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STATES OF POWER DECARBONIZATION

Q1 2023 Quarterly Report

Executive Summary



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The [NC Clean Energy Technology Center](#) is a UNC System-chartered Public Service Center administered by the College of Engineering at North Carolina State University. Its mission is to advance a sustainable energy economy by educating, demonstrating and providing support for clean energy technologies, practices, and policies. The Center provides service to the businesses and citizens of North Carolina and beyond relating to the development and adoption of clean energy technologies. Through its programs and activities, the Center envisions and seeks to promote the development and use of clean energy in ways that stimulate a sustainable economy while reducing dependence on foreign sources of energy and mitigating the environmental impacts of fossil fuel use.

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FULL REPORT AND OTHER 50 STATES REPORTS

The full Q1 2023 50 States of Power Decarbonization report may be downloaded [here](#). In addition to *The 50 States of Power Decarbonization*, the NC Clean Energy Technology Center publishes additional quarterly reports called *The 50 States of Solar*, *The 50 States of Grid Modernization*, and *The 50 States of Electric Vehicles*. These reports may be purchased [here](#). Executive summaries and older editions of these reports are available for download [here](#).

ABOUT THE REPORT

WHAT IS POWER DECARBONIZATION?

Decarbonization is an expansive term generally referring to the reduction of carbon dioxide emissions. Decarbonization can be discussed in the context of any emitting sector – electric power, buildings, industrial processes, transportation, agriculture, or the economy as a whole. This report focuses specifically on decarbonization of the electric power sector, which may include economy-wide decarbonization actions that necessarily encompass the electric power sector.

PURPOSE

The purpose of this report is to provide timely, accurate, and unbiased updates to a broad audience of state lawmakers and regulators, state agencies, utilities, the clean energy industry, and other energy stakeholders, about how states are choosing to study, adopt, implement, amend, or discontinue policies associated with power decarbonization and how utilities are planning for and implementing future generation resource additions and retirements. This report catalogues proposed and approved executive, legislative, and regulatory changes affecting electric power decarbonization during the most recent quarter, as well as actions related to investor-owned utility resource plans and generation capacity changes.

The 50 States of Power Decarbonization report series provides regular quarterly updates and annual summaries of electric power decarbonization policy updates and utility resource planning, keeping stakeholders informed and up to date.

APPROACH

The authors identified relevant policy changes and resource planning updates through state utility commission docket searches, legislative bill searches, popular press, and direct communications with industry stakeholders and regulators.

Questions Addressed

This report addresses several questions about U.S. electric power sector decarbonization, including:

- What targets are states setting for clean/renewable electricity generation or the reduction of greenhouse gas emissions from the power sector?
- How are states reforming statutes and regulations governing utility generation resource planning, procurement, and retirement?

- What electric generation capacity additions and retirements are utilities planning over the near-term and long-term?
- What specific electric generation capacity additions are utilities seeking to implement in the near-term through direct development or procurement processes? What resources are utilities requesting approval to retire in the near-term?

Actions Included

This report focuses on cataloguing and describing important proposed and adopted policy changes related to electric power sector decarbonization.

In general, this report considers an “action” to be a relevant (1) legislative bill that has been introduced, (2) an open or recently decided regulatory docket or rulemaking proceeding, (3) an executive order or significant state agency initiative, (4) a recently published integrated resource plan, or (5) a competitive procurement under development or underway for electric generation capacity. Primarily, statewide actions and those related to investor-owned utilities are included in this report. Specifically, actions tracked in this issue include:

Studies and Investigations

State- or utility-led efforts to study issues related to electric power decarbonization, including decarbonization pathways, cost impacts, and other specific topics.

Clean Energy Targets

New state clean energy standards, renewable portfolio standards, or technology-specific capacity targets, or changes to existing targets. Changes to implementation rules, such as eligible technologies and facility sizes, covered entities, and alternative compliance payment rates are also included.

Emission Targets and Carbon Policies

New state greenhouse gas emission reduction targets or modifications to existing targets. Changes to implementation rules for emission reduction targets are also included, as well as state or regional carbon pricing policies, such as carbon taxes or cap-and-trade programs.

Planning and Procurement Rules

Changes to rules governing the utility integrated resource planning process, as well as rules governing utility procurement of electric generation resources or retirement of existing utility-owned generation facilities.

Utility Integrated Resource Plans

Integrated resource plans recently filed by investor-owned utilities and actively under review by regulators, as well as utility efforts to develop an integrated resource plan in advance of filing the plan with regulators.

Generation Capacity Changes

Utility-initiated requests to build, acquire, convert, or retire generation facilities, as well as utility green tariffs for large customers and state- or utility-led competitive procurements for electric generation resources (excluding utility requests for approval of individual power purchase agreements and competitive procurements for unbundled renewable energy certificates).

Actions Excluded

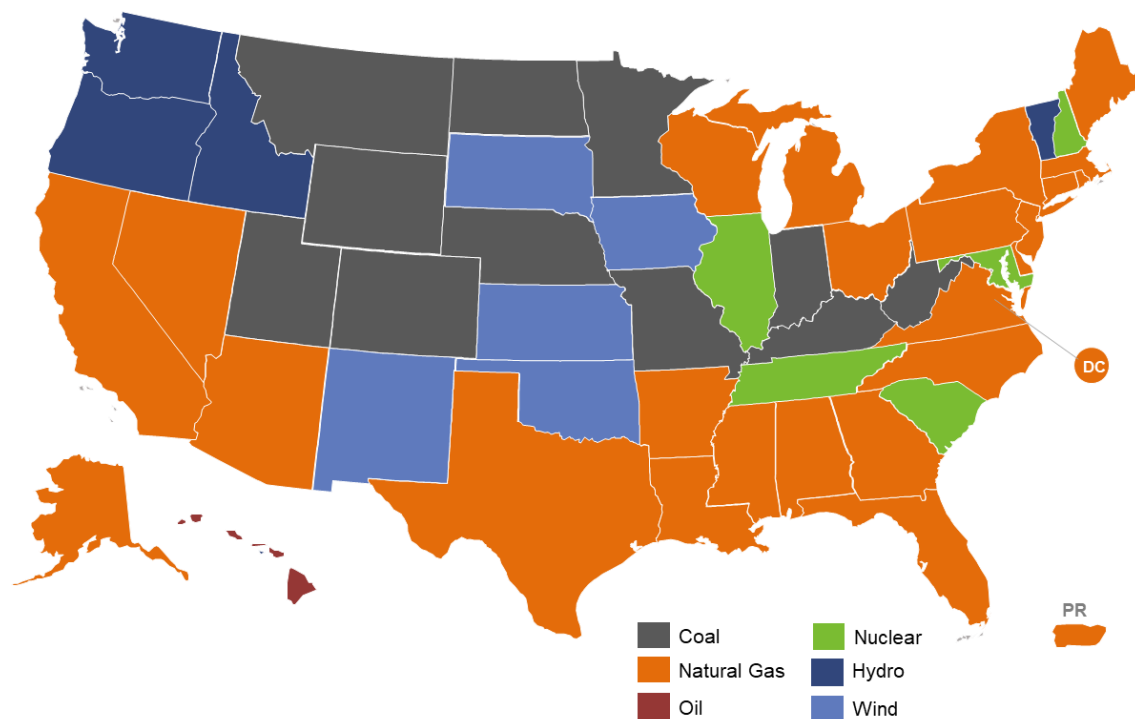
This report excludes actions that are specifically related to decarbonization of buildings, industrial processes, transportation, and agriculture. The report authors recognize that there are numerous important policy and regulatory issues related to clean energy project development that are highly relevant to overall electric power sector decarbonization. In order to maintain a well-defined scope of content, the report excludes actions specifically related to transmission and distribution planning, interconnection rules, and permitting and siting rules. Distribution system planning efforts are covered in the 50 States of Grid Modernization quarterly report, as well as a multitude of policies pertaining specifically to energy storage. Actions specific to distributed generation and community solar are covered in the 50 States of Solar quarterly report, and actions related to transportation electrification are covered in the 50 States of Electric Vehicles quarterly report. As noted above, utility requests for approval of individual power purchase agreements and competitive procurements for unbundled renewable energy certificates are excluded from this report.

DECARBONIZING THE U.S. ELECTRIC POWER SECTOR

The electric power sector in the U.S. is the second largest source of greenhouse gas emissions, behind the transportation sector, with a majority of its energy resources coming from fossil fuels. The industrial end-use sector is right behind it, followed by commercial and residential buildings. Together, these sectors account for approximately 90% of U.S. greenhouse gas emissions.* While the electric power sector itself accounts for 25% of emissions, efforts underway to electrify transportation, buildings, and industrial processes amplify the impact of decarbonizing the power sector.

Current federal government goals have the U.S. attaining a carbon pollution-free power sector by 2035 and a net-zero economy by 2050. As of now, 20 states have set clean or renewable energy standards or goals to reach net-zero emissions by 2050 at the latest. In addition, a plethora of electric utilities have announced net-zero or carbon neutrality goals for Scope 1, Scope 2 – and for some – Scope 3 emissions.†

Figure 1. Largest Contributing Resource to State Electric Generation Mix (2022)



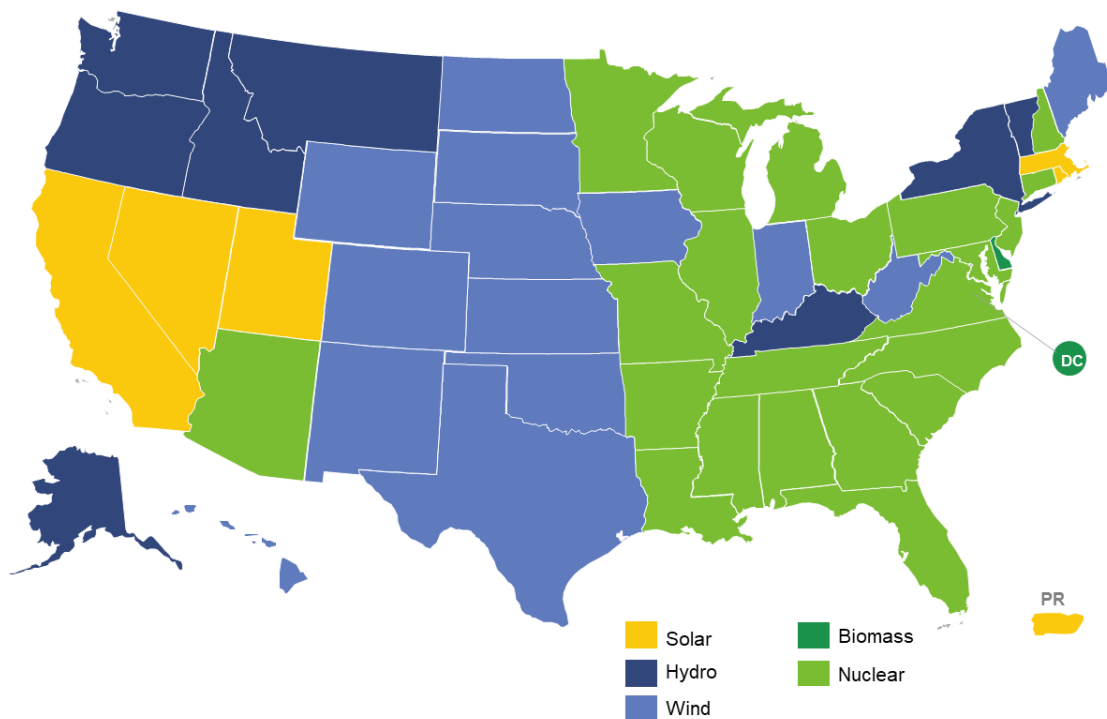
Data Source: U.S. Energy Information Administration – Electric Power Monthly, Net Generation by State by Type of Producer by Energy Source (Jan. – Dec. 2022).

* Environmental Protection Agency (EPA), *Sources of Greenhouse Gas Emissions*. EPA, May 2023, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.

† Smart Electric Power Alliance (SEPA), *Utility Carbon-Reduction Tracker™*. SEPA, May 2023, <https://sepapower.org/utility-transformation-challenge/utility-carbon-reduction-tracker/#:~:text=100%25%20carbon%2Dfree%20electricity%20by%20the%20end%20of%202030.&text=Carbon%20neutral%20scope%201%20and%202%20emissions%20by%202030.&text=Net%2Dzero%20scope%201%20and%202%20emissions%20by%202040.&text=Net%2Dzero%20CO2%20emissions%20by%202045>.

However, most U.S. states and the country as a whole still have a long way to go to achieve these goals. Natural gas (39.8%) and coal (19.5%) remain the nation’s dominant electric generation resources, and either natural gas, coal, or oil makes up the largest share of electricity generation in 36 states (See Figure 1).[‡] Despite the current dominance of fossil fuels, clean energy is becoming a mainstay in the nation’s energy mix, particularly as costs decline and states acquire cleaner resources to meet climate and other environmental objectives.

Figure 2. Largest Contributing Clean Resource to State Electric Generation Mix (2022)



Data Source: U.S. Energy Information Administration – Electric Power Monthly, Net Generation by State by Type of Producer by Energy Source (Jan. – Dec. 2022).

Nationwide, clean energy resources are currently led by nuclear (18.2%), followed by wind (10.2%), hydropower (6.2%), and solar (3.4%).[§] Across the country, these resource mixes vary greatly, with different resources leading each state’s clean electricity generation; currently, most states’ clean energy portfolios are led by either nuclear or wind energy (see Figure 2). The overall contribution of clean energy sources to states’ electricity generation also varies widely, ranging from 3% to 99% in 2022 (see Figure 3).

Power decarbonization involves a wide range of potential pathways and technological solutions, allowing decision-makers to pursue a variety of combinations that, in theory, lead to the same

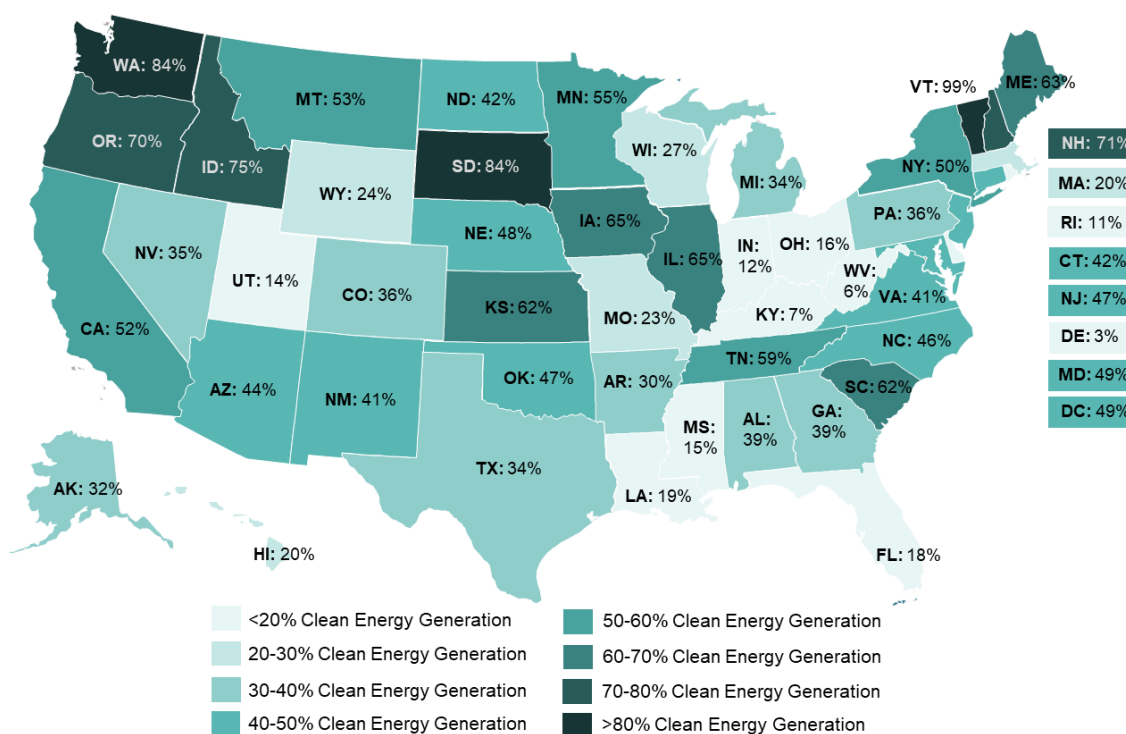
[‡] U.S. Energy Information Administration (EIA), *What is U.S. electricity generation by energy source?* U.S. EIA, February 2023, <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>. and U.S. EIA, *Electric Power Monthly, Net Generation by State by Type of Producer by Energy Source* (Jan. – Dec. 2022). <https://www.eia.gov/electricity/data/state/>.

[§] U.S. EIA, *What is U.S. electricity generation by energy source?* U.S. EIA, February 2023, <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>.

end goal. However, the cost of each pathway can vary dramatically, and challenges like global supply chains, transmission access, interconnection queues, and local permitting can impact the actual feasibility and timeline of each pathway. The timescale for implementation is a critical consideration for meeting climate goals, while cost is also highly important to minimize adverse economic impacts on individuals and businesses, particularly low-income households.

Another major factor influencing U.S. power decarbonization is the federal Inflation Reduction Act, signed into law in 2022. The Act includes significant incentives, including an array of tax credits and grants, for clean energy development and greenhouse gas emission reduction projects, upending the assumptions used in most existing technology deployment projections, cost-benefit analyses, and utility resource plans.

Figure 3. Percentage of Clean Electricity Generated by State (2022)



Data Source: U.S. Energy Information Administration – Electric Power Monthly, Net Generation by State by Type of Producer by Energy Source (Jan. – Dec. 2022). Map represents percent of total MWh generated in each state from clean energy sources (biomass, geothermal, hydroelectric, nuclear, solar, and wind).

Although there is much work to be done from where we currently stand to achieve state and utility power decarbonization goals, the future is looking bright. Power decarbonization is being actively considered by policymakers and regulators in nearly every state in the nation, and clean energy resources are dominating most states’ planned electric generation capacity additions in both the near-term and long-term. Meanwhile, states are working to create regulatory structures that will support the achievement of power decarbonization goals in the most fair and efficient ways.

EXECUTIVE SUMMARY

Q1 2023 POWER DECARBONIZATION ACTION

In the first quarter of 2023, 47 states plus DC and Puerto Rico took a total of 418 actions related to electric power decarbonization and resource planning. Table 1 provides a summary of state and utility actions on these topics. Of the 418 actions tracked, the most common were related to clean energy targets (127), planning and procurement rules (88), and emission reduction targets and carbon policies (57).

Table 1. Q1 2023 Summary of Grid Modernization Actions

Type of Action	# of Actions	% by Type	# of States
Clean Energy Targets	127	30%	32 + DC
Planning and Procurement Rules	88	21%	36
Emissions Targets & Carbon Policies	57	14%	22
Electric Generation Capacity Changes	53	13%	30 + PR
Utility Integrated Resource Plans	50	12%	25
Studies and Investigations	43	10%	26
Total	418	100%	47 States + DC, PR

Note: The “# of States/ Districts” total is not the sum of the rows because some states have multiple actions. Percentages are rounded and may not add up to 100%.

TOP 5 POWER DECARBONIZATION ACTIONS OF Q1 2023

Five of the quarter’s top policy developments are highlighted below.

Minnesota Lawmakers Adopt 100% Clean Energy Standard

Minnesota lawmakers enacted legislation in February 2023 adopting a requirement for utilities to generate or procure 100% of their electricity from carbon-free sources by 2040. The bill also directs the Public Utilities Commission to take all reasonable actions within its authority to ensure all citizens benefit from clean energy and have the opportunity to participate in the clean energy economy.

PacifiCorp files 2023 Integrated Resource Plan Covering Six Western States

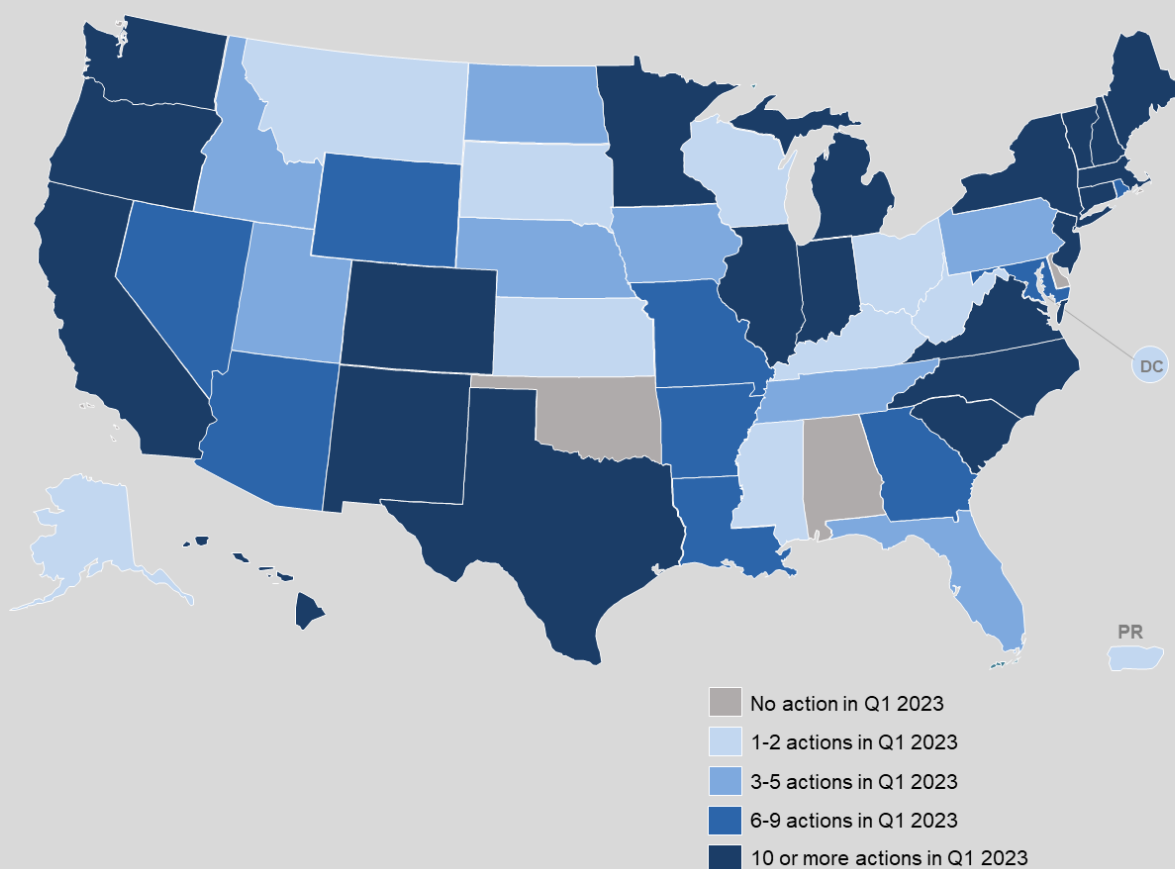
PacifiCorp filed its 2023 integrated resource plan (IRP) in March 2023 that covers all of its service territories across six states – California, Idaho, Oregon, Utah, Washington, and Wyoming. The IRP includes plans to add a total of 9,111 MW of new wind resources, 8,095

MW of storage resources, 7,855 MW of new solar, and 500 MW of advanced nuclear in 2023, with an additional 1,000 MW of advanced nuclear in the long term. The IRP also includes the retirement or gas conversion of 22 coal-fired facilities.

New Jersey Governor Signs Executive Order Setting Clean Energy Goal

The Governor of New Jersey signed an executive order in January 2023, adopting a goal of 100% of electricity sold in the state being from clean sources by 2035. The order directs the Board of Public Utilities to update the state’s roadmap to 100% clean energy in the 2024 Energy Master Plan with specific short-term and long-term proposals that can be implemented to achieve the goal.

Figure 4. Q1 2023 Action on Power Decarbonization and Resource Planning



North Carolina Governor’s Office Releases Deep Decarbonization Study

The North Carolina Governor’s Office released its final deep decarbonization pathways analysis in February 2023. The study finds that the reference scenario (current trends and policies) achieves a 37% reduction in greenhouse gas emissions by 2025, a 46% reduction by

2030, and a 60% reduction by 2050 relative to 2005 levels. The analysis also includes three net-zero scenarios (high electrification, high decarbonization fuels, and high carbon storage) that achieve net-zero emissions by 2050.

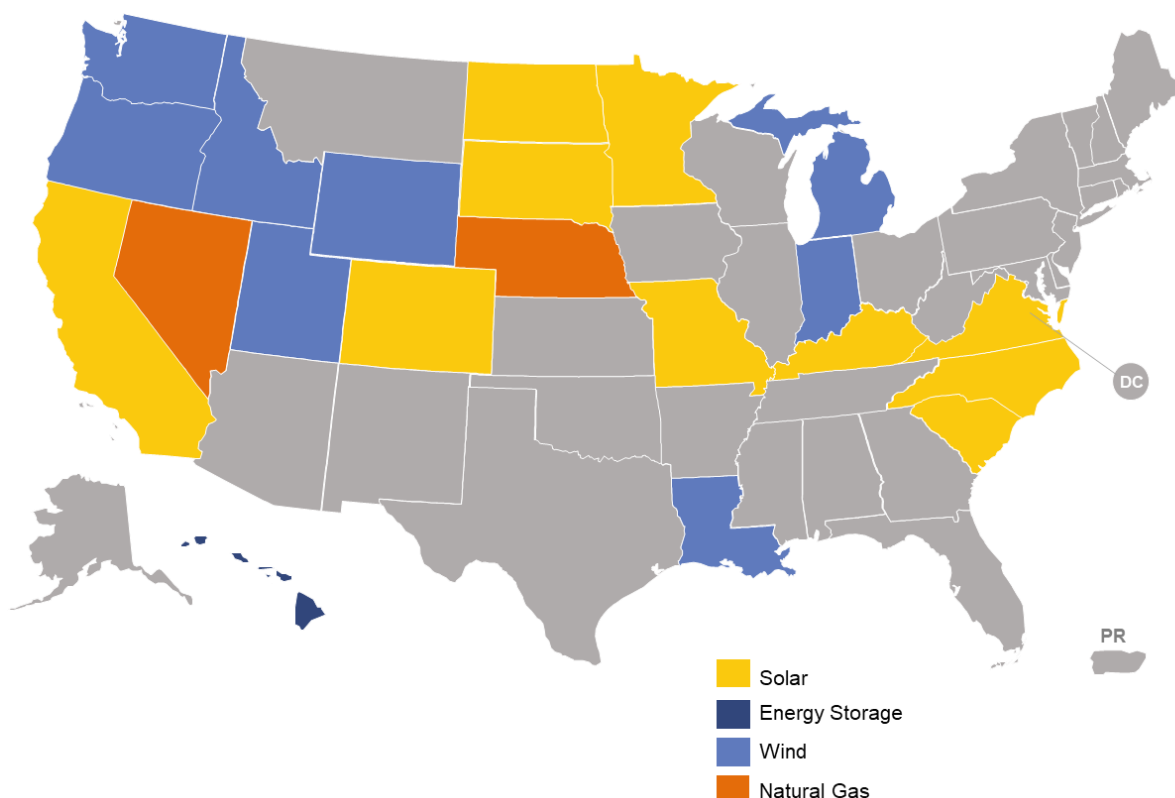
Utah and Wyoming Lawmakers Enact Legislation to Preserve Coal-Fired Generation

Legislators in both Utah and Wyoming enacted legislation during Q1 2023 intended to support the continued operation of coal-fired power plants in the states. In Utah, the enacted bill requires the legislature to be notified at least 180 days before the retirement of a coal plant, among other provisions. Meanwhile, the Wyoming legislation creates a litigation fund to be used in lawsuits against government entities establishing laws or regulations causing early retirement of facilities.

POWER DECARBONIZATION: LOOKING AHEAD

Although coal and natural gas currently account for the majority of U.S. electricity generation, solar and wind are making up the largest planned generation capacity additions for most utilities. Among integrated resource plans (IRPs) recently filed or under review by regulators in Q1 2023, planned capacity additions totaled 74,231 MW for solar, 47,662 MW for wind, 33,273 for storage, and 14,951 for natural gas.

Figure 5. Q1 2023 Utility IRP Action, by Largest Planned Resource Addition



TOP POWER DECARBONIZATION TRENDS OF Q1 2023

Solar, Wind, and Battery Storage Dominating Planned Capacity Additions

Although natural gas and coal currently account for the majority of U.S. electricity generation, utilities' planned capacity additions are being dominated by solar, wind, and battery storage in both the near-term and long-term. Of the 20 states with investor-owned utility integrated resource plans or plan updates under consideration by state regulators in Q1 2023, solar accounted for the largest planned capacity addition in ten states, wind accounted for the largest planned capacity addition in eight states, and battery storage in one state. Among integrated resource plans recently filed or under review by regulators during the quarter, planned capacity additions totaled 74,231 MW for solar, 47,662 MW for wind, and 33,273 MW for storage. These resources were followed by natural gas, which accounted for 14,951 MW of planned capacity additions.

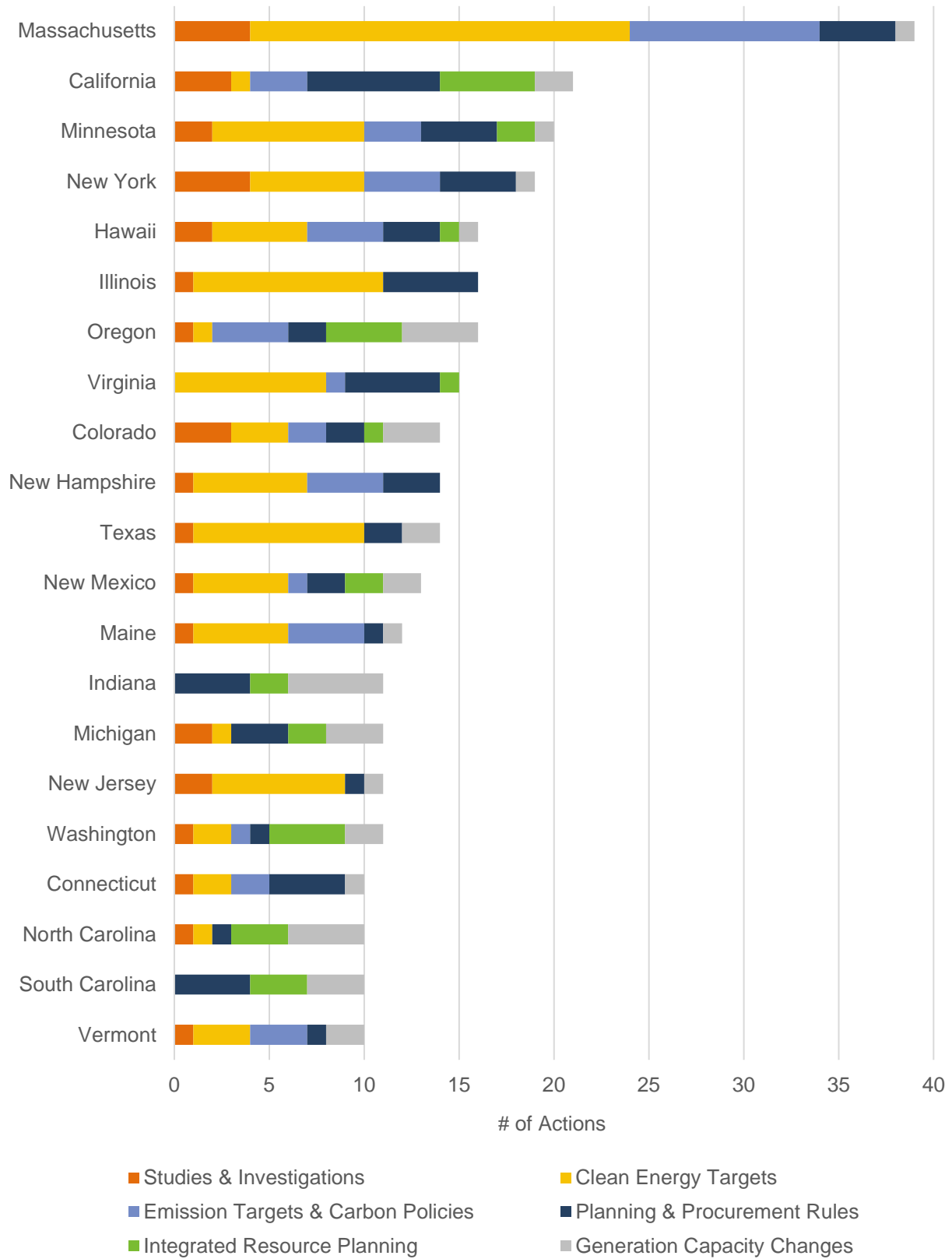
Policymakers Increasing Existing Clean Energy Targets

Policymakers across the country considered increasing existing state targets for clean or renewable energy, or moving up timelines for achieving these targets. In Minnesota, lawmakers enacted legislation increasing the state's renewable portfolio standard and adopting a new 100% clean energy standard. In New Jersey, the Governor signed an executive order setting a goal for the state to reach 100% clean energy by 2035. Legislation introduced in Vermont sets a target to reach 100% renewable electricity by 2035, while proposed Missouri bills would target 100% renewable energy by 2059. Some states, including Maryland and Massachusetts, also considered the expansion of existing offshore wind targets, while legislation introduced in Illinois, Minnesota, and Rhode Island would establish new energy storage targets. Legislators in some states have introduced bills lowering clean energy targets or extending deadlines, although these have thus far been less successful than bills strengthening requirements.

Regulators Exploring the Coordination of Multiple Planning Processes

In several states, regulators are exploring how to coordinate or combine multiple utility planning processes. These processes include integrated resource planning and clean energy planning, as well as transmission and distribution system planning. In North Carolina, regulators opened a new proceeding in March 2023 to consider Duke Energy's proposed rules to consolidate its carbon plan and integrated resource plan requirements. In Oregon, the Public Utility Commission considered rules that would allow utility integrated resource plans and clean energy plans to be filed together. Meanwhile, legislation enacted in early May 2023 removes the requirement for utilities to file separate implementation plans for meeting the state's renewable portfolio standard, instead allowing utilities to describe their compliance plans as part of integrated resource plans.

Figure 6. Most Active States of Q1 2023



FUTURE PRICING DETAILS

The full edition of the Q1 2023 50 States of Power Decarbonization report is publicly available at www.dsireinsight.com/publications. Future full editions of the 50 States of Power Decarbonization will be available at the same location for a cost of \$500 for a single issue and \$1,500 for an annual subscription. A 20% subscription discount is available to non-profit, government, and education customers. An annual subscription to the 50 States of Power Decarbonization report can be added on to any other DSIRE Insight subscription (see options below) at a cost of \$1,200.

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