UNITED STATES CLIMATE ALLIANCE

2021 ANNUAL REPORT

Further. Faster. Together.

MEETING THE CLIMATE CHALLENGE WITH BOLD, STATE-LED ACTION AND COLLABORATION

UNITED STATES CLIMATE ALLIANCE

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MEETING THE CLIMATE CHALLENGE WITH BOLD, STATE-LED ACTION AND COLLABORATION

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HIGHLIGHTING SOLUTIONS across the Alliance

Governors Jay Inslee of Washington, David Ige of Hawaii, Kate Brown of Oregon, and J.B. Pritzker of Illinois showcase U.S. state climate leadership at the 2021 United Nations Climate Change Conference in Glasgow, Scotland.

Message from the Co-Chairs

his has been a year marked by changes and challenges – for our country and the U.S. Climate Alliance. We have witnessed this in our national politics with a new administration taking office, in communities devastated by the ongoing pandemic, and in the worsening climate impacts that have ripped across our country, charring the west and flooding the east. These are days that have shaken and tested each of us, but these are days that have also renewed our resolve and sharpened our focus.

Once again in 2021, we demonstrated the power of partnership and the strength of collective action. After nearly four years of backstopping federal rules, defending against challenges to critical climate policies and regulations, and filling the void left by the previous administration's decision to withdraw the U.S. from the Paris Agreement, we gained a new partner: the federal government. This new partner hit the ground running this year in large part because of the foundation of ambitious climate action we laid.

We did this by working hand-in-hand across state and party lines to pursue innovative, ambitious climate solutions – from leading the charge to get cleaner cars and trucks on the road and generating more electricity from renewable energy sources to increasing the efficiency of our appliances and buildings and protecting natural and working lands. We shared experiences, resources, technical assistance, and regulatory, legislative, and policy expertise. We invested billions into building more equitable, resilient, and sustainable communities and we aligned policies and regulations to help transform the U.S. economy.

For the first time, the Alliance also expanded its reach all the way to the Gulf Coast, proudly welcoming Louisiana Governor John Bel Edwards to our coalition in May. Today, our coalition represents 62 percent of the U.S. economy and 56 percent of the U.S. population. Notably, our states are continuing to show that bold climate action can help drive economic growth across multiple industries and we've outpaced the rest of the country in both greenhouse gas (GHG) emission reductions and per-capita economic output.

As we've strengthened and grown our partnerships, we've also upped our ambition. This year, we committed to collectively achieve overall net-zero GHG emissions as soon as practicable, and no later than 2050, and to reduce collective net GHG emissions at least 50-52 percent below 2005 levels by 2030. Recognizing that health, environmental, and economic crises disproportionately impact overburdened communities and can displace workers, we also pledged to center equity, environmental justice, and a just economic transition in our efforts to meet these climate targets. And as the world's climate leaders convened in Glasgow for COP26, we committed to more than 40 specific and new high-impact actions that will accelerate GHG emission reductions, complement and spur federal efforts, and drive the sort of tangible, impactful implementation, and results needed to make our targets a reality.

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As you will see in this report, the Alliance and our states have made significant progress over the past year and the policies and programs we have put into place continue to drive emissions reductions. But the road ahead is long, and we know we are just getting started. Our own analysis charts one possible pathway forward, and we will continue to work together to put the next generation of climate policies in place to get it done. Our work in the coming months will chart the course for our future. The stakes, and the imperative to act, have never been clearer.

There will no doubt be more changes and challenges ahead, but we know that we can go further, faster – together.



Gavin Newsom Governor, California



Cathy Hochul Governor, New York



Jay Inslee Governor, Washington

Executive Summary

The U.S. Climate Alliance is a bipartisan coalition of 25 governors (MAP ES-1) working together to achieve the goals of the Paris Agreement and keep temperature increases below 1.5 degrees Celsius. Representing 43 percent of U.S. gross greenhouse gas (GHG) emissions, 56 percent of the U.S. population, and 62 percent of the U.S. gross domestic product (GDP), Alliance members are driving the most ambitious collective subnational climate action agenda in our nation's history. Over the past four years, we have coordinated across state and partisan lines and sectors to leverage our collective market power and transform the U.S. economy, while also backstopping federal rules and fighting off challenges to critical policies and regulations. The Alliance is also forging a new state-federal partnership to help ensure the United States achieves its climate goals and leaders are working together at every level of government.



MAP ES-01 U.S. Climate Alliance Members

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REFLECTING ON 2021

Over the past year, our nation has faced and addressed many global challenges. We quickly developed vaccines to address the COVID-19 pandemic, rejoined the Paris Agreement, and continued to expand awareness of long-standing environmental justice and equity issues. At the same time, 2021 is on track to rank among the ten-warmest years on record, with communities across the country continuing to experience major disasters and atypical weather patterns. In its latest report, the United Nations' Intergovernmental Panel on Climate Change (IPCC) finds that the window to avoid further catastrophic conditions is closing and some changes are irreversible, making it clear that the amount of climate change ahead depends on how quickly the world ramps down GHG emissions. Given this urgency, the Alliance joined the Biden Administration in raising our ambition, and in April 2021, committed to collectively achieve overall net-zero GHG emissions as soon as practicable and no later than 2050, and reduce collective net GHG emissions at least 50-52 percent below 2005 levels by 2030.

MEASURING OUR PROGRESS

Year after year, Alliance members have proven that economic growth and climate leadership go hand in hand. From 2005 to 2019, Alliance members cut GHG emissions faster than the rest of the country (15 percent vs. 12 percent) while continuing to grow our economies (FIG ES-1). Between 2016 and 2019, Alliance members created more than 133,000 clean energy jobs, a rate that outpaced the rest of the nation. At the end of 2019, Alliance states accounted for 55 percent of all U.S. jobs, yet they supported 60 percent of all clean energy jobs across the country. By switching to cleaner electricity and more-efficient vehicles, Alliance members have also achieved lower levels of harmful local air pollution such as carbon monoxide, nitrous oxide, sulfur dioxide, particulate matter, and volatile organic compounds.

While we have made progress in cutting our GHG emissions, more work needs to be done to put us on a pathway consistent with what science says is needed to avoid catastrophic climate change. According to independent analysis, there is a pathway to achieve our collective climate goals with Alliance members

FIGURE ES-01 Between 2005 and 2019, Alliance members cut their GHG emissions while continuing to grow their economies.

PERCENT CHANGE IN COLLECTIVE GHG EMISSIONS AND GDP FROM 2005 LEVELS



working in coordination with the federal government (FIG ES-2). Existing state and federal climate-related laws and regulations are projected to reduce collective Alliance emissions 27 percent by 2030 and actions like those being considered by Congress and various federal agencies can drive emissions down further, to 35 percent below 2005 levels by 2030. If all Alliance members put into place policies and programs to meet their individual GHG targets, they would collectively reduce their emissions to 43 percent below 2005 levels by 2030 and 84 percent by 2050, putting our climate goals within reach. However, both states and the federal government will need to continue working to fill the emissions-reduction gap to make our 2030 and 2050 targets a reality. This includes taking bold action across the economy—from transitioning to zero-carbon energy sources to generate electricity to increasing the efficiency of our buildings, cars, trucks, and industries while using electricity and low-carbon fuels to power remaining demand. It also means reducing leaks of methane and hydrofluorocarbons, enhancing our natural and working lands (NWL) to sequester an increasing amount of GHG emissions, and deploying carbon capture technology on appropriate systems and processes (e.g., cement production).

FIGURE ES-02 Achieving individual state GHG targets will put the Alliance's climate goals within reach, with collective action needed across the economy to fill the emissions gap.



GHG EMISSIONS IN THE REFERENCE CASE, FEDERAL CASE, COLLECTIVE ACTION, AND EXISTING GHG TARGETS SCENARIOS, AND THE 2005 BASELINE.

*All emissions reported using AR4 100-year GWP



Photo Credit: New Jersey Governor's Office // Governor Phil Murphy and President Joe Biden meet with families impacted by flood damage left by Hurricane Ida.

FORGING A NEW KIND OF STATE-FEDERAL PARTNERSHIP

Together, Alliance members have built a foundation of ambitious climate action that provides an actionable, bipartisan roadmap for national policy makers and the federal administration. We applaud the climate leadership that the Biden Administration has already shown in its first ten months in office. However, as our analysis shows, additional state and federal action is needed to address emissions sources across the economy. The federal government can continue to look to U.S. states and territories for policies and actions that can be scaled nationally to safeguard public health, protect the environment, drive down emissions, grow the U.S. economy, and create good community- and family-sustaining jobs.

Working together, we can better understand how states can complement and accelerate federal actions and identify opportunities for states to effectively implement federal policies in local contexts. Through this work, we will implement, reinforce, and enhance ambitious state and federal climate actions and help ensure the country builds back better.

DELIVERING ON OUR CLIMATE COMMITMENTS

As the federal government builds a new federal floor to increase national ambition, Alliance members will continue to implement the next generation of bipartisan climate actions so that the federal government can scale them up when feasible. In the past year, Alliance members moved aggressively on all fronts, across all sectors, by:

- 1. **Targets and Climate Governance:** Setting ambitious near-term GHG emissions-reduction targets, advancing climate governance, and leading by example.
- 2. Just Transition and Equity: Integrating equity and justice across government, centering equity and justice in new policies, and training the next generation of clean energy workers.
- Power: Deploying more clean energy, bringing clean energy benefits to all communities, and investing in offshore wind.
- 4. **Transportation:** Accelerating the transition to zero-emissions vehicles, expanding electric vehicle infrastructure, ensuring an equitable transition to a zero-emissions future, and cleaning transportation fuels.
- Buildings and Efficiency: Fostering zero-carbon new building construction, establishing building standards and equipment requirements, and expanding access to capital to retrofit existing buildings.
- 6. **Industry:** Pioneering innovative industrial policies and programs and investing in cleaner manufacturing.
- Carbon Markets and Pricing: Engaging in and developing carbon markets and valuing climate pollution damages in state utility planning and regulatory actions.
- 8. Short-Lived Climate Pollutants: Reducing methane emissions and continuing to lead on hydrofluorocarbons (HFCs).

- Natural and Working Lands: Protecting our natural and working lands by implementing innovative projects and setting ambitious conservation and carbon sequestration goals.
- Resilience: Planning for climate change impacts, enhancing community resilience, financing climate resilience measures, and minimizing climate risk across state operations.
- 11. **Climate Finance:** Mobilizing private investment in climate and clean energy, increasing the resilience of state investments, increasing transparency and disclosure in the financial system, and accounting for climate risks in the insurance industry.

CONTINUING TO LEAD

While we expand our partnership with the federal government, the Alliance will continue to push forward the next generation of innovative, high-impact, state-led actions. Doing so is necessary to meet our own GHG emissions-reduction targets; make our states more resilient to increasingly severe storms, drought, and wildfires; and bring a wide range of co-benefits to all our communities. This sustained action will also help ensure our country's climate goals are durable and that we continue to make progress and reduce emissions, regardless of who is in power in Congress or the White House.

To guide our work in the years ahead, the Alliance collectively identified eight priority policy areas related to power, buildings, industry, transportation, just transition and equity, resilience, natural and working lands, and the social cost of greenhouse gases. Within each of these priority areas, individual Alliance states committed to more than 40 specific and new high-impact actions that will accelerate GHG emissions reductions and drive the sort of tangible, impactful implementation and results needed to make the U.S. climate targets a reality. These bold new actions include several states committing to: 100 percent net-zero operating emissions for new construction beginning in 2030; 100 percent zero-emissions new light-duty vehicle sales by 2035; implementation of a low-carbon fuel standard to reduce the carbon intensity of fuels; and conserving at least 30 percent of land and coastal waters by 2030.



Photo Credit: Evan Westrup, USCA // Massachusetts Executive Office of Energy and Environmental Affairs Secretary Kathleen Theoharides moderates a discussion at COP26 with Governors Ige, Inslee, and Brown and U.S. EPA Administrator Michael Regan on how the U.S. can secure a net-zero future, safeguard public health, and drive economic growth across multiple industries through a strong, sustained state-federal partnership.

We know the types of actions that are needed to avoid the worst impacts of climate change and adapt to the climate impacts already locked in. While political change is frequent in Washington, D.C., our commitment is unwavering. We will continue to be the stabilizing force across future administrations, working together to develop and adopt the next generation of high-impact bipartisan climate policies, and always aiming for a more equitable, resilient, zero-carbon economy for the American people. The climate crisis knows no borders and when we share solutions and expertise, we can go further and faster together.



HIGHLIGHTING SOLUTIONS across the Alliance

Governor Gavin Newsom visits fuel break project protecting communities in Shaver Lake.

Photo Credit: California Governor's Office

Introduction

In June 2017, the three governors of California, New York, and Washington created the U.S. Climate Alliance (Alliance) to achieve the goals of the Paris Agreement and progress towards the U.S. climate target. The Alliance has since grown together to keep temperature increases below 1.5 degrees Celsius by driving the most ambitious collective state climate agenda in our nation's history and establishing a new partnership with the federal government to go further, faster together. In May 2021, the Alliance welcomed Governor John Bel Edwards and the State of Louisiana to our coalition. We now represent 43 percent of U.S. gross greenhouse gas (GHG) emissions, 56 percent of the U.S. population, and 62 percent of the U.S. gross domestic product (GDP).

REFLECTING ON 2021

Over the past year, our nation has faced and addressed many global challenges. Vaccines were quickly developed and made available to protect human health and address the COVID-19 pandemic. Poverty fell in the United States to 9.1 percent—a record low—after accounting for COVID-19 government aid. As the nation worked to continue the fight against the pandemic and recover economically, the Biden Administration entered office and immediately rejoined the Paris Agreement, bringing the United States back into the global fight against climate change. And importantly, awareness of long-standing environmental justice and equity issues continued to grow.

At the same time, 2020 was the hottest year on record and saw the greatest number of billion-dollar disasters in U.S. history.¹ These trends continued into 2021 as major disasters and atypical weather patterns were felt once again across the country, from Hurricane Ida (which was one of the most destructive hurricanes in U.S. history and led to loss of life and property from Louisiana to the Northeast)² to the Dixie wildfire in California (the largest-ever single wildfire in the state's history).³ In the first installment of its sixth Assessment Report (AR6), the United Nations' Intergovernmental Panel on Climate Change (IPCC) found that the window to avoid further catastrophic conditions is closing and some changes are irreversible, making it clear that the amount of climate change ahead depends on how quickly the world ramps down GHG emissions.⁴

Given this urgency, the Alliance joined the Biden Administration in raising our ambition. In April 2021, we committed to collectively achieve overall net-zero GHG emissions as soon as practicable and no later than 2050 and reduce collective net GHG emissions to at least 50-52 percent below 2005 levels by 2030. And we continued to put into place the policies and programs that will cut climate pollution, increase the resilience of our communities, and advance equity, environmental justice, and a just economic transition. To build our own capacity and accelerate the development and adoption of these measures, we are working together through the Alliance, collaborating with the federal government, engaging experts to share best practices and resources, and challenging each other to deliver more ambition. We've done this while aiming to put equity, environmental justice, and a just economic transition at the center of these efforts.



HIGHLIGHTING SOLUTIONS across the Alliance

Governor Whitmer signs a bill to incentivize residential solar purchases through tax code changes - on a solar array.

Photo Credit: Michigan Governor's Office

Measuring Our Progress

Over the past four years, we have coordinated across state lines to enact ambitious bipartisan climate solutions and leverage our collective market power to transform the U.S. economy, while also backstopping federal rules and fighting off challenges to critical federal policies and regulations. Between 2005 and 2019, Alliance members reduced collective GHG emissions 15 percent below 2005 levels (Figure 1).⁵ The majority of these reductions (81 percent) came from deploying cleaner electricity sources, with progress also made in the transportation and industry sectors. Transportation remains the Alliance's largest source of collective emissions (33 percent), followed by electricity generation and industry (19 percent each), and then building fossil fuel use (15 percent). Natural and working lands (NWL) sequestered roughly 15 percent of our gross emissions.



FIGURE 01 Between 2005 and 2019, Alliance members reduced collective GHG emissions 15 percent below 2005 levels.

U.S. CLIMATE ALLIANCE GHG EMISSIONS AND SINKS BY SECTOR

Source: Rhodium Group Climate Deck. Note: LULUCF = land use, land-use change, and forestry

Preliminary estimates from both Rhodium Group and Energy and Environmental Economics, Inc. (E3) show further GHG emissions reductions across Alliance states in 2020 (19-20 percent below 2005 levels) due to energy demand patterns resulting from COVID-19.6 However, as the economy recovers and grows, investing in clean, resilient infrastructure will advance climate solutions while protecting and creating economic opportunities for our communities. Year after year, Alliance members have proven that economic growth and climate leadership can go hand in hand. From 2005 to 2019, Alliance members cut net GHG emissions faster than the rest of the country (15 percent vs. 12 percent) while continuing to grow our economies (Figures 2 and 3). Between 2016 and 2019, Alliance members created 133,100 clean energy jobs, a rate that outpaced the rest of the nation. At the end of 2019, Alliance members accounted for 55 percent of all U.S. jobs, yet they supported 60 percent of all clean energy jobs across the country.7 By switching to cleaner electricity and more-efficient vehicles, Alliance members have lower levels of harmful local air pollution such as carbon monoxide, nitrous oxide, sulfur dioxide, particulate matter, and volatile organic compounds (Figure 4).



FIGURE 02 Between 2005 and 2019, Alliance members cut their GHG emissions while continuing to grow their economies.

PERCENT CHANGE IN COLLECTIVE GHG EMISSIONS AND GDP FROM 2005 LEVELS



Source: Rhodium Group Climate Deck, U.S. Bureau of Economic Analysis

FIGURE 03 Change in net GHG emissions and economic output, 2005–2019



COMPARED TO THE REST OF THE UNITED STATES, ALLIANCE MEMBERS HAD LARGER REDUCTIONS IN GHG EMISSIONS AND GREATER PER CAPITA ECONOMIC OUTPUT

Source Emissions Data - Rhodium Group Climate Service, GDP data - U.S. Bureau of Economic Analysis Population data - U.S. Census Bureau

FIGURE 04 Alliance members have lower levels of harmful air pollutants than the rest of the country (2019)

EMISSIONS OF HARMFUL AIR POLLUTANTS IN ALLIANCE VS. NON-ALLIANCE STATES



Source: U.S. Environmental Protection Agency, Air Pollutant Emissions Trends Data



Photo Credit: Capital Dynamics 250 MW Moapa Southern Paiute Solar Project // The Moapa Southern Paiute Solar Project is a 250-megawatt (MW) alternative current solar array located on roughly 2,000 acres of the Moapa River Indian Reservation in Clark County, Nevada. The project is the first large-scale solar project to receive construction approval on a tribal land in North America.

ACHIEVING OUR COLLECTIVE AMBITION

While we have made progress in cutting our GHG emissions to date, more work needs to be done to put us on a pathway consistent with what science says is needed to avoid catastrophic climate change. To understand the largest opportunities for Alliance members to work together and with the federal government to achieve our collective climate goals, the Alliance commissioned independent analysis from E3. This analysis assesses where our collective GHG emissions are headed through 2050 under four scenarios (specific assumptions can be found in Appendix 1):

- Reference Case: Includes existing and final statutory/regulatory measures in Alliance members as of July 1, 2021, but no new policies.
- 2. **Federal Action:** Builds on the Reference Case and incorporates proposed and likely federal actions, such as those signaled in the American Jobs Plan and other executive actions.
- Collective Action: Further builds on the Federal Action scenario and assumes Alliance members and/or the federal government take a suite of actions to achieve emissions reductions of 50–52 percent below 2005 levels by 2030 and net-zero GHG emissions by 2050.
- 4. **Existing GHG Targets:** Builds on the Reference Case and assumes Alliance members achieve their individual GHG emissions-reduction goals.

KEY TAKEAWAYS

E3's analysis shows that Alliance members, working in coordination with the federal government, can meet our collective emissions-reduction goals of overall net-zero GHG emissions as soon as practicable and no later than 2050, and reduce collective net GHG emissions to at least 50–52 percent below 2005 levels by 2030. According to E3's analysis, if all Alliance members put into place policies and programs to meet their individual GHG targets, Alliance members would collectively reduce their emissions by 43 percent below 2005 levels by 2030 and 84 percent by 2050, putting our climate goals within reach. With additional actions by the executive branch and Congress, E3's analysis shows that there is a pathway to achieve these ambitious goals.



Photo Credit: New Jersey Governor's Office // As part of its Electric Vehicle Charging Grant Program, New Jersey's Department of Environmental Program helped support the deployment of 10 zero-emission battery-electric yard tractors at the Red Hook Container Terminal.

FIGURE 05 Existing state climate policies will continue to drive collective Alliance emissions down through 2030, but additional actions are needed to meet our climate goals.

GHG EMISSIONS IN THE REFERENCE CASE SCENARIO COMPARED TO THE 2005 BASELINE



Note: COVID-19 impacts on emissions assessed using historical and projected monthly energy consumption data from EIA Short-Term Energy Outlook

RESULTS IN DETAIL

The Reference Case shows that policies that Alliance members already have in place will drive down our collective GHG emissions to 23 percent below 2005 levels by 2025 and 27 percent by 2030 (Figure 5). While this result falls short of our collective 2030 goal, this scenario does not capture proposed regulations, actions directed through executive orders, or recommendations from climate action or clean energy plans that states are still developing and would help drive GHG emissions down further. While Alliance members have been making significant progress, more work is clearly needed to achieve our GHG reduction targets. More durable policies and programs need to be established and states need to collectively overcome a variety of challenges, including public education and awareness and limited funding and staff capacity. Support and additional leadership from the federal government will also be needed, and recent actions being considered by the U.S. Environmental Protection Agency (EPA), Department of Energy (DOE), and Congress as of August 2021 are a good start. E3's analysis finds that these proposed federal regulations and programs can build on existing state actions and drive our collective emissions down to 35 percent below 2005 levels by 2030 and 42 percent by 2050 (Figure 6). In the near-term, the most impactful federal actions are policies that support generating 80 percent of electricity from zero-carbon energy sources by 2030, which enables further reductions from building and vehicle electrification. These actions would build on the leading renewable and clean energy standards that many Alliance members already have in place and whose associated GHG emissions reductions are embedded in the Reference Case. Cost-effective electrification in buildings and passenger vehicles due to tax credit extensions, like those being considered in the Build Back Better plan, leads to the greatest reductions by 2050.

NOTE: This scenario represents congressional and agency actions that were being considered as of August 2021, and does not include final provisions included in the signed Infrastructure Investment and Jobs Act,[®] nor does it include the Global Methane Pledge, which the United States announced in September 2021 with the European Union. Countries that join this pledge commit to a collective goal of reducing global methane emissions by at least 30 percent from 2020 levels by 2030.[®] See Appendix 1 for additional details.

Actions like the ones being considered by Congress and various agencies in the federal government will be critical to help Alliance members meet our individual and collective climate goals. Alliance members can help backstop some of these actions, depending on the details of what ultimately gets passed or finalized. Regardless, both states and the federal government





GHG EMISSIONS IN THE FEDERAL ACTION SCENARIO COMPARED TO THE 2005 BASELINE

will need to continue working to make our 2030 and 2050 GHG emissions-reduction targets a reality. E3's analysis maps out one possible pathway that Alliance members can take to fill the remaining emissions gap (Figure 7). This pathway relies on collective action taken by the states and the federal government to:

- Transition to zero-carbon energy sources to generate electricity;
- Increase the efficiency of our buildings, cars, trucks, and industries while using electricity and low-carbon fuels to power remaining demand;

- Address high global warming potential (GWP) refrigerant leaks;
- Reduce methane leaks from oil and natural gas systems, agriculture, and waste sources (e.g., landfills);
- Enhance our natural and working lands (NWL) to sequester an increasing amount of GHG emissions;
- Deploy carbon capture technology on appropriate systems and processes (e.g., cement production); and

FIGURE 07 Pathway to Net Zero: Achieving the Alliance's 2030 and 2050 climate goals will require collective actions across the economy.



GHG EMISSIONS IN THE COLLECTIVE ACTION SCENARIO COMPARED TO THE 2005 BASELINE

 Invest in research and development to identify additional measures to help fill in the remaining gap through 2050, such as expanding the role of NWL even further, accelerating the adoption of carbon-free technologies, or deploying direct air capture and other negative-emissions technologies.

Alliance members have already set their own ambitious GHG emissions-reduction goals that go beyond existing policies embedded in the Reference Case. E3's analysis suggests that if all Alliance members put into place policies and programs to meet their individual GHG targets, they would collectively reduce their emissions to 43 percent below 2005 levels by 2030 and 84 percent by 2050, placing our climate goals within reach (Figure 8).



FIGURE 08 Achieving individual state GHG targets will put the Alliance's climate goals within reach.

GHG EMISSIONS IN THE EXISTING GHG TARGETS SCENARIO COMPARED TO THE REFERENCE CASE, FEDERAL CASE, AND COLLECTIVE ACTION SCENARIOS, AND THE 2005 BASELINE



E3's analysis illustrates just one pathway towards meeting our collective GHG emissions-reduction targets. Many other pathways exist. However, a large amount of uncertainty remains, especially around the sequestration capacity of NWL management, new developments in technology, fuel costs, and consumer behavior, particularly as we look towards 2050. For example, recent studies estimate that in 2050, NWL could sequester on a net basis 300-400 million metric tons of CO₂e (MMtCO₂e) across the United States on the low end, up to 1,000+ MMtCO₂e (for reference, our Collective Action scenario assumes that 850 MMtCO_ae is sequestered on a net basis in 2050, with 475 MMtCO₂e sequestered across Alliance members).¹⁰ Given the large role that NWL must play in meeting both collective and individual state climate goals, more robust analysis is needed to better understand existing carbon sinks and help states design better policies to increase sequestration from NWL.

The federal government must also play a clear and important role in expanding the market for all clean energy and low-emissions technologies. This includes using existing policy frameworks to go further, such





Photo Credit: New Jersey Governor's Office // Healthy Atlantic White Cedar Forest.

as setting more-ambitious emissions and efficiency standards for appliances, cars, and trucks. It also includes providing national direction where sectors expand beyond state borders or where states have limited influence or ability to act, such as in electricity transmission, aviation, and agriculture. In some industries, such as offshore wind, direct action by the federal government is required to promulgate rules and guidelines that govern the permitting and operation of facilities. Targeted investment in research, development, and deployment will also be needed to help drive down costs and ensure that a full suite of technology options is available. By ensuring the largest possible market for manufacturers and technology developers to respond to, the federal government can help reduce the costs associated with achieving a climate-aligned pathway to achieve net-zero GHG emissions across the entire country.



HIGHLIGHTING SOLUTIONS across the Alliance

New Jersey Governor Phil Murphy, Senator Cory Booker, and President Joe Biden survey damage following historic rain and flooding caused by the remnants of Hurricane Ida.

Forging a New Kind of State-Federal Partnership

Together, Alliance members have built a foundation of ambitious climate action that provides a durable roadmap for national policy makers and the federal administration. The Alliance is also forging a new state-federal partnership and will continue to play an integral role in helping the United States achieve the goals of the Paris Agreement and advance a clean energy transition while supporting impacted workers and communities.¹¹

The U.S. Nationally Determined Contribution (NDC), which outlines and communicates post-2020 climate actions to other parties of the Paris Agreement, enshrines this new kind of state-federal partnership and the historic role of states in keeping climate leadership alive in the United States through differing federal administrations by acknowledging the importance of "building upon and benefiting from a long history of leadership on climate ambition and innovation from state, local, and tribal governments."¹²

With our new collective GHG emissions targets aligned with this NDC, Alliance members will continue to bolster climate leadership under this, and future, administrations.

We applaud the climate leadership that the Biden Administration has already shown in its first ten months in office, including: rejoining the Paris Agreement on day one and setting a new NDC; reconvening the Interagency Working Group on Social Cost of Greenhouse Gases; pushing forward Atlantic and Pacific offshore wind permitting; establishing the Justice40 initiative; announcing the Global Methane Pledge; and proposing new fuel economy and GHG emissions standards for light-duty vehicles. However, as E3's analysis shows, ambitious action is needed to address emissions sources across the economy. The federal government can continue to look to the states for policies and actions that can be scaled nationally to safeguard public health, protect the environment, drive down emissions, grow the U.S. economy, and create good community- and family-sustaining jobs (Box 1).

// BOX 1

Scaling State Actions

The federal government has already built upon a foundation of state leadership to move the country towards achieving the goals of the Paris Agreement. Across the suite of proposed and finalized federal climate actions in the past year, many can trace their roots to actions Alliance members have pioneered. For example:



FEDERAL ACTION: Congress enacted the American Innovation and Manufacturing Act (AIM Act) in December 2020, which provides for a nationally coordinated phase down of HFCs.¹³

FOUNDATIONAL STATE ACTION: Through collaborative work in the Alliance, 16 members had adopted or were working to adopt policies to phase out HFCs in their states when the AIM Act was enacted.



FEDERAL ACTION: President Biden signed an executive order that calls for the establishment of a national civilian climate corps program.¹⁴

FOUNDATIONAL STATE ACTION:

California,¹⁵ Colorado,¹⁶ and Maine¹⁷ had already taken steps to establish the first statewide civilian climate corps when the federal executive order was signed.



FEDERAL ACTION: President Biden signed an executive order that sets a national 50 percent zero-emissions vehicle (ZEV) sales goal for 2030 and calls for the development of clean car standards for model years 2027 and beyond.¹⁸ The federal government has begun a rulemaking to strengthen vehicle standards for model years 2024–2026.¹⁹

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Foundational state action: 18 Alliance members are adopting lowemissions vehicle (LEV) standards; 17 are adopting ZEV standards. In addition, California,²⁰ New Jersey,²¹ New York,²² Oregon, and Washington²³ are adopting clean trucks regulations; California,²⁴ Oregon,²⁵ and Washington²⁶ are adopting low-carbon fuel standards; and both California²⁷ and New York²⁸ have adopted 100 percent ZEV sales goals by 2035.

® & GREEN BANKS

FEDERAL ACTION: The Biden

Administration's American Jobs Plan proposed the establishment of a clean energy and sustainability accelerator, a national version of the green bank model pioneered by states.²⁹

FOUNDATIONAL STATE ACTION: 15 Alliance members are operating or developing green banks that finance clean energy, efficiency, and resilient infrastructure.³⁰

CONSERVATION GOALS

FEDERAL ACTION: President Biden signed an executive order that calls for the establishment of a goal to conserve 30 percent of U.S. lands or waters by 2030—also known as a 30x30 goal.³⁹

FOUNDATIONAL STATE ACTION: California,⁴⁰ Hawaii,⁴¹ and Maine⁴² had adopted or proposed adopting statewide 30x30 goals when the federal executive order was signed. New Mexico, Louisiana, Michigan, Oregon, and Washington have adopted 30x30 goals since.⁴³

Sesilient Se

FEDERAL ACTION: President Biden signed executive orders that directed federal agencies to develop action plans that bolster their facilities' resilience to climate change³¹ and reinstated the Federal Flood Risk Management Standard, which incorporates climate knowledge into federal floodplain management.³²

FOUNDATIONAL STATE ACTION: States including California,³³ Connecticut,³⁴ Hawaii,³⁵ Maine,³⁶ Massachusetts,³⁷ and New York³⁸ have issued executive orders, legislation, plans, and tools that establish guidelines and goals to boost resilience and account for climate hazards in state-owned assets and state-funded projects.

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Senvironmental JUSTICE INVESTMENTS

FEDERAL ACTION: President Biden signed an executive order that created the Justice40 Initiative, which tasked the administration with developing recommendations to ensure 40 percent of federal investments flow to disadvantaged communities.⁴⁴

FOUNDATIONAL STATE ACTION: Through statutory requirement, both California⁴⁵ and New York⁴⁶ require that 35–40 percent of the benefits of state climate investments flow to disadvantaged communities and low-income households or communities. Washington's Climate Commitment Act requires that auction proceeds dedicate a minimum of 35 percent of funds toward overburdened communities and a minimum of 10 percent toward tribal projects.⁴⁷ Illinois requires that 40 percent of utilities' spending on transportation electrification be dedicated toward charging equipment in environmental justice and low-income areas while Colorado has committed to spending 25 percent of energy efficiency and demand-side management funding to income-qualified households.

Going forward, collaboration and engagement will allow states to prioritize their actions in response to known federal action and harmonize policies and practices to ensure effective policy implementation and to move markets. For example, Box 2 details how the Alliance shared best practices and lessons learned with the federal government to ensure that its new land conservation targets are achievable. Collaboration will be especially important to address sectors where emissions reductions are most difficult or solutions are still being tested and deployed.

E3's analysis suggests that state action to achieve individual GHG targets (43 percent below 2005 levels by 2030 and 84 percent by 2050) would get the Alliance close to the reductions necessary to limit warming to 1.5 degrees, even without additional action or support from the federal government. However, while we are committed to meeting our individual and collective climate goals, we also acknowledge we cannot do this alone and federal action is needed to meet or exceed these goals on time. Our members all face a wide range of political, financial, and technological barriers that the federal government must help address. The nation needs the federal government to take big, bold action to establish and support markets for zero-carbon technologies at a national scale. This includes near-term priorities such decarbonizing the power sector, extending and enhancing consumer and technology tax credits, investing in critical infrastructure and technology development, plugging improperly abandoned oil and gas wells, and finalizing the proposed light-duty vehicle GHG and fuel economy standards, while expeditiously developing new fuel economy and other efficiency standards to drive the transition to zero-carbon technology.

Working together, we can better understand how states and territories can complement and accelerate federal actions, as well as opportunities for states to effectively implement federal policies in local contexts. We look forward to continuing to support and collaborate with the current—and future—federal administration to implement, reinforce, and enhance the durability of ambitious state and federal climate actions and help ensure the country builds back better.

// BOX 2

Sharing State Best Practices to Achieve National Land Conservation Targets

In April 2021, the U.S. Department of Agriculture, the Department of Interior, and the Council on Environmental Quality asked the U.S. Climate Alliance for recommendations to support the federal 30x30 effort to be achievable; well-coordinated with state priorities, goals, and leadership; and a key pillar of a federal climate strategy. The Alliance identified three priority actions based on state experience that the federal government drew on for its report on 30x30 to the National Climate Task Force⁴⁸ (see below).

Priority 1. Ensure early and sustained collaboration with states.

Priority 2. Balance multiple conservation goals and objectives, including land conservation, equitable access, and climate goals.

Priority 3. Develop clear and flexible definitions for "conservation" and "conserved" and establish durable management practices to achieve resilient land conservation.

The Alliance also shared best practices from its member states and proposed a sustained dialogue with states to deepen collaboration on state and federal 30x30 efforts.



HIGHLIGHTING SOLUTIONS across the Alliance

Solar plus storage project in Clark County, Nevada.

Photo Credit: Boulder Solar Power LLC

Delivering on Our Climate Commitments

As the federal government builds a new federal floor to increase national ambition, Alliance members will continue to implement the next generation of bipartisan climate actions so that the federal government can scale them up when feasible. In the past year, Alliance members moved aggressively on all fronts, across all sectors. These actions will reduce GHG emissions and contribute to our collective climate goals, help make our communities more resilient, and enable a just and equitable transition to a clean energy economy for all. Below are a few illustrative examples of the many climate actions our members took over the last year.

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DELIVERING ON OUR CLIMATE COMMITMENTS

Adopting Strengthened GHG Targets and Advancing Climate Governance



Over the past year, a number of Alliance members committed to more-ambitious GHG emissions-reduction targets within their own states that set a North Star towards deep GHG emissions reductions no later than 2050.

For example, **New York** finalized rules that set limits on economy-wide GHG emissions of 40 percent below 1990 levels by 2030 and at least 85 percent by 2050, measured using a 20-year global warming potential (GWP), adding further ambition to New York's reduction requirements.⁴⁹ Both **Massachusetts**⁵⁰ and **Rhode Island**⁵¹ adopted new laws that set statewide commitments to reduce GHG emissions to net zero by 2050. **Virginia** enshrined a goal in statute to reach net-zero emissions by 2045 across all major sectors.⁵² **Michigan** Governor Gretchen Whitmer signed a pair of executive orders to create the *MI Healthy Climate Plan*, which formally sets the goal of economic decarbonization by 2050.⁵³ **New Jersey** Governor Phil Murphy signed an executive order that establishes an interim GHG reduction target of 50 percent below 2006 levels by 2030, strengthening the state's path to achieve an 80 percent reduction in GHG emissions by 2050. Finally, **California** Governor Gavin Newsom directed state agencies in July 2021 to evaluate pathways to carbon neutrality by 2035 in advance of the state's 2045 target.⁵⁴

Climate Actions and Counts

- 24 Lead by Example programs and goals
- 22 Economy-wide GHG goals
- 20 State climate action plans
- 13 Net-zero GHG goals

See Box 10, page 76 for more details.

Identifying policy priorities

Alliance members continued to devise different strategies to achieve similar climate goals, each accounting for local context. They worked with stakeholders through councils and task forces, analyzed different pathways towards achieving their GHG targets, and developed action plans and roadmaps that outline the policies and programs they should consider putting into place in the years ahead. Examples include:

Colorado: Colorado released its Greenhouse *Gas Pollution Reduction Roadmap*, which represents the most action-oriented, ambitious and substantive planning process that Colorado has ever undertaken on climate leadership, pollution reduction, and a clean energy transition.

Connecticut: The Governor's Council on Climate Change released its Phase 1 report, which included 61 near-term strategies to mitigate carbon emissions and address adaptation and resilience, all through an equity lens.⁵⁵

Delaware: Delaware's first comprehensive *Climate Action Plan*, released in November 2021, provides a roadmap to meet current climate goals, sets a course for decades ahead, and integrates actions for both minimizing GHG emissions and maximizing resilience to climate change impacts.⁵⁶

Massachusetts: The Executive Office of Energy and Environmental Affairs released the Commonwealth's interim *Massachusetts Clean Energy and Climate Plan for 2030*,⁵⁷ which provides details on the actions the state will undertake through this next decade to ensure its 2030 emissions limit is met, as well as its 2050 decarbonization roadmap.⁵⁸

Minnesota: The Climate Subcabinet launched a process to engage all Minnesotans to develop a *Climate Action Framework* for the state. The Framework builds off the significant climate successes adopted in the summer of 2021, and identifies near-term actions needed to accelerate progress in reducing emissions and building resiliency in Minnesota. The *Climate Action Framework* is scheduled to be completed in mid-2022. **New Mexico:** The Climate Change Task Force released its second annual report, laying out its 2021 roadmap, which includes adopting clean vehicle standards, adopting rules to phase out hydrofluorocarbons, adopting rules that decrease emissions from oil and gas, and completing a grid modernization roadmap.⁵⁹

Pennsylvania: The Department of Environmental Protection (DEP) released its 2021 *Climate Action Plan,* which identifies 18 strategies—in electricity generation, transportation, agriculture, fuel supply, and residential and commercial buildings—to achieve Pennsylvania's GHG reduction goals: 26 percent below 2005 levels by 2025 and 80 percent by 2050.⁶⁰

Washington: The *2021 State Energy Strategy* offers a 30-year roadmap on steps the state needs to take to nearly eliminate the use of climate-threatening fossil fuels in Washington while incorporating principles of equity and environmental justice and continuing to maintain and grow a prosperous economy. The strategy identifies dozens of recommended actions the state must take to meet its climate goals across seven sectors.⁶¹

Wisconsin: The Climate Change Task Force released its report, recommending 55 policy solutions across nine sectors to mitigate and adapt to climate change while seeking environmental justice and economic opportunity.⁶²

Measuring progress

Alliance members have made conscious efforts to not only highlight their successes, but also learn from their climate policy shortcomings. Examples include:

Maryland: The Commission on Climate Change's 2020 annual report emphasized the state's accomplishment of leading the nation in GHG reductions, yet also underscored needed improvements to enhance equity and inclusivity.⁶³

Minnesota: The 2021 biennial emissions report from the Pollution Control Agency and Department of Commerce assessed the state's progress in meeting the emission reduction goals created in 2007. The report showed that only the electric generation sector was achieving reductions on track with the state's 2007 goal. The report showed that significant increases were coming from the use of fossil fuel use in the industrial, residential, and commercial sectors.

New Jersey: The Department of Environmental Protection's Global Warming Response Act 80x50 report assessed the state's progress in meeting the 2006 legislative mandate to reduce emissions 80 percent by 2050, and analysis showed that new initiatives are needed to reduce emissions and sequester carbon through natural lands management practices.⁶⁴

Virginia: Passed legislation to help track progress toward its climate goals by directing its Department of Environmental Quality to create a GHG inventory.⁶⁵

Leading by example

In order to walk the talk, many Alliance members established, or are looking to launch, leading-byexample (LBE) and government sustainability programs. These programs not only demonstrate leadership within state government, but can also reduce GHG emissions; increase renewable and on-site energy generation, energy efficiency improvements, and cleaner transportation options; increase resilience of state facilities; and more. Examples include:

Hawaii: Enacted legislation that establishes goals for state agency fleets to transition to 100 percent zero-emission light-duty motor vehicles by 2035.

Illinois: Governor Pritzker signed an Executive Order that established a state fleet working group, which will begin efforts to reduce emissions from the transportation sector by establishing a plan to finance the purchase of low-emission and zero-emission vehicles for Illinois state use.

Maine: Released its first LBE report, which outlines strategies to curb state agencies' GHG emissions, transition state electricity use to 100 percent clean power by 2024, and purchase 100 percent electric vehicles (EVs) for the state fleet by 2030.⁶⁶

Massachusetts: Governor Charlie Baker issued an executive order that requires all state fleets to buy zero-emissions vehicles (ZEVs) starting in 2022, to double the amount of EV chargers installed at state facilities by 2030, and to prioritize LBE activities in facilities located in environmental justice communities.⁶⁷

New York: Released the ninth *Greening New York State* report, covering FY 19–20, which found that the state government's ZEV fleet drove 4.4 million miles and spent a record \$212 million on green products and services.⁶⁸

Pennsylvania: Released its *2020 GreenGov Annual Report*, which found that Commonwealth facilities achieved a 6.2 percent normalized energy reduction from the previous year, with actual cost savings of over \$6.5 million and a 40 percent offset of the state's total electricity load for the year with renewable energy credits (RECs).⁶⁹

Washington: In 2021, the State Efficiency and Environmental Performance (SEEP) Office launched \$4,406,315 in State Project Improvement (SPI) grants to fund state agencies to redesign building projects in order to increase energy efficiency and environmental performance.⁷⁰



DELIVERING ON OUR CLIMATE COMMITMENTS

Ensuring a Just & Equitable Transition



Health, environmental, and economic crises disproportionately impact overburdened communities and can displace workers. Alliance members have committed to center equity, environmental justice, and a just economic transition in efforts to achieve their climate goals.

Establishing new governance structures

Over the past year, many Alliance members established new governance structures to develop and implement strategies for a just and equitable transition. Examples include:

Climate Actions and Counts

- 17 Environmental justice offices or interagency bodies
- 15 Environmental justice screening and policy tools
- 06 Just transition offices or interagency bodies

See Box 10, page 72 for more details. **Minnesota:** Established an Energy Transition Office at the Department of Employment and Economic Development to assist communities and workers in areas with retiring electric generation facilities.⁷¹

New Jersey: Governor Phil Murphy signed an executive order that established the Office of Climate Action and the Green Economy to convene a council of representatives from government, business, organized labor, and environmental justice communities to develop a comprehensive and coordinated green economy strategy.⁷²

New Mexico: Established a Sustainable Economy Task Force, which is charged with developing a strategic plan to diversify the state's economy and replace jobs and tax revenue from natural resource extraction industries, like oil and gas production.⁷³

Integrating equity and justice across government

Some members also took steps to fully integrate principles of equity and environmental justice across state government. Examples include:

Nevada: Enacted legislation to require each agency to collaborate with minority groups to ensure agency policies and programs are accessible and inclusive, including adding information about programs in multiple languages where possible.⁷⁴ Agencies are also required to designate a diversity and inclusion liaison for support in that collaboration with minority communities.

New Jersey: The Department of Environmental Protection issued guidance to executive departments and agencies to "apply the principles of environmental justice to their operations, participate in the newly-formed Environmental Justice Inter-Agency Council, and create assessments and action plans to improve the agencies' effects on environmental justice communities."⁷⁵

Virginia: Became the first state to produce a strategic plan to institutionalize equity across state government with Governor Northam's *ONE Virginia* plan.⁷⁶

Washington: Enacted the *Healthy Environment for All (HEAL) Act,* which requires major state departments to comply with several environmental justice-related mandates, including adopting a community engagement plan by July 2022, integrating environmental justice into their strategic plans by January 2023, and conducting environmental justice assessments when considering "significant agency actions."⁷⁷ An early adopter of the *HEAL Act* concepts, the *2021 State Energy Strategy* included a focus on equity and environmental justice developed by the Environmental Justice Task Force.⁷⁸ Centering equity and justice in new policies Alliance members enacted multiple new policies to improve outcomes for overburdened communities:

Colorado: Passed legislation to enhance Colorado's work on environmental justice by creating the Environmental Justice Action Task Force within the Colorado Department of Public Health and Environment (CDPHE), an ombuds position at CDPHE to serve as an advocate for disproportionately impacted communities, and a Community Impact Cash Fund to provide grants for environmental mitigation projects in impacted communities.⁷⁹

Illinois: Enacted legislation that creates an energy transition assistance fund, a displaced worker bill of rights, and internal and external advisory councils to make recommendations on transition programs.

New Jersey: Became the first state to mandate facility permit denials based on a facility's impact (e.g., power plants, waste processing and recycling facilities, and landfills) to environmental justice communities.⁸⁰

New York: Announced the largest statewide community air monitoring effort ever undertaken in the United States.⁸¹ The program will identify 10 disadvantaged communities to deploy hyperlocal air monitoring technology to collect air quality data on GHG emissions and other co-pollutants that affect public health. To ensure robust community participation in the program, capacity-building grants will be made available to improve the ability of community groups working on the ground in these areas to contribute to the development and operation of air quality monitoring networks across the state.

Oregon: Proposed a new program that sets limits on GHG emissions from significant sources—including large stationary sources, transportation fuels, and other liquid and gaseous fuels—while also prioritizing equity by promoting benefits and alleviating burdens for environmental justice and impacted communities.⁸²
Rhode Island: Directed the state's Executive Climate Change Coordinating Council to address environmental justice populations and identify opportunities to create an equitable transition in its submitted emissions-reductions plans to the state.⁸³

Training the next generation of clean energy workers

There are significant opportunities for clean energy job and technical training across the United States (Box 3) and Alliance members have enacted new policies and program to educate, train, and prepare a new generation of clean energy workers in their states:

Colorado: Created a workforce development program related to solar and renewable energy careers in the state's labor department.⁸⁴

Illinois: Governor Pritzker announced a \$15 million investment in advanced manufacturing academies, including a \$7.5 million grant to create an Advanced Manufacturing Center that prepares students for jobs in industrial electricity, precision machining, and welding manufacturing, and a \$7.5 million grant to create a first-of-its-kind EV manufacturing training program.⁸⁵ Illinois' new clean energy law invests over \$100 million annually in multiple new workforce development programs to prepare workers for the transition to a clean energy economy.

New Mexico: Supported by a recent grant award from the U.S. Department of Energy, New Mexico's Energy, Minerals and Natural Resources Department is partnering with four community colleges with established and successful building trades programs to develop and deliver skills training, continuing education, and certification programs for construction industry professionals who will build highly energy-efficient and energy-flexible infrastructure. The programs will establish a pipeline for New Mexicans to locally receive training for local clean energy careers.

New York: Created climate justice and environmental justice fellowships to support individuals residing in disadvantaged communities or from priority populations to gain experience working in clean energy or climate justice to ensure an equitable clean energy transition for all New Yorkers.⁸⁶

North Carolina: The Governor's Office, in partnership with the North Carolina Business Committee on Education, established clean energy youth apprenticeship programs at multiple learning institutions to provide skills training, establish business relationships, and kick-start clean energy careers.⁸⁷

Virginia: Established its first offshore and onshore wind workforce training collaborative, the Mid-Atlantic Wind Training Alliance, which will offer industry-required certifications on the operations and long-term maintenance of wind projects.⁸⁸

// BOX 3

The Alliance's 2020 Clean Energy Employment Report

The Alliance's 2020 Jobs in the Clean Energy Economy report illustrated the relationship between state job growth and ambitious climate policy.⁸⁹ As Alliance members pursued bold climate action from 2016 to 2019, we created more than 133,000 new clean energy jobs-outpacing the rest of the nation. However, employers in Alliance states reported that they had significant difficulty finding qualified workers to fill open clean energy positions.⁹⁰ This highlights that there are still significant opportunities for job and technical training across the United States as we build back the economy. These positions offer workers significant advantages and the report found that many clean energy jobs in the Alliance states provided above-average wages and employment benefits.

Cleaning and Modernizing Our Power Grids



Alliance members have cut the GHG emissions associated with generating electricity by nearly 40 percent during the period 2005–2019,⁹¹ largely from using less coal and more natural gas and renewable energy sources (Figure 9).⁹² In 2019, Alliance members' electricity generation mix used 50 percent less coal and 50 percent more zero-carbon sources than non-Alliance states. This sector remains the second-largest source of GHG emissions across the Alliance. As such, Alliance members have continued to deploy more zero-carbon energy sources and build out the necessary transmission while ensuring that the transition to clean energy brings benefits to all communities.

Climate Actions and Counts

22 Renewable portfolio standards 19 100% clean electricity goals

See Box 10, page 68 for more details.

FIGURE 09 Between 2005 and 2019, Alliance states significantly reduced their use of coal to generate electricity.



ELECTRICITY GENERATION MIX IN ALLIANCE STATES BY YEAR

Source: U.S. Energy Information Administration

Deploying more clean energy

Over the past year, Alliance members took actions that will expand use of clean energy and decarbonize their power sector; others developed plans on how to achieve their existing clean energy goals. Examples include:

Colorado: Passed legislation requiring its utilities to develop clean energy plans that will reduce GHG emissions at least 48 percent below 2005 levels by 2025 and 80 percent by 2030.⁹³

Connecticut: The Department of Energy and Environmental Protection (DEEP) released its latest integrated resource plan (IRP), which for the first time maps out pathways the state can take to achieve a 100 percent zero-carbon electric sector by 2040.⁹⁴

Delaware: Raised its renewable portfolio standard (RPS) to 40 percent by 2035.⁹⁵

Hawaii: Governor Ige issued *Executive Order* 21-01, establishing the Powering Past Coal Task Force to convene stakeholders to track and coordinate the progress of the projects and measures approved the Hawaii Public Utilities Commission (PUC) that are intended to replace the electricity and grid stability currently provided by Hawaii's last coal-fired power plant.

Illinois: Governor Pritzker signed legislation to target 100 percent carbon-free electricity by 2045—the first state in the Midwest to adopt such a bold target. This bill also invests in training a diverse workforce for the jobs of the future, institutes key ratepayer and residential customer protections, and prioritizes meaningful ethics and transparency reforms.⁹⁶

New York: Updated its clean energy standard (CES) to increase the penetration of renewable

energy into New York City, which is particularly dependent on polluting fossil-fueled generation.⁹⁷ Additionally, the New York State Department of Environmental Conservation (DEC) denied facility permits for two new fossil-fueled power plants based on a determination that the projects would be inconsistent with or would interfere with the statewide GHG emissions limits established in the *Climate Leadership and Community Protection Act.*⁹⁸

North Carolina: Governor Cooper signed bipartisan energy legislation that requires the North Carolina Utilities Commission to take all reasonable steps to provide a 70 percent reduction in power sector carbon emissions by 2030 and achieve carbon neutrality by 2050 at the least cost. It also requires the development of a carbon plan by December 31, 2022, to achieve the reduction goals.⁹⁹

Oregon: Set the most-aggressive timeline in the country for moving to 100 percent clean electricity sources by requiring utilities to reduce the GHG emissions intensity of the electricity delivered to end-use customers by 80 percent by 2030 and 100 percent by 2040.¹⁰⁰

Alliance members have made several of their own large solicitations and commitments for new clean energy to create good-paying jobs, expand their economies, and combat climate change. Examples include:

Maine: The Public Utilities Commission announced the largest procurement of renewable energy in Maine's history—17 projects totaling 546 megawatts (MW) of renewables; 482 MW were solar; the balance was wind, hydro, and biomass.¹⁰¹

Michigan: Governor Whitmer announced that state-owned facilities would utilize 100 percent renewable energy by 2025.¹⁰²

Pennsylvania: Governor Wolf announced the largest government commitment to solar in the United States with a new clean energy initiative that will produce nearly 50 percent of the government's electricity through seven new solar PV arrays, totaling 191 MW.¹⁰³

Bringing clean energy benefits to all communities

Transitioning to clean energy can bring good-paying jobs, cleaner air, and lower energy bills, and Alliance members are designing policies that ensure the clean energy transition brings these benefits to communities across their states. Examples include:

Delaware: Passed legislation to support community solar energy projects and remove barriers for implementing community solar projects.¹⁰⁴ It also requires that each system serve at least 15 percent low-income customers, expanding access to affordable clean energy.

New Mexico: Passed legislation to establish a new community solar program that will allow utility customers to access solar energy with a requirement that 30 percent of output go to lowincome customers or service organizations.¹⁰⁵

New Jersey: Completed its first community solar project as part of the state's Community Solar Energy Pilot Program, which ensures underserved and overburdened communities can access the health and financial benefits of renewable energy.¹⁰⁶

Virginia: Encourages locally sourced clean energy project materials by setting procurement preferences for utilities to purchase materials made in Virginia or the United States for certain onshore wind, solar, and storage projects.¹⁰⁷

Modernizing power grids and markets

To meet state clean energy goals, renewable energy capacity siting and transmission system expansion need to accelerate over the next decade. To facilitate the rapid planning and investment that is needed, while also protecting valuable natural and working lands, states are undertaking a number of different approaches. Examples include:

Maine: The Department of Agriculture, Conservation and Forestry (DACF) and the Governor's Energy Office (GEO) are convening a stakeholder group to examine the impact of solar energy development on agricultural lands and develop a set of recommendations to protect Maine's agricultural and other natural resources while ensuring continued solar energy development to support the state's climate and clean energy goals.¹⁰⁸

New Jersey: The New Jersey Board of Public Utilities (BPU) issued a first-of-its-kind competitive transmission solicitation process in an effort to incorporate the state's offshore wind goals into the regional transmission planning process.

New York: Finalized regulations that aim to improve and streamline the process for environmentallyresponsible and cost-effective siting of large-scale renewable energy projects across the state while delivering significant benefits to local communities.¹⁰⁹

Nevada and Colorado: Nevada Governor Sisolak and Colorado Governor Polis both signed legislation requiring transmission-owning utilities in their states to join a regional transmission organization by 2030, along with other policies intended to accelerate the build-out of transmission.¹¹⁰

North Carolina: Governor Cooper signed bipartisan energy legislation that requires the North Carolina Utilities Commission to develop a carbon plan with the electric public utilities and including stakeholder input, for achieving power sector carbon reduction goals. The carbon plan will be reviewed biannually and take a critical look at the entire energy system. The plan may consider power generation, transmission and distribution, grid modernization, storage, energy efficiency measures, demand-side management, and the latest technological breakthroughs.

Investing in offshore wind

Alliance governors are working with the federal administration and together across state lines to accelerate the development of the offshore wind industry. Examples include:

California: Entered into an agreement with the U.S. Department of the Interior to open the West Coast for offshore wind development for the first time in history.¹¹¹

Maryland, North Carolina, and Virginia: Entered a memorandum of understanding that creates the Southeast and Mid-Atlantic Regional Transformative Partnership for Offshore Wind Energy Resources (SMART-POWER).¹¹² This collaboration provides a framework for the three states to cooperatively promote, develop, and expand offshore wind energy and the accompanying industry supply chain and workforce.¹¹³

New York: Is actively developing five offshore wind projects—the largest offshore wind pipeline in the nation—totaling more than 4.3 gigawatts (GW) and representing nearly 50 percent of the capacity needed to meet New York's offshore wind goal of achieving at least 9.0 GW by 2035.¹¹⁴

North Carolina: Governor Cooper signed an executive order that establishes targets for the development of 2.8 GW of offshore wind energy resources off the North Carolina coast by 2030 and 8.0 GW by 2040, directs creation of the N.C. Taskforce for Offshore Wind Economic Resource Strategies (NC TOWERS), requires key agencies to designate an offshore wind coordinator, and continues operation of the N.C. Offshore Wind Interagency Workgroup.¹¹⁵

Alliance members are also continuing to aggressively pursue offshore wind projects to develop and expand the industry and scale up their state's renewable energy capacity. For example:

Connecticut: Governor Lamont announced an agreement that will support the redevelopment of the State Pier into a modern, heavy-lift facility capable of supporting offshore wind turbine staging and assembly.¹¹⁶

Maine: Is launching the country's first offshore floating wind research array, which will enable the state to work with the fishing industry and other stakeholders to understand how floating wind technology can be deployed to minimize potential harms in the Gulf of Maine and maximize the clean energy benefits from offshore wind.¹¹⁷

Virginia: Governor Northam established the state's first offshore and onshore wind workforce training collaborative, the Mid-Atlantic Wind Training Alliance.¹¹⁸

Deploying Cleaner and More-Efficient Vehicles on Our Roads



As a result of 2020's stay-at-home orders to combat the COVID-19 pandemic, cumulative travel across the country dropped 13.2 percent between 2019 and 2020.¹¹⁹ However, recent data shows this trend has started to reverse in 2021. At the same time, transportation remains the largest source of GHG emissions across the Alliance (32 percent of gross GHG emissions in 2019).¹²⁰

Climate Actions and Counts

- 18 Low-emission vehicle standards
- 17 Zero-emission vehicle standards
- 07 Clean truck standards
- 03 Clean fuels standards

 \bigcirc See Box 10, page 71 \bigcirc for more details.

Accelerating the transition to low- and zero-emissions vehicles

Alliance members have led the country in deployment of low- and zero-emissions vehicles (LEVs and ZEVs, respectively). Between 2011 and 2020, ZEV sales in Alliance states were on average four times higher than non-Alliance states (Figure 10). Both **New Mexico**¹²¹ and **Pennsylvania** started rulemaking processes to adopt California's Advanced Clean Car program¹²² while several states (e.g., **Minnesota**,¹²³ **Nevada**,¹²⁴ **Virginia**,¹²⁵ **Washington**¹²⁶) finalized their clean car rulemakings, after robust stakeholder engagement processes.

Alliance members are now developing the next generation of policies that will further accelerate the



FIGURE 10 Between 2011 and 2020, Alliance states deployed more zero-emissions light-duty vehicles compared to non-Alliance states.



ZERO EMISSION VEHICLE (ZEV) SALES

Source: Alliance for Automotive Innovation, Electric Vehicle Sales Dashboard. Note: PHEV = Plug-in Hybrid Electric Vehicle, BEV = Battery Electric Vehicle, FCEV = Fuel Cell Electric Vehicle



Photo Credit: Governor's Office of Maine // Maine's first electric schoolbus, deployed in Bar Harbor.

transition to ZEVs, including putting cleaner and moreefficient medium- and heavy-duty vehicles, like buses and trucks, on the road. Fifteen Alliance states and the District of Columbia are collaborating on the creation of a self-sustaining, zero-emissions, medium- and heavyduty vehicle (MHDV) market. This includes developing a multistate action plan, striving to make 30 percent of all MHDV sales zero emissions by 2030 and 100 percent by 2050, and accelerating deployment of MHDV ZEVs in disadvantaged communities.¹²⁷ Other examples include:

California: Governor Newsom directed the California Air Resources Board (CARB) to develop and adopt *Advanced Clean Cars II* (ACC II), regulations that require all new cars and passenger trucks sold in the state to be ZEVs by 2035.¹²⁸

Massachusetts: Released its interim *Clean Energy and Climate Plan* for 2030, which notes the intention of the Massachusetts Department of Environmental Protection (MassDEP) to adopt and implement California's ACC II regulations.¹²⁹

New Jersey: Became the second state after California to propose the Advanced Clean Trucks rule, requiring truck manufacturers to participate in a credit/deficit program intended to incentivize purchasing ZEVs over fossil-fueled vehicles.¹³⁰ In May 2021, NJ TRANSIT released its roadmap for achieving full transition to a 100 percent zero-emissions bus fleet by 2040. **New York:** Governor Hochul signed legislation requiring the adoption of regulations requiring all new passenger vehicles to be zero emissions by 2035 and all new trucks and buses to be zero emissions by 2045. The state is also working to adopt California's Advanced Clean Trucks rule.¹³¹

Washington: Adopted new rules to expand its ZEV program and include California's Advanced Clean Trucks rule.¹³²

Illinois, Michigan, Minnesota, Wisconsin, and Indiana: Signed a memorandum of understanding to establish Regional Electric Vehicle for the Midwest (REV Midwest), creating a regional framework to accelerate vehicle electrification in the Midwest and accelerate fleet electrification along key commercial corridors to safeguard economic security, reduce harmful emissions, improve public health, and advance innovation.¹³³

Expanding electric vehicle infrastructure

Alliance members also spent the past year planning for the infrastructure that will be needed to service electric vehicles (EVs) and help progress a smooth transition to ZEVs. Examples include:

Colorado: Enacted legislation to create new sources of dedicated funding and new state enterprises to enable the planning, funding, development, construction, maintenance, supervision and regulation of a sustainable transportation system by preserving, improving and expanding existing transportation infrastructure, developing the modern infrastructure needed to support the widespread adoption of electric motor vehicles, and mitigating adverse environmental and health impacts of transportation system use.

Hawaii: Is allocating \$0.03 of the existing barrel tax on imported oil to fund rebates for EV charging stations.¹³⁴

Illinois: Enacted legislation that will put 1 million EVs on the roads by 2030 in part through offering \$70 million in rebates to help fund up to 80 percent of the cost of the installation of charging stations. **Nevada:** Enacted legislation directing its investorowned utility to invest \$100 million in EV charging stations to accelerate transportation electrification and promote economic recovery. This investment seeks to facilitate the development of a strategic network of public charging across highway and urban corridors, outdoor recreation and tourism locations, for transit agencies and school bus transitions, and public agencies to support fleet electrification. The program also increases access to chargers in historically underserved communities by directing 40 percent of the investment in and for the benefit of these communities.¹³⁵

Virginia: Amended the Virginia Energy Plan to include an analysis of EV charging infrastructure and other infrastructure needed to support the 2045 net-zero carbon target in the transportation sector.¹³⁶

Ensuring an equitable transition to a zero-emissions future

As Alliance members continued to innovate and transition toward a cleaner future, a focus on ensuring that transition is done in an equitable and accessible manner has taken center stage. Examples include:

California: The California State Transportation Agency (CalSTA) adopted the *Climate Action Plan for Transportation Infrastructure (CAPTI).*¹³⁷ The plan details how the state recommends investing billions of discretionary transportation dollars annually to aggressively combat and adapt to climate change while supporting public health, safety, and equity.

Colorado: Created a new Environmental Justice Department within the state's transportation department, with \$234 million set aside for a Nonattainment Area Air Pollution Mitigation Enterprises to address the public health impacts of highway projects on low-income and disproportionately impacted communities.¹³⁸

Connecticut: Announced several newly approved EV incentives, which increase rebate amounts and expand the Connecticut Hydrogen and Electric Automobile Purchase Rebate (CHEAPR) program to cover new and used EVs and provide an additional incentive for income-eligible consumers.¹³⁹ **New York:** Announced the launch of the \$85 million New York Clean Transportation Prizes Initiative to seek proposals to help advance transportation solutions that reduce air pollution in disadvantaged communities in New York State.¹⁴⁰

Developing innovative programs and cleaning transportation fuels

Alliance members are continuing to pursue solutions to help reduce vehicle miles traveled (VMTs) and decarbonize transportation fuels. Examples include:

Colorado: Proposed standards that would require the Colorado Department of Transportation (CDOT) and the state's five Metropolitan Planning Organizations to determine the total pollution and GHG emissions increase or decrease expected from future transportation projects and take steps to ensure that GHG emission levels do not exceed set reduction amounts.

Hawaii: Established a sustainable aviation fuel program to provide matching grants to any small business in Hawaii that is developing products related to sustainable aviation fuel or GHG reductions from commercial aviation operations.¹⁴¹

New York: Is implementing the nation's first congestion pricing program in New York City after securing approval from the U.S. Department of Transportation.¹⁴²

North Carolina: The North Carolina Department of Transportation (NCDOT) recently completed a VMT-reduction study to identify transportation demand management (TDM) strategies that will reduce VMTs in urban, rural, and regional areas of the state.¹⁴³ Building on the study's findings, NCDOT is convening a VMT Reduction Task Force that will develop a TDM toolkit and prioritization framework for localities and metropolitan planning organizations to maximize VMT reductions.

Washington: Became the third state after California and Oregon to pass legislation creating a clean fuels standard.¹⁴⁴ This action calls for a 10 percent reduction in the carbon intensity of transportation fuels by 2028 and 20 percent by 2038.

Transforming Our Buildings to be Less-Polluting and More Efficient



In the United States, commercial and residential buildings account for 40 percent of energy consumption and close to 30 percent of total GHG emissions, making this a critical sector to address in meeting Alliance-wide emissions-reduction targets.¹⁴⁵ Beyond emissions reductions, building decarbonization and efficiency strategies offer various potential co-benefits, including job creation,¹⁴⁶ improved health outcomes,¹⁴⁷ and opportunities to address equity¹⁴⁸ and climate resilience.¹⁴⁹ To actualize these benefits, Alliance members are pursuing a variety of options to transform both new and existing buildings, including those strategies outlined in our Buildings Decarbonization Roadmap (Box 4).

Climate Actions and Counts

- 21 Electric utility energy efficiency resources standards
- 15 Gas utility energy efficiency resources standards
- 13 Appliance efficiency standards
- 02 Statewide building performance standards

See Box 10, page 69

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// BOX 4

U.S. Climate Alliance Buildings Decarbonization Roadmap

To help states better understand the pathways to decarbonization in this sector, the Alliance commissioned RMI to produce a Buildings Decarbonization Roadmap.¹⁶⁸ Developed through collaboration with staff from various state offices as well as industry experts, this tool summarizes high-impact actions that states can take to decarbonize buildings and provide a menu of options for state implementation. Core principles highlighted in the Roadmap include:

Efficient: Ensure new buildings are designed and constructed to be highly efficient and that existing buildings realize deep efficiency benefits.

Electric: Electrify fossil fuel-based end uses (e.g., space and water heating and cooking) where possible. Immediate opportunities in each state will differ based on available technology, economic feasibility, climate, and other context considerations. The benefits of electrification will continue to increase as the grid becomes cleaner.

Grid-interactive: Enable grid interactivity with appliances and energy management systems that can receive, send, and respond to grid signals. Grid-interactive buildings can also

serve as a distributed energy resource (DER) to minimize grid impacts, support variable renewable generation, and maximize consumer value.

Low-carbon fuels: Determine the role of lowcarbon fuels, which may support decarbonization of certain geographies or hard-to-electrify end uses.

Low embodied carbon: Use low-carbon materials in new construction and major retrofits, and reuse carbon-intensive materials and structures where possible.

These high-impact strategies are applicable to any state interested in decarbonizing its building sector, with different variations possible for each strategy. In any case, by selecting policies customized to their needs, states can take advantage of the widespread opportunities for progress in the buildings sector to meet decarbonization goals and other policy objectives.

Fostering zero-carbon new construction

Requiring highly efficient construction through building codes is a powerful decarbonization tool to avoid locking in emissions from inefficient buildings and new fossil fuel infrastructure. Building highly efficient, all-electric buildings from the outset can be dramatically more cost-effective than retrofitting buildings once they are already built.¹⁵⁰ Alliance members are taking actions to foster zero-carbon new construction. Examples include:

California: Adopted its 2022 building energy efficiency standards for new and existing buildings, becoming the first state to establish electric heat pumps as a baseline technology in its building codes. The codes also establish

"electric-ready" requirements, so homes are able to support EV charging and electric heating and cooking, in addition to expanding standards for onsite solar and battery storage and strengthening ventilation standards.¹⁵¹

Massachusetts: Authorized its Department of Energy Resources to establish, by 2023, a "highly efficient stretch energy code" for new buildings that municipalities may adopt.¹⁵²

Gas supply and infrastructure planning

Alliance members are using gas utility planning proceedings to consider how local gas distribution company services and investments align with state climate goals, increase stakeholder transparency into future investments and maintenance, plan for the impact of electrification growth, and protect low-income ratepayers (e.g., **New York**,¹⁵³ **Colorado**,¹⁵⁴ **Massachusetts**,¹⁵⁵ and **California**¹⁵⁶). Other examples include:

Colorado: Enacted legislation that promotes the use of energy-efficient electric equipment in place of less efficient fossil-fuel-based systems by requiring Xcel Energy and Black Hills Energy to file plans with the Public Utility Commission that support all cost-effective electrification including the full social cost of carbon and methane emissions in cost-effectiveness evaluations.

Minnesota: Passed a bill that includes funding and provisions for the implementation of a natural gas innovation plan that includes technologies that advance decarbonization. The Public Utilities Commission will also open a docket to evaluate natural gas utility regulatory and policy structures and what would be needed to meet or exceed the state's GHG emissionsreduction goals. Minnesota is the first state in the Midwest to implement this type of docket.¹⁵⁷

Nevada: The Public Utilities Commission of Nevada has an investigatory docket into the long-term planning and future of natural gas in Nevada.¹⁵⁸

Oregon: The Public Utility Commission is planning five workshops to explore natural gas utilities' strategies for reaching the state's GHG emissions-reduction goals, as detailed in Executive Order 20-04.¹⁵⁹

Establishing building standards and equipment requirements

Alliance members are implementing building standards and equipment requirements to limit the emissions from building technologies and existing buildings (see Box 5). Such standards target direct sources



of emissions—the technology and appliances within a building—and increase the pace of efficiency and electrification retrofits. Examples include:

Colorado: Became the second state to advance a statewide building performance standard for buildings above 50,000 square feet that must achieve a 7 percent GHG emissions reduction below 2021 levels by 2025 and 20 percent by 2030.¹⁶⁰

Illinois: Enacted a bill that requires the state to create and adopt a stretch energy code to allow municipalities and projects funded by the state to achieve more energy efficiency in buildings.

Nevada: Adopted the 2021 International Energy Conservation Code.¹⁶¹ Although not formally adopted, EV Ready Appendices were drafted to support authorities having jurisdiction to amend their codes as appropriate based on this guidance.

Virginia: Enacted a bill that requires certain state and local government buildings to be constructed or renovated with sufficient EV charging infrastructure as well as features that track the building's energy efficiency and carbon emissions.¹⁶²

Washington: Finalized rules to implement its first-in-the-nation Commercial Clean Buildings Performance Standard, setting a state target 15 percent below the 2009–2018 energy use average of commercial buildings larger than 50,000 square feet.¹⁶³

Transforming the energy market and expanding access to capital

Alliance members are pursuing actions to transform the energy market and speed the decarbonization of buildings by aligning utility regulations, establishing targets, and providing incentives for efficiency and electrification. These actions are often opportunities to integrate equity and workforce standards. Examples include:

Colorado: Passed a requirement that gas utilities file and implement first-in-the-nation "clean heat plans" that may utilize electrification, efficiency, leak reduction, green hydrogen, and recovered methane or biomethane to reduce GHG emissions 4 percent by 2025 and 22 percent by 2030.¹⁶⁴

Connecticut: Established an energy efficiency retrofit grant program for affordable housing, awarding grants for energy efficiency and weatherization measures in addition to rooftop solar, on-site energy storage, EV charging infrastructure, and heat pumps.¹⁶⁵

Illinois: Enacted a bill that extends electric energy efficiency goals until 2040 and expands low-income weatherization.

Massachusetts: Governor Baker issued an executive order, establishing a first-of-its-kind Commission on Clean Heat that will develop a framework to achieve deep emissions reductions from the use of heating fuels, consistent with the findings from the administration's 2050 Decarbonization Roadmap.¹⁶⁶

Minnesota: Strengthened its energy conservation program by expanding supports for lowincome households, enabling fuel-switching in certain circumstances, and increasing the state's overall energy savings goals for large utilities from 1.5 to 2.5 percent.¹⁶⁷



Photo Credit: New Jersey Governor's Office // The New Jersey Board of Public Utilities advertises the state's Clean Energy Program at Metlife Stadium.

// BOX 5

Alliance Appliance Efficiency Challenge

In September 2020, Alliance governors accepted the Appliance Efficiency Challenge, committing to collaborate on pursuing and implementing appliance efficiency standards.¹⁶⁹ Joining the states in accepting the challenge are the Appliance Standards Awareness Project (ASAP), Environment America, the Home Ventilating Institute (HVI), and the New Buildings Institute (NBI).

Following through on the Challenge, five Alliance states enacted appliance efficiency standards legislation for over 15 residential and commercial products. **Maine**,¹⁷⁰ **Massachusetts**,¹⁷¹ **Nevada**,¹⁷² **Oregon**,¹⁷³ and **Rhode Island**¹⁷⁴ each passed standards that, in combination, will save residents \$470 million on their annual utility bills by 2035 and reduce over 4 million metric tons of GHG emissions through 2035.¹⁷⁵ Some states included product categories for the first time in their bills. For example, **Massachusetts**¹⁷⁶ adopted the first EV charger standards and **Nevada**¹⁷⁷ adopted the first for air purifiers and gas fireplaces.

Decarbonizing the Industrial Sector



The industrial sector includes "all facilities and equipment used for producing, processing, or assembling goods."¹⁷⁸ This comprises a diverse array of activities in Alliance states and territories, ranging from food processing to mining, cement and chemical manufacturing to petroleum refining. Industry contributed 19 percent to Alliance-wide GHG emissions in 2019. After accounting for CO_2 and methane emissions from oil and gas extraction and distribution (3 percent), the industrial sector becomes the second-largest source of GHG emissions across the Alliance.¹⁷⁹

Climate Actions and Counts

- 05 Regulations addressing GHG emissions from industries
- 04 Buy clean programs, studies, or pilot projects

See Box 10, page 70

Although an energy- and emissions-intensive sector, industry is in the early stages of decarbonization in the United States. At the federal level currently, most industry-related programs provide targeted support towards energy efficiency and early-stage R&D, while few states have existing policies that require or incentivize industrial emissions reductions. Although electric-sector policies like renewable portfolio standards and energy efficiency programs have certainly helped reduce emissions in this sector, they alone will not align manufacturing activity with long-term, net-zero emissions pathways. However, both Alliance members and the Biden Administration have signaled an interest in decarbonizing industry, making it ripe for multi-state collaboration and policy alignment with the federal government (Box 6).

Alliance members and the Biden Administration have signaled an interest in decarbonizing industry, making it ripe for multi-state collaboration and policy alignment with the federal government.

Pioneering innovative industrial policies and programs

"Buy clean" standards are procurement policies that create maximum allowable global warming potential (GWP) thresholds for certain construction materials. Pioneered by **California**,¹⁸⁰ these standards leverage the purchasing power of public authorities to create a market for lower-carbon construction products. They can also be important tools to incentivize industrial decarbonization. Since California passed the *Buy Clean California Act* in 2017, at least six other Alliance states have introduced similar legislation.¹⁸¹ Over the past year, Alliance members continued to advance novel policies to reduce emissions from industrial sources. Examples include:

California: Enacted legislation that calls for the development of strategy that ensures the state's cement sector achieves net-zero GHG emissions no later than 2045. The strategy must also include an interim target, which reduces the GHG intensity of cement 40 percent below a 2019 baseline by 2035.¹⁸²



Photo Credit: New Jersey Governor's Office // Solar landscape in Perth Amboy, New Jersey.

Colorado: Became the second state to adopt a "buy clean" policy in July 2021 with the passage of a bill that directs its Office of the State Architect to develop maximum acceptable GWP limits for a variety of materials used in public construction projects starting in January 2024.¹⁸³ Colorado also directed its Air Quality Control Commission to develop rules that reduce GHG emissions from the oil and gas industry to at least 60 percent below 2005 levels by 2030 and from the industrial sector to at least 20 percent below 2015 levels by 2030.¹⁸⁴

Minnesota and Washington: In budgets passed by the state legislatures, funded studies and pilot projects that will track the environmental impacts of building materials purchased for state-funded infrastructure projects.¹⁸⁵

Investing in cleaner manufacturing

Alliance members also announced incentives and investments to build new clean energy industries and workforces in their states. Examples include:

Maine: Governor Mills announced the Maine Clean Energy Innovation Challenge, a grant program for startups developing clean energy or climate technologies that support the state's climate goals.¹⁸⁶

New York: Is investing \$30 million to help scale the creation of low-carbon goods and services, develop and commercialize carbon capture and utilization technologies, and implement beneficial electrification, manufacturing process emissions reductions, or low-carbon fuel projects.¹⁸⁷

Virginia: Governor Northam announced a regional grant award to support the development of a "new, high-wage industry cluster" around energy storage and electrification manufacturing.¹⁸⁸



// BOX 6

Decarbonizing industrial emissions together

All Alliance members have pledged to reduce our collective GHG emissions to net zero by 2050, with many members having similar or more-ambitious goals enshrined in law. These goals cannot be met without intensive policy development and investment in industrial decarbonization, given the sector's significant emissions footprint. Addressing industrial GHG emissions will also help Alliance members deliver on our commitments to safeguarding public health, facilitating an equitable transition to a clean energy economy, and creating good jobs for impacted workers and communities. Industry-related climate policies can spur demand for cleaner versions of products like concrete, metals, and chemicals, while also incentivizing the growth of a new, low-carbon manufacturing industry.¹⁸⁹

In June 2021, the Alliance launched the Industrial Decarbonization Working Group (IDWG) to support and identify state opportunities to reduce industrial-sector emissions. To start, the IDWG will provide educational activities and capacity building around key decarbonization pathways and technologies, resources and analysis most needed by states, and a policy guidebook for state action.

Deploying Market-Based Solutions and Accounting for Climate Change Damages



Photo Credit: Governor Murphy's Office //

Market-based climate programs incentivize cost-effective emissions reductions by setting prices or caps on carbon pollution. Carbon pricing is an essential climate policy that complements regulatory actions by not only driving GHG emissions reductions but also generating revenue that states can re-invest into furthering climate action and helping frontline communities. Market-based climate programs incentivize cost-effective emissions reductions by setting prices or caps on carbon pollution. Alliance members are taking action on market-based climate programs, which could eventually serve as a blueprint for federal action.

Climate Actions and Counts

- 15 Social cost of greenhouse gases in policymaking
- 13 Carbon market participation

See Box 10, page 76 for more details.



Engaging in and developing carbon markets Alliance members are establishing their own carbon markets or joining existing regional markets. Several other Alliance members are developing pilot programs and pioneering the adoption of novel and innovative programs. Examples include:

Hawaii: Released the first state-specific carbon pricing study, which explores the role of a state carbon tax in achieving Hawaii's 2045 goal to sequester more GHGs than it produces annually.¹⁹⁰

Illinois: Enacted legislation that authorizes the Governor to create a commission on market-based carbon pricing solutions.

Pennsylvania: Adopted its final-form rulemaking to join the Regional Greenhouse Gas Initiative (RGGI) in 2022. The Department of Environmental Protection (DEP)—in consultation with its Office of Environmental Justice and various environmental and community groups—developed equity principles to guide investment of income generated through RGGI.¹⁹¹

Washington: Became the second state to establish an economy-wide cap-and-invest program. Taking effect in 2023, the program includes large industrial facilities, the electricity sector, natural gas, and transportation fuel suppliers, covering 75 percent of the state's total emissions. Program revenues must be invested in clean energy transition and assistance, clean transportation, and climate resiliency projects, with at least 35 percent of funds (with a goal of 40 percent) dedicated to overburdened communities and at least 10 percent to triballysponsored or tribally-supported projects.¹⁹²

Valuing climate pollution damages

The social cost of greenhouse gases (SC-GHG) is used to provide a monetary value for the cost to society of GHG emissions that will result from a particular decision taken by the state—whether projects, programs, or policies.¹⁹³ Alliance members are taking steps to expand their use of the SC-GHG. Examples include:

Colorado: Passed legislation requiring the use of the SC-GHG for cost benefit analyses in air quality regulation, transportation planning, gas and electric utility DSM, electrification, and clean heat planning, and increased value of SC-GHG used for electric resource planning.¹⁹⁴

New York: The Department of Environmental Conservation (DEC) finalized guidance to help state agencies estimate the value of reducing carbon and other GHG emissions in decision-making.¹⁹⁵

Addressing Short-Lived Climate Pollutants



Methane and hydrofluorocarbons (HFCs) contributed 11 percent to total GHG emissions across the Alliance in 2019.¹⁹⁶ However, these gases are potent climate forcers. For example, methane has a warming effect that is 28–34 times stronger than CO_2 over 100 years and up to 86 times more potent than CO_2 over 20 years, contributing to at least a quarter of gross warming.¹⁹⁷ Some HFCs are over 1,000 times more potent. Because these pollutants are also short-lived compared to CO_2 , action taken today can achieve significant climate benefits in the near term.

Climate Actions and Counts

- 14 Regulations addressing hydrofluorocarbons
- 10 Regulations addressing methane

• 🔆 See Box 10, page 70

Reducing methane emissions

Alliance members have consistently led the country in adopting programs and policies that aim to reduce methane emissions and other harmful pollutants. Examples include:

Colorado: Adopted rules that ban routine natural gas flaring and venting, establish one of the most-protective oil development setbacks in the country, and incorporate environmental justice as a consideration in facility siting.¹⁹⁸

Maryland: Finalized regulations that reduce vented and fugitive methane emissions from both new and existing natural gas transmission and storage facilities, requiring new detection, testing, repair, reporting, and recordkeeping requirements.¹⁹⁹

New Mexico: Adopted natural gas waste reduction rules requiring oil and gas operators to capture 98 percent of their natural gas waste by the end of 2026. These rules take a unique approach to regulating the oil and gas industry, requiring reporting of natural gas loss from both production and midstream operations, prohibiting routine venting and flaring, and setting increasing gas capture targets.²⁰⁰

Continuing to lead on HFCs

Faced with several years of federal inaction, Alliance members stepped up and adopted rules that prohibit the use of high-warming HFCs, consistent with the EPA's 2015 and 2016 Significant New Alternatives Policy (SNAP) rules. This past year alone, **Maine**²⁰¹ and **Washington**²⁰² enacted legislation while **Delaware**,²⁰³ **Massachusetts**,²⁰⁴ **Maryland**,²⁰⁵ **New York**,²⁰⁶ **Rhode Island**,²⁰⁷ and **Virginia**²⁰⁸ all finalized regulations that reduce the use of HFCs. Even with a new federal framework to direct a national phase-down of HFCs (Box 7), states continue to implement innovative policies. Examples include:

California: Approved its final, first-in-the-nation regulations to reduce HFCs from commercial and industrial stationary refrigeration units and air conditioners.²⁰⁹ These rules also signal the beginning of the first refrigerant recycling program to put responsibility for compliance with manufacturers and could serve as the

model for comprehensive federal programs through implementation of the *American Innovation and Manufacturing Act* (AIM Act).

Oregon and Washington: Updated their building codes to enable the use of low-GWP refrigerants in chillers, air conditioning, and commercial refrigeration.²¹⁰

Washington: Enacted a bill directing the state to establish a GWP limit for new and existing stationary refrigeration equipment, new stationary air conditioning, and ice rinks. It also calls for the establishment of a refrigerant management program and recommendations on end-of-life disposal.²¹¹

// BOX 7

Rebuilding a National Phase-down of HFCs

Through collective action, Alliance members have leveraged their large market and catalyzed nation-wide transformational change. This has led to partnerships with industry to begin shifting the market to alternatives and progress across the states was used to advocate to Congress for a national framework—the American Innovation and Manufacturing Act (AIM Act) in 2020.212 The AIM Act specifically directs EPA to address HFCs by providing new authorities in three main areas: to phase down the production and consumption of listed HFCs 85 percent over the next 15 years, manage these HFCs and their substitutes, and facilitate the transition to next-generation technologies.²¹³ The AIM Act framework not only provides regulatory certainty for industry across the country, but also complements state leadership efforts.

Protecting and Enhancing Our Natural and Working Lands



Photo Credit: Wisconsin Governor's Office // Governor Tony Evers plants trees at Havenwoods State Forest in Milwaukee on Earth Day.

All pathways to net-zero emissions by 2050 must include carbon removal. Natural and working lands (NWL) such as forests, farmlands, wetlands, and other land types must therefore be a core part of the solution to the climate crisis. As such, several Alliance members (e.g., **Maine**,²¹⁴ **Massachusetts**,²¹⁵ **New York**,²¹⁶ and **Vermont**²¹⁷) have all included carbon sequestration on NWL, notably forests, as an essential component of midcentury net-zero GHG emissionsreduction targets. Alliance members are investing in their lands not only for the climate benefits, but because of the many societal benefits. These include public health, good jobs, and resilient communities, all of which play a role in addressing the triple crises faced by the world today: health, economy, and climate. And in a nation where climate is hyper-polarized, the nation's lands continue to break through as a solution both parties embrace.

Climate Actions and Counts

- 15 NWL in state GHG inventories 09 Healthy soils legislation
- 09 NWL conservation or sequestration goals

see Box 10, page 74 for more details. NWLs currently offset 15 percent of the Alliance's collective GHG emissions²¹⁸ and could potentially sequester even more carbon. However, they face risks from development, mismanagement, and other human activities. Alliance members have made significant progress over the past two years, particularly with regards to overcoming data, modeling, and other barriers to GHG mitigation planning and policy integration (Box 8) and identifying best practices to reduce GHG emissions and increase resilient carbon sequestration.

Identifying best practices and implementing innovative projects and programs

Over the past year, Alliance members have stood up task forces to study key issues and solutions related to enhancing carbon storage. Examples include:

Colorado: Passed legislation that authorizes the Colorado Department of Agriculture to run a soil health program and set up a Soil Health Advisory Committee.

Maine: Established a healthy soils program, which will provide outreach, education, and peer-learning to farmers and land owners to help them understand the benefits of implementing practices that improve soil health and sequester carbon.²¹⁹ Through this program, Maine will also investigate opportunities for market-based programs and promotional activities that incentivize healthy soils best practices, ensuring that incentives are equitably distributed to new and socially disadvantaged farmers and ranchers.

Michigan: The Department of Natural Resources (DNR) announced a final agreement with DTE Energy, Michigan's largest energy company, to pilot a carbon credit program on over 100,000 acres of state forestland.²²⁰ This project will increase carbon absorption above baseline levels, positioning Michigan to take full advantage of current and future carbon markets.

Virginia: Established a Carbon Sequestration Task Force to identify land and marine resource policies and practices that can increase carbon storage; develop a standardized methodology to establish baseline carbon levels and account for increases in carbon sequestration over time; identify existing carbon markets and considerations relevant to potential participation by the Commonwealth; and identify other potential funding mechanisms to encourage carbon sequestration practices.²²¹

Setting ambitious conservation and carbon sequestration targets and goals

Alliance members are advancing innovative policies that maximize the full climate benefits of natural and working lands and are setting quantifiable targets and goals to stay on track. Examples include:

Delaware and Wisconsin: Announced NWL goals that contribute to the Global Trillion Trees Initiative, which aims to conserve, restore, and grow one trillion trees by 2030.²²²

Hawaii: Tackling carbon sequestration through a tangible set of actions, including the Global Trillion Trees Initiative, 30x30 Initiative, and urban forestry efforts.

New Mexico: Established goals to conserve at least 30 percent of all lands by 2030 in a manner that preserves watersheds and biodiversity while demonstrating a commitment to equity and Tribal sovereignty and self-determination.²²³

Oregon: The Global Warming Commission adopted a proposal for harnessing the sequestration potential of the state's forests, wetlands, and agricultural lands to achieve the state's GHG goals.²²⁴

// BOX 8

Improving NWL Greenhouse Gas Inventories

NWL inventories are necessary to effectively measure progress toward state GHG goals, inform state policymaking, or track project performance. To this end, in September 2020, the World Resources Institute and the Alliance issued a *Guide to NWL Inventory Improvements,* which evaluates current NWL inventory methods among Alliance states, identifies gaps, and provides information and resources to improve data and methods for NWL inventories.²²⁵

Creating More-Resilient Communities



Photo Credit: New Jersey Governor's Office // Sewer system modification to reduce stormwater flooding. Hoboken, NJ.

Human-caused climate change is behind many recent, catastrophic events (e.g., wildfires, storms, and floods) and creeping hazards (e.g., extreme heat, droughts, and sea level rise).²²⁶ Such extreme events like these are becoming more commonplace, with devastating costs in lives, the economy, infrastructure, and property.²²⁷ Alliance members continued to increase the resilience of their communities in the face of our changing climate. This included creating or updating climate assessments and adaptation plans, making progress on resilience financing, and taking legislative or executive action to minimize risk from climate-related hazards.

Climate Actions and Counts

- 20 Resilience or adaptation plans
- 14 Resilience offices or interagency bodies

See Box 10, page 73 for more details.

Sector more details.

Planning for climate change impacts and preparing communities

State government facilities and infrastructure are also vulnerable to the impacts of climate change. Effective planning can help make sure governments and their constituents are prepared for climate impacts. Several Alliance members released climate change adaptation and resilience frameworks and strategies. Examples include:

Colorado: *The 2020 Colorado Resiliency Framework* (an update to the original 2015 plan) was released in early 2021, serving as the state's roadmap to a more resilient future with 29 strategies across six priority focus areas and is implemented by the interagency Colorado Resiliency Working Group.

Minnesota: The Pollution Control Agency received funding to assist tribal governments, and local governments and organizations in assessing vulnerabilities and conducting planning in three areas: stormwater resilience, wastewater resilience, and community resilience to adapt services and public infrastructure for the effects of climate change. The grant application process opened in November 2021.

New Jersey: New Jersey's first statewide *Climate Change Resilience Strategy* was released on October 12, 2021 and includes recommendations to promote the long-term mitigation, adaptation, and resilience of New Jersey's economy, communities, infrastructure, and natural resources throughout the state.

North Carolina: North Carolina launched its *Resilient Coastal Communities and RISE Programs* which aim to facilitate communitydriven processes for setting resilience goals, assessing existing and needed local capacity, and identifying and prioritizing projects to enhance community resilience to climate hazards—including sea level rise, flooding, and extreme heat and drought—leading to the development of "shovel-ready" projects.

Oregon: Released its *Climate Equity Blueprint,* with provides tools to assist state agencies

in the delivery of equitable climate change adaptation programs to underserved and overburdened urban and rural communities.²²⁸

Pennsylvania: Governor Wolf announced executive actions to address flood hazard mitigation by requiring the State Planning Board to develop a series of recommendations and best practices relative to land use, planning, zoning, and storm water management, with the emphasis on reducing the incidence of flash flooding in communities that impacts citizens and businesses.²²⁹

Virginia: The Coastal Resilience Master Planning Framework will serve as a blueprint for implementing the commonwealth's first project-driven Coastal Resilience Master Plan by the end of 2021.²³⁰



Financing climate resilience measures

Finance is key to implementation of climate resilience measures, but there are challenges with unlocking the large upfront costs to building resilience in the face of immediate needs, measuring the resilience outcomes of investments and projects, and communicating longterm benefits. To address these challenges, Alliance members created new funding streams to prioritize low-resource and vulnerable communities and create models for unlocking private capital. Examples include:

Connecticut: Enacted a law that allows municipalities in the state to create stormwater authorities to address water quality and flooding, adds climate resilience and flood prevention to the purview of municipal flood and erosion control boards, and expands the scope of the Connecticut Green Bank to invest more broadly in environmental infrastructure, including climate resilience and adaptation projects.²³¹

New York: The Department of Financial Services released guidance to banking institutions under the *New York Community Reinvestment Act* detailing incentives to boost climate resilience finance in underserved communities.²³²

North Carolina: Governor Roy Cooper signed a state budget that includes over \$1 billion for various resiliency measures and programs, including funding to address flooding; enhance water, wastewater and stormwater infrastructure; improve transportation infrastructure; and conserve working and natural lands.

Minimizing climate risk

Many communities—especially the most vulnerable as well as our built and natural infrastructure are increasingly exposed to climate-related hazards. Alliance members took legislative and executive action to reverse this trend and build climate resilience across all communities, including their own state government facilities and operations. Examples include:

Hawaii: Enacted a law that requires state agencies to identify existing and planned facilities that are vulnerable to sea level rise and create a plan to respond.²³³ Another new law in Hawaii requires



that anyone selling a home disclose if the property lies within a sea level rise exposure area.²³⁴ In June 2021, the Hawaii Department of Health issued a technical memo outlining the risks of sea level rise and increased flooding on known chemical contamination lands across the state.

Louisiana: Appointed a chief resilience officer to coordinate resilience-building strategies among the various relevant state agencies. All changes across Louisiana state government must align with the state's *Coastal Master Plan*.²³⁵

Maine: Passed a bill that requires state agencies to consider projected sea level rise and begin to implement the Maine Climate Council's 2020 recommendations on enhancing "community resilience to flooding and other climate impacts."²³⁶

North Carolina: Following up on North Carolina's 2020 Climate Risk Assessment and Resilience Plan, state agencies released their individual annual Agency Resilience Strategy Reports, which summarize agency climate adaptation priorities, accomplishments, and next steps.

Financing Climate Solutions



Photo Credit: Michigan Governor's Office // Michigan Governor Gretchen Whitmer at a ribbon cutting event at a battery facility.

Orienting the United States on a pathway to achieving net-zero emissions will require massive amounts of investment in clean technology and infrastructure—at least \$2.5 trillion in addition to business-as-usual energy system investments between now and 2030 (Box 9).²³⁷ Public dollars—through mechanisms such as tax incentives, direct investment, and grants—cannot finance the transition to a low-carbon economy alone.²³⁸ Plus, despite falling costs for clean technologies, many barriers impede private investors from financing climate-related projects. Beyond direct financing, mitigating and adapting to climate change will also require substantial reform of the financial system, including long-term investment of public dollars, regulation of insurance, and management of banks and lenders ²³⁹

Climate Actions and Counts

15 Green and/or resilient infrastructure banks

See Box 10, page 76

// BOX 9

Investing in a Robust and Resilient Recovery

Following the economic and public health fallout of the COVID-19 pandemic, Alliance members committed to rebuilding our economies in ways that prioritize equity, resilience, and public health. In our bipartisan stimulus letter submitted to Congress in July 2020, we called on Congress to kickstart the recovery with additional COVID aid and infrastructure investments.²⁵⁵ Alliance members welcomed the climate-related funds and programs included in the bipartisan December 2020 stimulus package and March 2021 *American Rescue Plan Act*, with many states allocating discretionary recovery funds towards investments in climate change mitigation and adaptation. The Alliance issued a second letter to Congress in June 2021, calling for major infrastructure investments to meet the climate challenge head on and create a better future for America and its people.²⁵⁶

FIGURE 11 Green banks have mobilized \$7 billon in clean energy investment since 2011



INVESTMENT CAUSED BY GREEN BANKS (MILLION \$)

Source: American Green Bank Consortium's 2021 Annual Industry Report.

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Mobilizing private investment in climate and clean energy

To help bridge the gap between available public funds and the actual investment that is needed to address the climate challenge, states have pioneered the use of "green banks." These programs use public capital to mobilize greater private investment into underserved climate-related financing markets. Since 2011, green banks have caused \$7 billion in clean energy investment, with a record \$1.7 billion in investment in 2020, despite the pandemic (Figure 11). There are now 21 green banks in the United States across 15 states and the District of Columbia.²⁴⁰

Alliance members have continued to establish and operate green and resilient infrastructure banks in the past year. Examples include:

Colorado: Enacted legislation to boost the funding available for clean energy financing programs, including \$30 million for the Colorado Clean Energy Fund, the state's green bank.²⁴¹

New York: Completed its first private-sector capital raise, increasing capital base by \$314 million for future use in sustainable infrastructure investment opportunities.²⁴²

Pennsylvania: Is establishing its version of a green bank, following an announcement from its Treasury Department in fall 2020.²⁴³

Virginia, Maine, and Illinois: Authorized the establishment of green banks to finance clean energy technologies.²⁴⁴





Increasing the resilience of states' investments

Through their pensions, states are significant stewards of investment dollars. Alliance members manage 21 of the 30 largest U.S. state pension plans, together representing over \$2.2 trillion in assets.²⁴⁵ In recent years, some Alliance members have taken action to ensure their large-scale investment decisions do not run counter to their climate priorities. Examples include:

California: Governor Newsom released the Climate Investment Framework, which aligns the asset management and investment policies of the state's three largest pensions with the state's carbon neutrality goal.²⁴⁶

Maine: Became the first state to legislatively require its pensions to fully divest from the fossil fuel industry with its enactment of a bill that requires divestment action from both the \$17 billion Maine Public Employee Retirement System and the state treasury within five years.²⁴⁷

New York: The State Common Retirement Fund, the third-largest pension in the country, adopted a goal to transition its portfolio to net-zero GHG emissions by 2040.²⁴⁸ The pension is currently applying standards to assess the "transition readiness" and climate-related financial risk of its energy-sector investments in coal, oil, and gas.

Increasing transparency and disclosure in the financial system

Alliance members are taking action to increase transparency and disclosure to enable more climatealigned financing, investing, and insuring. This position has long been promoted by the Task Force on Climate-related Financial Disclosures (TCFD), a best-practice reporting framework that now has over 2,300 global supporters.²⁴⁹ Examples include:

California: Launched the Climate-Related Risk Disclosure Advisory Group to advance government understanding and management of financial climate risks, including the applicability of frameworks like TCFD to government decision-making.²⁵⁰

New York: The Department of Financial Services (DFS) became the first U.S. banking regulator to issue climate-related financial risk guidance to financial institutions like banks, mortgage servicers, and insurance companies, including an expectation that these entities develop an approach to disclosure through existing frameworks like TCFD.²⁵¹

Accounting for climate risks in the insurance industry

As the primary regulators of the insurance industry, states can also play an important role in ensuring this sector fully accounts for climate change risks in its product offerings and investment decisions. Many Alliance members require large insurers to assess and disclose their climate-related risks and opportunities through an annual survey.²⁵² Outside of surveys, Alliance members are pursuing other novel actions related to insurance. Examples include:

California: The Climate Insurance Working Group released 40 state and local policy recommendations in response to the nation's first law directing the state to study how insurance can be used to protect communities from climate change.²⁵³ After evaluating these recommendations, California will release a Sustainable Insurance Roadmap, laying out its vision for adopting next-generation insurance policies.



Connecticut: The Connecticut Department of Insurance, in its role as a member of the Climate Change Disclosure Committee of the National Association of Insurance Commissioners (NAIC). reached out to Northeast Zone states to invite them to join the effort to require insurers in their state to respond to the NAIC Climate Risk Disclosure Survey. Seven additional states (DE, MA, MD, ME, PA, RI, and VT) and the District of Columbia in the Northeast, and Oregon in the West, joined in 2021 and together with the six original states (CA, CT, WA, NM, NY, and WI) there are now 15 states requiring the survey. Connecticut continued its leadership in this space with hosting the Connecticut Conference on Climate Change and Insurance in October 2021 with insurance commissioners from Alliance states (CA, MD, LA, and WA) in attendance.

New York: DFS issued first-in-the-nation guidance for insurers to manage their climate risks, offering a blueprint for insurance companies to assess climate-related business risks and develop strategies to manage those risks.²⁵⁴



HIGHLIGHTING SOLUTIONS across the Alliance

Climate Alliance Governors gather with other state and regional leaders for a group photo at COP26.

Photo Credit: Evan Westrup, USCA

Continuing to Lead

While we expand our partnership with the federal government, the Alliance will continue to push forward the next generation of innovative, high-impact, state-led actions. Doing so is necessary to meet our own GHG emissions-reduction targets; make our states more resilient to increasingly severe storms, drought, and wildfires; and bring a wide range of co-benefits to all our communities. This sustained action will also help ensure our country's climate goals are durable and that the United States continues to make progress and reduce emissions, regardless of who is in power in Congress or the White House.

The transformation that is needed is going to be difficult, and there are many barriers our states are already facing. A robust infrastructure package that aligns with the climate and clean energy components of the *American Jobs Plan* will provide tools and resources we need to overcome some of these challenges to meet our goals. Additionally, the regulatory actions that agencies like EPA, DOE, DOT, and others are taking will help raise the floor nationally, allowing our states to focus on innovative efforts in other important sectors.

Through the Alliance, we will continue to make progress on a range of foundational climate actions by collaborating, sharing lessons learned and best practices with one another, and leaning on experts for capacity building and technical assistance:

Adopting Strengthened GHG Targets and Advancing Climate Governance: Working to improve the data, methodologies, and tools that underpin state GHG inventories, allowing for more-robust policy-making and tracking as well as helping states develop implementation action plans toward mid-century deep decarbonization goals. Supporting states to lead by example by sharing best practices on target setting, data collection, and project implementation related to clean energy and sustainability efforts within state government buildings and facilities. **Ensuring a Just and Equitable Transition:** Helping to shape policies that reform economic systems and labor markets in order to support prosperous and resilient communities, eliminate existing disparities, and support workers impacted by the transition to net-zero emissions.

Cleaning and Modernizing Our Power

Grids: Supporting state adoption of policies and utility planning processes that accelerate the development of clean energy generation, transmission, and grid modernization.

Deploying Cleaner and More-Efficient Vehicles on Our Roads: Helping identify, develop, and implement transportation decarbonization strategies that reduce vehicle miles traveled (VMTs) and transition to low- and zero-carbon transportation fuels and vehicle technologies.

Transforming Our Buildings to be Less-Polluting and More Efficient: Identifying the full suite of policy options from which states can prioritize policy solutions to achieve the building sector reductions.

Decarbonizing the Industrial Sector: Developing educational resources and capacity-building activities that enable states to identify and advance policies and programs to decarbonize emissions-intensive industries like nonmetallic minerals, metals, chemicals, and refining.

Addressing Short-Lived Climate Pollutants:

For HFCs, developing regulations to backstop and build upon the Significant New Alternatives Policy (SNAP); tackling a range of HFC issues including refrigerant management, recycling/ disposal, and building codes; and developing an HFC inventory tool and guidelines to help states inventory their HFC emissions and understand the emissions impacts of HFC policies. For methane, utilizing innovative leak-detection technologies and working on policy solutions for up-, mid-, and down-stream oil and gas, landfills and food waste, manure management, and in 2022, agriculture.

Protecting and Enhancing Our Natural and

Working Lands: Improving inventory methods for land-based carbon flux; identifying and advancing best practices to reduce GHG emissions and increase resilient carbon sequestration; and integrating actions into state GHG mitigation plans.

Creating More-Resilient Communities:

Exploring how to incorporate resilience into everyday planning; increase community adaptation preparedness training, funding, and implementation; improve access to critical data to drive climate resilience; and mobilize investments in resilience. These efforts informed the Alliance's update to its Governors' Resilience Playbook, which serves as a key resource for practitioners across the U.S. climate resilience field.²⁵⁷



Photo Credit: Hawaii Governor's Office // The Hawaii delegation to COP26 pose for a photo.



Photo Credit: Evan Westrup, USCA // Climate Alliance governors join members of the Biden Administration to discuss how our bold new climate goals are both achievable and durable.

Given the urgency of the climate crisis, we will also continue to push the envelope by moving towards the next generation of bipartisan climate action. During this year's UN Climate Change Conference in Glasgow (COP26), the Alliance collectively announced eight priority policy areas that will guide our work in the years ahead related to power, buildings, industry, transportation, just transition and equity, resilience, natural and working lands, and the social cost of greenhouse gases. Within each of these priority areas, individual Alliance states committed to more than 40 specific and new high-impact actions that will accelerate GHG emissions reductions, complement and spur federal efforts, and drive the sort of tangible, impactful implementation and results needed to make the U.S. climate targets a reality (Box 10).

Collaboration and urgency are going to be critical in order to rise to the challenges we are facing, from responding to the climate threat, to recovering from COVID-19 and addressing the economic, health, and environmental disparities that overburdened communities have long been facing. We know the types of actions that are needed to avoid the worst impacts of climate change and adapt to the climate impacts already locked in. While political change is frequent in Washington, D.C., our commitment is unwavering. We will continue to be the stabilizing force across future administrations, working together to develop and adopt the next generation of high-impact bipartisan climate policies, and always aiming for a more equitable, resilient, zero-carbon economy for the American people. The climate crisis knows no borders and when we share solutions and expertise, we can go further, faster.

// BOX 10

U.S. CLIMATE ALLIANCE MEMBERS COMMIT TO NEW HIGH-IMPACT ACTIONS TO ACHIEVE CLIMATE GOALS AND GO FURTHER, FASTER, TOGETHER

N NOVEMBER 2021, THE WORLD'S LEADERS CONVENED IN GLASGOW FOR THE MOST CONSEQUENTIAL UN CLIMATE CHANGE CONFERENCE SINCE PARIS, AND THE U.S. CLIMATE ALLIANCE ANNOUNCED THE NEXT GENERATION OF "HIGH-IMPACT ACTIONS" ITS STATES WILL PURSUE TO LIMIT WARMING TO 1.5 DEGREES CELSIUS AND HELP ACHIEVE THE U.S. NATIONALLY DETERMINED CONTRIBUTIONS (NDC) AND THE ALLIANCE'S 2030 AND 2050 CLIMATE GOALS.

To guide its work in the years ahead, the Alliance collectively identified eight priority policy areas related to power, buildings, industry, transportation, just transition and equity, resilience, natural and working lands, and the social cost of greenhouse gases. Within each of these priority areas, individual Alliance states committed to more than 40 specific and new High-Impact Actions that build and expand on years of increasingly bold and ambitious commitments and actions from all of the Alliance's states. These actions complement strong climate and clean energy action plans being developed to guide work in the years ahead by a number of Alliance states, including: Delaware, Louisiana, Michigan, Nevada, New York, and Wisconsin.

The Alliance's announcement was part of a larger, coordinated effort among state and regional governments from coalitions spanning the globe, including the Under2 Coalition and C40, which also announced a number of new complementary climate actions and commitments. This collective effort is intended to drive further ambition among subnational leaders, as well as national governments—and showcases strong examples of visionary policies Alliance states will continue to pursue to achieve net-zero GHG emissions.

- 10.1 Power
- 10.2 Buildings
- 10.3 Industry
- 10.4 Transportation
- 10.5 Just Transition & Equity
- 10.6 Resilience
- 10.7 Natural & Working Lands
- 10.8 Social Cost of Greenhouse Gases
- 10.9 Additional State Climate Actions Underway

PRIORITY POLICY AREAS AND HIGH-IMPACT ACTIONS

10.1 **POWER**



ALLIANCE MEMBERS WILL DEVELOP POLICY PATHWAYS AND PROGRAMS TO...

decarbonize the electricity grid, including establishing interim targets and identifying opportunities to better align planning and procurement processes for generation, distribution, and transmission resources with our collective climate goals.

NEW HIGH-IMPACT ACTIONS

Evaluate current procurement and planning processes to ensure sufficient generation, distribution, and transmission infrastructure can be built in line with climate goals. (IL, RI, WA)

Advance solar and storage solutions for the most vulnerable post-disasters. (LA)

Tiered tax incentives for clean energy generation and component manufacturing development, with greater incentives for higher labor standards. (WA)

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Alliance members have adopted or are in the process of adopting the following	
100% clean electricity goals CA, CO, CT, HI, IL, ME, MD, MN, NC, NV, NM, NY, NJ, OR, PR, RI, VA, WA, WI	19
Renewable portfolio standards CA, CO, CT, DE, HI, IL, ME, MD, MA, MI, MN, NV, NM, NJ, NY, NC, OR, PA, RI, VT, VA, WA	22

PRIORITY POLICY AREAS AND HIGH-IMPACT ACTIONS

10.2 BUILDINGS



ALLIANCE MEMBERS WILL DEVELOP POLICY PATHWAYS AND PROGRAMS TO...

eliminate emissions from buildings, including supporting the development and adoption of zeroemissions building codes.

NEW HIGH-IMPACT ACTIONS

100 percent net-zero operating emissions government buildings by 2030. (HI, ME, OR)

100 percent net-zero operating emissions for new construction beginning in 2030. (OR, WA)

Align Energy Efficiency Resource Standards or utility demandside management program goals, budgets, and activities with achievement of climate goals. (C0, MA, RI, WA, MD)

Initiate gas local distribution company system planning proceedings to plan for system investments in alignment with decarbonization goals. (C0, MA, WA)

Establish new state appliance efficiency standards for appliances not covered under federal efficiency standards. (MA, WA)

Alliance members have adopted or are in the process of adopting the following	# of Alliance Members
Electric utility energy efficiency resource standards CA, CO, CT, DE, HI, IL, ME, MD, MI, MN, NV, NM, NJ, NY, OR, PA, RI, VA, VT, WA, WI	21
Gas utility energy efficiency resource standards CA, CO, CT, DE, IL, ME, MI, MN, NJ, NY, OR, RI, VT, WA, WI	15
Appliance efficiency standards CA, CO, CT, HI, MA, ME, MD, NV, NY, OR, RI, VT, WA	13
Statewide building performance standards CO, WA	2

PRIORITY POLICY AREAS AND HIGH-IMPACT ACTIONS

10.3 INDUSTRY





ALLIANCE MEMBERS WILL ESTABLISH INNOVATIVE POLICY FRAMEWORKS...

for eliminating GHG emissions from the industrial sector and its supply chains while fostering the growth of a strong, domestic clean manufacturing economy.

// THE BIG PICTURE

NEW HIGH-IMPACT ACTIONS

Reduce emissions from cooling equipment by 20 percent by 2030 (e.g., HFC phase-down). (WA)

Advance performance-based emissions standards for industrial products (e.g., "buy clean" policies, clean product standards). (WA)

Incentivize, plan for, and invest in domestic clean energy manufacturing through new programs. (WA)

Adopt industrial permitting and siting standards that account for disproportionate pollution burdens on overburdened and vulnerable communities. (MA, WA)

Reduce methane emissions from the oil and gas sector 45–50 percent by 2025 and no less than 75–80 percent by 2030, below 2015 levels. (NM)

Alliance members have adopted or are in the process of adopting the following	
Regulations addressing hydrofluorocarbons CA, CO, DE, MA, ME, MD, NJ, NY, OR, RI, VA, VT, WA, WI	14
Regulations addressing methane from oil and gas, landfill, and agricultural sources CA, CO, MD, MA, NM, NY, OR, PA, VA, VT	10
Regulations addressing GHG emissions from industrial sources CA, CO, MA, OR, WA	5
Buy clean programs, studies, or pilot projects CA, CO, MN, WA	4

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10.4 TRANSPORTATION





ALLIANCE MEMBERS WILL DEVELOP POLICY PATHWAYS AND PROGRAMS TO...

decarbonize the transportation sector by reducing vehicle miles traveled (VMTs) and significantly increasing access to and the affordability of zero-emissions vehicles, clean fuels, and multimodal options.

NEW HIGH-IMPACT ACTIONS

100 percent zero-emissions:

- new light-duty vehicle sales by 2035. (HI, MA, OR, WA)
- light-duty public fleets by 2035. (HI, NY, OR, WA)
- public/government-owned transit bus fleets by 2030. (HI, OR)
- medium- and heavy-duty public fleets by 2040, where technically feasible. (HI, IL, NY, OR, WA)

Promote sustainable communities that provide a range of affordable housing and transportation options that increase access to opportunity and reduce VMTs. (CT, HI, MA, ME, MN, NM, NY, RI, WA)

30 percent VMT reduction by 2035 and 50 percent by 2050. (OR)

Implement a low-carbon fuel standard to reduce the carbon intensity of fuels. (NM, MA) $\,$

Invest at least 35 percent of cap-and-invest program revenues for transportation into overburdened communities. (WA)

In partnership with frontline communities, increase investments to create walkable, bikeable neighborhoods, well connected by affordable, frequent transit. (OR, MA, WA)

Alliance members have adopted or are in the process of adopting the following	
Low-emission vehicle standards CA, CO, CT, DE, ME, MD, MA, MN, NM, NV, NJ, NY, OR, PA, RI, VT, VA, WA	18
Zero-emission vehicle standards CA, CO, CT, ME, MD, MA, MN, NM, NV, NJ, NY, PA, OR, RI, VT, VA, WA	17
Clean truck standards CA, MA, ME, NJ, NY, OR, WA	7
Clean fuels standards CA, OR, WA	3

10.5 JUST TRANSITION & EQUITY



ALLIANCE MEMBERS WILL PARTNER WITH FRONTLINE COMMUNITIES TO...

develop climate and clean energy solutions; provide training, facilitation, and funding that bolsters capacity and fosters leadership in those communities; and direct significant expenditures to create environmental and economic benefits for vulnerable and overburdened populations and grow family-sustaining jobs.

NEW HIGH-IMPACT ACTIONS

Empower overburdened and vulnerable communities and foster leadership to develop climate/clean energy solutions and policies through training, facilitation, and funding. (CT, HI, IL, MA, NY, OR)

Commit to a just transition that provides for sustainable livelihoods for those reliant on the fossil fuel economy in the shift to more-sustainable systems and practices. (C0, HI, IL, MA, ME, MI, NM, NY, WA)

Integrate racial and gender diversity in developing environmental solutions to the climate crisis. (HI, IL, RI, MA, MI, NY, WA)

Establish governance structures that include the voice of frontline communities and advance the work of efforts already underway to address systemic inequality. (RI, MA, MI, WA)

Establish training programs that provide pathways to high-road, familysustaining jobs for both current and future workers. (RI, MA, ME, MI, WA)

Establish clear and transparent participatory processes and practices across government that not only promote diverse and meaningful input but also promote cross-government alignment. (MA, MI, WA)

Establish a goal that least 40 percent of the benefits of expenditures with environmental and economic benefits flow to vulnerable populations and disadvantaged communities, including remote communities. (IL, NY, WA)

Alliance members have adopted or are in the process of adopting the following	
Environmental justice offices or interagency governance structures CA, CO, CT, IL, LA, MD, MA, MI, MN, NJ, NM, NY, NC, OR, PA, VT, VA	17
Environmental justice screening and policy tools CA, CO, CT, IL, MD, MA, MN, NJ, NM, NY, NC, PA, RI, WA, WI	15
Just transition offices or interagency bodies CA, CO, MN, NM, NJ, NY	6

10.6 **RESILIENCE**

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ALLIANCE MEMBERS WILL INTEGRATE PHYSICAL CLIMATE RISK AND PRIORITIZE CLIMATE ADAPTATION AND EQUITY IN STATE PLANNING AND DECISION MAKING TO...

help communities prevent, reduce, withstand, and recover from climate-related impacts and disasters. States, which have varying needs and capacity, will utilize and share best practices to bolster resilience and tailor effective solutions.

NEW HIGH-IMPACT ACTIONS

Create a statewide climate assessment or vulnerability assessment. (MA, ME, NM, NY, RI, WA)

Implement pilot or demonstration projects to show how infrastructure can be made resilient. (MA, NC)

Advance solar and storage solutions for most vulnerable post-disasters. (LA)

Alliance members have adopted or are in the process of adopting the following	
Resilience or adaptation plans CA, CO, CT, DE, HI, LA, ME, MI, MD, MA, MN, NJ, NY, NC, OR, PA, RI, VA, VT, WA	20
Resilience offices or interagency bodies CA, CO, CT, HI, LA, MA, MN, ME, NC, NJ, OR, RI, VA, WA	14

10.7 NATURAL & WORKING LANDS



ALLIANCE MEMBERS WILL SCALE BEST PRACTICES FOR LAND MANAGEMENT, RESTORATION, AND CONSERVATION TO CONTRIBUTE TO...

emissions reductions and carbon sequestration at the scale needed for deep decarbonization. Where appropriate, integrate natural and working lands into state mitigation and resilience plans with ambitious goals that center equity and prioritize actions that deliver multiple benefits.

NEW HIGH-IMPACT ACTIONS

Conserve at least 30 percent of land and coastal waters by 2030. (HI, LA, MI, OR, WA)

Commit to large-scale restoration of forests and other locally indigenous ecosystems. (HI, LA, MA, NM, RI)

Increase tree canopy in disadvantaged and/or heat vulnerable communities by at least 40 percent by 2030 to mitigate urban heat island effects. (HI, 0R)

Increase consumption of food produced within the jurisdiction to at least 20–30 percent of food consumed by 2030. (HI, 0R)

Halt biodiversity loss by 2030 and aim for habitat and population gains by 2035. (RI)

Improve inventory methods for land-based carbon flux. (LA, MA, MD, MN, NV, WA)

Identify best practices to reduce GHG emissions and increase resilient carbon sequestration. (MD, MN, WA)

Undertake actions that support a collective, Alliance-wide goal to maintain natural and working lands as a net sink of carbon and protect and increase carbon storage capacity. (MA, MD, MN, WA)

Advance programs, policies, and incentives to enhance resilient carbon sequestration. (ME)

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Alliance members have adopted or are in the process of adopting the following	
Natural and Working Lands in state GHG inventories CA, CO, DE, HI, MD, MA, ME, MN, NV, NM, NJ, NC, VT, WA, WI	15
Healthy soils legislation CA, CO, HI, IL, ME, MD, NM, VT, WA	9
Natural and Working Lands conservation or sequestration goals CA, CO, DE, HI, MA, MD, NM, OR, WI	9

10.8 SOCIAL COST OF GREENHOUSE GASES

ALLIANCE MEMBERS WILL CONSIDER SOCIETAL AND ENVIRONMENTAL IMPACTS OF GHG EMISSIONS AND CLIMATE CHANGE...

including the social cost of greenhouse gases, across relevant policymaking and decisionmaking processes, and guidance from the federal governments Interagency Working Group on the Social Cost of Greenhouse Gases and the academic and scientific communities.

NEW HIGH-IMPACT ACTIONS

Consider utilizing the SC-GHG in cost-benefit analysis as a part of rulemakings or environmental assessments. (HI)

Work towards describing the societal benefits of strategic plans, programs, or policies that will reduce GHG emissions. (HI)

Consider incorporating the SC-GHG when evaluating state procurements, contracts, grants, or permitting. (HI)

Alliance members have adopted or are in the process of adopting the following	
Social cost of greenhouse gases in policymaking CA, CO, CT, IL, MA, ME, MD, MN, NV, NJ, NY, OR, PA, VA, WA	15

10.9 ADDITIONAL STATE CLIMATE ACTIONS UNDERWAY



Alliance members are pursuing a comprehensive portfolio of climate solutions, including actions outside of the Alliance's new priority policy areas. These include setting ambitious GHG emissions-reduction targets, advancing climate governance, leading by example, mobilizing private investment in climate and clean energy, and engaging in and developing carbon markets.

Alliance members have adopted or are in the process of adopting the following	
ECONOMY-WIDE GHG TARGETS & CLIMATE GOVERNANCE	
Lead by Example programs and goals CA, CO, CT, DE, HI, IL, L A, ME, MD, MA, MI, MN, NV, NM, NJ, NY, NC, OR, PA, RI, VT, VA, WA, WI	24
Economy-wide GHG goals CA, CO, CT, HI, IL, L A, ME, MD, MA, MI, MN, NV, NJ, NM, NY, NC, OR, PA, RI, VT, VA, WA	22
State climate action plans CA, CO, CT, DE, HI, ME, MD, MA, MN, NV, NM, NJ, NY, NC, OR, PA, RI, VT, WA, WI	20
Net-zero GHG goals CA, HI, L A, MA, ME, MI, NM, NV, NY, RI, WA, VA, VT	13
CLIMATE FINANCE	
Green and/or resilient infrastructure banks CA, CO, CT, DE, HI, IL, LA, ME, MD, MI, NV, NY, PA, RI, VA	15
CARBON PRICING	
Carbon market participation CA, CT, DE, ME, MD, MA, NJ, NY, PA, RI, VA, VT, WA	13



HIGHLIGHTING SOLUTIONS across the Alliance

Lead by example solar project at the Blaine House in Augusta, Maine

Photo Credit: Maine Governor's Office of Policy Innovation and the Future

Appendix 1. Decarbonization Scenario Analysis

The U.S. Climate Alliance commissioned analysis from Energy and Environmental Economics, Inc. (E3) to assesses where Alliance-wide GHG emissions are headed through 2050. This appendix details the modeling methodology and scenario assumptions used in this analysis.

PATHWAYS AND RESOLVE MODELS

This analysis was conducted in E3's PATHWAYS model, which provides an overarching view of energy and emissions in the economy, and E3's RESOLVE model, which provides a moregranular view of electricity-sector capacity expansion and renewable integration solutions.

E3's model framework is summarized in Figure A-1. PATHWAYS accounts for all energy demands and sources of GHG emissions outside of the power sector, while RESOLVE models electricity generation in detail. E3 developed the PATHWAYS model using the Low Emissions Analysis Platform (LEAP),²⁵⁸ an application that tracks energy consumption and GHG emissions sources and sinks throughout the economy in user-defined scenarios.

E3's PATHWAYS model takes a "bottom-up" approach, meaning that users translate policies and measures into changes in physical infrastructure and energy, and then quantify the effect of those changes on overall economy-wide GHG emissions.





PATHWAYS uses a stock rollover approach in order to accurately capture the effects of policies like vehicle fuel economy standards (CAFE standards), building energy efficiency codes, and adoption of zero-emissions vehicles (ZEVs) over time (see Figure A-2). PATHWAYS tracks the lifetime of installed building equipment and vehicles and provides useful results such as annual ZEV sales required to meet a ZEV target, annual reductions in energy demand from increased adoption of efficient building shells, and total electricity demand by sector from both existing devices and new electrification loads. In addition, PATHWAYS produces liquid and gaseous fuel demands that are used as inputs to the low-carbon fuels and negative-emissions technology (NET) module, which optimizes the production of biomass-based and synthetic low-carbon fuels and deployment of NETs based on biomass feedstock supply, energy prices, and emissions targets.

The E3 PATHWAYS model includes a representation of the following sectors:

- Residential Buildings
- Commercial Buildings
- Industry
- Transportation
- Non-Energy/Non-Combustion Sectors
 - Agriculture
 - Industrial Processes and Product Uses (IPPU)
 - Coal Mining and Abandoned Mines
 - Natural Gas and Oil Systems
 - Solid Waste and Wastewater
 - Land-use, Land-use Change, and Forestry (LULUCF)

We include a stock rollover representation for 16 residential building sectors (e.g., space heating, water heating, lighting), 9 commercial building sectors, and 5 on-road transportation sectors (e.g., light-duty automobiles, heavy-duty trucks, buses). Other consuming sectors (e.g., industrial energy demand, aviation) are accounted for with total annual energy consumption by fuel and total annual emissions by pollutant. The default geography for the U.S. PATHWAYS model is the nine U.S. census divisions (Figure A-3), with state-level input





FIGURE A-03 US PATHWAYS Model Geography



FIGURE A-04 Electricity Generation Modeling Detail



Note: Colors denote operational regions modeled in RESOLVE. Solid black lines show reliability regions.

and outputs estimated using a range of scaling variables based on historical economic activity, energy consumption, and GHG emissions. This allows for the input of state-specific policies and viewing of state-level results, which can be aggregated up for the entire Alliance.

E3 utilizes our capacity expansion and system dispatch model, RESOLVE, to provide detailed insights into the electricity supply sector. RESOLVE is a capacity expansion model that uses linear optimization to identify the least-cost investment plan to meet the technical needs of the electric sector while simultaneously achieving aggressive policy goals. Originally developed to study the renewable integration challenges of California's aggressive RPS goals, RESOLVE has been used to study deep decarbonization scenarios in Colorado, the Pacific Northwest, the Upper Midwest, New York, New England, and the Middle Atlantic, among other regions. The operational regions in the U.S. RESOLVE model are shown in Figure A-4. Note, because Hawaii's electric sector is not represented in the national RESOLVE model, electric sector emissions in Hawaii were assumed to reach 70 percent below 2005 levels by 2030 and net-zero by 2045 in all scenarios (consistent with targets set by Hawaiian Electric and Hawaii's statutory GHG targets).

RESOLVE's optimization framework is tailored to analyze systems with high penetration of renewables. Key features include:

Co-optimization of investments and operations

 RESOLVE balances the costs of investments and operations to identify the least-cost generation portfolio from today through 2050. RESOLVE is typically run with five- or ten-year increments; all years are solved simultaneously, providing a forward-looking optimal plan.

Flexibility to model multiple policy design options

 The RESOLVE framework allows for simulation of multiple clean energy policy options applicable to the electricity sector, including GHG emissions caps, carbon taxes, renewables portfolio standards, and clean energy standards. Requirements may be defined to encompass different geographic scopes, allowing for comparison of regional and national policy approaches.

Effective integration with PATHWAYS electric-sector demand-side module

• Deep decarbonization scenarios inevitably lead to large changes in future energy demand that must be supplied by the electric sector, most notably due to electrification of transportation and buildings.

Hourly simulation of operations across representative days

 In an electricity system heavily reliant on wind, solar, and storage, capturing system operations on an hourly basis is essential to identifying the least-cost investment plan. For each modeling year, RESOLVE simulates hourly operations for a subset of representative days (e.g., a typical day for each month of the year). This day sampling methodology allows RESOLVE to capture seasonal and hourly challenges in energy balancing when making investment decisions.

An ELCC-based approach to ensuring reliability of portfolios

• RESOLVE relies on effective load carrying capability (ELCC) to measure the contribution of renewable and storage resources to reliability needs. ELCC is quickly becoming the consensus best practice within the industry to incorporate variable renewable resources like wind, solar, and storage into the resource adequacy framework; RESOLVE uses ELCC information to ensure that each portfolio has enough dependable capacity to meet a typical 1-in-10 (one day in ten years) standard.

SCENARIO INPUTS

The U.S. Climate Alliance designed four scenarios of Alliance-wide GHG emissions:

- 1. **Reference Scenario:** Includes existing and final statutory/regulatory measures in Alliance states as of July 1, 2021, but no new policies
- 2. **Federal Action Scenario:** Includes proposed and feasible federal actions such as those signaled in the AJP and other executive actions
- Collective Action Scenario: Alliance states and/or the federal government take a suite of ambitious actions to achieve 50–52 percent below 2005 levels by 2030 and net-zero GHG emissions by 2050
- 4. Existing GHG Targets Scenario: Alliance states put additional policies and actions into place to achieve their individual GHG emissions reduction goals
- 5. **Detailed input assumptions** for each of these scenarios are described in the sections that follow.

Reference Scenario

The Reference Scenario reflects a "business-as-usual" future with no new policies but includes existing state and federal statutory/regulatory measures as of July 1, 2021. The Reference Scenario is designed to align with key drivers (e.g., population growth, VMT growth) and outputs from the 2020 EIA *Annual Energy Outlook* at the national level, with the additional state-specific adjustments made based on input from Alliance member states.

SECTOR	INPUT ASSUMPTIONS
Electricity Generation	State renewable portfolio standards (RPS), clean energy standards (CES), and emissions-reductions requirements
Transportation	State zero-emissions vehicle (ZEV) programs, low-carbon fuel standard (LCFS) programs, and ZEV bus procurement requirements
Buildings	State building code updates, building performance standards, funded energy efficiency measures
HFCs	State backstop programs for EPA Significant New Alternatives Policy (SNAP), other state refrigerant management programs, and federal Kigali Amendment adoption through AIM Act
Oil and Gas	State oil and gas fugitive methane reduction requirements

Federal Action Scenario

Building on the Reference Scenario, this scenario incorporates proposed and feasible federal actions such as those signaled in the American Jobs Plan and other executive actions, as of August 2021.

WEDGE	INPUT ASSUMPTIONS
Clean Electricity	80 percent CES by 2030
Efficiency	NHTSA proposed passenger vehicle fuel economy standards (12 mpg average increase for MY2026 vs MY2021) ²⁵⁹
	Increased sales of efficient appliances for buildings, efficient buildings shells
	Moderate increase in industrial energy efficiency for manufacturing
Building and Transportation	29 percent heat pump sales by 2030, 60 percent by 2050 (based on output from E3 residential heat pump adoption model without additional incentives)
Electrification	50 percent LDV EV sales by 2030, 75 percent by 2050 (based on output from E3 LDV EV adoption model with extended \$7,500 tax credit)
Oil and Gas Methane Measures	25 percent reduction in CH_4 emissions relative to Reference by 2030, 36 percent by 2050 (cost-effective reductions available below \$0/tCO ₂ e from EPA Non-CO ₂ Mitigation Report) ²⁶⁰
	Annual reductions in abandoned well CH4 emissions through 2031 based on RFF analysis of Energy Infrastructure Act

Collective Action Scenario

Building on the Federal Action Scenario, this scenario quantifies the impact of policy actions that the collective USCA states and/or the federal government could take to achieve 50-52 percent below 2005 levels by 2030 and net zero GHG emissions by 2050.

WEDGE	ASSUMPTIONS
100 Percent Clean Electricity	80 percent CES by 2030, 100 percent by 2035
Zero-Carbon New Construction	All-electric new buildings with high-efficiency appliances and building shells by 2030 for new residential and commercial construction
Existing Buildings Performance Standards	All-electric and high-efficiency appliance sales for existing buildings by 2035, along with widespread building shell retrofits
Zero-Emissions Passenger Vehicles	ZEV sales mandate for light-duty automobiles and light-duty trucks takes effect in 2035
Zero-Emissions Trucks	ZEV sales mandate for MHDVs and buses takes effect in 2045
Industrial Energy Efficiency	Widespread adoption of current and emerging efficiency practices for manufacturing identified in ACEEE <i>Halfway There</i> report ²⁶¹
Industrial Electrification	High end of industrial natural gas electrification potential identified in NREL <i>Electrification Futures Study</i> , ²⁶² liquid fuels electrification aligned with MHDV ZEV mandate
Refrigerant Management Policies	Reductions align with California SB 1393 target and CARB Refrigerant Management Program (40 percent reduction below 2013 levels by 2030) ²⁶³
Agriculture and Waste Reductions	Cost-effective reductions below $50/tCO_2e$ identified in EPA Non-CO ₂ Mitigation Report ²⁶⁴
Oil and Gas Fugitive Methane Reductions	Maximum technical abatement identified in EPA Non-CO2 Mitigation Report265
Reduced Oil and Gas Activity	Energy demand for oil and gas extraction and processing declines with domestic consumption
Low-Carbon Fuels	Economy-wide LCFS encompassing fuel demands across all sectors designed to achieve 50 percent by 2030 and deeper reductions by 2050
Natural and Working Lands	Mid-point of high and low sequestration growth trajectories from 2016 Biennial Report ²⁶⁶
CCS	Industrial CCS for cement and iron & steel manufacturing and BECCS for $\rm H_2$ production

GHG Targets Scenario

The State GHG Targets scenario calculates the impact of states achieving the collective Alliance target (26 percent by 2025) and their individual targets:

YEAR	STATES WITH INCLUDED GHG TARGETS
2025	MI, MN, NC, NV
2030	CA, CO, CT, LA, ME, MD, MA, NV, NM, NY, RI, VT, WA
2035	OR
2040	MA, RI, WA
2045	CA, HI, ME, VA
2050	CO, CT, LA, ME, MD, MA, MI, MN, NV, NJ, NY, OR, PA, RI, VT, WA

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