tunnels that all provide critical access into Boston from the North Shore. And all of these things are important for the region, but they entail a burden that falls disproportionately on our communities.[32]

[32] Community Action Works. November 22, 2021. "Alien Language." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/4cdTjAnqfrQLOdockRs6z6?si=22f10dce757e47e5

Figure 3. EJ communities near the East Boston substation

Data sources: (1) American Community Survey. 2020. ACS 5-Year Estimates Detailed Tables. [TableID: B19013, B03002, C16002]; (2) Eversource. n.d. "Mystic-East Eagle-Chelsea Reliability Project." Available at: https://www.eversource.com/content/nh/residential/about/transmission-distribution/projects/massachusetts-projects/mystic---east-eagle---chelsea-reliability-project.

GreenRoots presented testimony in DPU Docket Nos. 14-153A and 14-154A documenting Eversource's failure to provide evidence of need for the substation—including an assessment of its reliability claims[33]—as well as the potential for flooding at the proposed substation site.[34] Nonetheless, in February 2021, EFSB unanimously approved the updated location of the substation.[35] In March 2021, GreenRoots filed an appeal of EFSB's final approval, which is pending before Massachusetts Supreme Judicial Court.[36]

[33] Woods, B. 2019. Testimony on Eversource's Proposed East Eagle Street Substation. Testimony to the Commonwealth of Massachusetts Department of Public Utilities on behalf of GreenRoots, Docket No. DPU 14-153A/14-154A. Available at: https://aeclinic.org/publicationpages/2019/6/11/testimony-on-eversources-proposed-east-eagle-street-substation-1.

[34] Luna, M. 2019. Testimony on Eversource's Proposed East Eagle Street Substation. Testimony to the Commonwealth of Massachusetts Department of Public Utilities on behalf of GreenRoots, Docket No. DPU 14-153A/14-154A.

[35] MA Energy Facilities Siting Board. February 26, 2021. Docket EFSB 14-04A/D.P.U. 14-153A/14-154A Petition of NSTAR Electric Company d/b/a Eversource Energy, Notice of Project Change. "Final Decision." Available at: https://www.mass.gov/doc/efsb14-04adpu-14-153a14-154a-final-decision/download.

[36] GreenRoots. March 18, 2021. "GreenRoots appeals EFSB Decision Approving Substation." Available at: http://www.GreenRootschelsea.org/news/2021/3/18/GreenRoots-appeals-efsb-decision-approving-substation.

> ***John:*** *And we got involved—GreenRoots got involved—as an intervener, they call it. So, we got a pro bono attorney, and we started getting into this. And really, as we moved along through the process, it became obvious that this stuff is so technical, and so high end, that [for] regular community folks, regardless of whether you speak English or not, it might as well be in some other alien language, because it's all super technical.*[37]

In January 2022, Massachusetts State Representative Adrian Madaro proposed a bill—*An Act relative to energy facilities siting reform to address environmental justice, climate, and public health*[38]—that, according to Madaro, seeks to make the EFSB "more accountable and to make it a process that actually has the best interests of the residents of Massachusetts in mind."[39] The bill was referred to the House committee on Telecommunications, Utilities, and Energy; as of this publication, no further action has been taken.[40]

Lydia Edwards has served as the State Senator for the First Suffolk and Middlesex County districts since her inauguration on January 20, 2022. Prior to her role as a State Senator, she was the Boston City Councilor for District 1, which included East Boston, Charlestown, and the North End, from January 2018 to April 2022. In February 2022, then-Boston City Councilor Edwards proposed a measure that would change Boston's zoning policies, including giving the City's building commissioner the power to stop projects that violate constituents' environmental rights.[41] If the proposal receives the necessary City approval, it will head to the State House for a final vote in order to take effect.[42] Then-City Councilor Edwards (and ten East Boston residents) also brought to the ballot a non-binding question regarding the substation during Boston's Municipal Election in November 2021.[43] The result: Almost 84 percent of Boston voters opposed the project.[44]

> ***John:*** *We have people at all levels of government [that] all signed on to the same letter saying, "do not build [the substation], this is a bad idea." And that's a great feeling…to have all of them say, "this is a bad idea." And we've been using that to get a decent amount of media*

[37] Community Action Works. November 22, 2021. "Alien Language." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/4cdTjAnqfrQLOdockRs6z6?si=22f10dce757e47e5

[38] Massachusetts Bills H.3336. *An Act relative to energy facilities siting reform to address environmental justice, climate, and public health*. Available at: https://malegislature.gov/Bills/192/HD3679.

[39] Shemkus, S. January 26, 2022. "Boston substation fight fuels push to reform how energy projects are sited." *Energy News Network*. Available at: https://energynews.us/2022/01/26/boston-substation-fight-fuels-push-to-reform-how-energy-projects-are-sited/?utm_source=Energy+News+Network+daily+email+digests&utm_campaign=2ce87947e8-EMAIL_CAMPAIGN_2020_05_11_11_42_COPY_01&utm_medium=email&utm_term=0_724b1f01f5-2ce87947e8-89263591.

[40] Massachusetts Bills H.3336. *An Act relative to energy facilities siting reform to address environmental justice, climate, and public health*. Available at: https://malegislature.gov/Bills/192/HD3679.

[41] McDonald, D. February 28, 2022. "Lydia Edwards files proposal that could halt East Boston electric substation." *Boston Globe*. Available at: https://www.bostonglobe.com/2022/02/28/metro/lydia-edwards-files-proposal-that-could-halt-east-boston-electric-substation/.

[42] Ibid.

[43] Lynds, J. September 22, 2021. "Eversource Substation Question Will Appear on November's Ballot." *East Boston Times – Free Press.* https://eastietimes.com/2021/09/22/eversource-substation-question-will-appear-on-novembers-ballot/.

[44] DeCosta-Klipa, N. November 9, 2021. "Boston voted overwhelmingly against a planned East Boston substation. Does it matter?" *Boston.com*. Available at: https://www.boston.com/news/politics/2021/11/09/boston-question-2-east-boston-substation-ballot-question/.

> *coverage in the local media here, in the [Boston] Globe, and radio stations…And actually on the ballot for November, we have a ballot question, question number three, which is a non-binding ballot question of whether or not Eversource should build this substation in East Boston. So, the idea is to get the people of Boston saying, "We don't want it." So, if you got all the politicians [and] the people of Boston saying they don't want it, eventually, one of the things you want to force Eversource to do is to actually come to the table and say why this is needed, because so far, they've avoided it. They just say, "trust us, it's needed."*[45]

In February 2022, Eversource Energy submitted an initial filing with the EFSB for a Certificate of Environmental Impact and Public Interest for the substation that would consolidate the permission required to move forward with construction into a single docket.[46] A decision in that case is still pending.

Case Study: Merrimack Generating Station (Bow, NH)

The Merrimack Generating Station is a 482 MW, predominantly coal-fired power plant[47] located in Bow, New Hampshire that has been in operation since the 1960s. Merrimack is the last coal-fired power plant still running in New England and a significant source of greenhouse gas emissions, which are a major contributor to climate change and the destructive environmental consequences that harm frontline communities.[48]

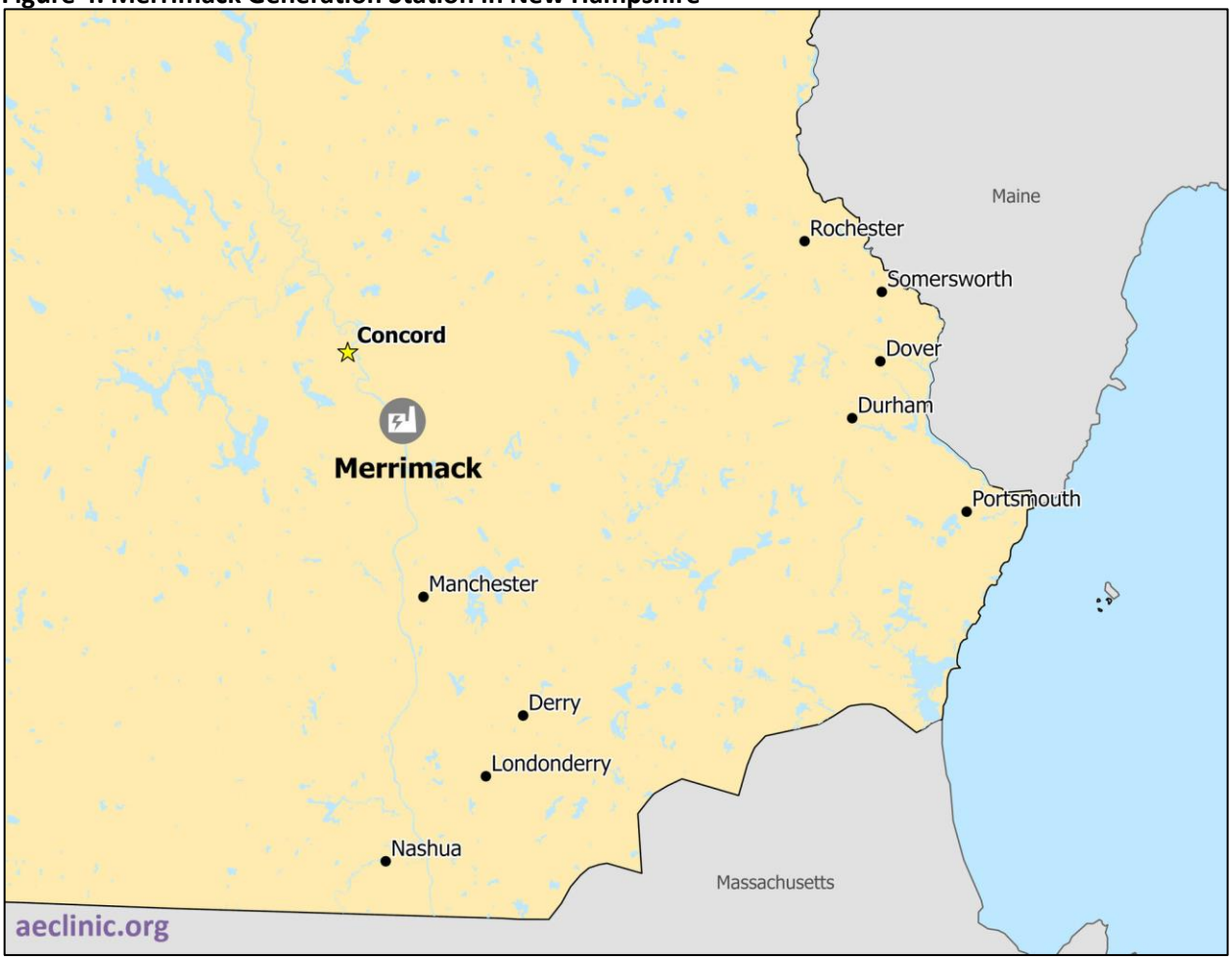
[45] Community Action Works. November 22, 2021. "Alien Language." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/4cdTjAnqfrQLOdockRs6z6?si=22f10dce757e47e5

[46] MA DPU Docket No. 22-01. February 2022. *Initial Petition and Application of NSTAR Electric Company d/b/a Eversource Energy for a Certificate of Environmental Impact and Public Interest pursuant to G.L. c. 164,§§ 69K-69O.* Submitted by NSTAR Electric Company d/b/a Eversource Energy. Available at: https://eeaonline.eea.state.ma.us/DPU/Fileroom/dockets/bynumber/EFSB22-01

[47] Granite Shore Power. n.d. "Merrimack Station." Available at: https://www.graniteshorepower.com/merrimack-station.

[48] Brooks, D. June 2, 2021. "Power plant in Bow is now the only one in New England burning coal." *Concord Monitor.* Available at: https://www.concordmonitor.com/bow-nh-merrimack-station-coal-fired-power-40758369

Figure 4. Merrimack Generation Station in New Hampshire



Data sources: Granite Shore Power. n.d. "Merrimack Station." Available at: https://www.graniteshorepower.com/merrimack-station.

In 2012, the Merrimack Generating Station (which has two coal-fired units built in 1960 and 1968[49] and two jet fuel-fired units built in 1968 and 1969[50]) installed a single scrubber system for both coal units in order to reduce its mercury emissions and be compliant with New Hampshire law.[51] Opponents of the scrubber argue that its cost cannot be justified,[52] particularly because the plant has run with decreasing

[49] U.S. EPA. 2011. *Draft National Pollutant Discharge Elimination System (NPDES) permit to discharge to waters of the United States pursuant to the Clean Water Act (CWA)*. Available at: https://www3.epa.gov/region1/npdes/merrimackstation/pdfs/MerrimackStationFactSheet.pdf. Page 4.

[50] The coal units account for over 400 MW of the capacity at the Merrimack Generating Station; jet fuel-fired units account for only 36 MW of total capacity. Source: U.S. EPA. 2009. *Form AR-633*. Available at: https://www3.epa.gov/region1/npdes/merrimackstation/pdfs/ar/AR-633.pdf

[51] Neville, A. 2012. "TOP PLANT: Merrimack Station's Clean Air Project, Bow, New Hampshire." *Power.* Available at: https://www.powermag.com/top-plantmerrimack-stations-clean-air-project-bow-new-hampshire/.

[52] Evans-Brown, S. October 14, 2014. "'Scrubber' Cost Dispute Heard By Regulator." *New Hampshire Public Radio*. Available at: https://www.nhpr.org/environment/2014-10-14/scrubber-cost-dispute-heard-by-regulator.

frequency over time;[53] that the owners did not obtain the appropriate permits before making modifications to the plant;[54] and that the scrubber does not reduce the plant's greenhouse gas emissions.[55]

Since its purchase by Granite Shore Power in 2017, the Merrimack plant has been operated as a peaker plant.[56] "Peaker" plants are designed to provide reliability by standing ready to run in only a small number of hours each year, at times of the greatest customer demand (called peak load). Over the five years from 2016 to 2020, the Merrimack plant operated at an average of about 8 percent of its maximum potential:[57] in 2020 (the last year for which data are available) Merrimack Station operated just 3.2 percent of the time. Granite Shore Power's electric customers are paying substantial costs in every bill for a scrubber that reduces mercury emissions on the rare occasions that this coal-fired power plant runs.

Despite the plant's infrequent operation, however, its environmental costs are hefty. Mary Fite works at the Bow, New Hampshire chapter of 350.org which is currently supporting the "No Coal, No Gas" campaign[58] and is fighting the Merrimack Generating Station, with the goal of stopping greenhouse gas emissions and the dangerous co-pollutants that impact community health and replacing dirty power facilities with renewables.

> ***Mary:*** *This plant emits more CO_2 in one hour of operating than the average American does in 26 years of their life. If we closed this plant […], the owner said, it wouldn't make a difference. But I really believe that's not true. And people in town feel intimidated by the idea of closing the plant, because they've been told for so long that without the plant, we wouldn't have reliable power. And I just don't feel like we have to choose between like a healthy, safe community or a stable economy. I think we can have both. Wind power is one option that people are talking about, and that seems really feasible for New Hampshire.*[59]

When Eversource sold the plant to Granite Shore Power in 2017, the full cost of the scrubber (approximately $500 million) was—not without controversy—allowed to continue to be recovered through customer rates; that is, electric customers would pay for the scrubber's cost, plus interest.[60] During this same period, Eversource sued the Town of Bow on two separate occasions, alleging both times that the Town overtaxed the Company. The lawsuits, occurring in 2018 and again in 2019, resulting in a total of

[53] Peress, N.J. June 4, 2012. "Ratepayers Subsidizing PSNH's Addiction to Coal." *Conservation Law Foundation*. Available at: https://www.clf.org/blog/ratepayers-subsidizing-psnhs-addiction-to-coal/.
[54] Morford, S. March 5, 2009. "Survival Strategy for an Aging Coal Plant: New Hampshire's 'Big Dig'." *Inside Climate News*. Available at: https://insideclimatenews.org/news/05032009/survival-strategy-aging-coal-plant-new-hampshires-big-dig/.
[55] No Coal, No Gas. n.d. "About Bow." Available at: https://www.nocoalnogas.org/about-bow.
[56] David Brooks. 2021. "Coal-fired Merrimack Station in Bow wins another year of funding." *Concord Monitor*. Available at: https://www.concordmonitor.com/coal-merrimack-station-bow-nh-39127335.
[57] (1) U.S. Energy Information Administration. 2016-2020. *Form EIA-860 Data - Schedule 3, 'Generator Data'*. Available at: https://www.eia.gov/electricity/data/eia860/. (2) U.S. Energy Information Administration. 2016-2020. *Form EIA-923 Monthly Generation and Fuel Consumption Data*. Available at: https://www.eia.gov/electricity/data/eia923/.
[58] No Coal, No Gas. Homepage. Available at: https://www.nocoalnogas.org/.
[59] Community Action Works. November 15, 2021. "26 Years." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/15NyKrm3E5LxG9NnpihVDM?si=uU_0rKWUSp-K0tlkZa1Z3A
[60] Sanders, B. 2015. "Merrimack scrubber at the center of Eversource's divestiture plan." *NH Business Review*. Available at: https://www.nhbr.com/merrimack-scrubber-at-the-center-of-eversources-divestiture-plan/.

$15.5 million in repayments from the Town of Bow back to Eversource.[61]

> ***Mary:*** *The previous owner, Eversource, sued the town [of Bow] for overage of tax payments, and then we, as a town, ended up settling out of court for $11 million. So literally, this plant that is pumping toxic material into the soil, water, and air that we're breathing, sued us. And we gave them money for this.*[62]

The environmental injustices Bow, New Hampshire experiences include not just pollution from Merrimack Station, but also cumulative, inequitable impacts from other polluting, hazardous, and toxic facilities. According to the U.S. EPA Toxics Release Inventory, two facilities in Bow, and five additional facilities within ten miles of Bow, release toxic chemicals that pose a threat to human health and the environment.[63] Data from the New Hampshire Department of Health and Human Services show that Merrimack County, whose designated county-wide air quality monitoring station lies just across the river from Bow, has significantly higher ambient fine particulate matter ($PM_{2.5}$) concentrations, and higher rates of asthma and chronic obstructive pulmonary disease, than the rest of the state.[64]

The continued operation of the Merrimack Generating Station despite its substantial greenhouse gas emissions and other serious environmental costs illustrates an opportunity for the deployment of renewable resources in energy reliability decisions. A credible assessment of the reliability of the Merrimack plant must substantively account for its carbon and air pollution footprint and resulting damages on surrounding communities. Moreover, it is essential that decisions pertaining to the maintenance and operation of coal plants and other polluting facilities like the Merrimack plant be critically examined in comparison to the environmental benefits of investments in zero-emission energy infrastructure.

II. Greenhouse gas emission reduction requirements

Equity implications: Greenhouse gas emission reduction requirements
• Retiring polluting facilities can especially benefit communities that have historically suffered from disproportionate emissions of greenhouse gases and co-pollutants, including EJ communities. • **Plans for new energy infrastructure should consider the local impacts of co-pollutants and climate damages, especially those impacts that fall on historically disenfranchised communities.**

All but 15 U.S. states have climate, renewable energy or emission reduction policies that limit the amount

[61] Brooks, D. July 1, 2019. "Bow to pay $10M to Eversource to settle legal battle over power plant value." *Concord Monitor*. Available at: https://www.concordmonitor.com/bow-merrimack-station-tax-coal-26685737

[62] Community Action Works. November 15, 2021. "26 Years." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/15NyKrm3E5LxG9NnpihVDM?si=uU_0rKWUSp-K0tlkZa1Z3A

[63] U.S. EPA. 2022. "Toxics Release Inventory (TRI) Program." *EPA*. Available at: https://www.epa.gov/toxics-release-inventory-tri-program.

[64] The state has not reported any data on ambient $PM_{2.5}$ concentrations since 2016. Source: New Hampshire Department of Health and Human Services. N.d. "New Hampshire Health and Human Services Data Portal." *NH DHHS*. Available at: https://wisdom.dhhs.nh.gov/wisdom/index.html

of fossil fuels that can be burned over the coming decades. These legally mandated limits must be considered in reliability assessments including the allowable amount of fossil fuels given policy mandates, existing fossil fuel use, and additional planned fossil fuel projects.

Currently, 35 U.S. states and the District of Columbia have renewable portfolio standards, clean energy targets or emissions reduction goals. Of those, 18 states aim to achieve 100 percent clean energy or 100 percent emissions reduction before 2050 (see Figure 5 below). Some states are making more progress towards their goals than others: For example, in 2020, Vermont's total electric generation was nearly 100 percent renewable (a combination of hydro, solar, wind and biomass).[65] Seven states—including Oregon, Washington and Maine—had renewable generation shares of 65 percent or more.[66]

Renewable consumption has grown year-on-year since 2016, and in 2020 the United States consumed a record amount of renewable energy—equal to 12 percent of total energy consumption.[67] In addition, the U.S. Energy Information Administration (EIA) found that energy usage declined across all energy types except for renewable energy resources in 2020, indicating that renewable energy resources were more resilient to the COVID-19 pandemic than other energy sources:

> *Renewable energy was the only source of U.S. energy consumption that increased in 2020 from 2019; fossil fuel and nuclear consumption declined.*[68]

Clean energy targets, renewable standards, and emission reduction goals are increasingly common with new goals being adopted and existing goals being strengthened. For example, in 2018, California increased its existing renewable energy standard to require 100 percent renewable electricity sales by the end of 2045.[69] In March 2021, Massachusetts passed a new climate law that sets emission reduction targets for 2030 and 2040 (previously, there were no interim emission reduction targets before 2050).[70] In April 2021, the Biden administration announced a nation-wide emissions reduction goal of 50 to 52 percent by 2030 (from 2005 levels) and net zero emissions by 2050[71]—significantly more ambitious than the previous national pledge set by the Obama administration in 2014 (26 to 28 percent by 2025).[72] As more clean and renewable energy and emission reduction goals are adopted and strengthened, the pace of renewable energy expansion is likely to speed up to meet those targets.

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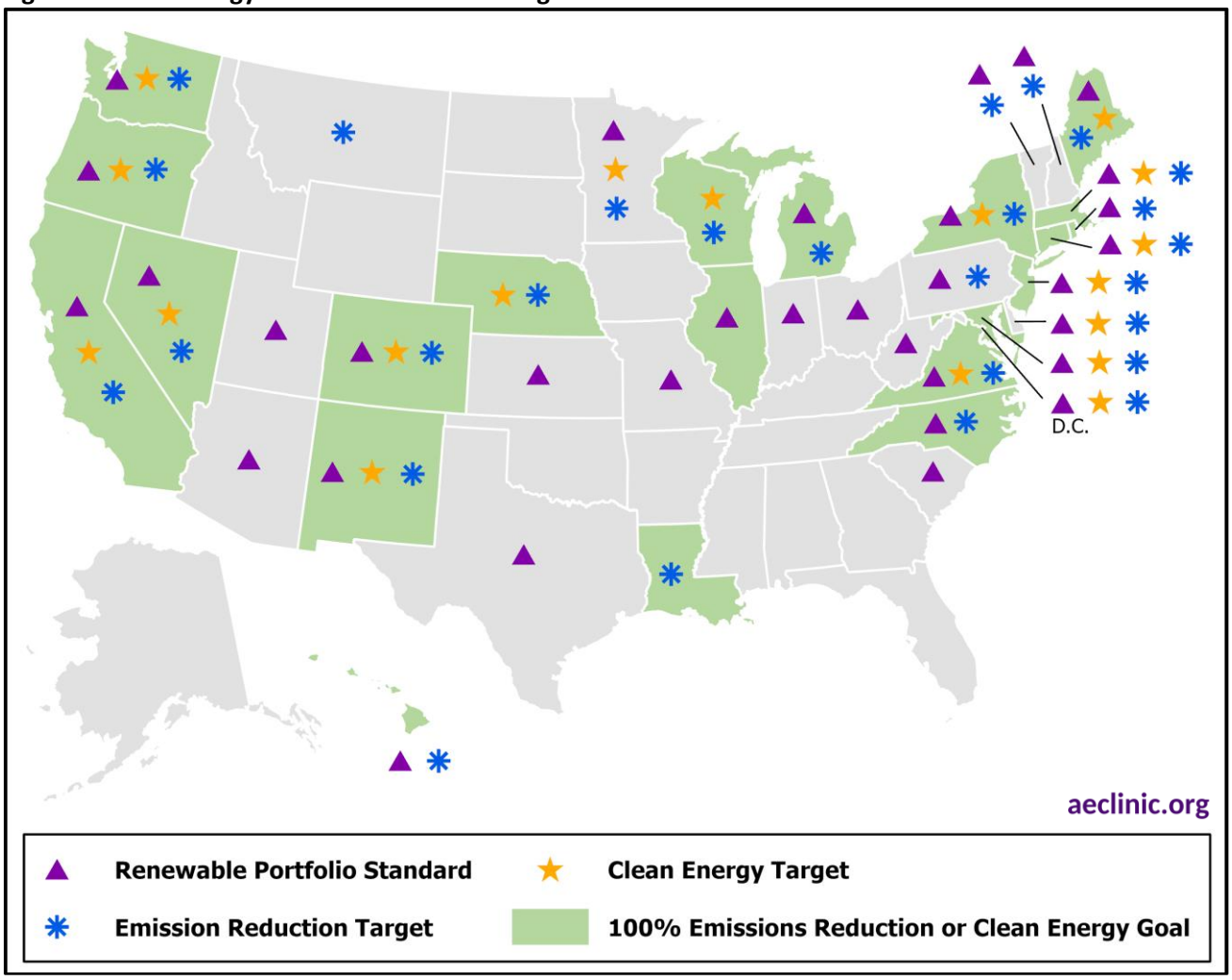
[65] U.S. EIA. July 2021. "Form EIA-923 detailed data with previous form data (EIA-906/920)". Electricity. Available at: https://www.eia.gov/electricity/data/eia923/.
[66] Ibid.
[67] U.S. EIA. June 16, 2021. "The United States consumed a record amount of renewable energy in 2020." *Today in Energy.* Available at: https://www.eia.gov/todayinenergy/detail.php?id=48396.
[68] Ibid.
[69] Center for Climate and Energy Solutions. N.d. "State Climate Policy Maps." Available at: https://www.c2es.org/content/state-climate-policy/.
[70] Wasser, M. March 26, 2021. "What You Need To Know About the New Mass. Climate Law." https://www.wbur.org/earthwhile/2021/03/26/new-mass-climate-law-faq.
[71] The White House. April 22, 2021. "FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies." Available at: https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/.
[72] Carlock, G. and Lashof, D. April 23, 2021. "6 Words to Describe the US Pledge to Reduce Emissions 50-52% by 2030." *World Resources Institute.* Available at: https://www.wri.org/insights/6-words-biden-us-target-ghg-emissions-reduction.

Figure 5. Clean energy and emission reduction goals across the United States



Data sources: (1) National Conference of State Legislators. August 13, 2021. "State Renewable Portfolio Standards and Goals." Available at: https://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx. (2) Center for Climate and Energy Solutions. Last updated March 2021. "U.S. State Greenhouse Gas Emissions Targets." Available at: https://www.c2es.org/document/greenhouse-gas-emissions-targets/. (3) Clean Energy States Alliance. N.d. "100% Clean Energy Collaborative – Table of 100% Clean Energy States." Available at: https://www.cesa.org/projects/100-clean-energy-collaborative/table-of-100-clean-energy-states/. Map last updated July 2022.

Planning for reliable energy systems requires consideration of: relevant renewable energy and emission reduction policies; existing fossil fuel resources and planned fossil fuel development; and consideration of how a proposed energy project fits into plans to achieve national, state, and sub-state climate goals.

Equity implications

As policy-mandated clean energy in the United States grows, concerns of equity and reliability are paramount. It is essential that the transition away from polluting fossil fuels and towards renewable energy resources maintains energy system reliability and that the costs and benefits of these resources are equitably distributed. Because low-income and racialized communities are exposed to the worst pollution

in the country,[73] they also stand to benefit the most when polluting facilities are retired or never built. These benefits can only materialize, however, if polluting facilities located in EJ or other overburdened communities are intentionally prioritized and targeted for retirement and/or replacement.

Case Study: Killingly Energy Center (Killingly, CT)

Killingly Energy Center is a proposed, 650 MW gas-fired combined cycle plant in Killingly, Connecticut under development by the Florida-based company NTE.[74] ISO-NE—New England's grid operator—first approved the proposed Killingly gas plant for construction in 2019. Killingly was originally scheduled to begin operating in June 2022, but a series of regulatory setbacks have cast doubt on the plant's future.[75]

Ian McDonald is a member of No More Dirty Power, a grassroots organization of concerned citizens from the Killingly area and across Connecticut working together to prevent the construction of the Killingly Energy Center and to stop the local and state government from making irresponsible energy choices at the expense of the community's health and environment.[76]

> ***Ian:*** *There was an informational meeting back in July of 2016, I believe, and it was about this big, new power plant. And…at the meeting, it was a little disturbing as there was this big board of corporate lawyers and people from the company. And it went on and on and on; we were supposed to be able to ask questions, but there was very little time for that to happen. And I finally asked a question about...[the power plant's] health impacts on my newborn son. I knew we had already doubled the national average of asthma rates in this area. What is this second plant going to do? There's this very, very long answer that this lawyer gave, and at the end of it he says, based on the local air monitoring, we speculate that the air will be cleaner. Well, the local air monitoring was in East Hartford, Connecticut, which is halfway across the state, against the prevailing winds. He was very cloudy about giving this answer…we knew we were going to have significantly higher levels of all the pollutants. So, this was a red flag for me.*[77]

The State of Connecticut aims to reduce statewide greenhouse gas emissions by at least 45 percent by 2030 and at least 80 percent by 2050 (from 2001 levels).[78] In his 2021 Executive Order No. 21-3, Governor Ned Lamont called for a carbon-free grid by 2040 and acknowledged the need to reduce greenhouse gas

[73] Environmental Protection Agency. 2021. *EPA Annual Environmental Justice Progress Report FY 2020.* Available at: https://www.epa.gov/sites/default/files/2021-01/documents/2020_ej_report-final-web-v4.pdf.
[74] NTE Energy. n.d. "Killingly Energy Center." Available at: https://www.killinglyenergycenter.com/#projectoverview
[75] Crowley, B. November 5, 2021. "Plans for 650 MW Killingly Power Plant in Doubt as Delays Threaten Price Guarantee." *CT Examiner*. Available at: https://ctexaminer.com/2021/11/05/plans-for-650-mw-killingly-power-plant-in-doubt-as-delays-threaten-price-guarantee/. (2) Crowley, B. February 24, 2022. "Further Setback for Killingly Gas-Fired Plant." *CT Examiner*. Available at: https://ctexaminer.com/2022/02/24/further-setback-for-killingly-gas-fired-plant/. (3) Spiegel, J.E. March 7, 2022. "Proposed Killingly power plant dealt another blow." *CT Mirror*. Available at: https://ctmirror.org/2022/03/07/killingly-gas-power-plant-iso-new-england-auction-ferc/
[76] No More Dirty Power in Killingly. Facebook page. Available at: https://www.facebook.com/groups/2378237445748038/.
[77] Community Action Works. October 25, 2021. "Lose the Forest for the Trees." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/0tU3fYdSsLSP4pFnTwP9Vi?si=8eA1_UIGQ7KDkiJPvKa77A
[78] Connecticut Public Act No. 18-82 (SB No. 7), 2018. *An Act Concerning Climate Change Planning and Resiliency*. Available online: https://www.cga.ct.gov/2018/act/pa/pdf/2018PA-00082-R00SB-00007-PA.pdf

emissions in order to protect the public health of all Connecticut residents, particularly overburdened communities and future generations.[79] Executive Order No. 21-3 includes 23 directives for different state agencies and leaders to take various climate-related actions, including creating an Office of Climate and Public Health to address the intersection of climate change and health equity, and enacting policy to protect Connecticut residents from climate-related illnesses and death. At present, the Connecticut Department for Energy and Environmental Protection (DEEP) is responsible for enforcing the state's EJ community protections.[80] According to DEEP's 2021 emissions inventory, the State is not on track to meet its emissions targets.[81] Ian observes a discrepancy between policymakers' bold words and their tepid actions:

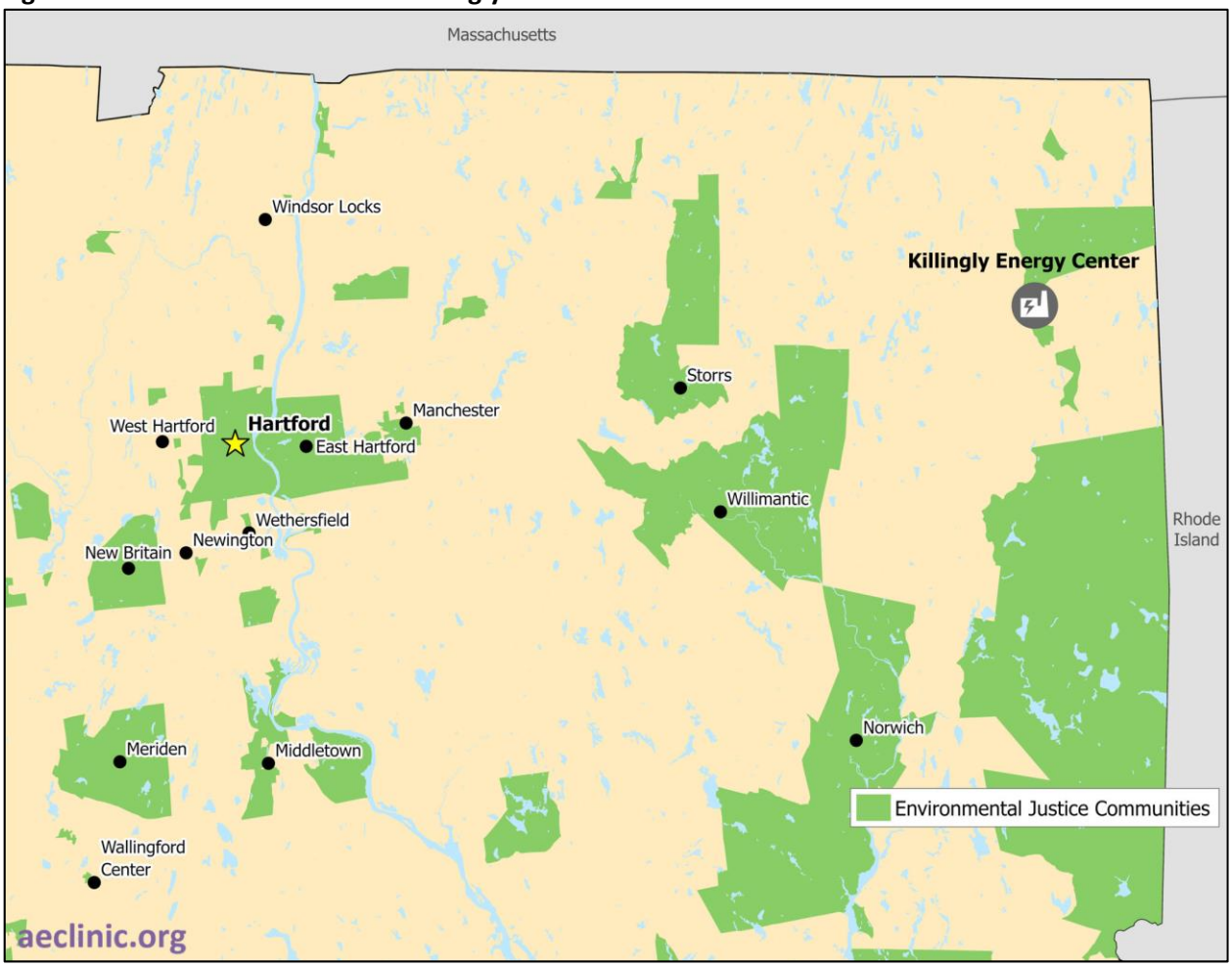
> ***Ian:*** *And the question is, these decision makers are very clear on in their messaging about how, you know, we have to take the lead in climate change, and they use all this great language. But then when you ask them, here's a large power plant that we don't need, that we can cut carbon emissions drastically from, and it's kind of like, everybody scatters.*[82]

While policymakers continue to avoid taking action to reduce carbon emissions in a meaningful way, ISO-NE, FERC, and the U.S. District Court of Appeals have taken recent action to exclude the Killingly plant from ISO-NE's planned capacity for the coming three years. In February 2022, FERC terminated ISO-NE's contract with the Killingly Energy Center in response to a request for termination from ISO-NE.[83] In March 2022, the U.S. District Court of Appeals in Washington, D.C., made a ruling allowing ISO-NE to exclude the Killingly facility from its annual capacity auction, which plans for energy use three years in advance.[84] Without a capacity contract or participation in the capacity auction, Killingly cannot earn revenues as a peaking facility.

The decisions by ISO-NE, FERC, and the Court of Appeals come after several Connecticut state agencies' decisions in support of the proposed plant. The Connecticut Siting Council initially decided in May 2017 that a public need for the Killingly gas plant had not been demonstrated.[85] However, NTE submitted

[79] Connecticut Governor Lamont's Executive Order No. 21-3, 2021. Available online: https://portal.ct.gov/-/media/Office-of-the-Governor/Executive-Orders/Lamont-Executive-Orders/Executive-Order-No-21-3.pdf.
[80] Miller, K. December 2020. *Connecticut's Environmental Justice Law*. Office of Legislative Research. Available at: https://www.cga.ct.gov/2020/rpt/pdf/2020-R-0286.pdf.
[81] CT DEEP. 2021. *2018 Connecticut Greenhouse Gas Emissions Inventory*. CT DEEP. Available at: https://portal.ct.gov/-/media/DEEP/climatechange/GHG_Emissions_Inventory_2018.pdf.
[82] Community Action Works. October 25, 2021. "Lose the Forest for the Trees." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/0tU3fYdSsLSP4pFnTwP9Vi?si=899d2bf90f7a4157
[83] Crowley, B. February 24, 2022. "Further Setback for Killingly Gas-Fired Plant." *CT Examiner*. Available at: https://ctexaminer.com/2022/02/24/further-setback-for-killingly-gas-fired-plant/
[84] Spiegel, J.E. March 7, 2022. "Proposed Killingly power plant dealt another blow." *CT Mirror*. Available at: https://ctmirror.org/2022/03/07/killingly-gas-power-plant-iso-new-england-auction-ferc/
[85] CT Siting Council. May 11, 2017. Docket 470. "NTE Connecticut, LLC application for a Certificate of Environmental Compatibility and Public Need for the construction, maintenance, and operation of a 550-megawatt dual-fuel combined cycle electric generating facility and associated electrical interconnection switchyard located at 180 and 189 Lake Road, Killingly, Connecticut. Decision and Order." Available at: https://portal.ct.gov/-/media/CSC/1_Dockets-medialibrary/Docket470/FINAL_DECISION/D470DOFINALpdf.pdf.

Figure 6. EJ communities near the Killingly Gas Plant



Data sources: (1) American Community Survey. 2020. ACS 5-Year Estimates Detailed Tables. [TableID: C17002]; (2) NTE Energy. n.d. "Killingly Energy Center." Available at: https://www.killinglyenergycenter.com/#projectoverview.

arguments claiming that Killingly is essential to electric supply reliability in Connecticut and New England,[86] and in January 2019, NTE submitted a motion to reopen and modify the decision, which the Siting Council granted.[87] In June 2019, NTE received a Certificate of Environmental Compatibility and Public Need from the Connecticut Siting Council, granting permission to construct the plant at its proposed location.[88]

[86] Hibbard, P.J. January 15, 2018. Docket No. 470. "Pre-filed Testimony of Paul J. Hibbard on behalf of NTE Connecticut LLC." Submitted to Connecticut Siting Council. Available at: https://portal.ct.gov/-/media/CSC/1_Dockets-medialibrary/Docket_470A/1_Motion/4Exhibit2PHibbardTestimonypdf.pdf.

[87] CT Siting Council. January 18, 2019. Docket 470. "Motion of NTE Connecticut, LLC to reopen and modify the decision in Docket No. 470 due to changed conditions." Available at: https://portal.ct.gov/-/media/CSC/1_Dockets-medialibrary/Docket470/MotiontoReopen2019/motiontoreopen/02MotionToReopenpdf.pdf.

[88] CT Siting Council. June 6, 2019. Docket 470B. "NTE Connecticut, LLC application for a Certificate of Environmental Compatibility and Public Need…Decision and Order." Available at: https://portal.ct.gov/-/media/CSC/1_Dockets-medialibrary/Docket_470B/FINALDECISIONDOCS/D470BDOFINALpdf.pdf.

Between May 2020 and January 2021, DEEP granted NTE a water quality certification,[89] a Best Available Control Technology (BACT) re-certification,[90] and a wastewater discharge permit.[91]

In November 2020, new statutes went into effect that require "enhanced public participation" in permitting processes for certain kinds of facilities (including electric generators larger than 10 MW) within an EJ community[92] (called a "distressed municipality" in Connecticut, as designated by the Department of Economic and Community Development, as any census block group with at least 30 percent of the population living below 200 percent of the federal poverty level).[93] The Killingly plant's proposed location is less than 1 mile from two nearby EJ communities (see Figure 6 above).

The Town of Killingly was formally designated an EJ community from 2010 to 2017, including when the project was announced in 2016, and again in 2019 (although not in 2020 or 2021—the most recent EJ designation available).[94] In addition, the residents of Killingly face disproportionately worse air quality[95] and higher rates of pollution-related health conditions including asthma, chronic obstructive pulmonary disease, and lung cancer relative to the rest of the state.[96]

> ***Ian:*** *I love my town, but it has been listed as a distressed municipality nearly every year for the past 20 years. Which means, you know, it's a poor town, more or less. We have one power plant, we have some of the highest asthma rates in Connecticut and double the national average, there's an ash landfill right over the border. So, to me, the environmental justice piece feels fairly obvious from a low-income perspective of already having health concerns [and] already having a power plant…I don't think if we were a wealthy community they would be trying to put the second power plant [here]...It's certainly a frustration that other communities, particularly communities of color, have dealt with, where polluting industries get approved very quickly despite how they affect local communities…There's all of this great*

[89] CT DEEP Bureau of Water Protection and Land Reuse Land & Water Resources Division. *Connecticut Department of Energy and Environmental Protection License: Section 401 Water Quality Certification.* Available at: https://static1.squarespace.com/static/56ec00b407eaa0a2a553f8e1/t/5ec2c3e8f3aa4c5b4fef4ebe/1589822442020/KEC+Final+WQC+signed+5.14.2020.pdf.

[90] Babbidge, T. November 24, 2020. "BACT Recertification for NTE Connecticut, LLC." *CT DEEP*. Available at: https://static1.squarespace.com/static/56ec00b407eaa0a2a553f8e1/t/5fc67396cb3e0f57712eafee/1606841239073/BACT+Recertification+Approval.pdf.

[91] CT DEEP. January 20, 2021. "Office of Adjudications in the matter of APP. No. 201615592: Final Decision." Available at: https://static1.squarespace.com/static/56ec00b407eaa0a2a553f8e1/t/6011caaf25207f7b7f17dcde/1611778736230/DEEP+NTE+Wastewater+Discharge+Permit+Final+Decision.pdf.

[92] CT DEEP. September 2021. *Environmental Justice Public Participation Fact Sheet*. Available at: https://portal.ct.gov/-/media/DEEP/environmental_justice/EJfspdf.pdf.

[93] Miller, K. December 2020. *Connecticut's Environmental Justice Law*. Office of Legislative Research. Available at: https://www.cga.ct.gov/2020/rpt/pdf/2020-R-0286.pdf.

[94] Connecticut's Official State Website. "Distressed Municipalities." Available at: https://portal.ct.gov/DECD/Content/About_DECD/Research-and-Publications/02_Review_Publications/Distressed-Municipalities.

[95] AirNow. April 11, 2022. "Interactive Map of Air Quality." *U.S. EPA*. Available at: https://gispub.epa.gov/airnow/?showgreencontours=false&xmin=-8612336.19512596&xmax=-7673077.99155776&ymin=4912768.663971963&ymax=5291284.828040137.

[96] Dugan, B., et al. 2021. *Connecticut Healthy Aging Community Profile: Killingly (Windham)*. Tufts Health Plan Foundation. Available at: https://healthyagingdatareports.org/wp-content/uploads/2021/04/CTCommunityProfiles/CT_Towncode69_Killingly.pdf.

> *rhetoric about environmental justice, but at the end of the day you're putting two power plants in the same town…it just seems like an obvious thing that any functioning environmental justice [regulation] set up by the state should be dealing with.*[97]

Though the plant no longer threatens the health and safety of Killingly residents for the time being, it would be premature to declare victory. Despite the major environmental costs to the community presented by the Killingly plant, its construction was approved by multiple Connecticut state agencies, based on claims of grid reliability—if NTE reapplies to operate the Killingly Energy Center in ISO-NE's Forward Capacity Market in the future, state agencies' assessments of the plant's reliability cannot fail to account for the costs of operating the dirty peaker plant, compared to implementing renewable energy and storage systems. On the other hand, the establishment of an Office of Climate and Public Health as ordered by Executive Order No. 21-3 could considerably benefit communities like Killingly.

Case Study: Peabody Peaker Plant (Peabody, MA)

The Peabody Peaker Plant (called "Project 2015A") is a proposed 55-megawatt (MW) capacity plant proposed for construction by the Massachusetts Municipal Wholesale Electric Company (MMWEC), which provides power to 14 of the Commonwealth's municipal light plants.[98] The Peabody Peaker Plant is estimated to cost about $85 million to build and would be run only during periods of high demand for electricity, burning mostly gas with the ability to switch to diesel fuel when gas becomes unavailable.[99]

In 2021, Massachusetts passed *An Act Creating a Next-generation Roadmap For Massachusetts Climate Policy* (2021 Climate Roadmap) that requires the Commonwealth to reach net zero greenhouse gas emissions by 2050—with interim targets of 50 percent emission reduction (from 1990 levels) by 2030 and 75 percent by 2040. The 2021 Climate Roadmap also provides legal protections for EJ populations in the Commonwealth. According to the Massachusetts definition, EJ population is defined as any that meets one or more of the following criteria:

(1) Annual median household income is less than 65 percent of the statewide median (the state's median income is about $81,000[100]); and/or

(2) Racial/ethnic minorities account for 40 percent or more of the population; and/or

(3) 25 percent or more of households lack English language proficiency; and/or

(4) Racial/ethnic minorities comprise 25 percent or more of the population *and* the annual median

[97] Community Action Works. October 25, 2021. "Lose the Forest for the Trees." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/0tU3fYdSsLSP4pFnTwP9Vi?si=8eA1_UIGQ7KDkiJPvKa77A

[98] Massachusetts Municipal Wholesale Electric Company. N.d. "Project 2015A." *MMWEC*. Available at: https://www.project2015a.org/what-is-project-2015a/

[99] Wasser, M. April 08, 2022. "What to know about a planned natural gas 'peaker' plant in Mass." *Wbur*. Available at: https://www.wbur.org/news/2022/04/08/peabody-peaker-natural-gas-power-massachusetts

[100] U.S. Census Bureau. n.d. "QuickFacts: Massachusetts." Available at: https://www.census.gov/quickfacts/fact/table/MA/INC110219.

household income does not exceed 150 percent of the statewide median.[101]

Susan Smoller is a member of Breathe Clean North Shore, a community group that aims to prevent the proposed 60 MW gas/oil-fired Peabody peaker[102] that, according to the organization's website, would pollute the atmosphere with greenhouse gas emissions and worsen the climate crisis in the name of improving electric system reliability in New England.[103] Alternatives to peakers include a range of "peak shaving" measures that reduce peak load, such as battery storage or installations that pair renewable energy with batteries.

> ***Susan:*** *The peaker plant is a bad idea for Peabody because we already have two of them…We already have 125 megawatts of peaker plants [in Peabody] now. What comes with that is transmission lines, and a gas pipeline, and storage tanks. Just a lot of stuff in an area that already had Superfund sites closed down because it is an industrial area that's been active since the middle of the 19th century. So, we have a cumulative environmental history.*[104]

The reliability of energy resources must be understood within a larger context of other environmental, energy and social burdens, the cumulative impacts of which are an important consideration in every energy decision. The creation and maintenance of energy generating facilities that will release additional pollution in communities that are already environmentally disadvantaged must account for the cumulative impacts of existing local pollution-intensive infrastructural and industrial facilities.

Massachusetts' 2021 Climate Roadmap requires an environmental impact report "for any project that is likely to cause damage to the environment and is located within a distance of 1 mile of an environmental justice population."[105] The Peabody peaker is located within 1 mile of multiple EJ communities (see Figure 7 below), but was approved before the EJ community environmental impact assessment requirement became law.

Not only is the Peabody peaker located in close proximity to multiple EJ communities, but according to the U.S. EPA Toxics Release Inventory, seven facilities in Peabody release toxic chemicals that pose a threat to human health and the environment.[106] EPA's EJ mapping tool ranks large portions of Peabody's geographic area in the 90 to 100th percentile (nationally) for proximity to superfund sites—most notably, the area surrounding the Peabody peaker site ranks in the 95 to 100th percentile.[107]

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[101] Executive Office of Energy and Environmental Affairs. n.d. "Environmental Justice Populations in Massachusetts." Available at: https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts#:~:text=Languages%20Spoken-,What%20is%20an%20Environmental%20Justice%20Population%3F,following%20four%20criteria%20are%20true%3A&text=minorities%20comprise%2040%20per%20cent,lack%20English%20language%20proficiency%3B%20or.

[102] MMWEC. 2021. "Project 2015A". Available at: https://www.project2015a.org.

[103] Breathe Clean North Shore. Homepage. Available at: https://breathecleannorthshore.org/.

[104] Community Action Works. November 7, 2021. "A Backhanded Compliment." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/5Wpk2lYJLKAoik8v0D8JLQ?si=y2D1wxcGRTelo39Jh1VNUQ

[105] Massachusetts Session Laws Chapter 8 (March 26, 2021). *An Act Creating a Next-generation Roadmap for Massachusetts Climate Policy*. Available at: https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8

[106] U.S. EPA. 2022. "Toxics Release Inventory (TRI) Program." *EPA*. Available at: https://www.epa.gov/toxics-release-inventory-tri-program.

[107] U.S. EPA and EJ Screen. 2022. "EPA's Environmental Justice Screening and Mapping Tool (Version 2.0)." Available at: https://ejscreen.epa.gov/mapper/.

Figure 7. EJ communities near the proposed Peabody peaker

Data sources: (1) American Community Survey. 2020. ACS 5-Year Estimates Detailed Tables. [TableID: B19013, B03002, C16002]; (5) MMWEC. 2021. "Project 2015A". Available at: https://www.project2015a.org.

> ***Susan:*** *When I went out petitioning and canvassing, [people in Peabody] had no idea what I was talking about when I said "environmental justice" area.*
>
> *The one issue that I have with the current [EJ] legislation is that it's not strong enough about the cumulative role of pollution in a community. It just seems that if you have a lot of environmental problems—superfund sites, and gas leaks, and gas lines, and all this other stuff—that should count towards something in defining it as an environmental justice area.*[108]

Breathe Clean North Shore argues that the Peabody peaker plant is unwanted, unnecessary, and would cause further harm to already overburdened communities. The placement of the plant—if deemed "unacceptable" by the Secretary of Energy and Environmental Affairs—is also a direct violation of the

[108] Community Action Works. November 7, 2021. "A Backhanded Compliment." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/5Wpk2lYJLKAoik8v0D8JLQ?si=y2D1wxcGRTelo39Jh1VNUQ

Commonwealth's EJ principles, and a credible reliability assessment of the plant would include a retroactive application of the EJ law.[109]

The story of the Killingly gas-fired power plant and Peabody peaker crystallize the intersection between issues of energy reliability and greenhouse gas emissions. As the impacts of climate change accelerate, polluting plants continue to operate, and public policies promote new cleaner energy infrastructure, it is communities like Killingly and Peabody that bear the brunt of costs and consequences. Siting energy facilities in low-income communities is no accident: There is a long history of companies strategically locating polluting facilities in communities with low levels of political power, where permits can be gained easily and cheaply, and greater opportunities exist to influence the local government in favor of industry with limited benefits to local communities.[110] Consequently, under-resourced and underserved communities experience the highest levels of pollution and are the most susceptible to adverse climate events that result from pollution-driven climate change.

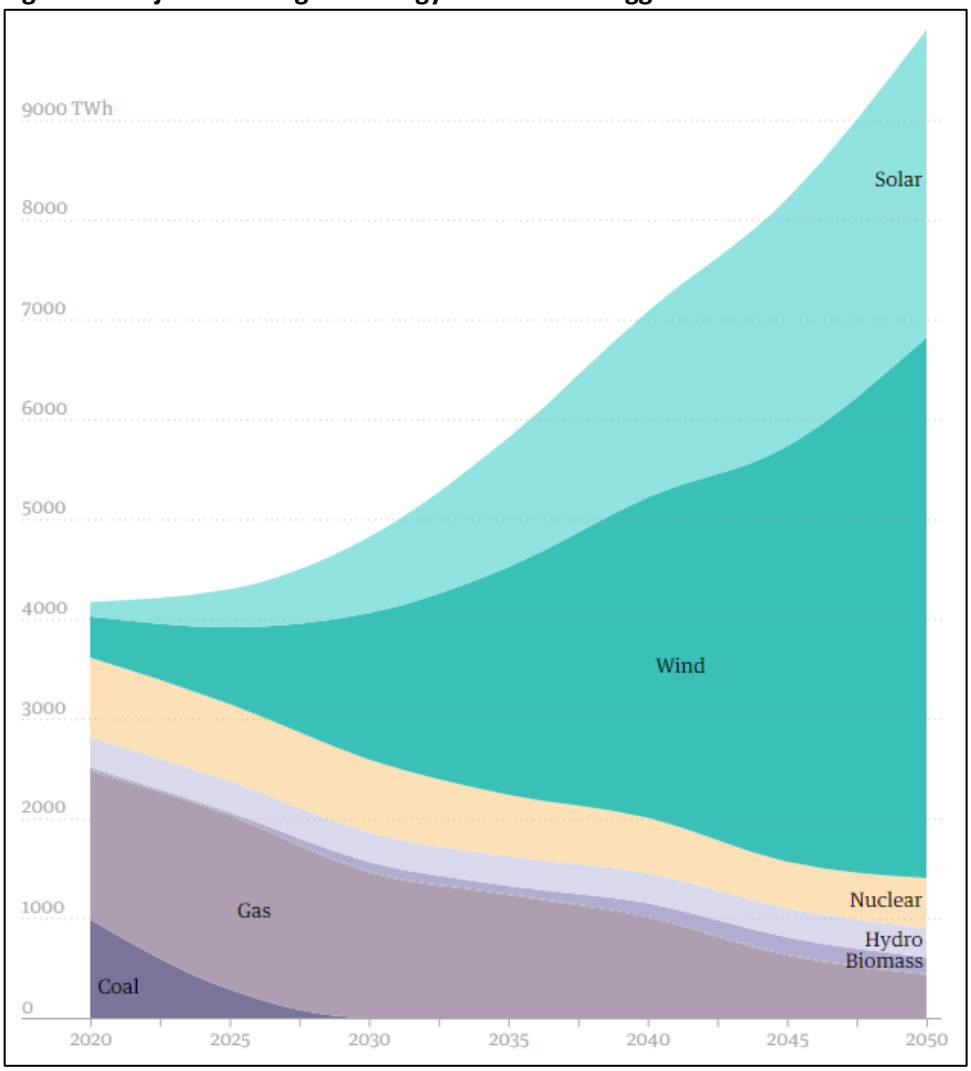
III. Increasing penetration of commercial-scale renewable energy and energy storage

Equity implications: Increasing penetration of renewable energy and energy storage
• Replacing polluting facilities with renewable generation can benefit EJ communities that currently experience disproportionate pollution from energy facilities. • Renewable generation offers potential benefit of reduced energy costs, which can disproportionately benefit energy-burdened communities. • The added grid reliability from battery energy storage usage helps at-risk groups like medical patients on ventilators, wage workers, and communities that experience frequent power outages. • **Proposals for new fossil-fuel energy infrastructure should justify their need in the context of state climate laws and expected future costs of and demand for renewables and battery storage.**

The amount of renewable energy in the United States has grown and its costs have decreased dramatically in the past few decades. In 2020, renewables accounted for 21 percent of total electric generation compared to 9 percent in 2000.[111] Renewable energy—including utility-scale hydro, wind, and large-scale solar as well as rooftop solar—is the fastest-growing energy source in the United States. EIA predicts that renewable energy's share of total electric generation will continue to grow in the coming decades, up to 42

[109] Massachusetts Session Laws Chapter 8 (March 26, 2021). *An Act Creating a Next-generation Roadmap for Massachusetts Climate Policy*.
[110] Clean Air Task Force. 2017. *Fumes Across the Fence Line.* Prepared for the National Association for the Advancement of Colored People. Available at: https://www.catf.us/wp-content/uploads/2017/11/CATF_Pub_FumesAcrossTheFenceLine.pdf. p. 6.
[111] U.S. EIA. Last updated April 19, 2022. "Electricity explained: Electricity generation, capacity, and sales in the United States." Available at: https://www.eia.gov/energyexplained/electricity/electricity-in-the-us-generation-capacity-and-sales.php.

Figure 8. Projected change in energy sources with aggressive electrification to meet net zero by 2050



Source: Reproduced from Milman, O., Chang, A. and Kamal, R. March 15, 2021. The race to zero: can America reach net-zero emissions by 2050? The Guardian. Available at: https://www.theguardian.com/us-news/2021/mar/15/race-to-zero-america-emissions-climate-crisis.

percent in 2050 in the reference case.[112] Credible assessments must consider a wide range of renewable energy futures that include faster-than-expected growth scenarios.

States' progress towards climate goals will have the effect of accelerating the transition away from fossil fuel energy sources like gas to renewable energy sources. For example, researchers at Princeton University

[112] U.S. EIA. 2021. "Table 2. Energy Consumption by Sector and Source." *Annual Energy Outlook 2021.* Available at: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=2-AEO2021&region=1-0&cases=lorencst&start=2019&end=2050&f=A&linechart=lorencst-d113020a.112-2-AEO2021.1-0~lorencst-d113020a.113-2-AEO2021.1-0~lorencst-d113020a.114-2-AEO2021.1-0~lorencst-d113020a.115-2-AEO2021.1-0~lorencst-d113020a.116-2-AEO2021.1-0~lorencst-d113020a.117-2-AEO2021.1-0~lorencst-d113020a.118-2-AEO2021.1-0&map=lorencst-d113020a.4-2-AEO2021.1-0&ctype=linechart&sourcekey=0.

examining potential pathways to net zero energy use in the United States by 2050 found that, assuming a scenario of aggressive electrification and renewables development to achieve net zero energy by 2050, gas generation falls by 71 percent between 2020 and 2050 while utility-scale wind and solar energy generation rise by 1,443 percent (see Figure 8 above).[113]

Falling renewable costs may also accelerate the adoption of more renewable energy. Lazard's 2020 levelized cost of energy (LCOE) report (an industry standard) shows that the cost of utility-scale wind and solar have fallen drastically since 2000: about 11 percent per year for solar and 5 percent per year for wind. The 2020 LCOE report also found that electric generation from utility-scale solar is cheaper than from gas combined cycle plants.[114]

Increased adoption of renewable energy often goes hand in hand with increased investment in battery energy storage systems to increase energy cost savings. Research from the National Renewable Energy Laboratory (NREL) reveals that the combined use of solar and battery storage can result in substantial cost savings; a 2020 study published in the journal *Energy Policy* shows that the cost savings of combining both technologies is even *greater* than the sum of cost savings achievable by each individual technology in isolation.[115]

In addition to cost savings, the deployment of battery storage technology can offer other major reliability benefits, including reduced grid congestion, reduced outages, and peak demand reduction. According to research from the National Energy Screening Project (NESP) and the research organization Energy and Environmental Economics, Inc. (E3), by capturing and storing energy at times of low demand for use at times of peak demand, battery storage systems can reduce transmission congestion on the grid,[116] particularly in electrically constrained locations.[117] The reduction in congestion can improve the reliability of electric service and prevent unplanned outages or unpredictable losses of service, while also reducing transmission costs. Nationally, power outages cost residences and businesses between $30 billion and $130 billion per year.[118] By providing energy when electric generation or transmission fails, batteries can

[113] Larson, E. Last updated January 9, 2022. "Net-Zero America – National Data." *Princeton University.* Available at: https://netzeroamerica.princeton.edu/img/nzap-national-report.pdf.
[114] Lazard. October 2020. Levelized Cost of Energy and Levelized Cost of Storage – 2020. Available at: https://www.lazard.com/perspective/levelized-cost-of-energy-and-levelized-cost-of-storage-2020/.
[115] (1) Muratori, M., et al. 2019. *Technology Solutions to Mitigate Electricity Cost for Electric Vehicle DC Fast Charging.* NREL. Available at: https://bit.ly/35JvoyQ. (2) Darghouth, N.R., et al. 2020. "Demand charge savings from solar PV and energy storage." *Energy Policy, 146.* Available at: https://www.sciencedirect.com/science/article/pii/S0301421520304882
[116] National Energy Screening Project (NESP). August 2020. *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources*. Available at: https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/. pg. 4-6.
[117] Ouyang J., et al. December 31, 2019. *Minnesota Energy Storage Cost-Benefit Analysis*. Energy + Environmental Economics. Available at: https://mn.gov/commerce-stat/pdfs/energy-storage-cost-benefit-study-2020.pdf. p. 10.
[118] Orlando, E. 2004. "Understanding the Cost of Power Interruptions to U.S. Electricity Consumers." *Lawrence Berkeley National Laboratory*. Available at: https://emp.lbl.gov/sites/all/files/REPORT%20lbnl%20-%2055718.pdf

prevent power outages and their costs.[119] In addition, by storing energy at times of low demand and low generation costs for use at times of peak demand, batteries can enhance grid reliability while reducing costs associated with peak demand by:

- drawing on stored energy to reduce costly power usage during times of peak demand,[120]
- reducing doubt in projections of future loads and related capital investment needs,[121]
- reducing congestion along transmission and distribution (T&D) lines during peak times, reducing the need for investments in T&D infrastructure,[122] and
- producing a greater buffer for system capacity to handle peak demand, reducing the likelihood of power outages and the associated costs.[123]

Planning for a reliable electric system requires accounting for the falling costs and increasing penetration of renewable generation and energy storage, considering the wide range of potential renewable energy futures—from business-as-usual to full climate policy attainment.

Equity implications

A higher penetration of commercial-scale (or "utility-scale") renewable resources and battery storage systems has a positive impact on equity. Under-resourced and underserved communities bear the greatest burden of today's pollution and of climate change caused by greenhouse gas emissions. As such, those communities stand to benefit the most from taking polluting facilities offline or deciding not to pursue new fossil fuel expansion, and instead investing in utility-scale renewables. Yet, to date, overburdened communities are often the first locations considered for siting fossil energy peaker plants, and the last ones considered for building expanded renewable energy. Credible energy system assessments account for the existing distribution of benefits and burdens from large-scale renewable generation in addition to potential disruptions and negative impacts that would be created by a proposed fossil energy project.

During grid service disruptions, the costs of power outages fall disproportionately upon overburdened populations including workers, commuters, low-income communities, and patients requiring medical machinery. These costs take the form of lost wages, disrupted transportation, loss of perishable foods, and potential morbidity or mortality. Greater penetration of battery storage, and the resulting grid reliability improvements, means fewer power outages and reduced associated costs.

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[119] (1) Massachusetts Department of Energy Resources, Massachusetts Clean Energy Center, Customized Energy Solutions, Ltd., Alevo Analytics, Sustainable Energy Advantage, LLC, Daymark Energy Advisors, and Strategen. 2016. *State of Charge: Massachusetts Energy Storage Initiative Study.* Available at: https://www.mass.gov/doc/state-of-charge-report/download. p. 45. (2) Energy Storage Association. 2017. *35x25 A Vision for Energy Storage*. Available at: https://energystorage.org/wp/wp-content/uploads/2019/06/esa_vision_2025_final.pdf. p.11. (3) Connecticut Green Bank. July 31, 2020. *Solarize Storage—A Proposal of the Connecticut Green Bank Under Docket No. 17-12-03(RE03)—Electric Storage.* Available at: https://www.ctgreenbank.com/wp-content/uploads/2020/08/PURA-Docket-No.-17-12-03RE03-%E2%80%93-Solarize-Storage-Proposal-from-the-Green-Bank.pdf. pp. 82-86, 89.

[120] CT Green Bank 2020. p. 227.

[121] NESP 2020. pg. 4-9.

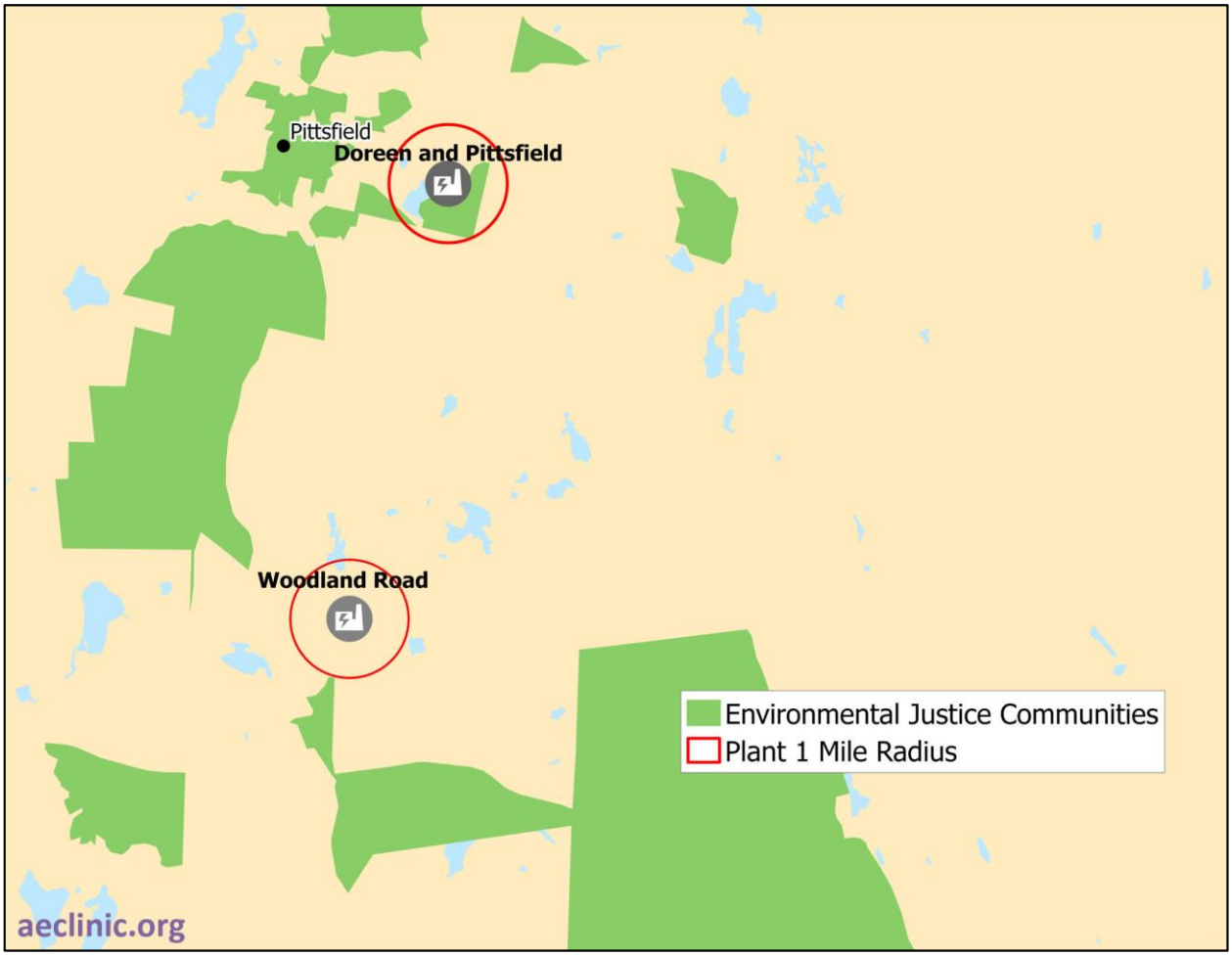
[122] Littell D., et al. October 2019. The Economics of Distributed Energy Resources. RAP. Available at: https://www.raponline.org/knowledge-center/economics-distributed-energy-resources/. p. 53.

[123] CT Green Bank 2020. p. 76.

Case Study: Berkshire County Peaking Plants (Berkshire County, MA)

Despite community concerns with the burdens associated with dirty power, three peaking plants in Berkshire County, Massachusetts continue to operate: the 20-MW fuel oil and kerosene-fired Woodland Road plant in Lee, operational since 1969;[124] the 21-MW kerosene-fired Doreen plant in Pittsfield, also operational since 1969;[125] and four gas- and fuel oil-fired peaking units totaling 176 MW called the Pittsfield Generating Plant in Pittsfield, operating since 1990 (see Figure 9 below).[126]

Figure 9. EJ communities near the Woodland Road, Doreen, and Pittsfield Generating plants



Data sources: (1) American Community Survey. 2020. ACS 5-Year Estimates Detailed Tables. [TableID: B19013, B03002, C16002]; (2) Energy Justice Network. Woodland Road. Available at: http://www.energyjustice.net/map/displayfacility-64722.htm. (3) Energy Justice Network. Doreen. Available at: http://www.energyjustice.net/map/displayobject.php?giFacilityid=64717&gsTable=facility. (4) Energy Justice Network. Pittsfield Generating LP. Available at: http://www.energyjustice.net/map/displayfacility-67302.htm.

[124] Energy Justice Network. *Woodland Road.* Available at: http://www.energyjustice.net/map/displayfacility-64722.htm
[125] Energy Justice Network. *Doreen.* Available at: http://www.energyjustice.net/map/displayobject.php?giFacilityid=64717&gsTable=facility.
[126] Energy Justice Network. *Pittsfield Generating LP.* Available at: http://www.energyjustice.net/map/displayfacility-67302.htm.

Jane Winn is Berkshire Environmental Action Team's (BEAT) Executive Director and Rosemary Wessel is the Program Director of No Fracked Gas in Mass at BEAT, a community-based organization that works to protect the environment. BEAT is currently fighting to have the Berkshire peakers shut down and replaced by renewable resources and battery storage.

> ***Rosemary:*** *Well, peaker plants…they're the most polluting [of all fossil fuel infrastructure], they tend to be really old. More than half of them are 50 years old or older. The ones in Berkshire County are 30, 40, and 60 years old. And they're the least efficient per megawatt produced. And they're easily yielded unnecessary by things like energy efficiency, demand response programs, and replacing whatever demand is left with good scale storage, charged by clean energy sources…[The peakers] take hours to start up and get up to speed. So, for the couple of hours that they're needed, they're actually producing emissions when they're gearing up and powering down, as well as when they're actually supplying energy.*
>
> ***Jane:*** *And one additional problem for the ratepayers is these [peaker] plants are actually paid to be on standby whether they run or not. And they're paid a lot of money upping our electric rates unnecessarily.*[127]

Because the Woodland Road and Doreen plants are so old, they do not need air permits to operate under the Clean Air Act.[128] In raising this issue to the plant owners, BEAT has had some success in securing agreements from plant owners to transition toward renewables and storage.

> ***Rosemary:*** *Well, one of the things that really made a lot of sense was approaching the corporations that own these places and seeing what they had in mind. You know, it's hard to believe that anyone in the fossil fuel industry doesn't know that the writing's on the wall. We all know about the IPCC report and what needs to happen. And now we have the Next Generation Climate Roadmap Act in Massachusetts, that says, you know, we need to get off of fossil fuels in all sectors, and we need to reduce emissions from all sectors.*
>
> ***Jane:*** *And one of [the corporations], who owns two of the facilities here, immediately came back and said, "Yep, we're on board, we just need to figure out how to make this transition, we would love your help."…The other facility, which is the really big one, was not so quick to come to the table.*
>
> ***Rosemary:*** *And now that we finally got through to the other peaker plant owner…we paired them up with some analysts, and they are now looking at transitioning to storage, just more*

[127] Community Action Works. November 1, 2021. "The Wider the Net, the Stronger the Fight." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/3JJRTBBxamSKGug01nGHKy?si=0AXrBcPRRSW58andhGj4yw

[128] 1) Flatt, V. & Connolly, K. 2005. *'Grandfathered' Air Pollution Sources and Pollution Control: New Source Review Under the Clean Air Act*. A Center for Progressive Regulation White Paper. Available at: https://cpr-assets.s3.amazonaws.com/documents/NSR_504.pdf; 2) Parnass, L. July 8, 2021. "'Peaker' power plant owner should discuss cleaner operation, Pittsfield health officials say." *The Berkshire Eagle*. Available at: https://www.berkshireeagle.com/news/local/peaker-power-plant-owner-should-discuss-cleaner-operation-pittsfield-health-officials-say/article_86bdb26a-dff9-11eb-b5cb-83c756551a4b.html.

slowly…and we're continuing the public push to get them to go all the way as soon as possible.[129]

The collaboration between BEAT and the peaker plant owners to replace their polluting facilities with clean energy and large-scale energy storage is an illustration of energy decision-making that is mindful of the benefits offered by renewable energy and battery storage. It bears noting, however, that the decision to transition to storage was only possible due to the sustained advocacy led by BEAT and their community allies. This integration of community considerations on renewable energy and energy storage into energy planning provides a path for credible reliability assessments to follow.

IV. Increasing amounts of distributed energy resources

Equity implications: Increasing amounts of distributed energy resources
• The use of distributed energy resources can reduce customer energy bills, which would especially benefit energy-burdened and low-income communities. • Distributed energy systems can enhance energy resiliency and reliability, a particular benefit for groups with sensitive energy needs (such as use of ventilators or medicines needing refrigeration). • **People who adopt distributed energy resources tend to be much wealthier than average, suggesting a disconnect between potential and actual distribution of benefits. Programs providing incentives for solar panels and small-scale batteries should include consideration of household income.**

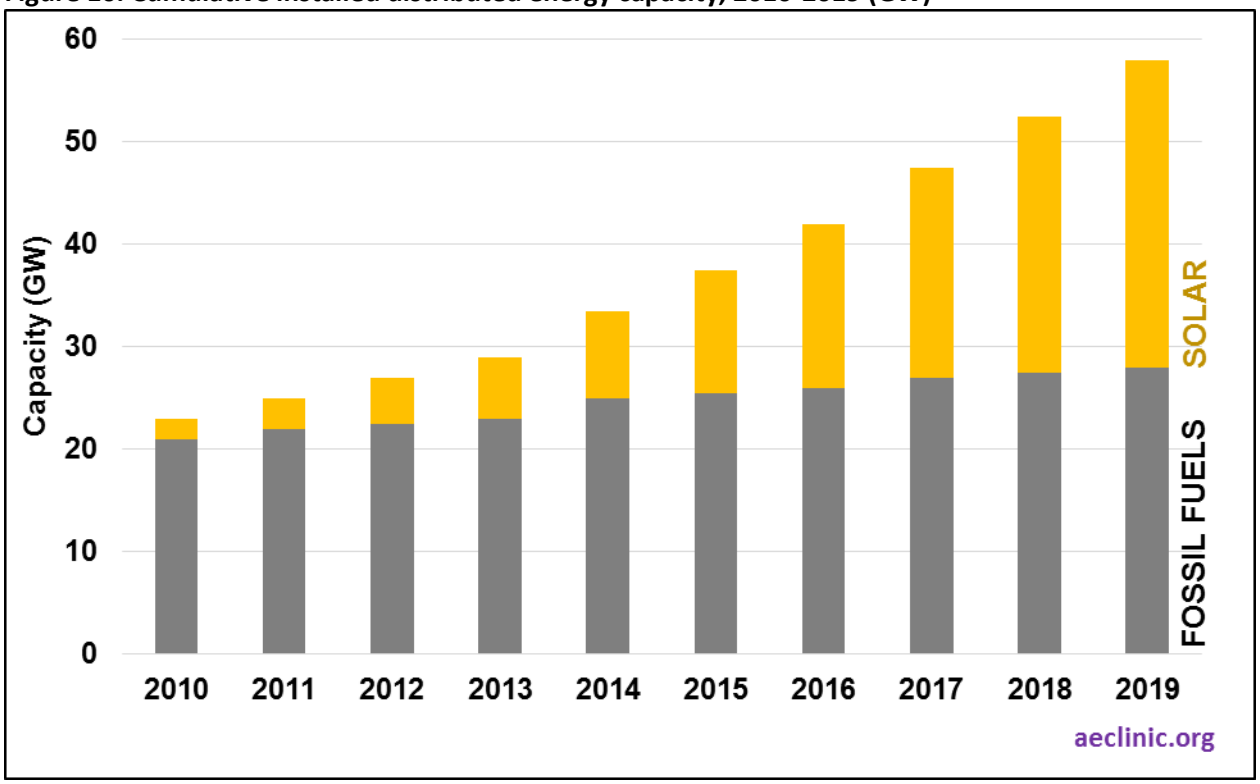
Distributed energy resources (sometimes called "behind-the-meter") are small energy generation and storage equipment like solar panels, batteries and fuel cells that are often located at homes and businesses and can be connected to the power grid or stand alone.[130] The most common example of distributed generation is rooftop solar panels. Distributed energy resources increase reliability and resiliency by allowing buildings to generate and/or store their own energy, keeping the power on during grid blackouts. In the United States, generation from distributed energy resources has been increasing over the last decade and is projected to continue to climb. Credible assessments of new energy projects intended to enhance reliability explicitly account for future growth in distributed energy and its impacts peak needs.

According to a 2020 report from the consultancy Wood Mackenzie, cumulative installed rooftop solar and distributed fossil generation capacity in the United States has grown by 35 GW since 2010, reaching 8.2 percent of peak demand in 2019 (see Figure 10). Over the same period, rooftop solar has overtaken distributed fossil resources like combined-heat-and-power systems that generally use reciprocating engines or turbines to produce electricity and heat. Wood Mackenzie attributes increasing amounts of

[129] Community Action Works. November 1, 2021. "The Wider the Net, the Stronger the Fight." Stories from the Frontlines [Podcast]. Available at: https://open.spotify.com/episode/3JJRTBBxamSKGug01nGHKy?si=0AXrBcPRRSW58andhGj4yw
[130] NREL and Oak Ridge National Laboratory. May 2002. "Using Distributed Energy Resources." *Federal Energy Management Program*. Available at: https://www.nrel.gov/docs/fy02osti/31570.pdf.

rooftop solar to falling costs and, when paired with battery storage, increased energy reliability.[131]

Figure 10. Cumulative installed distributed energy capacity, 2010-2019 (GW)

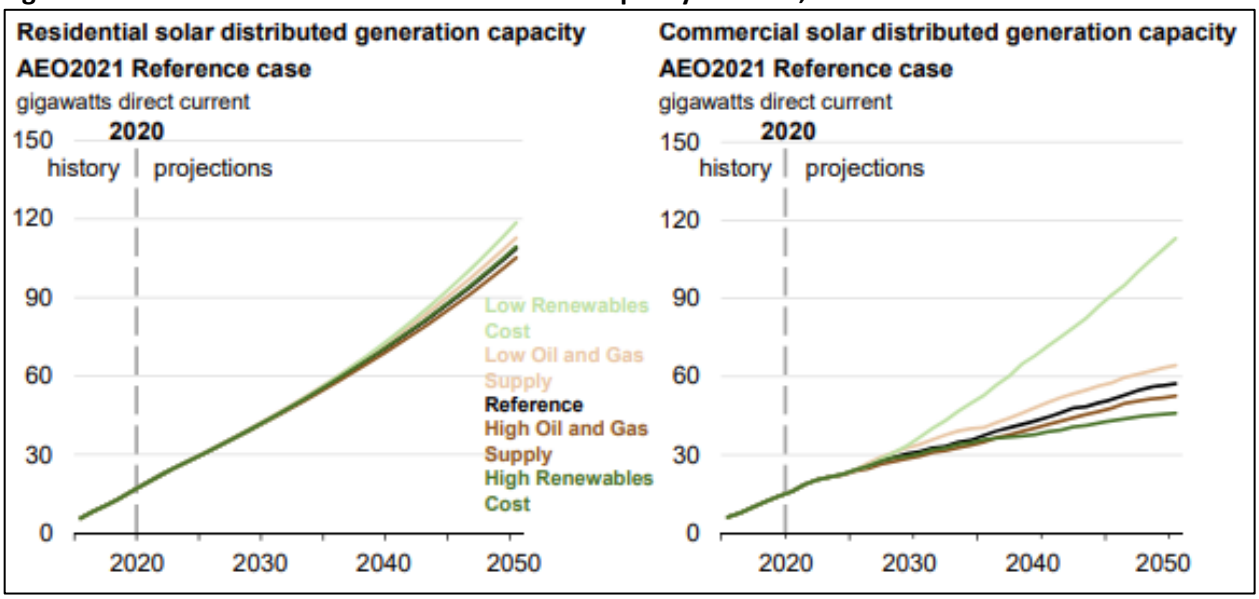


Data source: St. John, J. June 22, 2020. 5 Major Trends Driving the $110B US Distributed Energy Resources Market Through 2025. Greentech Media. Available at: https://www.greentechmedia.com/articles/read/5-takeaways-on-the-future-of-the-u.s-distributed-energy-resources-market.
Data Source: Wood Mackenzie. 2020. United States distributed energy resources outlook: DER installations and forecasts 2016-2025E. Available at: https://www.woodmac.com/reports/power-markets-united-states-distributed-energy-resources-outlook-der-installations-and-forecasts-2016-2025e-416181/?utm_source=gtm&utm_medium=article&utm_campaign=pandr&utm_content=wmpr_deroutlook2020.

Similarly, EIA's *2021 Annual Energy Outlook* reports that in 2020, 30 GW of residential and commercial rooftop solar was installed across the country. Under a reference case scenario, EIA predicts past growth in distributed energy resources to continue in the future: Combined residential and commercial rooftop solar is forecasted to surpass 160 GW by 2050 (see Figure 11, which forecasts increasing amounts of residential and commercial rooftop solar between 2020 and 2050 under all modeled scenarios).

[131] St. John, J. June 22, 2020. "5 Major Trends Driving the $110B US Distributed Energy Resources Market Through 2025." *Greentech Media*. Available at: https://www.greentechmedia.com/articles/read/5-takeaways-on-the-future-of-the-u.s-distributed-energy-resources-market.

Figure 11. Residential and commercial solar DER capacity forecast, 2020-2050



Source: Reproduced from U.S. EIA. February 2021. "2021 Annual Energy Outlook." Available at: https://www.eia.gov/outlooks/aeo/pdf/00%20AEO2021%20Chart%20Library.pdf.

However, rooftop solar is not the only distributed resource that is likely to have an important role in the future: Battery storage and more cutting-edge on-site, distributed technologies—like customers allowing energy providers to directly control their electric load via distributed, grid-connected smart thermostats, smart water heaters and electric vehicles (EVs), usually in exchange for some kind of incentive—are also on the rise. The 2020 Wood Mackenzie report predicts that battery storage and other kinds of on-site, distributed energy resources will also grow in the coming years, leading to a greater reliance on different kinds of distributed and flexible resources into the future.[132]

Small-scale battery storage and other kinds of on-site, distributed energy resources provide customers with reliability and resiliency: Rooftop solar paired with battery storage mean that customers have energy to draw on in the event of a power outage. They also provide grid operators with crucial flexibility: the means to draw on energy stored in customer-sited batteries, shift electric load away from times of peak demand, and/or curtail electric load during times of peak demand to prevent costly peaker plants from coming online and/or to prevent power outages. As distributed energy resources grow, so will the resiliency and reliability of energy service to the buildings that operate them—particularly those that can both generate and store energy—which will reduce the need for new fossil fuel projects intended to enhance reliable electric service.

Planning for a reliable electric system requires accounting for projections of rapid growth in distributed resources—including both more conventional distributed energy resources like fossil fuel combined heat

[132] Wood Mackenzie. 2020. *United States distributed energy resources outlook: DER installations and forecasts 2016-2025E*. Available at: https://www.woodmac.com/reports/power-markets-united-states-distributed-energy-resources-outlook-der-installations-and-forecasts-2016-2025e-416181/?utm_source=gtm&utm_medium=article&utm_campaign=pandr&utm_content=wmpr_deroutlook2020

and power and rooftop solar panels, as well as more cutting-edge flexible resources like smart thermostats and EVs—as well as an explicit consideration of distributed energy resources impact on the need for large-scale energy projects intended to enhance reliability.

Equity implications

Distributed energy resources benefit equity in two important ways: by reducing monthly energy bills for owners of these small-scale generating resources and by enhancing energy resiliency and reliability, both of which provide the greatest benefits to low-income and other households at increased risk from power shutoffs (for example, nebulizer-dependent households). However, neither of these equity benefits is a given: 2021 research from the Lawrence Berkeley National Laboratory found that the median income of households with rooftop solar is nearly double that of the U.S.-wide median ($113,000 and $64,000, respectively).[133] If rooftop solar is primarily installed in wealthy households, then the benefits of rooftop solar—decreased energy costs and increased reliability and resiliency—are also accruing primarily to wealthy households. On the other hand, if the development of rooftop solar and other distributed energy technologies is targeted toward energy burdened communities and those without stable power service, benefits can be distributed more equitably.

Developing distributed energy resources is an alternative to fossil fuel resources that can enhance reliability. As with all reliability resources, careful and inclusive assessment is needed to assure that these investments do not come at the expense of an equitable distribution of benefits.

Case Study: Berkshire County Peaker Plants (Berkshire County, MA)

Distributed energy resources offer crucial reliability benefits—particularly to populations with acute energy needs—relative to energy systems that only include centrally located generation. Centralized, fossil fuel-powered grids leave customers more susceptible to losses of power and dangerous levels of toxic pollutants and greenhouse gases, particularly in low-income and/or racialized communities; peaker plants, in the name of enhancing grid reliability, release emissions and pollution in already-overburdened communities. In contrast to peaker plants, distributed renewable energy generation offers a decentralized, climate-friendly solution to ensuring grid reliability while protecting environmental and public health.

In addition to the Pittsfield generating plants' proximity to EJ communities, the community of Pittsfield, Massachusetts faces other compounding environmental threats. According to the U.S. EPA Toxics Release Inventory, two facilities in Berkshire County—the Woodland Road and Doreen plants—release chemicals toxic to human and environmental health.[134] The majority of Pittsfield's land area ranks in the 90th to 100th percentile nationwide for proximity to Superfund sites.[135] Communities like Pittsfield can benefit especially from distributed energy resources, which offer cheaper, cleaner and less pollution-heavy alternatives to

[133] Barbose, G. et al. April 2021. *Residential Solar-Adopter Income and Demographic Trends: 2021 Update* [Powerpoint slides]. Lawrence Berkeley National Laboratory. Available at: https://eta-publications.lbl.gov/sites/default/files/solar-adopter_income_trends_final.pdf.
[134] U.S. EPA. 2022. "Toxics Release Inventory (TRI) Program." *EPA*. Available at: https://www.epa.gov/toxics-release-inventory-tri-program.
[135] U.S. EPA and EJ Screen. 2022. "EPA's Environmental Justice Screening and Mapping Tool (Version 2.0)." Available at: https://ejscreen.epa.gov/mapper/.

today's toxic energy realities in Pittsfield. However, current energy market mechanisms enable the use of dirty peaker plants like the ones in Berkshire County over cleaner distributed resources.

In their advocacy with BEAT, Jane Winn and Rosemary Wessel emphasize the issue of pollution from peaker plants, its impacts on surrounding communities, and the market agents responsible for environmental harms in communities like theirs.

> ***Rosemary:*** *There are folks living in the EJ communities where these plants are sited, you know, their health outcomes are far worse than people in other neighborhoods…Some of the folks that showed up at our [events] were either still in high school or fresh out of high school…and one of them said, "Yeah, I went to the elementary school that's directly next to the power plant." The largest peaker is directly next to an elementary school. It's actually just across a toxic waste dump from the peaker plant. So, he said, "it was intimidating, going to school and seeing these large smokestacks overhead every time you went out into the playground."…You know, for the neighborhoods that live next to these plants, their concern is their health and not having to breathe in the pollution, and also the cost of their electric bills. When they find out how much money goes to incentivizing the peakers, it absolutely lights people's hair on fire. They're like, what? We're paying millions of dollars for them to just sit and wait, even if they never turned on? And most people just want to stop breathing in the pollution.*[136]

ISO-NE provides capacity payments to power plants that safeguard the New England region's reliable electric supply by standing ready to provide energy at peak times. Plants are paid by ISO-NE regardless of how often they actually generate electricity. When old, polluting peaker plants like the ones in Berkshire County are kept in business for reliability purposes as a result of capacity payments, there are obvious implications for the health and wellbeing of the communities near those plants, but also for the ability of the Commonwealth to reach its climate and clean energy goals. In contrast, the deployment of distributed energy resources offers a cleaner, more reliable alternative as well as financial, health, and environmental benefits to communities like Pittsfield. If government funds are diverted from incentives and subsidies for fossil fuels and in favor of clean energy technologies like distributed energy resources, energy markets like ISO-NE can achieve more efficient outcomes for consumers.

> ***Rosemary:*** *Yeah, ISO-NE—it's long past the time that they need to transition to clean energy and take that transition seriously. Right now, New England really needs to restructure the energy markets in a way that disincentivizes fossil fuel-based energy and incentivizes clean energy and storage. Right now, the incentives are very heavily geared towards fossil-based technology or fuel-based technology. It also means that our regulatory agencies need to hold the utilities' feet to the fire and make them upgrade the grid to facilitate the clean energy transition.*
>
> ***Jane:*** *I think one of the things we really need, government funding to not be incentivizing big,*

[136] Community Action Works. November 1, 2021. "The Wider the Net, the Stronger the Fight." Stories from the Frontlines [Podcast]. Available at https://open.spotify.com/episode/3JJRTBBxamSKGug01nGHKy?si=0AXrBcPRRSW58andhGj4yw

> *huge plants. Instead, really helping people be able to put solar on rooftops, have battery backup, so that when the grid goes down, people are okay. You can still have your oxygen machine running, because you've got battery backup at your own home. Or at the community center. Having a really distributed grid with locally produced clean electricity and storage is the way we should be funneling our money, not towards more, large, investor-owned utilities.*[137]

Rooftop solar panels, small-scale batteries and other zero-carbon distributed energy alternatives can ensure energy reliability in lieu of pollution-intensive peaker plants. A distributed grid can directly benefit groups of people who are especially reliant on electricity, such as patients on ventilators or people at the community center. Despite the achievable benefits from distributed energy resources, the energy market, market regulators, and policymakers continue to direct investments toward dirty power sources while shifting the costs of grid upgrades onto clean energy companies and consumers. BEAT makes a case for energy markets and policymakers restructuring incentives away from fossil fuel-based energy sources and toward clean and distributed energy sources.

> ***Rosemary:*** *We were talking to a solar installer about the Connected Solutions program, which in theory is a very good program that helps people take advantage of all the different clean energy incentives and storage incentives. But somebody from one of these companies went through putting the storage in, and they got stalled for a half year while the utility company did a study on how it works. And then at the end of that study, they told them they needed to pay another $10,000 to upgrade the grid in that area. It should be the utilities that are responsible for the grid, and ISO New England and our state agencies.*[138]

The case of Berkshire County's aging peakers illustrates clear contradictions in the energy market: Communities close to dirty power plants bear all of the resulting environmental costs but hold none of the decision-making power. Meanwhile, decisionmakers in the energy market must carefully weigh the costs of grid upgrades and new transmission lines required to divest from dirty power sources and support electrification. The result is a shift in costs from polluters to the affected communities themselves. In a just system, the entities responsible for the costs of pollution and downstream consequences of dirty energy sources like the peaker plants in Pittsfield would bear financial responsibility for the costs of creating a distributed, upgraded, cleaned-up energy grid.

[137] Ibid.
[138] Ibid.

V. Energy efficiency potential

Equity implications: Energy efficiency potential
• Energy efficiency initiatives can lower participant energy bills, which offers particular benefits to energy-burdened and low-income populations. • Energy efficiency technologies can lead to improved indoor air quality, conferring extra gains to asthma patients and groups susceptible to indoor pollution. • **Energy efficiency benefits skew toward wealthy and white customers, indicating a mismatch between potential and actual distribution of benefits. Energy efficiency programs should include measures targeted to reach the underserved customers that can benefit the most from lower energy bills.**

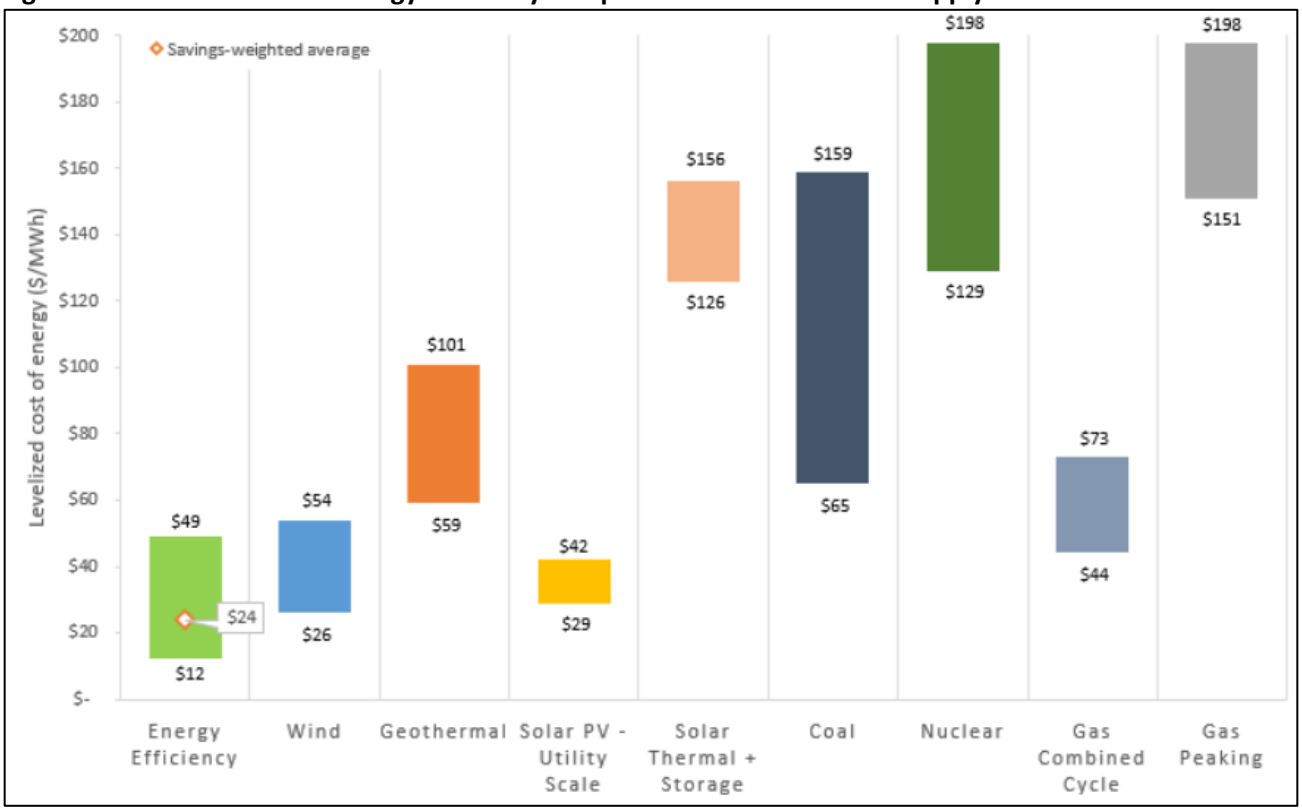
U.S. energy use has become more efficient over the last three to four decades and opportunities for energy efficiency are still increasing while energy efficiency measures are the least-cost generation resource available. Reliability assessments of new energy projects must account for energy efficiency potential and the low costs of energy efficiency measures.

The American Council for an Energy-Efficient Economy's (ACEEE) 2015 research found that the U.S. economy's energy intensity (defined as energy use per real dollar of economic output) fell by about 50 percent from 1980 to 2014.[139] Some efficiency improvements are the result of structural changes to segments of the economy over time (for example, the U.S. steel industry reduced its energy use per ton of steel produced by 60 percent between 1945 and 2000)[140], but ACEEE's research estimated that at least six-tenths of the observed decline in the U.S. economy's energy intensity is due to more efficient energy use.

In the past, some assessments assumed that energy efficiency potential was severely limited and will become increasingly expensive for each additional unit of saved energy[141]—but 2018 research from the Rocky Mountain Institute found that the opportunities for energy efficiency are still increasing,[142] and 2021 research from the ACEEE demonstrates that energy efficiency measures are the least-cost for electric distributors.[143] Based on data from 48 large investor-owned utilities, ACEEE's research found that the levelized cost of energy efficiency in 2018 was 2.4 cents per kilowatt-hour (shown in Figure 12 as $24 per MWh), making energy efficiency the most cost-effective resource currently available.

[139] Nadel, S. et al. 2015. *Energy Efficiency in the United States: 35 Years and Counting.* American Council for an Energy-Efficient Economy. Available at: https://www.aceee.org/research-report/e1502.
[140] Stubbles, J. September 2000. "Energy Use in the U.S. Steel Industry: An Historical Perspective and Future Opportunities." *Prepared for the U.S. Department of Energy*. Available at: https://www.energy.gov/sites/prod/files/2013/11/f4/steel_energy_use.pdf.
[141] Lovins, A. 2018. "How Big Is The Energy Efficiency Resource?" *Rocky Mountain Institute.* Available at: https://rmi.org/insight/how-big-is-the-energy-efficiency-resource/.
[142] Ibid.
[143] ACEEE. June 2021. "The Cost of Saving Electricity for the Largest U.S. Utilities: Ratepayer-Funded Efficiency Programs in 2018." Available at: https://www.aceee.org/sites/default/files/pdfs/cost_of_saving_electricity_final_6-22-21.pdf.

Figure 12. Levelized cost of energy efficiency compared with unsubsidized supply-side resources



Source: Reproduced from ACEEE. June 2021. "The Cost of Saving Electricity for the Largest U.S. Utilities: Ratepayer-Funded Efficiency Programs in 2018." Available at: https://www.aceee.org/sites/default/files/pdfs/cost_of_saving_electricity_final_6-22-21.pdf. Figure 3.

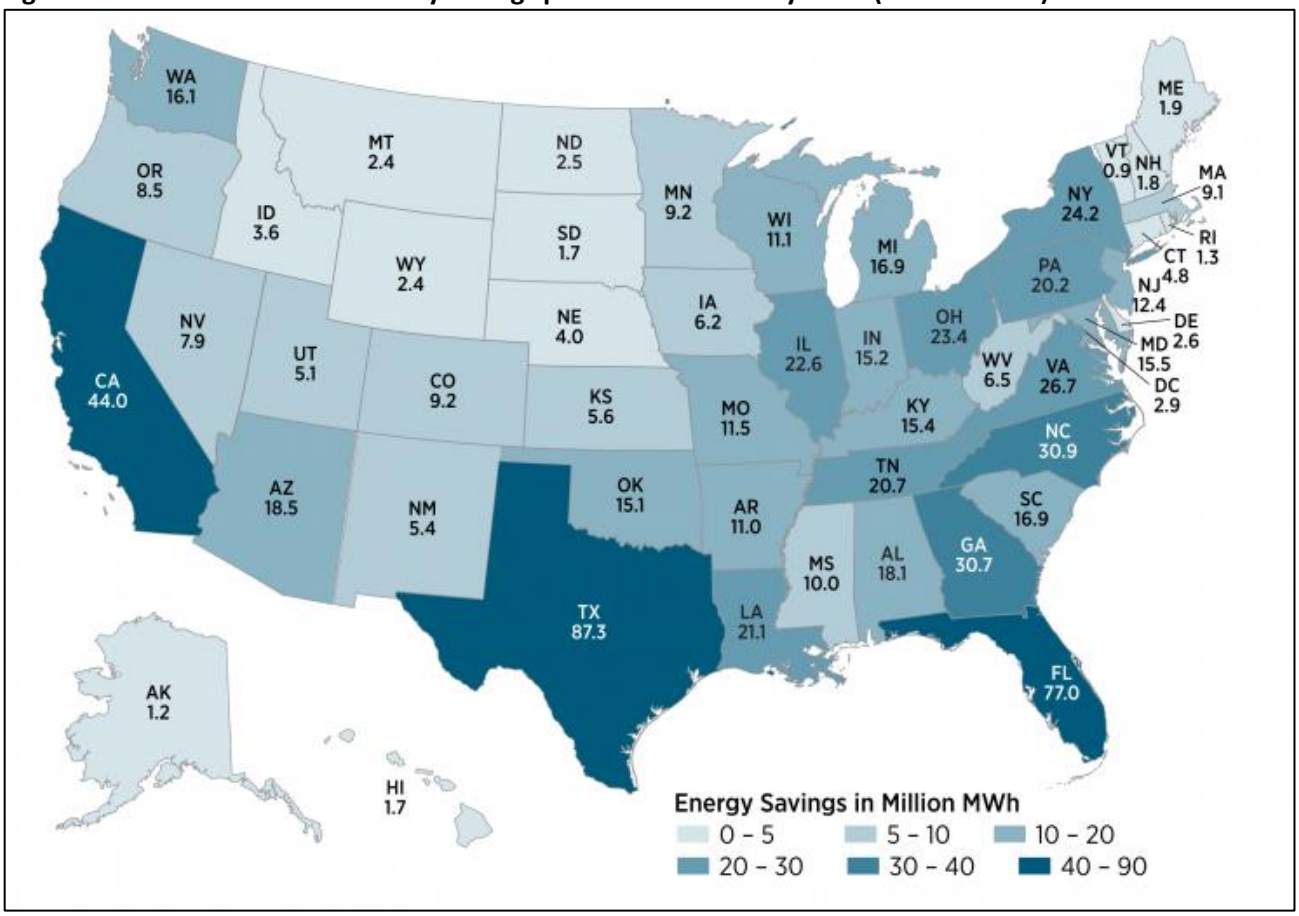
The U.S. Department of Energy estimates that all 50 states have untapped energy efficiency potential through 2035 (see Figure 13 below).

The benefits of energy efficiency measures extend well beyond their low cost: There are emissions reductions, grid reliability and resiliency benefits, economic benefits, and societal benefits as well:[144]

- 2019 research by the International Energy Agency (IEA) found that, if the world implemented all currently cost-effective energy efficiency measures, annual global energy-related emissions would decline by 12 percent (from 2017 levels) because of the reduction in polluting energy supply;[145]
- IEA also found societal benefits from energy efficiency because it leads to improvements in indoor and outdoor air quality and associated improvements in physical and mental health and wellbeing.[146]

[144] ACEEE. June 2021. "The Cost of Saving Electricity for the Largest U.S. Utilities: Ratepayer-Funded Efficiency Programs in 2018." Available at: https://www.aceee.org/sites/default/files/pdfs/cost_of_saving_electricity_final_6-22-21.pdf.
[145] IEA. N.d. "Multiple Benefits of Energy Efficiency: Emissions savings." Available at: https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/emissions-savings.
[146] IEA. N.d. "Multiple Benefits of Energy Efficiency: Health and wellbeing." Available at: https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/health-and-wellbeing.

Figure 13. Total economic electricity savings potential for 2035 by state (million MWh)



Source: Reproduced from U.S. Department of Energy. N.d. "U.S. Energy Efficiency Potential Maps." Available at: https://www.energy.gov/eere/slsc/us-energy-efficiency-potential-maps.

- A 2019 policy brief from the U.S. Department of Energy found that energy efficiency benefits resiliency when more efficient critical facilities have lower energy needs and require less backup generation when energy disruptions do occur;[147] and
- A 2018 report by the U.S. Environmental Protection Agency (EPA) found that energy efficiency entails economic benefits by lowering costs for electricity producers and consumers when less generating capacity gets added to the system, and that energy efficiency benefits reliability because energy disruptions and power outages are less likely when lower energy use removes strain from the energy system.[148]

Realizing energy efficiency potentials would have the effect of: enhancing grid affordability because less new generation capacity would need to be built; enhancing grid reliability by easing stress on the system; and providing important equity benefits (like lower energy bills and less indoor and outdoor air pollution).

[147] U.S. Department of Energy. 2019. "Energy Efficiency and Distributed Generation for Resilience: Withstanding Grid Outages for Less." Available at: https://www.energy.gov/sites/prod/files/2019/06/f64/EEDG-Resilience.PDF.
[148] U.S. EPA. 2018. "The Multiple Benefits of Energy Efficiency and Renewable Energy." Available at: https://www.epa.gov/sites/default/files/2018-07/documents/mbg_1_multiplebenefits.pdf.

Planning for a reliable electric system requires accounting for energy efficiency potential, the role of energy efficiency for reliable electric service, the low cost of energy efficiency measures, and the environmental, reliability, resiliency, economic and societal benefits of energy efficiency. Energy efficiency resources are an important alternative to new energy infrastructure and a critical part of any credible reliability assessment.

Equity implications

Energy efficiency can and does impact equity—for example, using less energy lowers efficiency program participants' energy bills, a particular benefit to energy-burdened (commonly defined as any household spending more than 30 percent of their income on energy costs) and low- to moderate-income households. Under-resourced and underserved populations tend to have worse indoor and outdoor air quality than their peers,[149] so improved air quality from energy efficiency measures entails equity benefits. That said, pursuing energy efficiency—even aggressively—inherently benefits energy service reliability but—without careful and inclusive planning—may not benefit equity. For example, Massachusetts was named the most energy efficient state in the nation nine years running (2010-2019) by ACEEE and ranked in second place in ACEEE's most recent (2020) Energy Efficiency Scorecard rankings,[150] but 2018 research by AEC found that the benefits of its energy efficiency efforts have skewed white and wealthy while the costs per kilowatt-hour fall relatively evenly across all ratepayers.[151] Equal per kilowatt-hour costs are regressive: They cost more as a share of income to those with the lowest incomes. Enhancing the reliability of energy service by pursuing energy efficiency can be achieved through an equitable distribution of its benefits.

Case Study: Massachusetts Three-Year Energy Efficiency Plan (Statewide, MA)

Massachusetts' energy distributors are currently carrying out their fifth Three-Year Energy Efficiency Plan, which will run from 2022 until 2024.[152] The current Three-Year Plan began with the submission of individual efficiency plans from gas and electric companies, as well as the Cape Light Compact (an association of 22 Massachusetts towns), to the Department of Public Utilities in early November of 2021.[153] These plans were filed pursuant to the Green Communities Act, which requires planning for all cost-effective energy efficiency resources.[154] The latest Plan includes new incentive programs to assist low- and

[149] 1) American Lung Association. April 20, 2020. "Disparities in the Impact of Air Pollution". Available at: https://www.lung.org/clean-air/outdoors/who-is-at-risk/disparities. 2) Rosofsky, A. et al. 2018. Temporal trends in air pollution exposure inequality in Massachusetts. Environmental Research 161. Page 84. Available at: https://www.sciencedirect.com/science/article/pii/S001393511731054X.

[150] Due to the COVID-19 pandemic, ACEEE did not publish a scorecard for the year 2021; as such, the latest year with a scorecard available is 2020. (1) Massachusetts Department of Energy Resources. October 1, 2019. "Massachusetts Named Most Energy Efficient State in Nation." Available at: https://www.mass.gov/news/massachusetts-named-most-energy-efficient-state-in-nation-0. (2) ACEEE. N.d. "The State Energy Efficiency Scorecard." Available at: https://www.aceee.org/state-policy/scorecard.

[151] Stanton, E.A. et al. 2018. *Accessing Energy Efficiency in Massachusetts.* Prepared for Conservation Law Foundation. Available at: https://aeclinic.org/publicationpages/2018/2/26/accessing-energy-efficiency-in-massachusetts.

[152] MA DPU Docket No. 21-120. January 2022. *Petition for approval by the Department of Public Utilities of its Three-Year Energy Efficiency Plan for 2022 through 2024.* Submitted by. Available at: https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/14461268

[153] Ibid.

[154] Ibid.

moderate-income families.[155]

The Green Justice Coalition (GJC) is a partnership of community-based groups that work to make Massachusetts a more sustainable, efficient, equitable and clean energy economy.[156] The coalition is composed of organizations that seek to bring energy efficiency upgrades and jobs to communities of color as well as low-income communities in the Boston area.[157] Sabrina Davis is the lead organizer of environment and transit at the Coalition for Social Justice and Cindy Luppi is the New England director of Clean Water Action; both serve on the GJC.[158]

> ***Sabrina and Cindy:*** *For over 10 years, our organizations and partners in the statewide Green Justice Coalition have called for real attention to this inequity which denies low income and communities of color meaningful access to these programs. For the current three-year plan, which began in 2019, members of the state's Energy Efficiency Advisory Council unanimously approved a solution that specifically addressed the needs of renters. This was an exciting advance which proposed an incentive bonus for utilities to encourage increased service to renters, a tool that would help expand services for low-income residents and non-English speakers among others. Despite support from all corners for this new approach, the Department of Public Utilities killed the program unilaterally and with complete disregard for the needs of a big percentage of our state's population.*[159]

GJC has advocated for more equitable energy efficiency plans in Massachusetts in part by helping communities secure funding for efficiency and clean energy projects. In 2021, GJC, along with Resilient Urban Neighborhoods, helped secure funding for the City of Chelsea's community microgrid project, that would help bring clean energy to the community.[160] GJC works to provide access to weatherization and affordable utilities to all communities and emphasizes that underserved communities, communities of color and language isolated communities, face higher electricity bills due to a lack of access to energy efficiency programs, while wealthier neighborhoods can easily access efficiency programs and services that reduce their energy bills.[161]

GJC has been playing an active role in lobbying the DPU for equitable energy efficiency provisions as early

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[155] *Clean Water Action.* N.d. "News & Updates: Energy Efficiency.*"* Available at: https://www.cleanwateraction.org/features/energy-efficiency

[156] *Developing Policy with An Equity Lens*. Green Justice Coalition. Available at: https://greenjusticecoalition.org/wp-content/uploads/2021/05/GreenJusticeCoalition_Equality-tool1-1.pdf

[157] N.d. "Our Initiatives." *Mass Community Labor United*. Available at: https://www.massclu.org/initiatives/#1501530535108-9b338c0c-fff6

[158] Luppi, C. and Davis, S. September 16, 2020. "Creating equal access to energy efficiency crucial for cities like Fall River." *The Herald News*. Available at: https://www.heraldnews.com/story/opinion/2020/09/16/opinion-creating-equal-access-to-energy-efficiency-crucial-for-cities-like-fall-river/42915691/

[159] Ibid.

[160] October 14, 2021. "City of Chelsea Awarded $824,000 in State Grants" [Blog Post]. *Green Justice Coalition*. Available at: https://greenjusticecoalition.org/2021/10/14/city-of-chelsea-awarded-824000-in-state-grants/

[161] N.d. "News & Updates: Energy Efficiency." *Clean Water Action.* Available at: https://www.cleanwateraction.org/features/energy-efficiency

as Massachusetts' 2016-2018 Energy Efficiency Plan.[162] GJC advocated for innovative additions to the Plans in 2016, which lead to the inclusion of a Renter-Specific Initiative that would offer energy efficiency services to tenants themselves.[163] The GJC also advocated for improving language access throughout the entire process of Three-Year Plan development and helped to expand an existing low-income program to include more moderate-income families for financial incentives.[164] GJC's advocacy towards the drafting of the 2019-2021 Plan brought together environmentalists, labor unions, and community organizations over a shared interest in making weatherization accessible to all.[165] GJC's work, such as their campaign with "Hard-to-Reach, Hard-to-Serve" (HTR/HTS) communities, was able to help guide the state's energy efficiency programs in the 2019-2021 Plan.[166] HTR/HTS communities, which are often low-income communities and racialized communities, were able to look forward to improvements in wages and job quality for home weatherization workers under the 2019-2021 Plan; in addition, programs within the Plan offered broader public health and environmental benefits, such as the weatherization efforts,[167] which have been shown to improve indoor air quality and help to prevent and mitigate asthma.[168] However, benefits of the Plan were still inequitably distributed, with wealthier communities participating in the program at much higher rates than lower-income ones.

> ***Sabrina and Cindy:*** *Studies also show a critical flaw in the program: benefits are not reaching all of our communities. A recent report commissioned by the utilities shows that MassSave participation rates in some Gateway Cities are as low as 6%, while participation in more affluent communities can be up to seven times higher.*[169]

Massachusetts' 2022-2024 Energy Efficiency Plan expands on the previous plans by providing new incentives for low and moderate-income families, as well as including direct measures for EJ and language isolated communities.[170] The 2022-2024 Plan has the following three goals: energy savings, workforce development, and equity.[171] Clean Water Action, a member of GJC, pushed for an increased focus and funding for communities that have previously been neglected by government programs.

> ***Sabrina and Cindy:*** *Due to a chronic lack of investment, will and intentional policies to remedy these gaps by the utilities and the Baker Administration, lower and moderate income residents receive fewer benefits despite contributing a greater share of their income. The good*

[162] Clean Water Action. N.d. "News & Updates: Green Justice Coalition." Available at: https://www.cleanwateraction.org/features/energy-efficiency
[163] Ibid.
[164] Ibid.
[165] Grant, J. 2019. *Building a Brighter Day: Energy Efficiency Innovations Yield High Returns for the Commonwealth*. Community Labor United. Available at: http://massclu.org/wp-content/uploads/2019/01/building_a_brighter_day-mobile.pdf
[166] Ibid.
[167] Ibid.
[168] Ibid.
[169] Luppi, C., and Davis, S. September 16,2020. "Creating equal access to energy efficiency crucial for cities like Fall River." The Herald News. Available at: https://www.heraldnews.com/story/opinion/2020/09/16/opinion-creating-equal-access-to-energy-efficiency-crucial-for-cities-like-fall-river/42915691/
[170] Clean Water Action. N.d. "News & Updates: Energy Efficiency." Available at: https://www.cleanwateraction.org/features/energy-efficiency
[171] Ibid.

news is that, as the administration approaches its next 3-year plan, there are things we can do right now to take an already strong initiative and make it truly equitable.[172]

The new plan includes incentives that cover 100 percent of the cost of weatherizing homes for low- and moderate-income residents.[173] In order to improve equity within language-isolated communities, GJC pushed for more translated materials for non-English speakers within the Plan, as well as urging utility companies to reconfigure their outreach programs.[174] These inclusions will help improve access to energy efficiency programs and services for low-income and racialized communities. At the same time, despite GJC's advocating against revisions such as reducing transparency in demographic data and incentives aimed at shifting away from fossil fuel, the 2022-2024 Plan weakens such provisions.[175]

Advocacy by organizations such as GJC in Massachusetts offers an expanded opportunity for under-resourced and underserved communities to participate directly in energy efficiency planning. Such advocacy efforts create a platform for communities to have their voices and needs heard and prioritized where they otherwise would not be. The GJC offers a blueprint for advocates in other states in the Northeast and nationwide to follow, not only in members' advocacy for energy efficiency provisions that will alleviate the disproportionate burdens placed on low-income and EJ communities, but also in its success in enshrining important protections into Massachusetts' official Three-Year Energy Efficiency Plans. GJC's active engagement with the DPU can act as guidance for advocates and decisionmakers in other jurisdictions to create robust, policy-driven campaigns and initiatives to ensure universal access to energy efficiency benefits. Credible energy assessments should follow these practices to improve equity while safeguarding reliability.

[172] Luppi, C., and Davis, S. September 16,2020. "Creating equal access to energy efficiency crucial for cities like Fall River." The Herald News. Available at: https://www.heraldnews.com/story/opinion/2020/09/16/opinion-creating-equal-access-to-energy-efficiency-crucial-for-cities-like-fall-river/42915691/

[173] N.d. "News & Updates: Energy Efficiency." *Clean Water Action.* Available at: https://www.cleanwateraction.org/features/energy-efficiency

[174] Hyp, I. December 9, 2020. "Chime in on Energy Efficiency" [Blog Post]. The *Clean Water Blog*. Available at: https://www.cleanwateraction.org/2020/12/09/chime-energy-efficiency-justice

[175] N.d. "News & Updates: Energy Efficiency." *Clean Water Action.* Available at: https://www.cleanwateraction.org/features/energy-efficiency

VI. Increasing levels of electrification

Equity implications: Increasing levels of electrification
• Electrification of appliances can lead to better indoor air quality, which would disproportionately help those who are exposed to the highest levels of indoor air pollution: renters, low-income, BIPOC and disabled community members.
• Building electrification includes the introduction of upgraded technologies, which can offer substantial cost savings to customers, benefiting energy-burdened and low-income communities.
• High upfront costs of electrification can pose a financial barrier to lower-income families.
• Private electric vehicles are just one part of transportation electrification; mass transit and active transportation are more available to people of all means. Comprehensive planning for a transition from fossil fuels to building electrification must include consideration of the rising costs of a shrinking gas system, which will fall on a smaller and poorer customer base.

Electrification refers to the process of replacing direct fuel use technologies (like a gas- or oil-fired furnace or boiler) with a technology that runs instead on electricity (like an air-source heat pump). Electrification is a key strategy for emission reductions because, depending on the share of renewable resources used to generate electricity, switching to EVs and electric heating reduces emissions from direct fuel use in transportation, buildings, and industry (which account for about two-thirds of U.S. total emissions).[176] Planning for a reliable electric system requires accounting for increasing levels of electrification across all sectors, as electrification will add to electric demand. Credible reliability assessments consider a range of potential electrification futures, ranging from business-as-usual to the achievement of the Biden administration's goal of net zero emissions by 2050[177] to the pursuit of more aggressive plans to reach net zero emissions by 2035 or sooner.

A 2018 study by the NREL found that, historically, electric consumption has steadily risen as Americans adopted new technologies like refrigerators, televisions and other home electronics and internet—and projects that demand will continue to grow between now and 2050.[178] Under conditions of medium to high electrification, NREL predicts that electric use will grow 20 to 38 percent by 2050 (from 2016 levels), due primarily to the adoption of EVs but also to the electrification of building space and water heating.

[176] Cleary, K. Last updated March 24, 2022. "Electrification 101." *Resources for the Future.* Available at: https://www.rff.org/publications/explainers/electrification-101/.
[177] White House Briefing Room. December 08, 2021. "FACT SHEET: President Biden Signs Executive Order Catalyzing America's Clean Energy Economy Through Federal Sustainability" [Statements and Releases]. The White Hose. Available at: https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/08/fact-sheet-president-biden-signs-executive-order-catalyzing-americas-clean-energy-economy-through-federal-sustainability/.
[178] Mai, T. et al. June 2018. *Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States. Demand Side Scenarios*. NREL. Available at: https://www.nrel.gov/analysis/electrification-futures.html.

Researchers at Princeton suggest a much higher figure. Their 2021 analysis estimates that reaching the nation's net zero energy goal by 2050 will require aggressive electrification efforts that increase total generation by 138 percent between 2020 and 2050 (from approximately 4.2 billion MWh to approximately 9.9 billion MWh, see Figure 8 above).[179] A 2021 study by the IEA that examined how the whole world could reach net zero emissions by 2050[180] found that global electric demand would increase by 80 percent between 2020 and 2050, about double the overall rate of growth in final energy consumption. EDF's 2019 analysis found that electrification will impact gas capacity needs and uses, which could affect the ability for utilities to recoup costs and necessitate the need for "creative financing mechanisms such as accelerated depreciation."[181]

Planning for a reliable electric system requires accounting for increasing levels of electrification including a range of potential electrification futures and an explicit consideration of how various electrification futures would impact fossil fuel-fired resources. More electrification means greater demand for electricity and shifted peak demand times as electricity replaces fuels for winter heating, which—according to a 2018 NREL study—"could have significant impacts on electric utility planning, grid operations, reliability assessments, and electricity markets."[182]

Equity implications

Electrification has the potential to benefit equity by creating healthier and safer buildings with better indoor air quality, and by saving money and energy by replacing older, less efficient technologies with lower-emitting, newer, more efficient ones.[183] However, equity benefits from increasing electrification are not a given: There are high upfront costs associated with switching technologies that impact the ability of low-income and other overburdened populations to electrify, and such households are more likely to have structural and maintenance issues in their buildings which can make technology-switching even more difficult. Without the ability to make the switch, ratepayers will face rising bills as the costs of the gas system fall on fewer and fewer homes and businesses; the greatest impact of rising bills would be felt by low-income and energy-burdened customers. Credible reliability planning must include both the potential equity benefits and any challenges associated with electrification.

Case Study: Green New Deal programs (New England)

Beginning in the early 2000s, political parties, both domestic and abroad, began to propose "Green New

[179] Larson, E. Last updated January 9, 2022. "Net-Zero America – National Data." *Princeton University.* Available at: https://netzeroamerica.princeton.edu/img/nzap-national-report.pdf. Table 7.
[180] IEA. May 2021. Net Zero by 2050. Available at: https://www.iea.org/reports/net-zero-by-2050.
[181] EDF. July 22, 2019. Case 19-G-0080. Supplemental Comments of the Environmental Defense Fund. In the Matter of Staff Investigation into a Moratorium on New Natural Gas Services in The Consolidated Edison Company of New York, Inc. Service Territory. State of New York Public Service Commission.
[182] NREL. July 9, 2018. "NREL Analysis Explores Demand-Side Impacts of a Highly Electrified Future." Available at: https://www.nrel.gov/news/program/2018/analysis-demand-side-electrification-futures.html.
[183] 1) Liang, X. et al. October 7, 2019. Air quality and health benefits from fleet electrification in China. Nature Sustainability. 962–971. Available at: https://www.nature.com/articles/s41893-019-0398-8. 2) Barron, M. Torero, M. November 2017. Household Electrification and Indoor Air Pollution. Journal of Environmental Economics and Management. Available at: https://openknowledge.worldbank.org/handle/10986/29227. 3) Billimoria, S. et al. 2018. The Economics of Electrifying Buildings. Rocky Mountain Institute. Available at: https://rmi.org/insight/the-economics-of-electrifying-buildings/.

Deal" policy platforms—proposals calling for public policy to address simultaneous issues of economic inequality and climate change, modeled after the policies enacted by President Franklin D. Roosevelt in the 1930s. Perhaps the most famous of these proposals on a national level was proposed in 2019, in a joint Resolution sponsored by U.S. Representative Alexandria Ocasio-Cortez of New York and U.S. Senator Edward Markey of Massachusetts. Broadly speaking, the Resolution (H. Res. 109) outlined a proposal for a robust federal jobs program with a central focus on transitioning to clean energy in all sectors of the economy, including electrification of buildings and public transportation.[184]

> ***H. Res. 109:*** *[The Green New Deal goals] should be accomplished through a 10-year national mobilization that will require the following goals and projects: […] upgrading all existing buildings in the United States and building new buildings to achieve maximum energy efficiency, water efficiency, safety, affordability, comfort, and durability, including through electrification.*[185]

Though the proposed Resolution was not passed, nor has any federal action been taken on it in over three years since it was first introduced, in its wake have come several similar green jobs programs and program proposals at the local, state, national, and global levels. Most—if not all—such proposals and policy slates underscore policies like electrification, and the need for and benefits of such policies. For instance, recently-elected Mayor Michelle Wu of Boston included a Green New Deal as a core position on her platform, and the Green New Deal for Boston Public Schools—launched in May 2022—features an emphasis on improving climate resiliency in school buildings.

In addition, Massachusetts State Senator and progressive gubernatorial candidate Sonia Chang-Díaz included a "Green New Deal for Massachusetts" platform in her 2022 campaign with plans for building and retrofitting zero-energy buildings, electrifying large buildings and school buildings, and ensuring an equitable clean energy transition in the transportation sector that includes electrifying public transit.[186] Sen. Chang-Díaz highlights how the Commonwealth's statewide energy efficiency programs are lagging behind climate goals and continuing to incentivize dirty energy, disproportionately harming low-income communities and communities of color.

> ***Sen. Chang-Díaz:*** *Effectively implementing these technological changes requires state investment and active support. Right now, however, the state's energy efficiency programs such as Mass Save continue to incentivize gas conversions and lag in serving communities of color and renters, while falling far behind their goals for electrification, continuing our fossil fuel dependence.*[187]

[184] U.S. House of Representatives Resolution 109 (H. Res. 109), 2019. *A Resolution Recognizing the duty of the Federal Government to create a Green New Deal*. Available online: https://www.congress.gov/bill/116th-congress/house-resolution/109/text
[185] U.S. House of Representatives Resolution 109 (H. Res. 109), 2019. *A Resolution Recognizing the duty of the Federal Government to create a Green New Deal*. Available online: https://www.congress.gov/bill/116th-congress/house-resolution/109/text
[186] Sonia Chang-Díaz for Governor. February 1, 2022. "A Green New Deal for Massachusetts." Available at: https://www.soniachangdiaz.com/plan/ma-gnd
[187] Ibid.

Sen. Chang-Díaz points to EVs as a solution whose deployment has been tailored toward wealthier residents with cars, as opposed to a more inclusive transportation plan that includes electrified and expanded public transit.

> ***Sen. Chang-Díaz:*** *Electric vehicles can be a win-win for both our environment and consumers: they provide carbon-free access to transportation as well as significant savings on fuel and maintenance. Unfortunately, our current system for incentivizing the increased use of EVs serves mostly wealthy communities and is too narrow in its focus on cars.*[188]

A narrow focus on EV adoption can restrict the benefits of electrification. An inclusive and equitable public transit strategy requires inclusion both of EVs and of expanded and electrified public transit, as well as incentives for active transit like walking and bicycling.

Massachusetts policymakers and advocates are not alone in calling for a robust and inclusive clean energy jobs and electrification program in the Northeast. The Renew New England Alliance—a coalition that spans the six New England states and is made up of members from more than 150 organizations—advocates for an "intersectionality approach" to address issues in New England including climate crisis, unemployment, and racial injustices. Renew set policy goals in 2021 that include the construction of green affordable housing, the electrification of transport, and the retrofitting of existing homes, to meet their mission of providing everyone in New England with a clean and safe home.[189]

Renew proposes a Jobs Guarantee program in its 2020 Regional Policy Framework, which aims to build an efficient and convenient large-scale public transit system that is centered around the needs of frontline communities. Renew also calls for improved and well-integrated active transportation facilities, widespread EV charging infrastructure, and new climate-resilient affordable housing.[190] Green retrofits for existing homes—which will reduce energy bills and carbon emissions—would benefit both renters and homeowners.[191] Renew's policies also include financial support for EV purchases, targeted toward low-income, rural, and working-class populations.[192]

Renew's slate of electrification policies is a concrete roadmap for New England state governments to consider to help boost the region's progress toward goals of social and environmental equity and justice. The adoption of such policies—along with their companion policies of guaranteed healthcare, expanded affordable housing, and universal clean energy—would go a long way towards safeguarding the environmental and physical health of New England's communities, particularly its most systematically harmed communities under status-quo energy decision-making. Credible energy reliability assessments include not only the stability of the energy grid, but also the accessibility of energy services and related services including transportation and housing, universal and equitable distribution of the benefits of energy decisions, and the potential of electrification to achieve these reliability benefits.

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[188] Ibid.
[189] Renew New England Alliance. 2020. *Reginal Policy Framework*. Available at: https://www.renewnewenglandalliance.org/_files/ugd/a0c4d1_acb49dfcfa4e48489b5886d341146c49.pdf
[190] Ibid. pg.3-6
[191] Ibid. p.3
[192] Ibid. p.6

Case Study: Massachusetts Clean Energy Council Low Income Challenge Program (Statewide, MA)

Established in 2009 and funded by the Massachusetts Renewable Energy Trust Fund, the Massachusetts Clean Energy Center (MassCEC) is an economic development agency that focuses on accelerating the expansion of clean energy industries across the Commonwealth of Massachusetts. MassCEC aims to expand the clean energy workforce and deliver environmental benefits across the Commonwealth to ensure long-term economic security.[193] In addition, MassCEC strives to expand the adoption of clean energy technologies while minimizing costs and offering economic, environmental, and long-term growth-related benefits to energy and utility customers statewide.[194] A key feature of the organization's work is its commitment to diversity, equity, inclusion, and environmental justice.[195] In its pursuit of rapid, widespread, and equitable deployment of clean energy solutions, MassCEC has helped make building electrification and other clean energy technologies more broadly accessible across the income spectrum and across the Commonwealth.

Partnering with policymakers, employers, job seekers, students, municipal governments, communities, schools, consumers, advocates, and others, MassCEC funds more than 25 programs, including clean energy technology installations, funding for early-stage companies, and investments in workforce training programs. Among MassCEC's programs and initiatives are a slate of actions and grants geared toward implementing electrification and clean heating and cooling in residential and commercial buildings. MassCEC accelerates the adoption of electrification technologies and approaches to decarbonizing the building sector through its Building Electrification Transformation Accelerator (BETA) Program,[196] which includes programs such as: Decarbonization Pathways, EmPower Massachusetts, Triple Decker Retrofit Pilot (a program that works with New Ecology, Inc. to offer support for both market rate and affordable housing triple decker owners),[197] Passive House Design Challenge (awards up to $4,000 per unit for 8 new affordable housing construction developments that are seeking Massachusetts Low Income Housing Tax Credits), and Triple Decker Design Challenge.

MassCEC's work also includes a Low-Income Challenge that funds the adoption of clean energy technologies in low-income households across the Commonwealth. As part of the Low-Income Challenge program, MassCEC partnered with Action for Boston Community Development (ABCD) to install mini-splits (a type of air-source heat pumps) for homeowners earning less than 60 percent of the state median income and receiving fuel assistance from ABCD to power their old electric heating systems.[198] Through the program, ABCD coordinated the installation of mini-splits for 67 homeowners, including the Mattapan resident highlighted below, who has achieved major savings in her electric bills thanks to the program.

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[193] MassCEC. N.d. "About MassCEC." *Massachusetts Clean Energy Center*. Available at: https://www.masscec.com/about-masscec
[194] Ibid.
[195] Ibid.
[196] MassCEC. N.d. "Buildings." *Massachusetts Clean Energy Center*. Available at: https://www.masscec.com/buildings
[197] MassCEC. N.d. "Triple Decker Retrofit Pilot." *Massachusetts Clean Energy Center*. Available at: https://www.masscec.com/triple-decker-retrofit-pilot
New Ecology. N.d. "Community-based Sustainable Development." *New Ecology*. Available at: https://www.newecology.org/
[198] MassCEC. N.d. "Other Success Stories: Rita B Action for Boston Community Development (ABCD)." *Massachusetts Clean Energy Center*. Available at: https://www.masscec.com/success-stories/lowest-heating-and-cooling-bill-50-years-charlestown-homeowner

> ***Nia:*** *Wow, it blew my mind. Normally the bill is anywhere from $400 to $500, and it was more like $200 [after installing mini-splits]. I was like, "Let me look at that again!"*[199]

Nia has also noticed increased levels of comfort since installing mini-splits, making the air more breathable and the temperature easier to control in her house.[200]

MassCEC's programs have brought cleaner air and lower electricity costs to dozens of households in Boston, Martha's Vineyard, and elsewhere across the Commonwealth, by introducing electrification technologies like mini-splits and ground-source heat pumps. MassCEC's work on building electrification, particularly in residential buildings, serves as a template for larger-scale action, not only within the Commonwealth but also elsewhere in New England and across the United States, on the part of government agencies, energy market actors, and other decisionmakers. The agency demonstrates successful coordination across clean energy industries from production to installation, provision of energy efficiency upgrades and electrification opportunities, and prioritization on low-income and energy-burdened populations. MassCEC's work on electrification has helped to ensure greater reliability of heating, cooling, and electricity, as well as reducing both financial and environmental burdens for residents and businesses alike, particularly in underserved communities.

VII. Volatile gas prices and flat gas demand

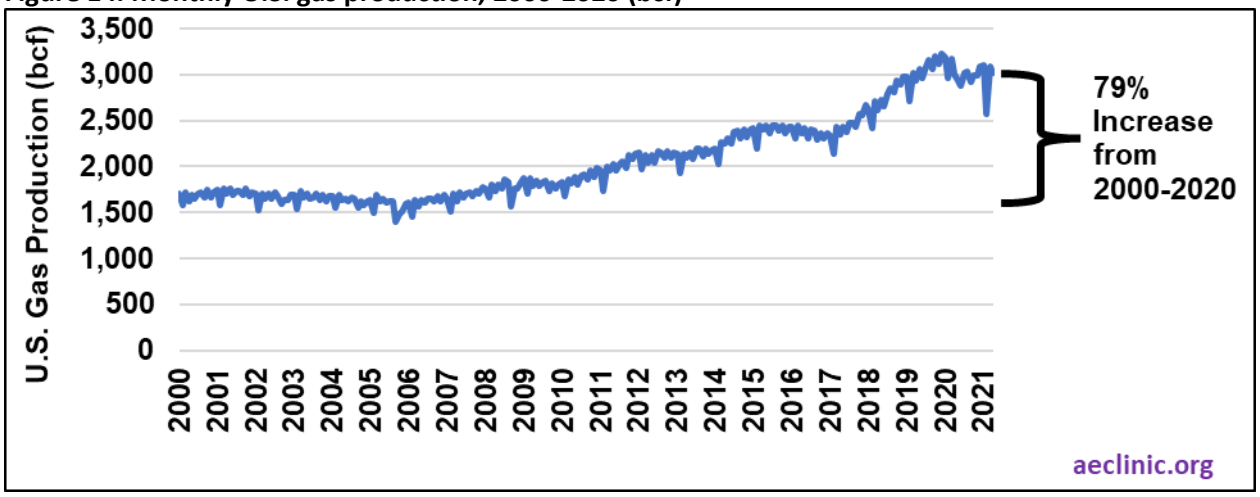
Equity implications: Volatile gas prices and flat gas demand
• Gas utility death spirals resulting from flattening gas demand will disproportionately impact low-income, racialized, and energy-burdened communities. • **Planning for expensive updates to aging gas infrastructure and investments in new gas infrastructure should take climate laws and the long economic lifetimes of the equipment into account.**

The U.S. gas sector has experienced major changes in the last decade, including dramatic increases in domestic gas production and liquefied natural gas (LNG) exports—and the associated price volatility that comes with increasing integration with global gas markets—and flattening domestic demand. Credible assessment of new gas projects intended to enhance reliability takes these new and evolving conditions into consideration.

LNG exports have surged in the recent past and with it U.S. natural gas production: Annual gas production has grown 79 percent since 2000 while monthly LNG exports grew from essentially zero in 2016 to 3.2 billion cubic feet (bcf) per month in March 2021 (see Figure 14 and Figure 15).

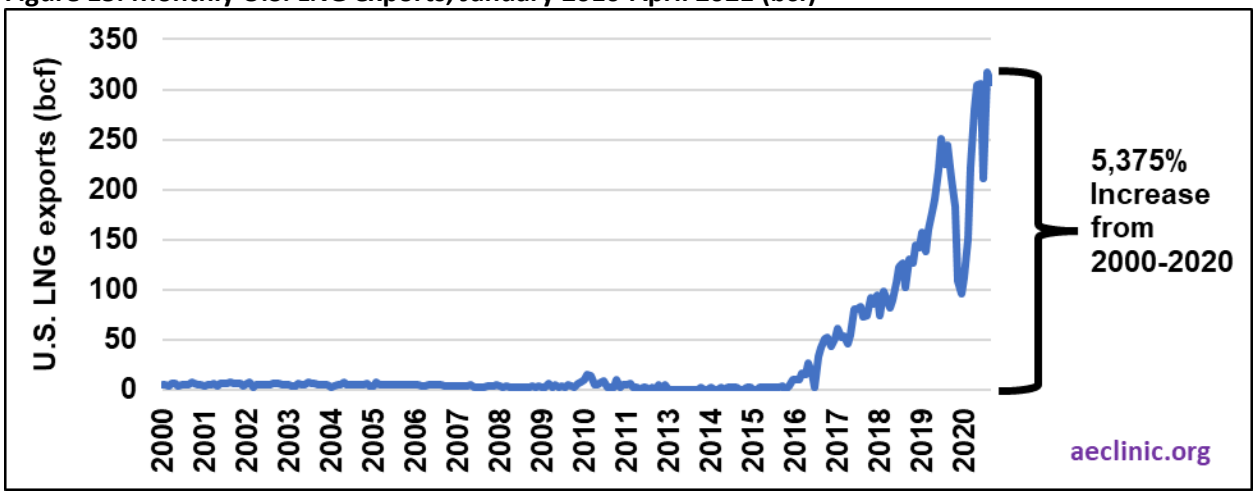
[199] MassCEC. N.d. "Other Success Stories: Nia I. Action for Boston Community Development (ABCD)." *Massachusetts Clean Energy Center*. Available at: https://www.masscec.com/success-stories/electric-bill-cut-half-mattapan-homeowner-0
[200] Ibid.

Figure 14. Monthly U.S. gas production, 2000-2020 (bcf)



Data source: U.S. EIA. No Date. "U.S. Natural Gas Marketed Production." Available at: https://www.eia.gov/dnav/ng/hist/n9050us2a.htm.

Figure 15. Monthly U.S. LNG exports, January 2010-April 2021 (bcf)



Data source: U.S. EIA. 2021. "Liquefied U.S. Natural Gas Exports". Available at: https://www.eia.gov/dnav/ng/hist/n9133us2m.htm.

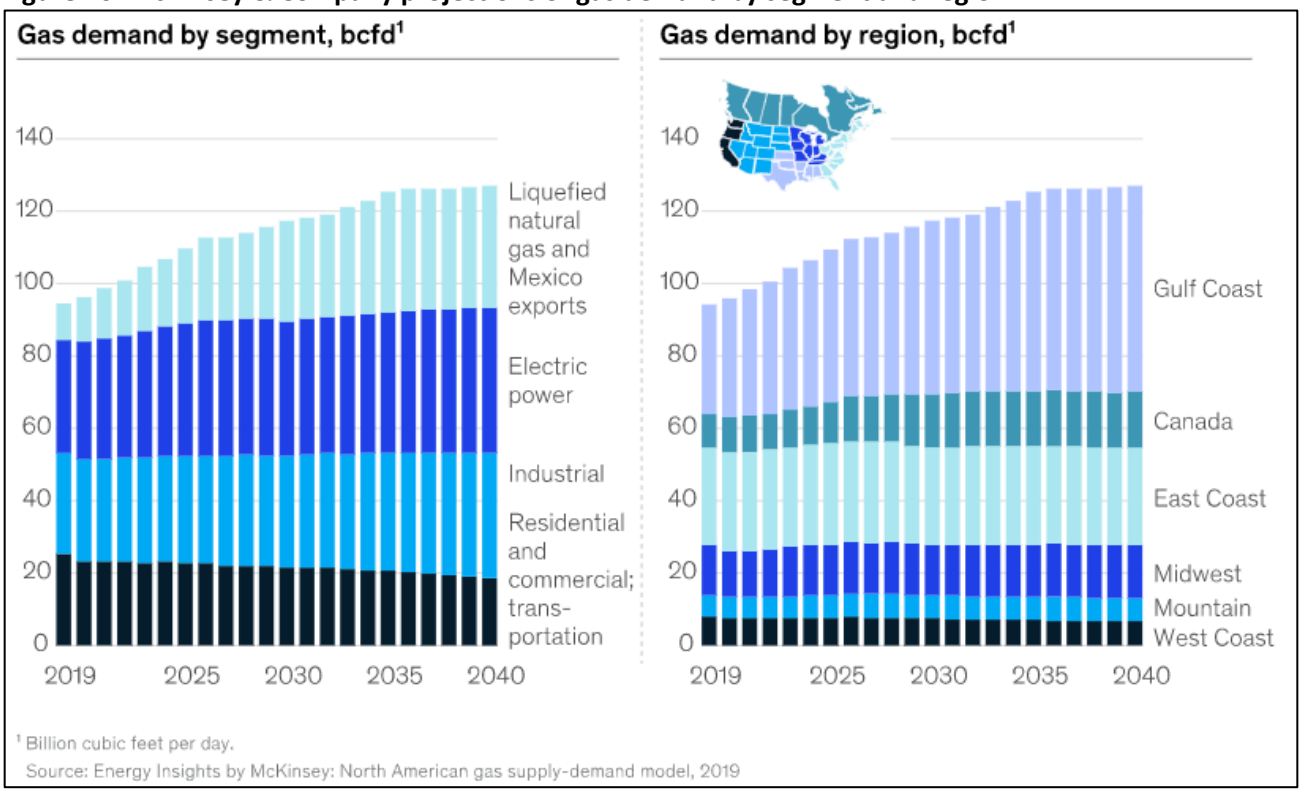
The rapid increase in LNG exports is causing greater integration of U.S. gas market with the global gas market, increasing the U.S. gas exporters' exposure to global market dynamics and price volatility. A May 2018 report by the U.S. Commodity Futures Trading Commission suggests that increasing LNG exports are exposing the domestic gas market to global market forces and may increase gas price volatility:

> *Given the magnitude of U.S. exports, there is also the potential that domestic natural gas markets could become subject to global supply-demand dynamics with the potential for increased volatility.*[201]

[201] Commodity Futures Trading Commission. May 2018. Liquefied Natural Gas Developments and Market Impacts. Available at: https://www.cftc.gov/sites/default/files/2018-05/CFTC_LNG0518_1.pdf.

A 2020 McKinsey & Company analysis predicts that the coming decades will witness flat to declining domestic demand for gas as renewables become increasingly price competitive and clean energy and emission reduction goals are met. The vast majority of forecasted growth in the domestic gas sector is the result of increasing LNG exports (see Figure 16: the left panel shows declining gas demand in the residential and commercial sectors, flat gas demand in the electric sector, slightly increasing demand in the industrial sector and rapidly increasing LNG exports. In the right panel, gas demand is flat to declining in all regions except the Gulf Coast—where most LNG export terminals are located).[202]

Figure 16. McKinsey & Company projections of gas demand by segment and region



Source: Reproduced from Barth, A. et al. January 6, 2020. "The future of natural gas in North America." McKinsey & Company. Available at: https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/the-future-of-natural-gas-in-north-america#.

Planning for reliable energy service requires a clear accounting of future gas market conditions including increasing price volatility and flat gas demand. Modeling a range of future gas demand and gas prices and uncertainty assumptions in reliability assessments produces more robust modeling results, which are essential is credible assessment of the reliability of new fossil gas energy projects.

Equity implications

As demand for gas flattens, gas customer rates and bills will increase. When gas utilities pass their already-committed investments (and fixed costs) onto a flat (or declining) customer base the result can be a "utility

[202] Federal Energy Regulatory Commission. May 29, 2020. "North American LNG Export Terminals: Approved, not Yet Built." Available at: https://www.ferc.gov/sites/default/files/2020-06/lng-approved-export-new-052920.pdf.

death spiral": as gas costs go up, more customers will be encouraged to leave the gas system entirely. (A death spiral is not a risk for electric utilities, which can count on a steadily increasing customer base from vehicle and heating electrification to distribute the costs associated with establishing new and upgraded transmission lines as part of the Biden administration's Bipartisan Infrastructure Law.[203]) Increasing gas prices would have the greatest impact on energy-burdened and low- to moderate-income households that can least afford bill increases.

A gas utility death spiral also has the potential to be self-reinforcing: As bills rise, the gas customers that can afford to will electrify their home heating; the lower-income gas customers will be stuck with gas heating and ever-increasing fixed charges on their bills to cover the costs of maintaining pipelines and other infrastructure. The greatest impact of increasing gas bills would be felt by the customers with the greatest energy burdens (energy expenditures as a share of income) and the least ability to make capital investments in their home energy systems—low- to moderate-income households.[204] Increasingly volatile gas prices would also have the greatest impact on energy-burdened and low- to moderate-income households that can least afford bill increases as utilities raise rates to protect their bottom line against uncertainty.

Planning for reliable energy service should not come at the expense of an equitable distribution of energy system costs. Credible reliability assessments account for volatile gas prices, flat gas demand and projected electrification.

Case Study: Gas Leaks Allies (Statewide, MA)

Gas Leaks Allies is a Massachusetts-oriented group of representatives from climate and social justice organizations, as well as concerned community members and those with expertise in the matters of climate, justice, and the energy system. Member organizations include Boston Climate Action Network, Community Action Works, CLF, Speak for the Trees, and Gas Safety USA, among others. Since 2015, the Gas Leaks Allies' work has been focused on efforts within Massachusetts and concentrates predominantly on the equitable transition away from gas. Gas Leaks Allies' members conduct research, inform decision makers, engage stakeholders, and raise public awareness about gas. The organization's work emphasizes the pitfalls in decision making by utilities and gas companies, and how energy system decisions made with flawed logic can result in volatile gas prices and a capacity for gas that fails to meet the demand.

According to Gas Leaks Allies, a clean energy transition includes installing utility-scale carbon free energy systems, managing gas leaks both within homes and within the gas industry, and implementing more urban green spaces. The transition is made equitable by ensuring that:

- costs are reduced for all consumers,
- energy solutions aim to benefit low-income communities, and

[203] (1) Friedrich, K. August 8, 2018. "Can electrification short-circuit the Utility Death Spiral?" *GreenBiz.* Available at: https://www.greenbiz.com/article/can-electrification-short-circuit-utility-death-spiral, (2) Department of Energy. 2022. "Biden Administration Launches $2.5 Billion Fund to Modernize and Expand Capacity of America's Power Grid." *Energy.gov*. Available at: https://www.energy.gov/articles/biden-administration-launches-25-billion-fund-modernize-and-expand-capacity-americas-power

[204] EDF. January 2021. Aligning Gas Regulation and Climate Goals: A Road Map for State Regulators.

- clean energy jobs promote fair labor standards.[205]

Gas Leaks Allies' support for those disproportionately impacted by energy decisions—particularly decisions to construct and maintain gas plants—is exhibited by its volunteers' advocacy regarding how market factors play a role in decision-making.

Costs of gas infrastructure range from increased ratepayer prices and potential costs of stranded assets to indirect societal and environmental burdens that disproportionately harm the communities most impacted by emissions and pollution. Cora Weissbourd, a volunteer at Mothers Out Front—which supports a livable climate that is equitable for everyone and is a member organization to Gas Leaks Allies—explains the costs of relying on gas.

> ***Cora:*** *To stay in business with their current model, our gas companies need a future where they get to keep making money off investing in pipelines, and they need gas to work to make that profit system work. Unfortunately, natural gas causes climate change and so now they have plans insisting that renewable natural gas and hydrogen will save us. Renewable natural gas is just rebranded methane; it's a potent greenhouse gas. RNG is sourced from different places than natural gas, which makes it scarce and more expensive, but it's still just methane and so it still causes climate change…The gas company's plans to dabble and delay will cost as much or more as a true system transformation, and they won't actually solve our climate problems. Every day that we don't act to solve this problem, we put even more cost burden and climate burden on the next generation, and on the people who can least afford it.*[206]

Gas Leaks Allies is working to shape the narrative around gas in an informative, environmentally minded, and equity-focused manner, with a particular emphasis on how decisions made today place a costly burden on communities already facing disproportionate impacts. The work conducted by the many member organizations at Gas Leaks Allies can inform future energy system decisions, such as how to approach the transition away from gas and how to weigh the benefits and costs of integrating renewable energy and other distributed energy sources.

VIII. Meaningful, influential, and inclusive community engagement

Equity implications: Meaningful, influential, and inclusive community engagement
· Energy decision making processes commonly ignore the input and knowledge of impacted communities and fail to offer information or accept feedback in languages other than English. **· Intentional community engagement and inclusive energy decision-making processes ensure fairness for overburdened communities in energy decision-making.**

Whenever an energy project is proposed to enhance reliability, it is essential that meaningful, influential, diverse, language-appropriate and transparent community engagement be conducted from start-to-finish.

[205] Gas Leaks Allies. N.d. "Who We Are." *Gas Leaks Allies*. Available at: https://www.gasleaksallies.org/who-we-are
[206] Gas Leaks Allies. 2022. "The Future of Gas." Available at: https://www.gasleaksallies.org/future-of-gas

Meaningful community engagement involves establishing and nurturing relationships with affected populations and communities—including developing an understanding of historical context and existing inequities—and seeking to identify and address social issues that act as barriers to change.[207] Community engagement should include stakeholders representing from the local area and have a clear, transparent plan for getting and using stakeholder feedback in decision-making.

The development of energy projects regularly faces public opposition due to concerns with facility siting, safety, pollution, or other environmental risks. A failure to engage the community can slow down projects, increase their costs, and—most importantly—result in projects that damage or fail to improve equity. For example:

- Since its proposal in 2016, Entergy's planned gas plant in New Orleans East has been met with strong opposition from residents. However, instead of facilitating discussion between Entergy, the utilities committee, and the public, the New Orleans City Council was found to be in violation of the state's Open Meeting Law by physically locking out more than 100 residents opposed to the project from meetings about Entergy's proposal.[208] In addition, Entergy was caught hiring professional actors to fill seats at City Council meetings and speak in defense of the new plant.[209] The project was placed on hold in 2019.[210]

Successful engagement of the community can provide residents with the assurance that their concerns are being heard and addressed, for example:

- In 2016, a gas-fired plant at a sewage treatment facility was proposed in Newark, New Jersey to improve onsite resiliency to natural disasters.[211] During Hurricane Sandy, the sewage treatment facility shutdown for 72 hours, resulting in 840 million gallons of raw sewage dumped into the Passaic River and Newark Bay.[212] Residents and advocates urged the Passaic Valley Sewerage Commission (PVSC) to halt their plans for the gas plant and shift to a plan involving renewable energy or a different design with reduced pollution.[213] This community engagement prompted PVSC, in June 2021, to retract its application and promise to work with the community to identify

[207] Minnesota Department of Health. July 2018. "Principles of Authentic Community Engagement." Available at: https://www.health.state.mn.us/communities/practice/resources/phqitoolbox/docs/AuthenticPrinciplesCommEng.pdf
[208] Zniber, Siham. June 14, 2019. "Victory! Judge Griffen rules with the People of New Orleans, Says City Council Did Not Substantially Comply with Open Meetings Law". *Earthjustice.* Available at: https://earthjustice.org/news/press/2019/victory-judge-griffin-rules-with-the-people-of-new-orleans-says-city-council-did-not-substantially-comply-with
[209] Stein, Michael Isaac. May 4, 2018. "Actors were paid to support Entergy's power plant at New Orleans City Council meetings". *The Lens NOLA.* Available at: https://thelensnola.org/2018/05/04/actors-were-paid-to-support-entergys-power-plant-at-new-orleans-city-council-meetings/
[210] LaRose, Greg. July 22, 2019. "Entergy puts new Michaud power plant on hold". *The Times-Picayune.* Available at: https://www.nola.com/news/business/article_e6b3007d-136d-501f-a800-b15da9a33dcd.html
[211] Passaic Valley Sewerage Commission. March 2016. "Request, Solicitation and Invitation for Qualifications and Proposals for Design Services During Construction for a Standby Power Plant." Available at: https://nj.gov/comptroller/sandytransparency/contracts/pdf/blackveatch_solicitation.pdf.
[212] Kenward, A. et al. 2013. "Sewage Overflows from Hurricane Sandy". *Climate Central.* Available at: https://semspub.epa.gov/work/02/210346.pdf
[213] Parry, Wayne. May 13, 2021. "New Jersey solar, gas power plans spotlight justice concerns." *Associated Press.* Available at: https://apnews.com/article/nj-state-wire-new-jersey-business-environment-and-nature-f7701edef59c49ac5097f4d40ad6d37f

alternatives that are less reliant on fossil fuels.[214]

In April 2021, FERC held a workshop[215] to solicit input from landowners, communities affected by energy infrastructure, development, EJ communities, tribal representatives and consumer advocates on the creation of an Office of Public Participation (OPP) and how to best facilitate public participation. Thereafter in June 2021 FERC established a U.S. OPP to coordinate and provide assistance to members of the public to facilitate participation in Commission proceedings. The OPP has various responsibilities including an educational component and serving as a liaison to members of the public interested in Commission proceedings.

Community engagement and public feedback on reliability needs and potential alternatives can result in enhanced public trust as well as more credible, robust reliability assessments.

Equity implications

Community engagement helps to ensure fair decision-making processes for communities disproportionately affected by pollution and other environmental hazards[216] when considering new energy projects for reliability. To be equitable, community engagement must be meaningful, influential, diverse, language-appropriate and transparent. For example: by offering engagement opportunities at multiple times of day on multiple days of the week; publicizing community engagement opportunities online and offline; providing clear community engagement timelines; transparently communicating how public feedback will be considered, responded to, and influence decision-making; and offering materials and information in the languages spoken in the community. Credible reliability planning and assessments always involve community engagement.

Case Study: East Eagle Street Substation (East Boston, MA)

Chelsea, Massachusetts has been an officially-designated "Sanctuary City" since 2007—this means that the City formally refuses to cooperate with federal agents seeking to deport undocumented migrants. Chelsea has provided a safe home to immigrant families since the mid-20th century and currently has the highest percentage of foreign-born residents out of all cities in the Commonwealth of Massachusetts.[217] According to the U.S. Census Bureau, 71 percent of Chelsea's population speaks a language other than English at

[214] Wiedmann, Tom. June 14, 2021. "Sewerage Commission to Re-Examine Plans for Ironbound Wastewater Facility Power Generator." *Tap into Newark.* Available at: https://www.tapinto.net/towns/newark/sections/east-ward/articles/sewerage-commission-to-re-examine-plans-for-ironbound-wastewater-facility-power-generator

[215] Federal Energy Regulatory Commission. Apr 16, 2021. "Workshop Regarding the Creation of the Office of Public Participation". Docket No. AD21-9-000. Available at: https://www.ferc.gov/news-events/events/workshop-regarding-creation-office-public-participation-04162021

[216] Heydon, James. 2020. "Procedural Environmental Injustice in 'Europe's Greenest City': A Case Study into the Felling of Sheffield's Street Trees". Social Sciences *MDPI* 9, 100. Available at: https://www.mdpi.com/2076-0760/9/6/100/pdf

[217] Global Boston. n.d. "Chelsea." *Boston College Department of History*. Available at: https://globalboston.bc.edu/index.php/home/immigrant-places/chelsea/.

home; 47 percent of its population is foreign born, and 68 percent is Hispanic or Latinx.[218] In contrast, Massachusetts only has 24 percent of its overall population who speak a language other than English at home, 17 percent foreign born persons, and 12 percent Hispanic or Latinx.[219] Bordering Chelsea to the southeast, East Boston has long been home to immigrants from Ireland, Nova Scotia, France, Russia, Poland, Lithuania, Italy, and migrants from other parts of Boston. With high shares of racial/ethnic minorities, low-income households, and English-isolated populations, these communities are protected by the Commonwealth as EJ populations (see Figure 3).

State Senator and Former City Councilor Lydia Edwards supports the residents of East Boston in their efforts to stop construction of Eversource's highly controversial substation at East Eagle Street in East Boston, which has received approval from the Massachusetts EFSB and the DPU. In February 2022, then-City Councilor Edwards announced a proposal—a home rule petition—to halt certain projects that raise environmental concerns, including the East Eagle Street Substation.[220]

The approved new electric substation in East Boston is part of the Mystic-East Eagle-Chelsea Reliability Project. While Eversource claims that the new electric substation will contribute to the reliability of the area's electricity supply system considering the forecasted grow of electric demand,[221] the site chosen seems to neglect the impacts of climate change and poses undesirable consequences that are impacting the East Boston/Chelsea community. Eversource failed to engage the community into the planning process and put little effort into informing the community of the negative impacts of constructing a new electric substation. Eversource's actions led the CLF to file an appeal on behalf of the East Boston residents in January 2022 against the substation.[222]

Senator Edwards provided her testimony as part of the appeal process and spoke on behalf of GreenRoots.

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[218] The term "Latinx" is used in this report as a gender-neutral alternative to the traditionally used "Latino," referring to people of Latin American descent, and as an alternative to the common U.S. term "Hispanic," which excludes non-Spanish speakers of Latin American descent. While polling indicates no clear consensus among U.S. residents of Latin American descent on a "preferred" demographic term, and only one-quarter of respondents had previously heard the term "Latinx," the term offers greater inclusivity to women and non-binary members of the community. Nonetheless, the lack of clear consensus on the matter reinforces the importance of self-identification by members of the community themselves, in favor of prescriptive labels.
Sources: (1) United States Census Bureau. 2020. "QuickFacts: Chelsea City, Massachusetts." *United States Census Bureau*. Available at: https://www.census.gov/quickfacts/chelseacitymassachusetts. (2) Noe-Bustamante, L., Mora, L., and Lopez, M.H. August 11, 2020. "About One-in-Four U.S. Hispanics Have Heard of Latinx, but Just 3% Use It." *Pew Research Center*. Available at: https://www.pewresearch.org/hispanic/2020/08/11/about-one-in-four-u-s-hispanics-have-heard-of-latinx-but-just-3-use-it/. (3) McCarthy, J. and Dupree, W. August 4, 2021. "No Preferred Racial Term Among Most Black, Hispanic Adults." *Gallup*. Available at: https://news.gallup.com/poll/353000/no-preferred-racial-term-among-black-hispanic-adults.aspx.

[219] Ibid.

[220] McDonald, D. February 28, 2022. "Lydia Edwards files proposal that could halt East Boston electric substation." *Boston Globe*. Available at: https://www.bostonglobe.com/2022/02/28/metro/lydia-edwards-files-proposal-that-could-halt-east-boston-electric-substation/

[221] Eversource Energy. N.d. Mystic - East Eagle - Chelsea Reliability Project. *Eversource*. Available at: https://www.eversource.com/content/wma/residential/about/transmission-distribution/projects/massachusetts-projects/mystic---east-eagle---chelsea-reliability-project

[222] Wuthmann, W. January 27, 2022. "Opponents appeal East Boston substation's waterfront license." *WBUR*. Available at: https://www.wbur.org/news/2022/01/27/opponents-appeal-east-boston-substation-waterfront-license

On June 21, 2022, at the fifth evidentiary hearing of the Massachusetts EFSB in Docket EFSB 22-01,[223] Senator Edwards answered questions regarding Eversource Energy's certificate of environmental impact and public interest for the East Eagle Street Substation, addressing Eversource's lack of inclusivity with regards to language barriers, community outreach, and racial equity.

> ***Sen. Edwards:*** *I have felt as an elected official and as representative of many people of my community that our input was seen as a part of our process but not something actually valued. It was almost an annoyance for Eversource. They seemed to be annoyed to have to come to East Boston. They seemed to be annoyed to have to do things in Spanish. They seemed to be annoyed by us—because I believe true participation and true listening actually results in some change. There was one change made in the project, and that was to move it across the lot, closer to the community. But that to me is not a result of community participation. It was probably a result of a lawsuit that they would have lost against a local businessperson.*[224]

For energy companies like Eversource, including community voices and creating meaningful participation is important because it would establish a better understanding and visibility of the issue and empower the community to enforce law. Meaningful participation requires going to the community—asking them to be partners, listening to their needs and concerns, and figuring out where their ideas can be implemented. Eversource's interpretation of meaningful participation in this case, however, was only to ask the community to submit written response, and the community's input did not have an impact on the siting decision.

Community members and advocates have long cited a lack of inclusivity, transparency, and adequate translation services in utility proceedings. Despite Eversource's claim—called into question by GreenRoots—that there will be an insufficient energy supply in the Chelsea/East Boston/Lynn area, Eversource's lack of effort towards building an inclusive community has already led to a loss of public trust that will be difficult to repair.

> ***Sen. Edwards:*** *[D]o we understand how grave this could be? And my response is, do you understand how little you are trusted? Do you understand how little Eversource is trusted or believed? That is more grave to me than anything in this world where we already have people not believing in basic science, where we already have that. That trust, that lack thereof, on this, when climate change is so vital that we all stay on the same page—there is such a lack of it, and I believe it has everything to do with the way in which the engagement has happened, the process has happened.*[225]

In the case of East Eagle Street Substation, the loss of public trust has an important impact on the project's legitimacy. Eversource's perceived unwillingness to accept accountability has been taken as a dismissal of

[223] MA DPU Docket No. EFSB 22-01. June 2022. Petition and Application of NSTAR Electric Company d/b/a Eversource Energy for a Certificate of Environmental Impact and Public Interest. Submitted by NSTAR Electric Company d/b/a Eversource Energy. Available at: https://eeaonline.eea.state.ma.us/DPU/Fileroom/dockets/bynumber/18-111
[224] Department of Public Utilities Public Hearing. June 21, 2022. "EFSB 22-01: Mystic-East Eagle-Chelsea Reliability Project Certificate Evidentiary Hearings" [YouTube Video]. Available at: https://www.youtube.com/watch?v=7humQt7HRSE
[225] Ibid.

the harms that the project can bring to frontline communities, and a refusal to discuss race and other forms of structural oppression.[226] In Senator Edwards' experience, attempts to bring up the community's needs and ongoing disparities to Eversource resulted in an accusation of her "playing the race card."

> ***Sen. Edwards:*** *This is still somewhat controversial. But again, it's more to demonstrate that I'm trying. I'm looking, I'm trying to think of different places to move it. At least this version wasn't near the community. It wasn't near a playground. It was already fenced off. So, I said, okay. So, I actually approached and spoke with Eversource about it, or tried to. And, the conversation, as I describe in my testimony, became very acrimonious. Because he rightfully noted, well, you're not meeting the need of being close to gas stations, you're not meeting the need of being away from the flood station. But I said, "We are meeting the need of […] the community and dealing with the racial implications and concerns" about the project, at which point I was accused of playing the race card.*

The construction of energy facilities regularly faces public opposition due to concerns with pollution and other environmental risks. Building a meaningful, influential, diverse, language-appropriate and transparent community engagement process would help ensure fair decision-making, by including and centering the community's needs and voices. Together, as Senator Edwards' testimony suggests, communities and energy providers could think of ways to build energy facilities that could meet the needs of both parties. However, according to local advocates from GreenRoots (see above in Section 2.I), Eversource neglected to provide appropriate language services in limited-English communities, failed to meaningfully consider the community's input, and, as a result, disenfranchised the systemically neglected communities that will bear disproportionate harms from energy decisions.[227]

Senator Edwards' experience with Eversource offers many lessons for energy companies and other decisionmakers on how to provide substantive, diverse, inclusive, and genuine community engagement. In order to ensure community support for energy projects and the reliability thereof, energy companies and policymakers can expand public participation options in decisions by taking actions such as ensuring adequate translation services at all proceedings and in all public announcements, restructuring decision-making processes to ensure greater community stake, and maintaining a constant emphasis on redressing historic and structural inequities in affected communities.

3. Recommendations for Energy Reliability Assessments

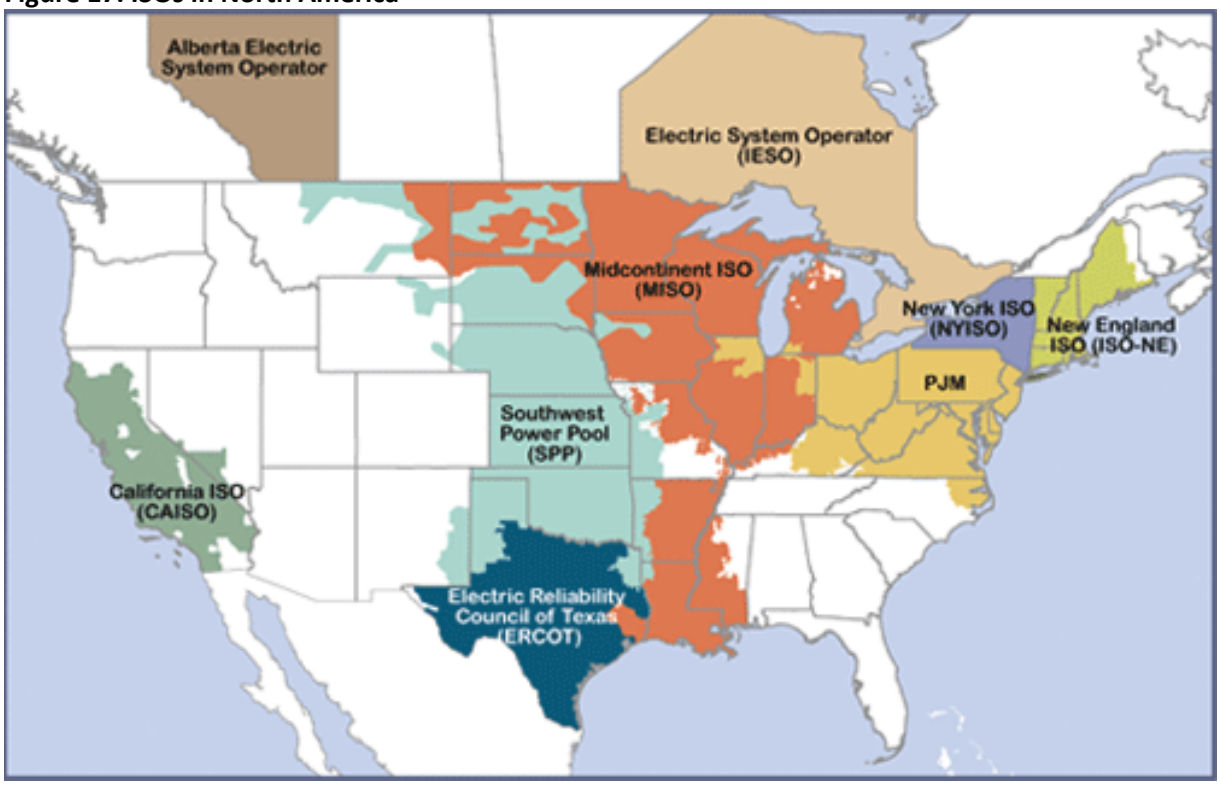
The real-world experiences of advocates for a more equitable energy system demonstrate a need for transparency in energy decision-making processes and the critical role that ISO-NE (New England's grid operator) plays in determining the region's energy future. ISO-NE's markets select which energy resources

[226] Ibid.

[227] Community Action Works. November 22, 2021. "Alien Language." *Stories from the Frontlines [Podcast].* Available at: https://open.spotify.com/episode/4cdTjAnqfrQLOdockRs6z6?si=22f10dce757e47e5

are chosen to stand ready to run for reliability purposes and to run as needed. The same is true of other grid operators beyond New England, including: NYISO in New York, PJM in the Mideast, MISO in the Midwest, SPP in the Midwest and Southwest, ERCOT in Texas and CAISO in California (see Figure 17). Independent System Operators (ISOs) are not-for-profit entities authorized by FERC to ensure the constant availability of competitively priced wholesale electricity via the operation of energy, capacity and ancillary service markets. ISOs determine future energy resource mixes—with obvious implications for both reliability and equity. However, grid operators like ISO-NE have a principal obligation to ensuring grid reliability without a mandated requirement to base their decisions on state policy goals. As a result, the clean energy commitments of five out of six New England states put ISO-NE under no legally enforced obligation to account for such commitments or policy mandates.

Figure 17. ISOs in North America



Reproduced from: FERC. "RTOs and ISOs." Available at: https://www.ferc.gov/power-sales-and-markets/rtos-and-isos.

In theory, ISOs are unbiased facilitators of the region's electric markets, independent of profit motives and solely interested in cost-effectiveness, reliable electric supply, and efficiency. In practice, however, the line between ISOs, industry, government, and policy is not so clear-cut. For example, according to OpenSecrets (a website that publishes data on money in politics from the Senate Office of Public Records), ISO-NE has employed a lobbying firm, Owen Evans Ingols—that also represents an array of electric utility clients—for

congressional and executive branch lobbying activities amounting to at least $120,000 per year for over the last decade.[228]

ISO-NE's major decision-making powers and lobbying activities—as well as the important discrepancies between its decisions and community priorities—demonstrate a need for not only greater transparency but also greater inclusivity in its operations. Transparent proceedings and decision-making processes—which must be responsive to working people's schedules, disabled people's accessibility needs, mobility-restricted people's geographic constraints, and Internet-insecure people's technological challenges—can ensure that communities are adequately informed about proposed energy decisions that will directly affect them. However, transparency without inclusivity is an incomplete solution: If energy decisions remain under the exclusive control of select bodies such as ISO-NE without inclusively and actively soliciting community feedback and input, these decisions will remain fundamentally undemocratic. Inclusivity requires not only informing potentially affected communities about proposed energy decisions, but also listening to communities' voices and meeting communities' needs.

There are two primary ways that ISOs could change in ways that have the potential to benefit equity in decision-making about reliability: (1) a shift in ISO decision-making processes such that consumer interests are better represented and accounted for; and/or (2) given that energy markets are confined by the bounds of public policy, new, more aggressive policy mandates from Governors and state legislatures would set the terms of ISO decisions. The latter is limited by the fact that ISO has not fully embraced state mandates, and consequently, stronger state mandates do not necessarily translate into ISO action. Fundamental change is required to substantively incorporate clean energy mandates from state leaders into wholesale market decisions. For example:

- In its decision-making processes, ISO-NE works closely with a stakeholder group called the New England Power Pool (NEPOOL)[229] that is meant to represent the perspectives of electric utilities, power generators, brokers, consumer-owned utilities, end users (residential and business utility customers), and other market actors. At present, NEPOOL's membership is dominated by electric suppliers (211 of 535 members—nearly 40 percent). If NEPOOL membership had a larger share of end user representatives (currently less than 10 percent), NEPOOL membership would better represent consumer interests such as equity concerns.
- Launched in 2016, a NEPOOL stakeholder process called Integrating Markets and Public Policy (IMAPP) was launched to identify potential changes to ISO-NE's wholesale power markets that would advance New England states' public policy objectives.[230] One of the market changes under discussion was ISO-NE establishing a carbon price. However, in 2017, ISO-NE objected to a carbon

[228] OpenSecrets. N.d. "Client Profile: ISO New England." *OpenSecrets*. Available at: https://www.opensecrets.org/federal-lobbying/clients/hired-firms?cycle=2021&id=D000052432.
[229] (1) Doot, D.T. 2005. *New England Power Pool: Second Restated NEPOOL Agreement.* ISO-NE. Available at: https://www.iso-ne.com/static-assets/documents/2015/01/op_2d_rna.pdf; (2) ISO-NE. n.d. "Participant Directory." *ISO-NE*. Available at: https://www.iso-ne.com/participate/participant-asset-listings/directory?id=1&type=committee
[230] NEPOOL. No date. "IMAPP." Available at: https://nepool.com/zimapp/#:~:text=Integrating%20Markets%20and%20Public%20Policy,policy%20objectives%20in%20New%20England.

price and no such change was made.[231] In June 2021, NEPOOL stakeholders engaged in discussions regarding new market designs, including a hybrid approach that would combine a forward clean energy market with net carbon pricing in pursuit of an 80 percent carbon emissions reduction goal.[232] In February 2022, ISO-NE finalized the *Pathways* study analyzing four pathways to a clean energy grid, including the proposed hybrid approach.[233]

- ISO-NE "closely monitors"[234] policy developments like New England states' renewable portfolio standards, clean energy standards and greenhouse gas emissions limits that impact its energy system planning. In 2021, ISO-NE updated its peak electric demand forecasts to better account for historical and projected increases in energy efficiency and behind-the-meter resources (like rooftop solar),[235] which directly impacts how much generation capacity is solicited for reliability purposes in its capacity market.

Governors and state legislators are also the ones with the power to change what state agencies can and must do with regard to equity considerations in energy regulatory decisions. For example, in December 2021, the Governor of Connecticut signed Executive Order No. 21-3 which, among other things, establishes an Office of Climate and Public Health, an Equity and Environmental Justice Advisory Council, and a Clean Economy Council.[236] In 2020, New Jersey passed SB 232,[237] which requires the New Jersey Department of Environmental Protection to identify overburdened communities throughout the state and sets new requirements on permits for polluting energy projects (like incinerators, landfills and waste treatment facilities) located within these communities.[238]

No parallel planning, operations, and oversight organization exists for the country's gas distribution network. Gas projects are addressed state agency by state agency with very little cross-utility planning. State-level gas modeling and planning is feasible but rare: California's city-level building codes reduce gas reliance and have led to a Public Utility Commission rulemaking for the purpose of regulating California's

[231] 1) U.S. Senators Sheldon Whitehouse and Bernard Sanders. September 20, 2017. Letter to Gordon van Welie, President and CEO, ISO-NE. 2) ISO-NE. September 29, 2017. Letter to U.S. Senators Sheldon Whitehouse and Bernard Sanders. Both letters available at: https://www.iso-ne.com/static-assets/documents/2017/10/sept_2107_imapp_carbon_ltrs.pdf.
[232] NESCOE Staff. June 22, 2021. Pathways Hybrid Model Scope Document [Memo]. Submitted to ISO-NE/NEPOOL. Available at: https://nepool.com/wp-content/uploads/2021/06/FGP_NPC_20210721_NESCOE_Hybrid_Approach_Assumptions_20210622.pdf
[233] Schatzki, T., et al. 2022. *Pathways Study: Evaluation of Pathways to a Future Grid*. Prepared by Analysis Group for NEPOOL Participants Committee. Available at: https://www.iso-ne.com/static-assets/documents/2022/02/pathways-study-report.pdf
[234] ISO-NE. 2021. "2021 Regional System Plan." Available at: https://www.iso-ne.com/static-assets/documents/2021/11/rsp21_final.docx. Page 12.
[235] Ibid. Page 14.
[236] Connecticut Executive Order No. 21-3 (E.O. 21-3), 2021. *An Order Directing Connecticut Executive Branch State Agencies to Take Significant Actions within their Authority to Reduce Carbon Emissions and Prepare for the Impacts of the Climate Crisis*. Available online: https://portal.ct.gov/-/media/Office-of-the-Governor/Executive-Orders/Lamont-Executive-Orders/Executive-Order-No-21-3.pdf.
[237] New Jersey Legislature. Session 2020-2021. "Bill S232 ScsScsAcaAca (SCS/2R)." Available at: https://www.njleg.state.nj.us/bill-search/2020/S232.
[238] National Conference of State Legislatures. January 2022. "State and Federal Environmental Justice Efforts." Available at: https://www.ncsl.org/research/environment-and-natural-resources/state-and-federal-efforts-to-advance-environmental-justice.aspx.

transition away from gas,[239] and there are open dockets in other states inquiring into the future of gas. The California Energy Commission's *Challenge of Retail Gas in California's Low-Carbon Future* report analyzes the customer costs and public health benefits of that transition.[240] Many U.S. states have laws and regulations enforcing climate and emission reduction consistent with a transition away from gas use in buildings. Nonetheless, gas utilities and public utility regulators continue to proffer and approve one-off gas plans without consideration of interaction among distribution companies or between the gas and electric sectors.

ISOs, Governors, state legislators and energy system decision-makers like public utility commissions, departments of environmental protection, and siting boards can change in ways that could enhance equity in energy decisions for reliability by:

- Better representing and accounting for consumer interests in decision-making processes;
- Establishing new, equity-focused policy mandates that set the terms of energy market decisions and decisions by energy-related state agencies; and
- Launching new, holistic, policy-responsive gas-sector modeling and planning processes.

In addition, Table 2 below summarizes key equity considerations and recommendations for energy system decisionmakers and policymakers, based on lessons from the case studies detailed in each of the eight subsections in Section 2.

Embedding equity, alongside reliability, into energy system assessments can amplify community voices, increase transparency between government bodies, and expose opportunities for creative solutions to address the climate crisis. Without provisions ensuring equitable community engagement and outcomes, energy system investments cannot be considered reliable.

[239] Public Utilities Commission of the State of California. January 2020. Order Instituting Rulemaking to Establish Policies, Processes, and Rules to Ensure Safe and Reliable Gas Systems in California and Perform Long-Term Gas System Planning." Available at: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M324/K792/324792510.PDF.
[240] California Energy Commission. April 2020. "The Challenge of Retail Gas in California's Low-Carbon Future." Available at: https://www.energy.ca.gov/sites/default/files/2021-06/CEC-500-2019-055-F.pdf.

Table 2. Summary of energy system reliability criteria and equity recommendations

Reliability Criteria	Equity Recommendations
Accelerating climate change impacts and worst-case scenarios	New infrastructure aimed at enhancing reliability should take into account impacts on under-resourced and undeserved communities, including the effects of expected climate damages like coastal flooding.
Greenhouse gas emission reduction requirements	Plans for new energy infrastructure should consider the local impacts of co-pollutants and climate damages, especially those impacts that fall on historically disenfranchised communities.
Increasing penetration of renewable energy and energy storage	Proposals for new fossil-fuel energy infrastructure should justify their need in the context of state climate laws and expected future costs of and demand for renewables and battery storage.
Increasing amounts of distributed energy resources	People who adopt distributed energy resources tend to be much wealthier than average, suggesting a disconnect between potential and actual distribution of benefits. Programs providing incentives for solar panels and small-scale batteries should include consideration of household income.
Energy efficiency potential	Energy Efficiency benefits skew toward wealthy and white customers, indicating a mismatch between potential and actual distribution of benefits. Energy efficiency programs should include measures targeted to reach the underserved customers that can benefit the most from lower energy bills.
Increasing levels of electrification	Private electric vehicles are just one part of transportation electrification; mass transit and active transportation are more available to people of all means. Comprehensive planning for a transition from fossil fuels to building electrification must include consideration of the rising costs of a shrinking gas system, which will fall on an increasingly smaller and poorer customer base.
Volatile gas prices and flat gas demand	Planning for expensive updates to aging gas infrastructure and investments in new gas infrastructure should take climate laws and the long economic lifetimes of the equipment into account.
Meaningful, influential, and inclusive community engagement	Intentional community engagement and inclusive energy decision-making processes ensure fairness for vulnerable communities in energy decision-making.