

Delivering on

AMERICA'S PLEDGE

Achieving Climate Progress
in 2020





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About America's Pledge

An unprecedented coalition of US states, cities, businesses, communities of faith, universities, health care and cultural institutions, and other organizations is now acting to fulfill America's climate pledge to the world. This commitment is reflected in the large number of American actors continuing to back the Paris Agreement, including members of the We Are Still In network, US Climate Alliance, Climate Mayors, We Mean Business, and many others.

In July 2017, United Nations Secretary-General's Special Envoy for Climate Action and three-term Mayor of New York City Michael R. Bloomberg and California Governor Edmund G. Brown, Jr., launched an initiative, known as America's Pledge, to analyze, catalyze, and showcase climate action leadership by US governors, mayors, business leaders, and others. America's Pledge serves these efforts as a voice of US action to the international community—and also to our domestic actors to better understand the significant impact that their actions are achieving as activity broadens and deepens across the country.

In November 2017, at the 23rd Conference of the Parties to the United Nations Framework Convention on Climate Change (COP-23), America's Pledge released a comprehensive survey of US climate action led by states, cities, and businesses and other non-Federal actors. At the Global Climate Action Summit in San Francisco in 2018, America's Pledge released *Fulfilling*

America's Pledge, providing at that point the most comprehensive and robust assessment of the impact of action by US states, cities, businesses, and others. In December 2019, at the 25th Conference of Parties in Madrid, America's Pledge released *Accelerating America's Pledge*, updating the assessment of impact and looking ahead toward 2030 to assess what can be delivered with an "All-In" comprehensive American climate approach that first expands actions by states, cities, businesses, and citizens and then layers on a robust, complementary, and ambitious federal policy program after 2020.

With this report, released September 2020 at the Bloomberg Green Virtual Festival, America's Pledge assesses how states, cities, and businesses are continuing to drive climate progress despite the events of 2020—including the COVID-19 pandemic and economic recession—and increasing our confidence in the country's ability to achieve the 2030 emissions reductions modeled in *Accelerating America's Pledge*.

Acknowledgments

America's Pledge is co-chaired by Michael Bloomberg and Edmund G. Brown. The America's Pledge Vice-Chairs are Carl Pope, former Executive Director of the Sierra Club, and Mary Nichols, Chair of the California Air Resources Board. The America's Pledge report is the product of a collaborative effort between the leadership of the America's Pledge initiative and a core project team. The America's Pledge project team responsible for this report is co-led by the University of Maryland Center for Global Sustainability and Rocky Mountain Institute. Significant contributions to this year's report were also made by the World Resources Institute. Support for America's Pledge is provided by Bloomberg Philanthropies. Special thanks to significant and sustained input and helpful comments from Carl Pope, Co-Vice-Chair of America's Pledge. America's Pledge would also like to thank the numerous stakeholders and reviewers that made suggestions to improve the framing and analysis of this report.

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Introduction Letter from America's Pledge Leadership

Over the past three years, America's Pledge has tracked, encouraged, and reported on the progress of one of the most dynamic efforts to fight climate change in history—a coalition of US states, cities, businesses, and local leaders working to fill the void created by the Trump administration's shortsighted decision to walk away from America's climate obligations.

We launched America's Pledge in July 2017, after the Trump administration announced its intent to pull out of the historic Paris Agreement. Coalitions of local leaders, including We Are Still In and the US Climate Alliance, quickly emerged to announce their continued commitment to upholding the goals of the Paris Agreement in their own communities. In the three years since, even in the face of rollbacks from the federal government and, more recently, the global pandemic, we have made a great deal of progress together.

This is our fourth report measuring the progress of this movement. The focus of this year's report is the long-term impact of the COVID-19 pandemic. This unprecedented economic and public health crisis has uprooted our way of life. It has led many to believe that the stresses it has put on our institutions would drive the US back into increased dependence on fossil fuels, and away from current efforts to reduce emissions and transition to a 100% clean energy economy.

Thankfully, that has not been the case. In fact, by every outcome we could measure, the data tells a very different story. Thanks to a groundswell of bottom-up climate leadership across the country, America's commitment to fulfilling its climate goals appears unshakeable.

There is no doubt we need a leadership change in Washington. To fight climate change with the urgency that scientists call for will require bold leadership from the White House—here at home and on the world stage. But we've found that the American people and our state, local, and business leaders are already committed to this work—and together we're building a more equitable and sustainable future.

Michael R. Bloomberg

Founder, Bloomberg LP & Bloomberg Philanthropies and three-term Mayor of New York City

Edmund G. Brown Jr.

Former Governor of California

Mary D. Nichols

Chair of the California Air Resources Board

Carl Pope

Former Executive Director of the Sierra Club

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Executive Summary

Highlights

Our US sector-by-sector assessment increases our confidence that bottom-up action is driving climate and clean energy ambition, despite the challenges posed by COVID-19. Increased and lower-cost emissions reduction opportunities are laying the foundation for an “all in” climate strategy that includes ambitious federal re-engagement. Accelerated market transformation and increasing social and political mobilization will be key to enable the comprehensive strategy that can put the country onto a 1.5°C-aligned emissions reduction pathway.

States, cities, and businesses are leading America to a climate-friendlier future even in the face of the enormous economic and public health crisis caused by COVID-19. Despite immense challenges, states, cities, and businesses have accelerated climate and clean energy progress in four out of five key sectors. Economic support for state and local governments will likely be key to the needed speed of progress in the years ahead.

Demand for clean technologies has proven resilient, suggesting that we may have passed a tipping point in the energy transition. Leadership from diverse states, cities, and businesses, combined with strong clean energy market fundamentals and supportive public opinion point toward powerful winds of change across America’s energy landscape.

Climate initiatives can be more rapidly and reliably achieved with the aid of federal stimulus programs that include ambitious clean energy investments and policies. Support for grid modernization, electric transit, zero-emissions buildings, end-of-life refrigerant disposal, cleanup of the legacy of fossil fuel mining and drilling, and investment in low-income and impacted communities can strengthen the economy, create jobs, improve public health, reduce air and water pollution, promote equity, and address climate change.

In 2019, our report *Accelerating America’s Pledge* illustrated how states, cities, businesses, and others across the United States could achieve 37% emissions reductions below 2005 levels by 2030 with significantly expanded action (the “Bottom-Up” scenario). It also plotted out how to achieve 49% emissions reductions below 2005 levels by 2030 with aggressive federal reengagement starting in 2021 (the “All In” scenario). This All In scenario would put the United States on a pathway to a net-zero emissions economy by mid-century.

Since the 2019 report, the COVID-19 pandemic and subsequent economic recession have had wide-ranging and destructive impacts on lives, employment, and economic security across the United States and the world. At the same time, widespread protests have increased attention from the public, governments, and businesses on the need for racial and social justice. In this new analysis, we assess how recent trends have affected climate progress driven by states, cities, and businesses. Specifically, we look at

how recent trends may have altered our confidence in the country's ability to achieve the 2030 emissions reductions modeled in *Accelerating America's Pledge*.

To measure these prospects, we examine key drivers in the five sectors that offered the greatest opportunities for 2030 emissions reductions in the Bottom-Up scenario from *Accelerating America's Pledge*: electricity, transportation, methane, buildings, and hydrofluorocarbons (HFCs). Methane and HFCs are subsets of the industrial sector; we broke them out separately to discuss specific recent developments. Together these sectors provide almost 95% of the economy-wide total avoided emissions in 2030 in the Bottom-Up scenario, building toward further emissions reduction post-2030.

Across sectors, we separate trends that will have long-lasting effects (e.g., investments in new infrastructure) from the immediate social and economic changes that dominate 2020 but are likely to prove more ephemeral (e.g., many temporary market and behavior changes). Similarly, we consider how quickly economic stimulus measures and other policies could reinforce the positive trends or mitigate the risks. Positive trends are those likely to lead to lower emissions in 2030 than

we modeled in our 2019 report; negative trends are those likely to lead to higher emissions in 2030 than we modeled.

For each sector, after considering the key drivers individually, we evaluate how these drivers add up relative to the ambitious levels of bottom-up climate action modeled in *Accelerating America's Pledge*. In this 2020 report, we do not conduct a new economy-wide analysis of emissions for 2030. Rather, we evaluate whether recent trends have undercut the clean energy transition taking hold across the country, and whether the changed circumstances of 2020 have affected our confidence in achieving the Bottom-Up scenario from 2019.



Terminology for US Entities Acting on Climate Change

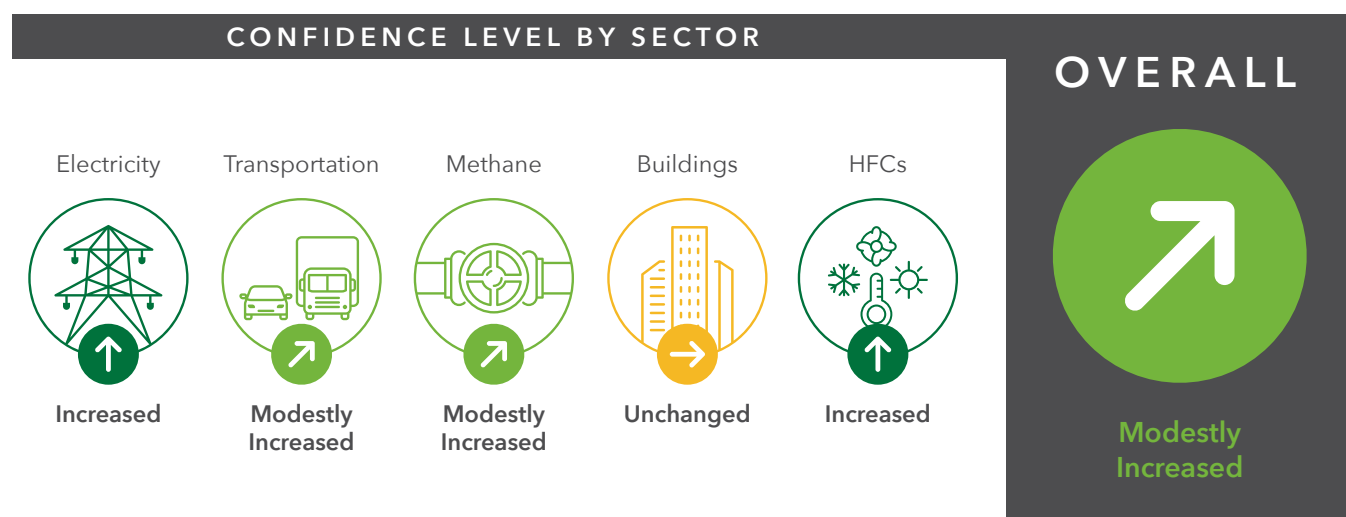
As shorthand, this report refers to the many US entities taking action on climate change outside the federal government as *states, cities, and businesses*. However, these are not the only important actors. Tribes, counties, regional associations, investors, faith-based groups, healthcare institutions, cultural institutions, universities, citizen groups, and others are all also making efforts to address climate change. In other reports and in the context of the Paris Agreement and the United Nations Framework Convention on Climate Change, such groups are sometimes called non-state actors, subnational actors, non-federal actors, or non-party stakeholders.

Trends Assessment

As described in our key findings that follow, our sector-level assessments range from substantially increased confidence to unchanged confidence. For four of the five sectors our confidence increased while in the fifth it was unchanged, despite the pandemic and the recession. The pace and number of increased emissions reductions opportunities are exceeding new risks and barriers.

Devastating as it has been, the COVID-19 pandemic has not shaken the climate commitment of US states, cities, and businesses. In the midst of a public health and economic crisis, they have continued to drive ahead—in many cases with even greater resolve—toward a fully decarbonized economy by mid-century. Stimulus relief could help put states and cities in a position to continue this trend.

Exhibit 1 Overall Confidence in Ability to Achieve 2030 Emissions Reductions

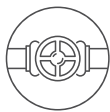


Despite the challenges posed by the events of 2020, our sector-by-sector assessment **modestly increases** our confidence that bottom-up action can achieve the emissions reductions modeled in *Accelerating America's Pledge* (2019).

Selected Examples of Subnational Climate and Clean Energy Successes

Since the last America's Pledge report in December 2019, states, cities, and businesses have continued to take significant climate and clean energy actions. These are some highlights of successes that have occurred through August 2020.

**DEC
2019**



Colorado adopts updated and strengthened controls on emissions from oil and gas industry

JAN



New York state announces \$2 billion in utility efficiency and electrification programs, including \$434 million for heat pumps

California issues \$45 million for heat pump water heater incentives, including \$4 million for low-income customers

FEB



EPA reports that ALDI installed climate-friendly refrigerants in 110 additional stores in 2019

MAR



Washington state adopts zero-emission vehicle (ZEV) program

APR



NRDC wins legal battle, forcing EPA to reinstate limits on HFC use

US Senate holds socially distanced hearing on HFC legislation



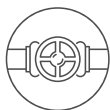
Virginia commits to 100% zero-carbon electricity

Houston commits to 100% renewable energy to power all municipal operations

MAY



Kansas City commits to carbon neutrality by 2040



Pennsylvania releases draft rules to reduce emissions from existing oil and gas infrastructure



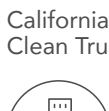
Colorado and Virginia enact policies to phase out super-polluting HFCs

JUN



Lyft commits to achieve 100% electric vehicles (EVs) on its platform by 2030

Electrify America completes the first cross-country EV charging route



California passes Advanced Clean Trucks (ACT) rule



Xcel proposes \$3 billion in new efficiency programs and rebates



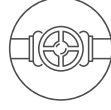
City of Jacksonville Electric Authority and Florida Power & Light Company agree to close one unit of largest US coal plant

JUL



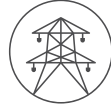
15 states and DC commit to 100% zero-emission medium- and heavy-duty vehicles by mid-century

New York launches \$701 million EV charging infrastructure program



New Mexico releases draft rules to reduce emissions from oil and gas industry

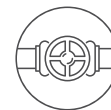
North Dakota begins using CARES Act funding to plug abandoned oil and gas wells



New Mexico approves 100% renewables and storage to replace retiring coal capacity

Wisconsin-based WEC Energy Group announces carbon neutral electric generation by 2050 target

AUG



Membership in ONE Future coalition committed to industry-wide methane emissions reduction increases to 27 companies



California finalizes clean car agreements with six major automakers



Maryland Department of the Environment proposes HFC regulations

Change in Confidence:

-  Increased
-  Modestly Increased
-  Unchanged
-  Decreased

Exhibit 3 **Change in Confidence by Driver****ELECTRICITY**

Coal Generation Has Declined Sharply, and Coal Retirements Have Accelerated

Long-term Drivers of Renewable Energy Investment Remain Strong

Economics of Gas Generation Face Headwinds, and Gas Buildout Holds Steady

Progress on State, City, and Business Clean Electricity is Mixed

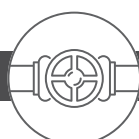
**TRANSPORTATION**

People Are Driving Less

Public Transit Is Facing an Existential Budget Shortfall

Electric Vehicle Prospects Appear Steady

Political Will Is Growing to Address Emissions from Heavy-Duty Transportation

**METHANE**

Prospects for Growth in US Oil and Gas Production Are Dimming

Methane Leaks from Existing Infrastructure Are Rising

Regulatory Landscape Continues to Shift

**BUILDINGS**

Trends in Efficiency Programs Are Mixed

Efforts to Electrify Are Progressing Despite Growing Signs of Opposition

**HFCs**

State HFC Action Is Expanding

Federal Regulatory Rollback Is Countering State-Level Action



Below we summarize our findings across all five sectors.



Electricity

The strong economic fundamentals of clean energy **increase our confidence** in continued clean energy expansion consistent with our modeling in *Accelerating America's Pledge*.

Electricity generation is continuing to shift away from coal and towards renewables, indicating that we have passed a tipping point in the energy transition. Between January and June 2020, the US Department of Energy–Energy Information Administration's (EIA) monthly tally of planned coal retirements beginning in 2021

increased by more than 13 GW, with more utilities announcing plans to go coal-free since then; EIA's data show an 11.8 GW net increase in permitted utility-scale wind and solar projects over the same few months.¹

While the pandemic and economic downturn have slowed some renewables projects and clean energy legislation, state clean electricity targets and voluntary clean energy purchases by cities and businesses are likely to continue to drive additions over the next decade.



Transportation

Accelerated progress on medium- and heavy-duty electric vehicles and the potential for long-term reductions in miles driven are expected to outweigh currently negative public transit trends. This **modestly increases our confidence** in the country's ability to shift to electric vehicles and reduce vehicle miles travelled (VMT) consistent with our modeling in *Accelerating America's Pledge*

The United States will likely adjust to a "new normal" following the pandemic, which may include enduring changes in behavior around remote working and e-commerce. Such changes could lead to a permanent drop in VMT of as much as 10%.² Furthermore, states have announced goals that would reduce emissions from medium- and heavy-duty vehicles almost twice as fast as modeled in *Accelerating America's Pledge's* Bottom-Up scenario.³

Meanwhile, light-duty emissions rules, zero-emission vehicle standards, and electric vehicle sales are proving to be about on par with the Bottom-Up scenario, though their impact may be slightly delayed due to a temporary reduction in auto sales. Public transit agencies, which are projecting a \$40 billion budget shortfall this year, will need significant support in upcoming economic recovery and stimulus packages to restore and maintain service while protecting riders and drivers.⁴

We expect the short-term increase in emissions from reduced transit commuting to be outweighed by the overall, enduring reduction in VMT. The long-term trends in this sector will depend on the extent and durability of behavioral change around commuting and transit, as well as the pace of electrification.



Methane

The oil and gas industry faces pressure from recent price shocks and reduced long-term demand expectations, including from accelerated global policy and industry support for electric light- and heavy-duty vehicles. This pressure **modestly increases our confidence** in the country's ability to reduce methane emissions from oil and gas systems consistent with our modeling in *Accelerating America's Pledge*.

Demand, production, and investment have declined significantly as a result of near-term price shocks, and the long-term market outlook has weakened amid global oversupply and gathering policy and industry support for vehicle electrification. In the first quarter of 2020 alone, publicly traded US oil producers wrote down at least \$48 billion

in assets, and industry growth projections are lower through 2030 than we modeled in 2019. These trends are already reducing infrastructure buildout and rig counts. If continued, these trends would substantially reduce the potential for methane emissions from new sources.

Key risk factors and uncertainties remain as regulatory trends continue to be patchwork in nature and emissions from existing sources, particularly from idle and abandoned wells, appear to be on the rise. However, we expect these risks to be outweighed by a diminished industry growth outlook and long-term policy trends.



Buildings

Recent trends are unlikely to have significant long-term impacts, **leaving our confidence largely unchanged** in the country's ability to move toward continued efficiency increases and all-electric new buildings and appliances consistent with our modeling in *Accelerating America's Pledge*.

Some jurisdictions are increasing investments in efficiency to address the economic hardships brought on by the pandemic. For example, Michigan and New York have bolstered low-income efficiency programs and energy assistance as a means of helping ease high energy bills. However, COVID-19 and the economic downturn have

stalled program implementation, financial investments, and policy enactment in other jurisdictions. For example, Missouri, Ohio, and New Jersey regulators have proposed diverting funding from utility energy efficiency programs into bill payment assistance funds. Efforts to electrify new and existing buildings have continued to grow, though electrification policies have met with political resistance in some states.



HFCs

Significant momentum in state-level HFC policies and the push for federal legislation outweigh federal regulatory rollbacks. This **increases our confidence** in the country's ability to phase down HFC use and improve reclamation from existing systems consistent with our modeling in *Accelerating America's Pledge*.

Most notably, 16 states have now passed or proposed HFC policies, businesses are investing in climate-friendly refrigeration

and air conditioning solutions, and industry is pushing for federal legislation requiring phasedowns of high-global warming potential HFCs, in line with the Kigali Amendment. These trends are likely to outweigh the negative impact of recent regulatory rollbacks at the federal level and result in HFC emissions reductions that exceed expectations from our ambitious Bottom-Up scenario detailed in last year's report.



In four of the five sectors—electricity, transportation, methane, and HFCs—recent trends are increasing confidence in the ability to achieve the modeled 2030 emissions reductions by states, cities, and businesses. In the only remaining sector assessed—buildings—prospects for emissions reductions appear substantially unchanged from our previous ambitious analysis. Overall, the pace and number of increased emissions reduction opportunities are exceeding new

risks and barriers. Together these five sectors were responsible for over 75% of US GHG emissions in 2018 and provided nearly 95% of the economy-wide 2030 total avoided emissions modeled in the Bottom-Up scenario in *Accelerating America's Pledge*.

Stimulus and Recovery Opportunities

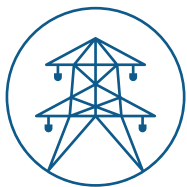
Accelerating America's Pledge emphasized that achieving those ambitious levels of emissions reductions will require accelerated market transformation and significant social and political mobilization around climate action. A massive, accelerated effort is still needed from both the federal government and states, cities, and businesses to deploy clean energy and other solutions at the speed and scale envisioned in the scenarios from the 2019 report.

Federal economic recovery and stimulus packages provide a critical opportunity to maintain momentum and further spur needed climate action. Importantly, policies aimed at keeping state and local governments solvent are likely to be key to continued momentum in the years ahead—without this infusion, progress could slow, resulting in an inability to achieve the needed 2030 emissions reductions. As we evaluate the key drivers in each sector, we identify key stimulus opportunities that could accelerate progress toward needed 2030 emissions reductions and help address risks to that progress. Investments in public transit and methane leak reduction are particularly critical to avoid recent threats to modeled emissions reductions. Key opportunities across the sectors include:

- **Electricity:** renewable energy and storage financial incentives, grid modernization, and just transition support
- **Transportation:** support for public transit, electric vehicle manufacturing, and charging infrastructure; purchase incentives; workforce training; and complete streets
- **Methane:** programs to address idle and abandoned wells and other infrastructure, advanced monitoring and efficiency, and support for state and local governments and at-risk communities
- **Buildings:** zero-emissions buildings and appliance incentives, weatherization and efficiency retrofits, and prioritizing low-income housing for efficiency and electrification
- **HFCs:** heating, ventilation, and air-conditioning (HVAC) industry and consumer incentives for climate-friendly conversions and end-of-life HFC disposal

Finally, the robustness of public attitudes and institutional commitments to clean energy, even in the face of this great challenge, are strong validators of increasing demand for and political salience of a rapid clean energy transition. Polling in June found that 71% of Americans surveyed supported the goal of a 100% clean energy economy by 2050. And from 2015 to 2020, the community that feels climate change is extremely important to them personally has nearly doubled from 13% to 25%.⁵

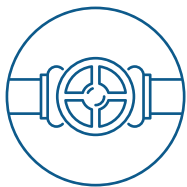
Continued leadership by diverse businesses and cities across the political and geographic spectrum, and a broad array of states, combined with strong public opinion in favor of clean energy, demonstrate powerful, resilient winds of change sweeping America's energy landscape.

Exhibit 4 **Potential Stimulus and Recovery Policies****Electricity**

- Financial incentives for renewable energy and storage
- Investment in grid modernization
- Support for a just transition

**Transportation**

- Funding for public transit
- EV funding (manufacturing, purchase incentives, charging)
- Workforce training
- Complete streets

**Methane**

- Clean up idle and abandoned infrastructure
- Advanced monitoring and efficiency
- Funding support for local jurisdictions and at-risk communities

**Buildings**

- Zero-emissions buildings and appliance incentives
- Expansion of weatherization and efficiency retrofitting
- Efficiency and electrification for low-income housing

**HFCs**

- Tax credits for HVAC installers
- Consumer efficiency incentives
- End-of-life HFC disposal

Introduction



America's Pledge was established in 2017 to understand and communicate the collective impact of climate leadership by US states, cities, and businesses. Our 2019 report, *Accelerating America's Pledge*, demonstrated the power and potential of these actors to drive US greenhouse gas (GHG) emissions reductions by accelerating the shift toward 100% clean energy; decarbonizing transportation, buildings, and industry; and enhancing the carbon storage potential of natural and working lands.

The 2019 analysis showed that ambitious and rapidly expanded bottom-up action by states, cities, and businesses could reduce US GHG emissions up to 37% below 2005 levels by 2030, even without federal leadership. It found that an all-in, comprehensive strategy combining aggressive federal reengagement starting in 2021 with expanded state, city, and business efforts could reduce US GHG emissions 49% below 2005 levels by 2030. This would put the United States on a pathway consistent with a net-zero carbon economy by 2050.

Since the 2019 report, the COVID-19 pandemic and subsequent economic recession has had a wide-ranging and devastating impact on public health, employment, and economic security across the United States and the world. Individuals and communities are suffering from loss of life and income, disruptions to work, school, and childcare, and restrictions on daily activity that largely confine people to their homes. At the same time, widespread protests have increased attention from the public, governments, and businesses on the need for racial and social justice.

States, cities, and businesses are facing unprecedented challenges and are working to protect the health and well-being of residents, employees, and customers while facing major revenue losses from the economic downturn. As entities across the United States struggle to manage the public health crisis along with a rise in social unrest, increased unemployment, and significant financial challenges, they are being forced to cut budgets, realign priorities, delay

or cancel projects, and lay off or furlough workers. For example, about 1.5 million jobs were lost in state and local government from March to early June.⁶

Although these challenges have disrupted legislative sessions, interrupted regulatory agendas, and delayed many energy projects, states, cities, and businesses continue to lead and often to accelerate climate action. At the same time, the recession is changing the market forces affecting the energy transition, creating some dynamics that help clean technologies and others that hinder the transition. Together, these trends have called into question whether the trajectory of climate progress has improved, worsened, or remained relatively unchanged.

In this report, we seek to answer:

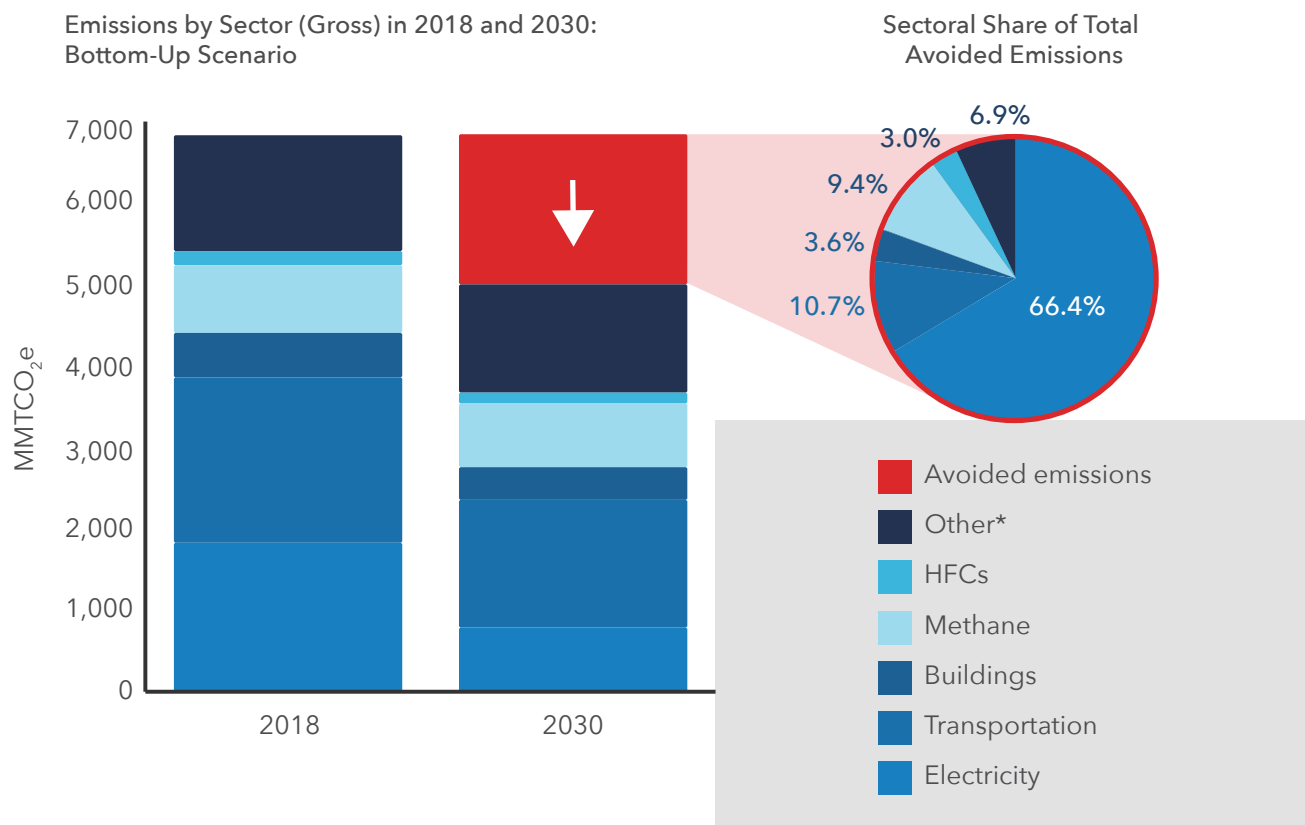
- How have changes since the 2019 report, including COVID-19 and the economic recession, affected bottom-up climate progress?
- Have recent events increased or decreased our confidence in the ability to achieve the 2030 emissions reductions modeled in *Accelerating America's Pledge*?
- How can COVID-related stimulus policies be used to accelerate climate progress?

To answer these questions, we focused on five sectors—electricity, transportation, methane, buildings, and HFCs—which together provide almost 95% of the 2030 economy-wide total avoided emissions in the Bottom-Up scenario of *Accelerating America's Pledge*.ⁱ For each, we identified the key drivers affecting emissions since the last report (whether explicitly COVID-related or not), characterized the direction and extent of recent trends, and assessed their potential to affect emissions reductions in 2030.



ⁱ Electricity corresponds directly with Climate Action Principle 1 (Accelerate Toward 100% Clean Energy) of *Accelerating America's Pledge*. Transportation and buildings correspond directly with two of the sectors within Principle 2 (Decarbonize End-Uses). Methane and HFCs are key parts of the industry sector (also part of Principle 2) where we have seen a lot of movement over the last several months. Given their cross-cutting nature, we chose to address methane and HFCs by gas instead of end use. Although methane and HFCs are types of greenhouse gases, not economic sectors, we use the term "sectors" for simplicity in this report to describe the industrial processes and infrastructure leading to emissions of those gases.

Exhibit 5 2018 GHG Emissions and 2030 Accelerating America's Pledge Emissions Reductions Potential by Sector



Source: EPA GHG Inventory, *Accelerating America's Pledge* (2019)

* This graph focuses on the five sectors assessed in this 2020 analysis. "Other" is the sum of all remaining sources of emissions, including CO₂ emissions from the rest of industry and additional sources of non-CO₂ emissions such as N₂O emissions from agriculture. Sources of emissions and sinks from Land Use, Land Use Change, and Forestry (LULUCF) are excluded from these totals. Due to stock and flow constraints, sectors with smaller 2030 emissions reductions ramp up reductions significantly after 2030.

Across sectors, we separated trends that will have long-lasting effects from the immediate social and economic impacts that dominate 2020 but are likely to prove more ephemeral. Trends with long-lasting effects include investments in new infrastructure, while immediate social and economic impacts

include temporary behavior changes forced by shutdowns and market blips like the briefly negative oil prices in the spring. Similarly, we considered how quickly economic stimulus measures and other policies could reinforce the positive trends or mitigate the risks.

Although we have assessed in depth the prospects for bottom-up climate action in the United States—in light of the major social and economic disruptions of 2020—we have not updated the emissions scenario results in *Accelerating America's Pledge*. The unknown course of the current recession and recovery casts uncertainty on the rate of economic growth over the next decade. Any attempt to offer an updated emissions assessment for 2030 would have a similarly wide range of uncertainty. For example, the Rhodium Group attempted to calculate the likely pathway to recovery and concluded that 2030 emissions were likely to be from 2%–12% below its previous estimate.⁷

We chose not to try to incorporate such a wide range of economic pathways in this report. While it is important to understand those uncertainties, our purpose here is to evaluate whether the accelerated market transformation and significant social and political mobilization that we modeled in 2019 remains viable in the wake of COVID-19. We *conclude that it is*.

The report's chapters are organized by sector, ordered based on their contribution to modeled 2030 emissions reductions in the Bottom-Up scenario from *Accelerating America's Pledge*. Importantly, some sectors will have greater contributions to emissions reductions after 2030 because stock and flow turnover takes time. In each chapter, we:

- Identify the emissions drivers
- Describe each driver's impact to date and its likelihood to have a long-term impact
- Identify stimulus actions that can accelerate climate progress while creating jobs and stimulating the economy
- Assess the net impact of all drivers in the sector

We conclude by discussing the net impact of trends across all sectors and summarizing the highest priority stimulus actions.



01 Electricity



In 2018, electricity production generated 27% of US greenhouse gas emissions, primarily from coal- and gas-fired electric generators.⁸ *Accelerating America's Pledge* found that changes in the electricity sector would account for 1,226 MMTCO₂e of avoided emissions in 2030 in our Bottom-Up scenario—approximately two-thirds of the economy-wide total avoided emissions in 2030. The report modeled that renewable electricity market share would increase from 17% in 2019 to 40% by 2030 in the Bottom-

Up scenario, while coal and gas without carbon capture, utilization, and storage would decrease their share of electricity generation from 24% and 37% to 7% and 32%, respectively.

Whereas the electricity generation mix can shift rapidly among existing power plants based on current market conditions, long-term trends are driven by the deployment, retirement, and turnover of long-lived infrastructure and assets.

Trends Assessment

The following are major drivers of emissions with potential long-term impacts:

- *Coal generation has declined sharply, and coal retirements have accelerated*, not only leading to emissions reductions in the short term but also potentially speeding progress toward deeper power sector emissions reductions.
- *Long-term drivers of renewable energy investment remain strong* and, despite any near-term disruptions to the industry, renewables' role in the power sector will continue to expand. This will enable the country to meet the bottom-up ambition of *Accelerating America's Pledge*.
- *The economics of gas generation face headwinds, and gas buildout holds steady*, suggesting that the pace of new gas plant construction may not reach projected high levels going forward.
- *Progress on state, city, and business clean electricity is mixed*, with some actors continuing and others stalling action.

Note that we do not discuss electricity demand or nuclear generation as separate drivers for the following reasons:

- **Electricity demand:** The near-term reduction in electricity demand is likely to be temporary. We do discuss the implications of reduced demand for the economics of coal generation, as changing economic dynamics could have a long-term emissions impact.

- **Nuclear generation:** The prospects for nuclear energy in the nation's electricity mix in the coming decade remain largely unchanged from what we anticipated in 2019.

Overall, recent trends are reinforcing the longer-term shift to clean electricity, increasing confidence in continued clean energy expansion consistent with our modeling in *Accelerating America's Pledge*. Reduced electricity demand has increased economic pressure on coal generation, pushing it closer to a breaking point. The increasing contribution of renewables is largely market-driven and likely to prove durable as states continue to increase their clean electricity commitments.

Stimulus and recovery packages targeting renewable energy, grid modernization, and transition opportunities for fossil fuel workers and local communities can help accelerate progress toward needed 2030 emissions reductions while creating jobs and promoting equity. In contrast, a stimulus package that ramps up fossil fuel use would lock in decades of high-carbon, polluting, and inefficient infrastructure.

Overall Change in Confidence for
ELECTRICITY



INCREASED



Increased

Key Driver #1 Coal Generation Has Declined Sharply, and Coal Retirements Have Accelerated

Coal is the only generation source with a meaningful decline in generation in March, April, and May 2020, compared to the same period in 2019.⁹ The EIA forecasts that coal's share of electricity generation will fall from 24% in 2019 to 18% in 2020 and then will rebound to 22% in 2021.¹⁰ Moody's forecasts that coal's share will fall to 17% or below this year and will not rebound in 2021, based on its expectations of additional shutdowns of coal-fired plants and persistently low gas prices.¹¹

The combination of reduced power demand during the pandemic, reduced access to capital for US coal companies, and increasing climate concerns could trigger new closure announcements in the next couple of years.¹² Monthly data on the status of generating units suggests this is already happening. In January, generators reported 28.7 gigawatts (GW) of planned coal retirements beginning in 2021; in June, reports showed 42.1 GW.¹³ Additional utilities have announced plans to go coal-free that are not captured in the June EIA report:

- Jacksonville municipal utility JEA and Florida Power & Light plan to retire the 860 megawatt (MW) Unit 4 at Plant Scherer, the largest coal-fired power plant in the country.¹⁴
- Tucson Electric Power plans to close its remaining coal plants by 2032 and achieve 70% renewables by 2035.¹⁵



- Arizona Public Service plans to obtain 100% clean power by 2050, with an interim target of 65% by 2030.¹⁶
- Alliant Energy, which owns eight coal-fired power plants across Iowa and Wisconsin, plans to reduce carbon emissions 50% below 2005 levels by 2030 and eliminate all coal-fired generation by 2040.¹⁷
- Wisconsin-based WEC Energy Group plans to reduce emissions 70% below 2005 levels by 2030 and to be carbon neutral by 2050.¹⁸

These pressures could speed progress toward the deep power sector emissions reductions modeled in *Accelerating America's Pledge*, which projected in the Bottom-Up scenario that 144 GW and 77 GW of coal capacity would remain in operation by 2025 and 2030, respectively. While our Bottom-Up scenario already expects much of the coal capacity to be retired by 2030, faster coal retirements can deliver emissions reduction earlier in the decade, reducing cumulative emissions.



Key Driver #2

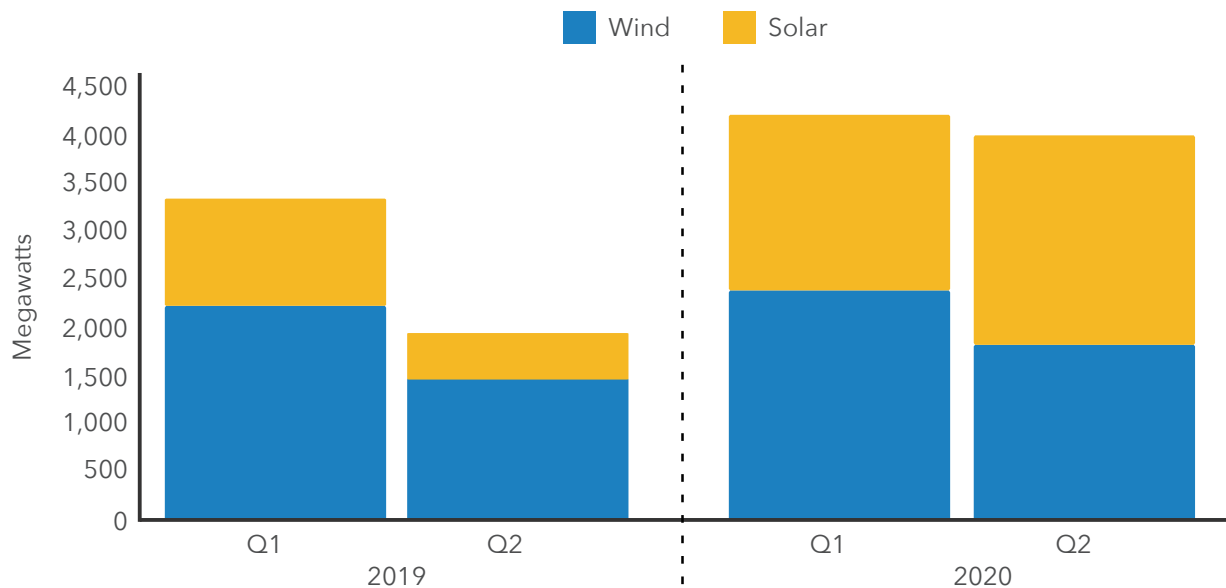
Long-Term Drivers of Renewable Energy Investment Remain Strong

The renewable energy industry appears to be weathering the pandemic relatively well, despite pandemic-related disruptions to supply chains, labor, and project construction.

Utility-scale solar and wind capacity is faring particularly well. In the first quarter of 2020, 1.8 GW of utility-scale solar capacity was added, which is 62% higher than in the first quarter of 2019.¹⁹ In April-June 2020, the

deepest period of the lockdown, 4 GW of utility-scale solar and wind capacity were added, compared to 1.9 GW during the same period in the past year.²⁰ This surge in 2020 installations is due to projects that began construction in previous years and need to be operational by year-end to qualify for the full Production Tax Credit and Investment Tax Credit under safe harbor rules.²¹

Exhibit 6 Utility-Scale Wind and Solar Capacity Additions



Source: Energy Information Administration, Preliminary Monthly Electric Generator Inventory, June 2020.

▲ Utility-scale wind and solar capacity additions have been higher in Q1 and Q2 of 2020 than in the corresponding periods of 2019.

Notably, the EIA's short-term outlook for 2020 utility-scale wind and solar capacity installations increased from 31.7 GW in its January outlook to 36 GW in its August outlook (after an initial decrease). This indicates that utility-scale renewable capacity installations are increasing despite the pandemic.²² In fact, EIA projects renewables to produce more electricity than coal for all of 2020, whereas there were only 38 days in 2019 renewables produced more electricity than coal.²³ That being said, future renewable capacity additions could be negatively affected if the economic downturn is prolonged.

The impact of COVID-19 is more acute for distributed solar, as the recession reduces consumer and business appetites for large investments. The EIA's non-utility solar installation forecast for 2020 was revised downward from 5.1 GW in the January outlook to 3.3 GW in the August outlook.²⁴ However, this does not appear to reflect any long-term weaknesses for this market. State policies, such as California's requirement that all new home construction must have rooftop solar panels beginning this year, will help support the growth in the distributed solar segment.²⁵

There is no indication that COVID-19 has slowed down the planned construction of renewable projects, though that might change if economic recovery from the pandemic is sluggish. While the EIA's January electric generator inventory had 36.4 GW of utility-scale wind and solar projects that had received regulatory approval and commenced construction, June's inventory includes 41.9 GW of similar planned projects.²⁶ Given that the June data excludes 6.3 GW of wind and solar

projects from the January inventory which commenced operation from February 2020, this represents a net increase of 11.8 GW of wind and solar projects.

State, city, and business action supports this growth. For example, in May 2020, the New Mexico Public Regulation Commission approved two El Paso Electric solar power purchase agreement projects that will add a total 200 MW of solar and 50 MW of dispatchable battery storage.²⁷ States, cities, and businesses are also advancing battery storage to match increased renewable production. For example, Southern California Edison signed seven contracts for 770 MW of battery-based energy storage to replace aging gas plants in May 2020.²⁸

Institutional investors remain positive about renewables' long-term prospects and are increasing the capital they allocate to renewables to hedge climate change exposure.²⁹ A survey of renewable energy investors reveals that, despite the pandemic's impact on the industry, investors remain as confident in renewable energy growth over the next three years as they were in 2018-2019.³⁰ Rapidly declining renewable energy costs, combined with maturation of energy storage, will continue to increase the competitiveness of renewables.³¹ Overall, we expect renewable energy's continued growth trajectory to remain strong and advance progress toward the bottom-up ambition of *Accelerating America's Pledge*.



Modestly
Increased

Key Driver #3

Economics of Gas Generation Face Headwinds, and Gas Buildout Holds Steady

The EIA's August short-term outlook projects gas-fired generation to increase to 40% in 2020, which is higher than the 38% projection from the beginning of the year and the 2019 level of 37%. This reflects a 1.3% increase in gas generation and a 3.9% decrease in total generation.

Nevertheless, as discussed further in the methane chapter, the gas industry faces numerous challenges that could slow the build-out of gas power plants. These challenges are financial pressures on oil and gas companies, investor skepticism about the long-term prospects of fossil fuels, and opposition to pipeline projects.³² The cancellation of the Atlantic Coast Pipeline, which would have transported fracked gas from West Virginia to customers in Virginia and the Carolinas, has raised questions about the future role of gas in the US energy mix.³³ Duke Energy recently announced that it would shift its investment strategy toward "low-cost, smaller-scale projects such as solar and battery storage" to fill the investment hole left by the canceled pipeline project.³⁴

In particular, the falling costs and increasing deployment of renewable energy is undermining the economic case for gas.³⁵ Utilities in Arizona, Colorado, and Florida have recently decided to close coal plants and replace them entirely with renewables, without building new gas-fired plants.³⁶ Similarly, New Mexico regulators approved a plan to replace the San Juan coal capacity with 100% renewables and storage, supporting the state's 2019 Energy Transition Act.³⁷

Although New Mexico's legislation was included in the *Accelerating America's Pledge* Bottom-Up scenario, the state's recent move indicates greater confidence among utilities and policymakers that the grid does not need fossil fuels for reliability. In fact, 68% of all customer accounts in the United States are now served by utilities with carbon reduction goals, including 27 utilities with goals to be carbon-free or net-zero emission by 2050.³⁸

EIA data also reflects that gas buildout has more or less remained steady in the past few months. EIA's January electric generator inventory reported 21.5 GW of planned gas projects that had received regulatory approval and/or commenced operation.³⁹ Of this, more than 6.3 GW had come online by June. The June inventory reported 18.8 GW of planned gas projects, meaning that between January and June 2020 3.6 GW of new gas projects were added to the queue of projects most likely to become operational.

Taken together, the combination of economic challenges facing the gas industry and the data showing that the pace of gas buildout in the past few months has held steady suggests that new gas projects may not reach levels anticipated at the end of 2019. For instance, S&P Global estimated that 200 gas projects, totaling 70 GW capacity, were planned or in development in December 2019.⁴⁰ Stimulus policies targeted towards renewable projects can help reinforce this trend and enable the United States to continue making progress towards a low-carbon future.



Key Driver #4

Progress on State, City, and Business Clean Electricity Is Mixed

In recent months, many states, cities, and businesses have taken action to reaffirm support for clean electricity policy. For example:

- Virginia enacted the Clean Economy Act, requiring the state to transition to 100% carbon-free or renewable energy by 2050. Virginia is now the eighth state in the nation and the first in the South to require 100% clean electricity.⁴¹
- New York adopted legislation to streamline renewable energy siting.⁴²
- Cincinnati announced that it is building the largest municipal solar array with 100 MW of installed capacity, which will power all city facilities and serve the city's residents.⁴³
- The city and county of Honolulu required all new construction to be solar-ready.⁴⁴
- Houston signed a contract and Chicago took steps to power municipal operations with 100% renewable energy by 2025.⁴⁵ These are two of the largest municipal renewable energy deals in US history, with a combined capacity of ~1 GW.
- Houston and Dallas adopted ambitious climate action plans with goals for carbon neutrality by 2050.⁴⁶
- Wells Fargo announced a plan to buy 62.7 MW of solar electricity, representing 8% of its global energy needs.⁴⁷
- Facebook signed contracts to buy 806 MW of additional solar and wind power to support its operations.⁴⁸

Interpreting Continued State, City, and Business Action

In this report, we have identified numerous actions that states, cities, and businesses have taken during the pandemic that support the clean energy transition. These actions provide evidence that the COVID-19 crisis has not dampened the desire to act or halted action on the climate crisis. However, some caution is needed in interpreting these actions. Many of these recent actions, such as Virginia's Clean Economy Act, resulted from significant efforts before the pandemic.

Similar announcements may continue in 2020 based on the momentum of previous groundwork. However, it is not clear to what extent states, cities, and businesses will be

able to continue their foundational work for future policies and actions, given the economic challenges they currently face.

This year's continued momentum could begin to fade as the economic crisis continues and undercuts ongoing and future efforts. Economic recovery and stimulus policies by the federal government aimed at keeping state and local governments solvent is likely to be key to continued momentum in the years ahead. The need for relief and the prospect of stimulus is not just a "nice to have," it could be a "need to have" for cities, counties and states.

However, action has slowed elsewhere. Legislative sessions were shut down in many states, stalling efforts in Minnesota on a bill to prioritize carbon-free energy and strengthen the state's energy efficiency standard, and in Illinois on a 100% renewable energy bill.⁴⁹ Other states are focusing on economic recovery and budget challenges instead of clean energy. The pandemic is also expected to temporarily slow corporate and public renewables procurement. According to Bloomberg New Energy Finance, renewable energy purchases by corporations and public institutions stood at 4.3 GW through July 2020, compared to 6 GW during the same period in the past year.⁵⁰ However, over the long-term COVID-19 is not expected to affect corporations' decarbonization goals.⁵¹

As noted in *Accelerating America's Pledge*, significant social and political mobilization is still needed to deploy clean energy and other solutions at the speed and scale

necessary to get onto a 1.5°C-aligned emissions reduction pathway.

Jobs Trends and Stimulus Opportunities

In 2019, zero-emissions electricity sources like solar and wind accounted for about 544,000 jobs, more than twice as many as the 214,000 jobs in fossil fuel generation.⁵² In addition, another 800,000 American workers were employed in electricity transmission, distribution, and storage. Growth in clean energy jobs was projected to continue in 2020, but the economic fallout from COVID-19 has led to significant loss of employment in the clean energy industry, including in renewable energy. At the end of July, renewable electric power generation lost 81,840 jobs, accounting for a 14% drop in employment in the sector.⁵³ Clean transmission, distribution, and storage jobs have also declined 15% from pre-pandemic employment levels.⁵⁴



As part of stimulus and recovery, the following investment opportunities could accelerate progress toward the emissions reductions discussed above, while creating jobs and promoting equity.

Renewable energy financial incentives:

Extending the phasedown period for the Production and Investment Tax Credits, expanding the list of eligible technologies to include storage and load management, and creating direct pay options to address industry concerns about liquidity could stimulate growth and private investment in renewable energy.⁵⁵ Phasing out or eliminating fossil fuel subsidies with a strong emphasis on ensuring a just transition for workers in these industries can also accelerate progress towards a clean energy future.⁵⁶

One recent analysis found that extending the Production and Investment Tax Credits for five years and the Section §1603 Grant Program for two years while investing in port infrastructure to advance offshore wind could help create 497,800 direct, indirect, and induced jobs per year for five years. These actions would also generate \$7.6 billion in added value each year and \$1 billion in tax revenue.⁵⁷

Grid modernization: Investment in smart grid, storage, load management, other distributed energy technologies, and long-distance high voltage transmission infrastructure would allow for better integration of low-cost renewable energy and a more resilient, efficient grid, while creating jobs and sustained, economy-wide benefits.⁵⁸

For instance, \$25.4 billion in stimulus spending for grid modernization would create 73,100 direct, indirect, and induced

jobs, \$5.3 billion in total earnings, and \$7.2 billion overall added value to the national economy each year for five years.⁵⁹ Texas' Competitive Renewable Energy Zones—designated areas identifying routes for construction of new transmission lines—led to the construction of 3,600 miles of new transmission network and enabled Texas to add more than 18 GW of wind generation capacity to the state's power system while cutting utility bills by billions of dollars.⁶⁰

Just transition support: Support for fossil fuel workers and communities should include covering income, training, and relocation for workers facing job loss, as well as transition programs to help diversify economic activity in communities currently reliant on fossil fuels.⁶¹ The proposed Environmental Justice for All Act calls for the creation of a Federal Energy Transition Economic Development Assistance Fund to support workers and communities as the country transitions away from fossil fuel.⁶²



Climate Action Spotlight: State and City Climate Action Gains Traction in the South and Midwest

Climate action has been spreading across the country, with exciting new developments in both the Midwest and the South during the pandemic.⁶³



In the South:

- Virginia became the first southern state to commit to 100% zero-carbon electricity.⁶⁴
- Louisiana committed to reaching net-zero GHG emissions by 2050, with the interim goals of 26%–28% reduction by 2025 and 40%–50% reduction by 2030.⁶⁵
- Southern Company, based in Atlanta, updated its climate goal to net-zero emissions across electric and gas operations by 2050, with an interim goal of 50% reduction of GHG emissions by 2030.⁶⁶
- Houston and Dallas released climate action plans including goals of carbon neutrality by 2050.⁶⁷
- Travis County, Texas (home to Austin) approved its first-ever climate action plan.⁶⁸

In the Midwest:

- Alliant Energy, a Madison, Wisconsin-based investor-owned utility, improved its climate targets: net-zero CO₂ emissions from electricity by 2050, and the interim goals of 50% CO₂ emissions reductions by 2030 and the elimination of coal generation by 2040.⁶⁹
- Kansas City, Missouri updated its climate plan with a commitment to become carbon neutral by 2040.⁷⁰
- St. Louis became the first city in the Midwest (and fourth government overall) to adopt a Building Energy Performance Standard.⁷¹ The city estimates the standard will save more than \$65 million in annual energy costs and reduce emissions by at least 11%.⁷²
- Ford Motor Company of Dearborn, Michigan, announced its updated climate goal of carbon neutrality by 2050, across vehicle use, supply base, and corporate facilities. The company specifically mentions its intention to be in line with the Paris Agreement goals and calls for more robust vehicle emissions standards.⁷³
- Chemical manufacturer Dow, headquartered in Midland, Michigan, committed to carbon-neutrality by 2050 by reducing and reusing plastic waste, and participating in the circular economy.⁷⁴

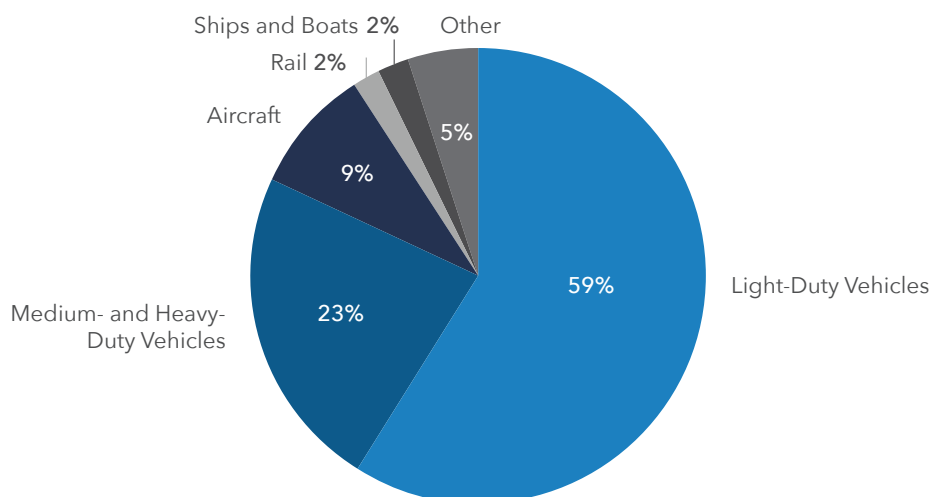
02 Transportation



Transportation of people and goods is currently the largest source of US greenhouse gas emissions, accounting for approximately one-third of total US emissions.⁷⁵ Over 80% of transportation emissions come from cars and trucks. *Accelerating America's Pledge* found that the transportation sector would account for 198 MMTCO₂e of avoided emissions in 2030 in our Bottom-Up scenario, approximately 11% of the economy-wide total avoided emissions in 2030. Modeled emissions reduction opportunities include promoting smart growth and public transit to reduce VMT, incentivizing rapid deployment of electric vehicles (EVs) and charging infrastructure, and improving the efficiency of remaining internal combustion engine (ICE) vehicles.

Considering the long lifetimes of vehicles—the average car operating in the United States is approximately 10.1 years old—most of the 2030 avoided emissions in *Accelerating America's Pledge* came from fuel efficiency rules already in place.⁷⁶ Other measures, including smart growth and EVs, will have significant impact post-2030 given long lead times for projects started now. One aspect of transportation with the potential to change quickly is the volume of miles driven to deliver passengers or freight, which is highly responsive to the overall level of economic activity.

Exhibit 7 US Transportation GHG Emissions by Source



Source: US Environmental Protection Agency, "Inventory of U.S. Greenhouse Gases and Sinks 1990-2018," 2020

Trends Assessment

The following are major drivers of emissions with potential long-term impacts:

- *People are currently driving less* due to the economic shutdown, remote working, and stay-at-home orders, causing unprecedented reductions in VMT. If this short-term experience of new ways of working and getting around becomes solidly established, the changes could have lasting impacts—with projected VMT shrinking by as much as 10%.
- *Public transit is facing an existential budget shortfall* due to lack of riders and fares, as well as plummeting city and state budgets; agencies will need significant support to restore and maintain service and will need to win back the trust of the public.
- *EV prospects appear steady* despite a short-term sales slump, given the trends in expanding model availability, policy support, and charging infrastructure.
- *Political will is growing to address emissions from medium- and heavy-duty vehicles*, with leader states committing to 30% zero-emission medium- and heavy-duty vehicle sales by 2030, almost twice as fast as the 20% for medium-duty and 15% for heavy-duty sales that we modeled for leaders in the past year's Bottom-Up scenario.⁷⁷

Overall Change in Confidence for
TRANSPORTATION



**MODESTLY
INCREASED**



Note that we do not analyze light-duty vehicle standards or air travel in detail, for the following reasons:

Light-duty vehicle standards: There has been no material movement since 2019 on the legal challenges to light-duty clean car standards; the authority of states to set these standards is still being determined. The automakers that supported the rollback of federal efficiency and emissions standards and the revocation of state waivers for higher emissions standards have expressed desires and plans to avoid two regulatory markets, instead leapfrogging from fossil fuel-burning vehicles to an all-electric future.

The most likely fleet design for the 2022-2025 model years appears to be the compromise struck by California and an increasing number of automakers, which is estimated to double the emissions reductions compared to the Trump administration's Safer Affordable Fuel Efficient (SAFE) rule, resulting in an additional 136 to 148 MMTCO₂ by 2035.⁷⁸

Air travel: Although air travel has experienced a significant drop in demand due to the pandemic, its rebound is tied to overall economic recovery, and air travel was not expected to offer many bottom-up opportunities for avoided emissions because it is federally regulated.

Overall, accelerated progress on medium- and heavy-duty EVs and the potential for long-term reductions in miles driven are expected to outpace transit trends. This modestly increases confidence in the country's ability to shift to electric vehicles and reduce vehicle miles traveled consistent with our modeling in *Accelerating America's Pledge*. Importantly, long-term implications in this sector will depend heavily on the pace of economic recovery, lasting behavioral change, and a willingness of policymakers to support infrastructure changes.⁷⁹ Proposals for stimulus and recovery packages can target further support of public transit, deployment of EV manufacturing and charging infrastructure, workforce training, and complete streets to accelerate progress toward needed 2030 emissions reductions while creating jobs and promoting equity.



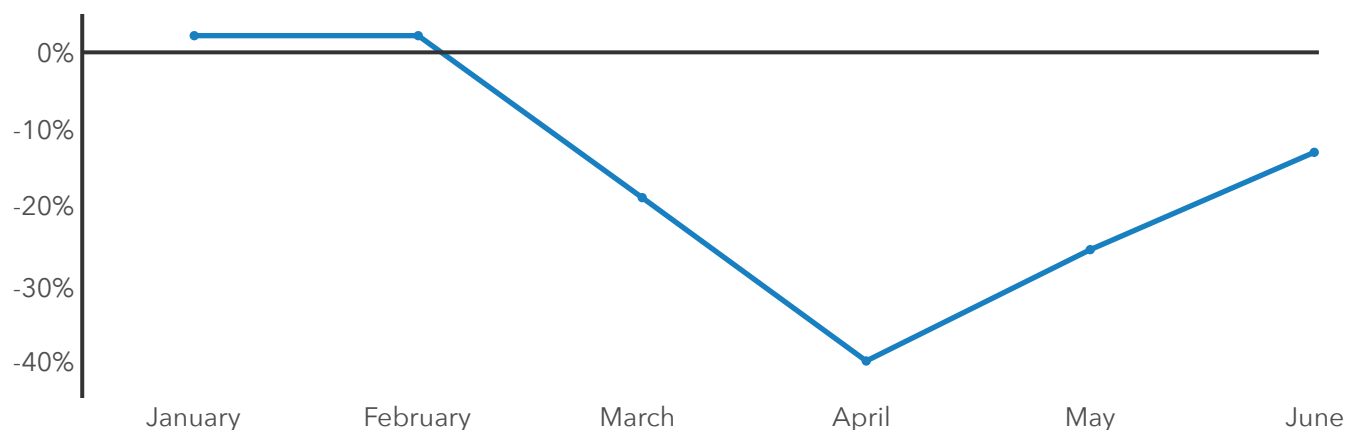
Key Driver #1 People Are Driving Less

Across the country and particularly in urban areas, people have been driving much less than pre-pandemic, due to the cocoon culture created by COVID-19 stay-at-home orders, increased remote working, massive unemployment, and the general economic shutdown.

Whereas many cities and states have struggled to achieve single-digit reductions in annual VMT, national VMT dropped by over 40% in April 2020—at the height of the

pandemic—compared to April 2019. Though VMT has since rebounded, it remained down 13% in June.⁸⁰ As of June 2020, cumulative car travel for the year is down by over 264 billion vehicle miles, approximately 17% below normal. Though more recent VMT data was not available at the writing of this report, gasoline demand data through mid-August shows that demand remains down over 10% compared to one year ago.⁸¹

Exhibit 8 Percent Change in Individual Monthly Travel 2020 vs. 2019



Source: Federal Highway Administration

▲ In April 2020, at the height of the pandemic, US vehicle miles travelled dropped by over 40% as compared to April 2019. Though VMT has since rebounded, it remained lower than 2019 levels in June.

During COVID-19, many businesses have learned that they are capable of operating with remote workforces; the pace of emissions reductions from deferred commuting over the next decade depends on how many extend and formalize remote work policies post-pandemic.

Although car travel is rebounding as businesses reopen and employees return, businesses have a huge opportunity to dramatically cut emissions from employee commutes—the single biggest source of corporate GHG emissions—while increasing worker productivity and reducing office space expenses.⁸² Many employers are already considering long-term changes to in-office work, with big-name brands like Google, Twitter, Zillow, and Square announcing that employees will not return to the office this year, if ever.⁸³ And nearly one in five chief financial officers have said that at least 20% of their workforce will remain remote after the pandemic.⁸⁴

In addition to changes in work habits, the pandemic has also spurred an increase in e-commerce, the delivery system for which produces an estimated 20% less carbon emissions than traditional retail shopping.⁸⁵ These changes in work and shopping habits have the potential to produce a permanent drop of up to 10% in VMT, equivalent to 270 billion miles per year.⁸⁶ An enduring drop in VMT of this magnitude would represent an acceleration of emissions reductions from transportation compared to our 2019 analysis, which modeled that leading states would reduce VMT 2% below business as usual by 2030.

However, as transit continues to struggle (see Key Driver #2 below) and some commuters



switch from public transit to private vehicles due to safety concerns, there is a justifiable concern that the pandemic could result in a more auto-dominated environment. To counter these trends, states, cities, and businesses should consider (in addition to teleworking policies) increased funding and support for complete streets—those designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities.⁸⁷

Micromobility devices, such as bicycles, e-bikes, electric scooters, and electric skateboards—some of which people have embraced as safer transportation options during the pandemic—should be embraced as the country recovers.⁸⁸ The federal government could help provide funding to support greater use of these options.

Further, states and cities should explore land-use policy reform to enable greater infill housing and affordable neighborhoods that provide closer access to critical services.⁸⁹ These practices may help lock in VMT reductions by further reducing reliance on personal vehicles.



Key Driver #2

Public Transit Is Facing an Existential Budget Shortfall

COVID-19 stay-at-home measures, an increase in teleworking, and the difficulty of maintaining social distancing on public transit have led to decreases in public transit ridership of over 90% across many major US cities.⁹⁰ Lower revenue from fares, tolls, gas tax, and sales tax has had a severe impact on nationwide transit agency budgets, which are projecting a \$40 billion budget shortfall—about 20 times worse than the loss during the 2008 financial crisis.⁹¹

Due to COVID-19, cities and states across the country have cut budgets and planned projects. For example:

- San Antonio diverted \$40 million in sales tax revenue from public transit expansion plans to economic recovery for residents and businesses.⁹²
- The North Carolina state legislature cut \$94 million for municipalities, public transportation, bicycles, and pedestrians and the state's Department of Transportation delayed most major projects after projecting a \$300 million loss for the year.⁹³
- The New York City Transit Authority suspended its \$54 billion plan to modernize the city's transportation network, which experts warn may plunge the system into disrepair.⁹⁴

Transit agencies have also cut service—in some areas by as much as half—either by reducing the number of buses and trains servicing routes or by closing stations completely.⁹⁵ These cuts are felt hardest by

essential workers—who typically account for over a third of total transit commuters—and in disadvantaged communities, where residents often rely on public transportation.⁹⁶ Service cuts can lead to even lower ridership, “causing spiraling revenue loss and service cuts, until a network eventually collapses.”⁹⁷

All together, these trends threaten the business model and the very existence of transit agencies. Although the Coronavirus Aid, Relief, and Economic Security (CARES) Act federal stimulus package included \$25 billion for transit, experts indicate this is not enough to keep transit agencies afloat.⁹⁸ If additional support is provided quickly and substantively to reinstate service, to implement measures to keep drivers and riders safe, and to transition to zero-emission vehicles, we expect minimal changes to 2030 projections.

However, if adequate funding solutions are not developed in time, public transit networks across the country—which are vital to deep decarbonization pathways—could collapse. Sustained reductions in public transit service could increase long-term emissions.



Key Driver #3 Electric Vehicle Prospects Appear Steady

The EV share of the light-duty vehicle market has seen a slight decline, representing 1.6% of the market in Q2 2020—during the height of the pandemic—compared with its 2019 average of 1.9%; meanwhile, the passenger car market, a subset of the light-duty vehicle market, held relatively steady at just under 7%.⁹⁹ Though sales of both ICE vehicles and EVs have fallen during the pandemic, consumer behavior in such an exceptional moment is a poor predictor of long-term trends. We do not expect this slump to materially affect the light-duty vehicle stock turnovers and resulting emissions reductions we modeled in the Bottom-Up scenario.

Despite low gas prices, public announcements on EV models, investments, and long-term plans indicate that automakers are continuing to transition to an electric

future to meet growing consumer and policy demand. For example, building on the more than 80 available models, automakers have announced plans to release another 200 new electric car models over the next five years, including many in the popular pickup truck and sport utility vehicle market segments.¹⁰⁰

And while the temporary shutdown of production has resulted in new model release delays, new products were delayed, on average, only a few months.¹⁰¹ Based on our review of major automaker statements before and during the pandemic, most have not announced reductions or significant delays to EV investments.





In addition, states, cities, and businesses continue to advance EVs and public charging infrastructure.

So far in 2020, on the overall light-duty EV front:

- Washington adopted a zero-emission vehicle (ZEV) policy, joining the 11 other states that have adopted ZEV programs. Nevada announced they are considering one.^{ii,102}
- The Climate Mayors EV Purchasing Collaborative has grown by over 35%, now representing over 215 cities, counties, universities, transit agencies, and ports committed to purchasing more than 3,680 EVs. Over 660 EVs have been purchased by these entities this year.¹⁰³
- Lyft committed to achieve 100% EVs on its platform by 2030.¹⁰⁴
- New York approved a \$701 million EV Make-Ready Program to install over 50,000 charging stations by 2025, with a focus on environmental justice and disadvantaged communities.¹⁰⁵
- Xcel Energy announced plans to help put 1.5 million EVs on the road in its service areas by 2030—more than 30 times the number today.¹⁰⁶
- The Western Governors' Association launched the Electric Vehicles Roadmap Initiative, which seeks an expanded regional agreement on EV charging infrastructure.¹⁰⁷
- Over 820 public EV charging stations with over 3,380 charging ports have been opened in the United States.¹⁰⁸
- Electrify America completed the first cross-country EV charging route, spanning 11 states and over 2,700 miles to connect Los Angeles to Washington D.C. with high-powered charging stations every 70 miles on average.¹⁰⁹

These signs indicate that market shifts and policy support continue to advance a transition to EVs, on par with the trends modeled in our 2019 analysis. However, additional cost reductions, charging infrastructure buildout, and dealership education will all be necessary to advance EVs at the required pace.

ⁱⁱ Minnesota and New Mexico are also considering ZEV policies.



Increased

Key Driver #4 Political Will Is Growing to Address Emissions from Heavy-Duty Transportation

2020 has seen enormous progress toward zero-emission medium- and heavy-duty vehicles. Policymakers and regulators, who have historically focused on reducing emissions from passenger cars, are now turning their attention to commercial vehicles, which account for over one-fifth of the country's transportation sector GHG emissions.¹¹⁰

Most significantly, California adopted an Advanced Clean Trucks (ACT) rule (see Climate Action Spotlight), requiring truck makers to sell an increasing percentage of zero-emission trucks in the state.¹¹¹

Almost immediately, 15 states and the District of Columbia signed a memorandum of understanding (MOU), committing to develop a medium- and heavy-duty electric vehicle action plan, with the goal of achieving 30% zero-emission medium- and heavy-duty vehicle sales by 2030 and 100% by 2050.¹¹² These signatories collectively account for almost half the US economy and nearly 40% of goods moved by truck (by value).¹¹³ Successful execution could reduce US greenhouse gas emissions by 277 to 289 MMTCO₂e by 2045, on a cumulative basis, depending on the pace of future economic recovery.¹¹⁴

Since our last report, states, cities, and businesses have taken numerous actions to advance zero-emission trucks and buses:

- Santa Monica, California announced plans for the country's first zero-emission delivery zone.¹¹⁵
- New York City launched its Clean Trucks Program, which provides funding to replace older, diesel trucks with cleaner trucks, including electric models.¹¹⁶
- Chicago developed its Commercial Electric Vehicle Readiness Guidelines to help developers incorporate EV charging readiness for medium- and heavy-duty fleets into projects.¹¹⁷
- The Climate Mayors Electric Vehicle Purchasing Collaborative expanded its offerings to include electric heavy-duty vehicles like school buses and street sweepers.¹¹⁸ It also plans to offer electric models of medium- and heavy-duty trucks later this year.¹¹⁹
- Recycling and solid waste provider Republic Services ordered 2,500 electric refuse trucks—the largest single order in the waste industry—with an option to double the order.¹²⁰
- San Diego Gas and Electric launched a new make-ready program,ⁱⁱⁱ Power Your Drive for Fleets, to support charging infrastructure design and construction for electric medium- and heavy-duty vehicles, becoming the third major utility in California to offer such a program.¹²¹

ⁱⁱⁱ Make-ready infrastructure refers to the electrical infrastructure needed to install and operate charging stations, including transformers, panels, conduit, and wiring.



Climate Action Spotlight: California Advances Electrification of Medium- and Heavy-Duty Vehicles

In June 2020, California became the first state to mandate that truck makers sell a minimum percentage of zero-emission vehicles via its Advanced Clean Trucks rule. The rule goes into effect in 2024, with the percentage of minimum ZEV sales increasing year-over-year through 2035, at which point at least 55% of small truck (Class 2b-3), 75% of big truck (Class 4-8), and 40% of semi-tractor (Class 7-8) sales must be zero-emission.¹²² Benefits of the rule include:¹²³

- Industry savings of least \$7 billion over the next 20 years
- Emissions reductions of more than 17 million metric tons (MMT) of carbon dioxide and 60,000 tons of hazardous nitrogen oxides
- Reduced particulate pollution (particulate pollution is associated with an increased mortality rate among COVID-19 patients)¹²⁴

- More than 900 prevented premature deaths
- Public health benefits of at least \$9 billion¹²⁵

Reduced emissions are particularly beneficial for disadvantaged communities, where residents live, work, play, and attend schools adjacent to ports, railyards, distribution centers, and freight corridors. These communities are disproportionately exposed to air pollution and are more at risk for diseases such as asthma, lung and heart disease, and chronic bronchitis.¹²⁶ California is also considering a complementary regulation that would require fleets in the state to transition to electric trucks over time.¹²⁷

- Southern California Edison broke ground on its first Charge Ready Transport infrastructure projects.¹²⁸
- New York's EV Make-Ready Program requires utilities to develop medium- and heavy-duty fleet make-ready pilot program implementation plans.¹²⁹
- The West Coast Clean Transit Corridor Initiative—a collaboration among nine electric utilities and two agencies representing more than two dozen municipal utilities—proposed a plan to build out charging infrastructure along 1,300 miles of I-5. This would support medium- and heavy-duty electric trucks from the Mexican to the Canadian border.¹³⁰
- A group of America's biggest truck equipment manufacturers, suppliers, and key stakeholders formed the National Zero-Emission Truck Coalition and called for a national point-of-sale incentive program to support the production and deployment of zero-emission trucks. This has also been incorporated into the House Select Committee's Climate Action Plan.¹³¹
- As a step toward a zero-emission future, California is working to reduce pollution from the diesel fleet as well.¹³²

We expect this expanded support of zero-emission medium- and heavy-duty vehicles to have long-term GHG emissions impacts on the transportation sector. The MOU mentioned above, if translated into action, would almost double the 2030 medium- and heavy-duty vehicle sales modeled in our 2019 Bottom-Up scenario. Although

additional funding will be required to achieve these goals, early signs indicate that 2030 emissions reductions from medium- and heavy-duty trucks will be easier to achieve than past *America's Pledge* modeling indicated.

Jobs Trends and Stimulus Opportunities

Jobs in the transportation sector took a significant hit due to COVID-19, with over 61,000 workers in clean vehicles and clean fuel losing their jobs in April and May.¹³³ Over 12,000 of those jobs were reinstated in June, but many clean transportation employees are still unemployed, despite the large volume of work necessary to move people and goods while reducing nationwide transportation emissions.¹³⁴ Lost revenue and service cuts by transit agencies threaten the jobs of drivers and other staff that support the operation of public transportation.

As part of stimulus and recovery, the following areas could accelerate progress toward the emissions reductions previously discussed, while creating jobs and promoting equity:

Public Transit: Operational assistance for transit agencies would immediately help reinstate and maintain transit service, implement measures to keep drivers and riders safe, and transition to zero-emission vehicles. And reforming federal funding structures to compensate transit agencies based on frequency of service instead of low operating costs would require more workers and benefit riders.¹³⁵

Research indicates an additional 269,000 jobs can be created by funding the

operations and maintenance of existing public transit and investing in the electrification of school and public buses.¹³⁶ Additional funding for public transit is needed and it is estimated to create nearly 50,000 jobs and return \$5 billion in economic activity for every \$1 billion invested.¹³⁷ The Health and Economic Recovery Omnibus Emergency Solutions (HEROES) Act proposes \$15.75 billion for public transit.

Electric Vehicles: EV and battery manufacturers, consumers, and charging infrastructure need support to transition the market. Electrification of all vehicle sizes (from light- to heavy-duty) and all sectors (including passenger and freight vehicles, school and transit buses) will require investment.¹³⁸ Bolstering EV and battery engineering and production could create tens of thousands of high-quality jobs over 10 years, while removing 63 million carbon-emitting cars.¹³⁹

Workforce Training: Workforce training is needed to support these changing industries. New skills will be required to manage and service electric fleets. For example, technicians will need training to work in high voltage environments. Workforce training can be prioritized for the under/unemployed, the formerly incarcerated, and former fossil fuel industry workers.¹⁴⁰ Workforce training can also support gender, racial, and economic equity while valuing both vocational/technical training and higher education. The Transportation Electrification Partnership's stimulus proposal includes over \$12 billion for this sort of workforce training.

Complete Streets: Several stimulus proposals call for increased support for infrastructure that prioritizes pedestrians and cyclists.¹⁴¹ Benefits include reduced air pollution, ease of movement, community building, and more.



03 Methane



Methane is a growing source of human-made emissions globally and threatens climate goals due to its potency as a greenhouse gas.^{iv,142} This chapter focuses on methane emissions from the oil and gas sector, the biggest contributor to US methane emissions increases over the last decade.¹⁴³ As of 2018, methane emissions from fossil fuel production and infrastructure were reported to be 3.6% of national emissions.¹⁴⁴ However, research suggests this is likely to be an underestimate,¹⁴⁵ underscoring the need for more robust monitoring and mitigation efforts.

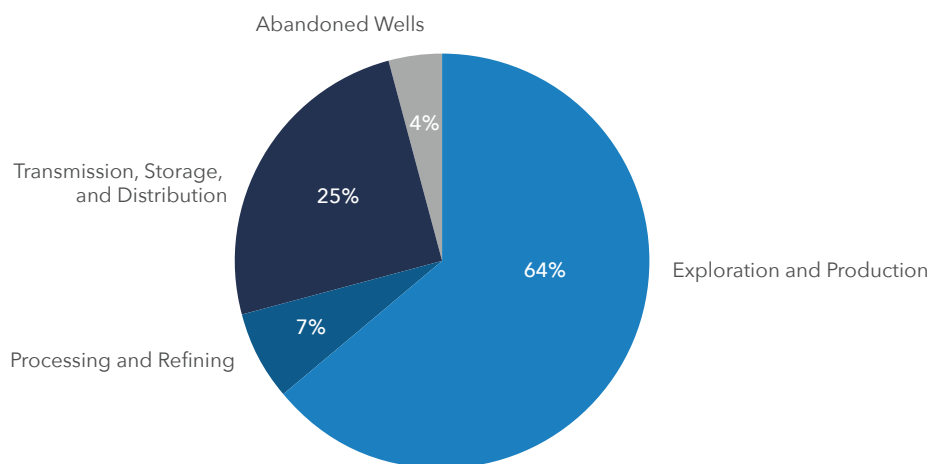
In *Accelerating America's Pledge*, we found that reductions in this sector would account for 165 MMTCO₂e in avoided emissions in 2030 in our Bottom-Up scenario,

approximately 9% of the economy-wide total avoided emissions in 2030. Modeled emissions reduction opportunities include voluntary commitments and regulatory standards requiring leak detection and repair and efficient deployment of leak resistant technology.

Mitigation efforts to reduce methane emissions from oil and gas operations are increasingly well-understood, are cost-effective, and can yield meaningful reductions on a relatively short time scale.¹⁴⁶ A large share of the 2030 avoided emissions in *Accelerating America's Pledge* are premised on the adoption of new and increasingly robust regulations and best practices over the next decade, beyond present-day measures.

^{iv} Methane, or CH₄, has a global warming potential approximately 84 times stronger than CO₂ on a 20-year timescale and 28 times stronger on a 100-year time scale (See IPCC 2015).

Exhibit 9 Methane Emissions from US Petroleum and Gas Systems 2018



▲ US Environmental Protection Agency, "Inventory of US Greenhouse Gases and Sinks 1990-2018," 2020

Trends Assessment

The following are major drivers of emissions with potential long-term impacts:

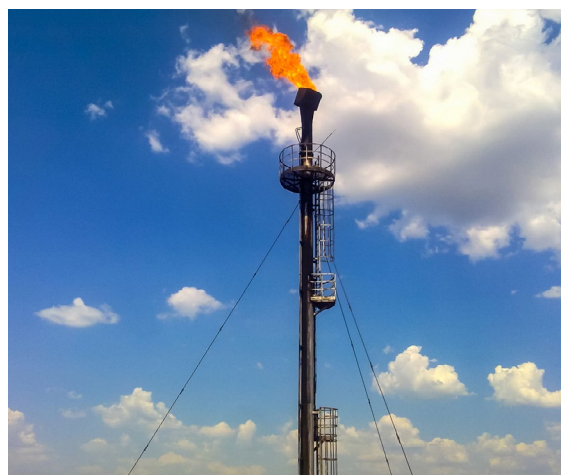
- *Prospects for growth in US oil and gas production are dimming* as recent shocks have exposed economic vulnerabilities and global momentum toward vehicle electrification accelerates in markets like the EU, China and California. These trends pose both near- and long-term challenges for the industry, reducing potential for future infrastructure buildout and associated methane emissions.
- *Methane leaks from existing infrastructure are rising* due to lack of economic incentives and oversight for financially struggling operations; stimulus directed toward abandoned well cleanup could address leaks while ensuring an equitable and practical workforce transition.
- *Regulatory landscape continues to shift* at the state and federal level; key federal regulations have been rolled back and others have been restored by the courts, while state-level regulatory expansion continues gradually. The net impact has uncertain implications for emissions reduction moving forward, however accelerated policy adoption can drive rapid reductions even if put in place later in the decade.

Taken together, these trends modestly increase our confidence in the country's ability to reduce methane emissions from oil and gas systems consistent with our modeling in *Accelerating America's Pledge*. Key uncertainties remain regarding industry growth, associated emissions, and regulation, and much will depend on how these factors develop and interact over the next decade. However, on balance emissions increases from existing sources and regulatory uncertainty in the near term appear to be outweighed by diminished industry growth outlook and long-term policy trends. Moreover, significant opportunities for stimulus and recovery packages can further bolster efforts to eliminate methane and other pollutants while creating jobs and an equitable workforce transition.

Overall Change in Confidence for
METHANE



**MODESTLY
INCREASED**





Modestly
Increased

Key Driver #1 Prospects for Growth in US Oil and Gas Production Are Dimming

In the first half of 2020, short-term demand shocks have occurred amid already wavering prospects for long-term global oil demand, leading to significant industry losses and a reevaluation of the viability of future growth. Prices fell significantly in the immediate aftermath of the crisis, with oil prices in particular hitting record lows and showing little sign of fully recovering. These factors have exposed systemic vulnerabilities including over-leveraged investments and default risk that are prevalent in the US shale sector and which predated the pandemic.¹⁴⁷ Long-term prospects are seriously jeopardized by ongoing pricing wars and oversupply linked in part to an accelerating global transition to electric vehicles in key markets such as China and the European Union.¹⁴⁸ Adding to this momentum, a coalition of US states led by California recently committed to rapid electrification of medium- and heavy-duty vehicles.¹⁴⁹

These trends have triggered a wave of bankruptcies and investment cuts as well as far less optimism regarding the industry's growth trajectory in the years to come. In the first quarter of 2020, publicly traded US oil producers had written down at least \$48 billion in assets,¹⁵⁰ while by June the number of oil and gas rigs—another indicator of industry health—had fallen by nearly 70%.¹⁵¹ Forecasts now predict lower oil prices and a continued contraction in US production in the near term, an outlook which deviates significantly from previous forecasts.

For example, in our 2019 analysis, we assumed US oil and gas production would grow by approximately 8.5% in the first half of the decade, adding roughly 55 MMTCO₂e in annual methane emissions from new sources (if left unchecked by mitigation efforts).^v In contrast, recent projections from the EIA now expect year-on-year production to fall by approximately 5.5% and 3.5% in 2020 and 2021,¹⁵² respectively.

Looking more long term, US production is still expected to resume some growth by mid-decade or earlier,¹⁵³ and a more robust recovery in the oil and gas sector cannot be ruled out. However, any resumption in growth is now likely to be at a much slower pace than prior expectations and in a market environment where prices remain well below their pre-pandemic levels of roughly \$60 per barrel.¹⁵⁴ These factors will reduce the potential for new buildout of oil and gas wells and infrastructure and therefore modestly increase our confidence in the country's ability to achieve the 2030 methane emissions reductions envisioned in our 2019 analysis.



^v Based on growth rates derived from EIA Annual Energy Outlook, 2019.



Key Driver #2 Methane Leaks from Existing Infrastructure Are Rising



While the above-mentioned factors are likely to contribute to avoided emissions from new wells and infrastructure in the near and potentially longer term, emissions from existing infrastructure appear to be on the rise. Although still preliminary, recent analysis from satellite data shows an increase in methane emissions at oil and gas production facilities in 2020 for the months of March and April relative to the same period in the previous year over the Permian Basin, the largest oil and gas-producing region in the United States.¹⁵⁵

Two issues underlie this increase in emissions. First, as oil and gas operations on the margin are temporarily or permanently shuttered, leaks from these sites may increase and remain unchecked. Second, even at active sites, low prices provide even less incentive for producers to invest in equipment and processes that minimize methane emissions. Sites that face closure in the wake of price shocks are often financially risky operations with insufficient funding set aside for cleanup.¹⁵⁶ In addition, decisions

on responsibility for cleanup may become tied up in bankruptcy court. If states must foot the bill, a vicious circle can occur where lost oil and gas revenues result in cuts to the very budgets that would have been allocated to detecting and fixing leaks.¹⁵⁷

Given these dynamics, this trend has potential to increase cumulative methane emissions unless key structural issues are addressed. At the same time, it can be reversed well before 2030 through regulations and incentives to ensure that leaks from existing sources are quickly repaired and that sufficient funds are allocated for decommissioning, cleanup, and continued monitoring.



Climate Action Spotlight: Project Astra Advances Innovative Methane Emissions Detection

Project Astra—a subnational partnership among the Environmental Defense Fund, ExxonMobil, the Gas Technology Institute, and Pioneer Natural Resources Company—has formed to design, develop, and deploy a prototype monitoring network to measure methane emissions from oil and gas production sites.¹⁵⁸ Led by researchers at The University of Texas at Austin, the project aims to reduce emissions by deploying a network of advanced methane sensors and allowing for data sharing and analytics. The sensor network aims to be more cost-effective and to provide more continuous data compared to current monitoring methods, which could enable producers and regulators to find and fix significant methane releases more quickly and effectively.

Announced in May 2020, the project will begin by testing a wide range of methane-sensing technologies in the Permian Basin. The Project Astra team is taking advantage of advances in virtual reality to create atmospheric simulations modeled after oil and gas production sites in the West Texas region. This will allow the team to test and identify the most cost-effective monitoring technologies and locations for these sensors. Project Astra plans to make its findings and analyses publicly available to help guide how companies, states, and the federal government measure, monitor, and manage methane emissions in the future.¹⁵⁹



Key Driver #3 Regulatory Landscape Continues to Shift

Expansion of comprehensive regulations on methane emissions from oil and gas facilities can have a dramatic and lasting impact. However, in the wake of the pandemic, both positive and negative developments have occurred in this arena. This is a trend that is consistent with the patchwork regulatory landscape of recent years. Most recently, in August 2020 the EPA removed industry-wide regulations on methane emissions that were established in 2016, a move that would have lasting, negative impacts on climate ambition if left in place.¹⁶⁰ However, just a month before this, a federal judge vacated the removal of similar rules that had established leak detection and repair requirements for facilities on federal lands,¹⁶¹ demonstrating that the legal durability of federal rollbacks remains uncertain.

Meanwhile, states continue to advance regulation. In July 2020, New Mexico released draft rules that would require operators to achieve an effective methane loss rate of no more than 2% of gross withdrawals by 2026,¹⁶² a significant improvement on the estimated regional average of 3.7% but less ambitious than the voluntary 1% goal many companies have set.^{163,vi} The rules are built on proven strategies adopted in other states and would make New Mexico the first Permian Basin state to adopt such regulations. In addition, Pennsylvania, the largest oil and gas-producing state in the East, moved forward with a draft plan to strengthen rules



to cover existing oil and gas sites in spring 2020, while Colorado strengthened its own regulations in late 2019.¹⁶⁴

Current momentum at the non-federal level is thus positive; however, achieving the level of emissions reductions envisioned in our 2019 report will require these efforts to gain further momentum and translate into binding regulations. The long-term picture remains unclear, although regulations can have relatively rapid impact once adopted. As an example, after their initial adoption in 2014, Colorado's regulations led to a 50% reduction in the number of leaks identified annually from 2015 to 2017, even while the number of inspections increased.¹⁶⁵

^{vi} Based on a voluntary target adopted by ONE Future: www.onefuture.us/

Jobs Trends and Stimulus Opportunities

The pandemic has wreaked havoc on the US oil and gas industry, resulting in more than 100,000 lost jobs and billions in lost revenues to-date.¹⁶⁶ As part of stimulus and recovery efforts, the following areas could accelerate progress toward the emissions reductions previously discussed, while creating jobs and promoting equity:

- **Idle and abandoned infrastructure:** Plugging 500,000 of the country's more than 2 million abandoned wells could create over 100,000 jobs. Moreover, these jobs would be well aligned with the skillset of recently laid off oil and gas workers.¹⁶⁷ The idea of stimulus for well cleanup is continuing to gain traction in federal legislative platforms and in states including West Virginia, North Dakota, and New Mexico.¹⁶⁸
- **Advanced monitoring and efficiency:** An assessment of the economic impacts of federal standards found that over 50,000 jobs would be created through the adoption of leak detection and repair technologies and practices at new and modified facilities over the course of 10 years.¹⁶⁹ Although these efforts

pay for themselves, congressionally-approved funding can ensure that necessary technologies and monitoring networks are deployed rapidly and comprehensively, and in areas where the need is greatest.¹⁷⁰

- **Support for state and local governments and at-risk communities:** Government agencies responsible for monitoring emissions will face budget shortfalls that are compounded by reduced oil and gas revenues during the current economic crisis. Moreover, pollutants from the industry often disproportionately affect economically vulnerable communities.¹⁷¹ The above stimulus opportunities can address these issues by ensuring that funding, job programs, and environmental co-benefits are directed toward the regions most impacted.



04 Buildings



In 2018, direct emissions from residential and commercial buildings (for example, gas for heating) contributed 12% of total emissions in the United States.¹⁷² *Accelerating America's Pledge* found this sector would account for 66 MMTCO₂e in 2030 avoided emissions in our Bottom-Up scenario,^{vii} approximately 4% of the economy-wide total avoided emissions in 2030.

Major efficiency gains coupled with efforts to electrify all new buildings by 2030 would set the foundation for steeper reductions after 2030. Modeled emissions reduction opportunities include policies and programs to promote energy efficiency and electrification in new and existing buildings, such as energy efficiency resource

standards; appliance standards, incentives, and replacement programs; building codes (including for net-zero, all-electric buildings); and retrofit programs including weatherization programs.

Building stock turns over slowly due to the long lifetime of buildings and the slow planning and construction cycle. Efficiency and electrification standards for new buildings are critical to lock in long-term energy savings and emission reductions as the capital new builds are a small portion of the total building stock. Retrofit programs offer the ability to reduce energy use and increase electrification across the much larger, existing building stock.

^{vii} This only includes direct emissions; reductions from indirect emissions from electricity consumption and HFCs from building cooling are reported in other chapters in this report.

Trends Assessment

The following are major drivers of emissions with potential long-term impacts:

- *Trends in efficiency programs are mixed*, with some delays and rollbacks in program implementation, financial investments, and policy enactment. Although many other efforts remain robust, some jurisdictions are increasing investments in efficiency to address the economic hardships brought on by COVID-19.
- *Efforts to electrify building infrastructure are progressing despite growing signs of opposition*, with some states and cities advancing electrification and others actively opposing it.^{viii}

Efficiency and electrification are dual pillars of building decarbonization, equally important and mutually reinforcing. While design and delivery of efficiency and electrification are inextricably linked, we split them in this assessment simply for purposes of trend assessment.

Note that we do not discuss in detail the recent shift in building energy consumption from commercial to residential buildings as more people telework, primarily because the emissions impacts appear to roughly balance. EIA reports that electricity sales in the building sector declined by 3.3% overall through the first two quarters of 2020 (compared to the first two quarters of 2019). Broken out by sector, commercial sales fell 7.6% while residential sales actually increased 0.9%.^v

Operational requirements have also changed, with increased need for filtration and outdoor air use to help reduce COVID spread.^{ix} These shifts may lead to modest overall changes in energy consumption given the different use patterns, fuels, and technologies in residential and commercial sectors. The recession may also be decreasing overall building energy consumption, which is down 8.5% overall compared to April and May 2019,ⁱⁱⁱ although the decrease may also include weather and efficiency effects.^x

^{viii} California and Massachusetts are two states we modeled as leader states in our Accelerating America's Pledge analysis and are advancing electrification.

^{ix} Also not discussed are changes in guidance in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) for HVAC as buildings reopen to accommodate large amounts of people, either in workspaces or cultural spaces like museums. More stringent HVAC requirements could potentially correspond to higher energy use.

^x In March and April, the first two months significantly affected by COVID-19, building energy consumption across the residential and commercial sectors and fuels was 8.5% lower overall compared to the same period in 2019. Prior to the pandemic, the EIA predicted that total building energy consumption would decrease by a modest 1.9% compared to 2019. An unusually warm winter may be responsible for at least some of the decrease in energy use. In January and February, two months which were largely unaffected by the pandemic, gas consumption in the building sector was 12% lower than in 2019. Weather patterns began to rebound in ensuing months, making it difficult to precisely separate the effects of weather, changes in consumption patterns, and the recession.

These dynamics were unanticipated in earlier studies, including *Accelerating America's Pledge*, but are likely to be relatively temporary as the pandemic retreats. Even if a more permanent change in working patterns were to occur, the impacts on building energy consumption would be ambiguous and likely modest relative to other factors. They would more likely represent a shift in where energy is used rather than a change in overall energy use.

Overall, recent trends are unlikely to have significant long-term impacts, leaving our confidence largely unchanged in the country's ability to achieve the buildings emissions reductions modeled in *Accelerating America's Pledge*. A rapidly applied economic stimulus package that directs resources and new ambition for building efficiency and electrification could address current delays and forestall potential future reductions in incentive programs.

Overall Change in Confidence for **BUILDINGS**



UNCHANGED





Key Driver #1 Trends in Efficiency Programs Are Mixed

Even in the face of COVID-19, states, cities, and businesses continue to advance energy efficiency. For example, in 2020:

- Virginia passed an Energy Efficiency Resource Standard.¹⁷³
- Utilities in Connecticut and the New York State Energy Research and Development Authority (NYSERDA) increased incentives for efficiency.¹⁷⁴

Some jurisdictions are responding to the pandemic by increasing investments in efficiency to assist lower-income households. For example:

- In response to a request from Minnesota, Xcel proposed almost \$3 billion in new investments. These investments include expanding efficiency programs and providing rebate payments to help lower customers' energy bills and create approximately 5,000 jobs.¹⁷⁵
- Michigan and New York bolstered low-income efficiency programs and energy assistance as a means of helping ease high energy bills.¹⁷⁶

In addition, states and cities have opposed federal rollbacks of national efficiency rules. For example, thirteen states, Washington DC, and New York City filed a lawsuit against federal government rollbacks of energy efficiency standards, highlighting that efficiency standards encourage steady growth

and investment.^{177,xi}

At the same time, some states, utilities, service providers, and small businesses have suspended energy efficiency programs due to COVID-19.¹⁷⁸ For example:

- At least 20 states halted retrofits to low-income homes under US Department of Energy (DOE) Weatherization Assistance Program (WAP) except for emergency repair situations.¹⁷⁹ And due to stay-at-home mandates and social distancing, many of the local nonprofit agencies that implement the program have paused work.¹⁸⁰
- Missouri, Ohio, and New Jersey regulators have proposed diverting funding from utility energy efficiency programs into bill payment assistance funds to help customers dealing with economic fallout from the pandemic.¹⁸¹

Although COVID-19 has disrupted some efficiency programs, support for efficiency continues. Some states, cities, and utilities are using efficiency programs as a tool to support low-income households, while others are diverting efficiency funding to more immediate needs or delaying action. Overall, the countervailing trends are unlikely to have a significant impact on the country's ability to move toward continued efficiency increases and all-electric new buildings and appliances consistent with our modeling in *Accelerating America's Pledge*.

^{xi} Of these thirteen states, twelve were modeled as leader states, and one as a modestly ambitious state in *Accelerating America's Pledge*.



Key Driver #2

Efforts to Electrify Are Progressing Despite Growing Signs of Opposition



In many cases, states, cities, and businesses continue to advance electrification, despite COVID-19. For example:

- New York announced \$2 billion in utility energy efficiency and building electrification programs, including \$434 million for heat pumps.¹⁸²
- California regulators allocated \$45 million in incentives for heat pump water heaters, including \$4 million set aside for low-income customers.¹⁸³
- The Sacramento Municipal Utility District (SMUD) recently increased its rebate program for heat pump HVAC gas-to-electric upgrades and has suspended dual fuel and gas HVAC rebates.¹⁸⁴
- Since Berkeley, California became the first US city to pass legislation prohibiting gas infrastructure in new buildings, 32 California municipalities have passed

laws to reduce gas infrastructure in new buildings.¹⁸⁵ More than 60 others are considering similar legislation.¹⁸⁶

- Municipalities in the Boston area continue to advance electrification, even though the Massachusetts Attorney General struck down the City of Brookline's gas ban.¹⁸⁷
- Several of California's largest utilities, including Pacific Gas and Electric (PG&E), Southern California Edison, and SMUD, have submitted letters supporting building electrification in building energy performance standards.¹⁸⁸

In addition, setbacks and cancellations for oil and gas distribution networks are aiding efforts to electrify end-uses, including buildings. In July 2020, the Dakota Access, Atlantic Coast, and Keystone XL pipelines had operations halted or plans canceled, succumbing to legal, regulatory, and social pressure.^{189, xii}

^{xii} Despite the Supreme Court halting construction, labor unions have pushed forward to align with the developer to build the Keystone XL pipeline.



Climate Action Spotlight: New York Contractors Receive Free Building Electrification Training During COVID-19 Pandemic

The COVID-19 pandemic has created a difficult situation for contractors and installers, who have had to suspend on-premises work due to the economic downturn and social distancing. Online training can help ensure that workers are familiar with the latest technologies and are prepared to take on building electrification jobs. As a result, NYSERDA launched a new virtual training program to help familiarize contractors and technicians with building electrification strategies. The program offers both commercial and residential/multifamily tracks and includes modules on topics such as heat pump installation and common commissioning issues.¹⁹⁰ Courses are eligible for continuing education credits.

Since launching in late May, the program has hosted over three dozen sessions and has trained over 520 contractors. Professional development opportunities like these are important for electric heat pump deployment since they address market challenges, including a potential shortage in the supply of trained heat pump installers, and a lack of familiarity with heat pump technology in the HVAC community.¹⁹¹ Web-based building electrification training has also been offered in California, Vermont, and Maine.¹⁹²

On the other hand, some states, cities, and businesses are directly opposing building electrification. For example, in February 2020, Arizona preempted building electrification efforts by passing legislation that would prohibit municipalities from denying building permits based on the use of fossil fuels.¹⁹³ Soon after, Tennessee, Oklahoma, and Louisiana passed similar legislation.¹⁹⁴ In addition, several business associations in California have sued to block electrification progress in Berkeley and San Luis Obispo.¹⁹⁵

Program implementation, consumer and business investment, and policy enactment has also stalled in some instances in response to COVID-19. For example:

- Six cities, including Seattle and Bellingham, Washington, paused public forums and non-essential policy work, preventing progress on electrification retrofits and all-electric building requirements.¹⁹⁶
- Heat pump shipments decreased 4.9% through June 2020, which is likely associated with slowdowns in construction.¹⁹⁷

Overall, recent trends are mixed and do not represent a major change from the ambitious activities included in *Accelerating America's Pledge*. We do not anticipate that these trends will have significant impact on modeled 2030 emissions reductions.

Jobs Trends and Stimulus Opportunities

The buildings sector generates numerous energy-related jobs, particularly in building retrofits. COVID-19 has affected many of these. Across the entire energy sector, energy

efficiency had the highest jobs growth overall in 2019 and was posed to grow another 3% in 2020.¹⁹⁸ Since the start of the stay-at-home orders and subsequent economic downturn, approximately 360,000 energy efficiency workers have lost their jobs.¹⁹⁹

An economic recovery package would spur opportunity to rebound and create jobs in efficiency and electrification. One estimate is that building electrification could lead to over 100,000 net jobs by 2045 just in California, after accounting for job losses in the fossil fuel industry.²⁰⁰

As part of stimulus and recovery, the following three areas could accelerate progress toward emissions reductions previously discussed, while creating jobs and promoting equity:

- **Zero-emissions buildings and appliances:** Stimulus efforts can lay the groundwork to eliminate emissions from buildings. Approaches include requiring and incentivizing leading states and cities to adopt net-zero energy codes, driving commercial retrofits through tax incentives,²⁰¹ and updating standards.²⁰² Financial incentives for consumers to replace home combustion appliances (e.g., gas stoves and furnaces) with clean electric appliances (e.g., induction stoves and heat pumps) can reduce respiratory health problems and COVID-19 risks.²⁰³
- **Weatherization and efficiency retrofits:** Reauthorizing the Energy Efficiency and Conservation Block Grant (EECBG) program and increasing funding to the WAP program would support infrastructure investments and job creation.²⁰⁴ For example, an assessment

found that increasing funding by \$100 billion across EECBG, State Energy Program, and Community Development Block Grant could support 2–4 million jobs.²⁰⁵ Public-private financing like energy savings performance contracts could help leverage additional funding and create jobs.²⁰⁶

- **Low-income housing:** Efficiency and electrification programs can prioritize underserved and low-income communities to promote equity and increase the supply of much-needed high-performance affordable housing. Efforts could include

establishing a federal bank that dedicates a portion of efficiency and electrification upgrades to underserved and low-income communities and provides accessible financial models to support adoption.²⁰⁷ Other efforts include increasing funding and coordination for WAP and the Low-Income Home Energy Assistance Program to better align with population needs,²⁰⁸ and expanding Low-Income Housing Tax Credit projects to require them to be all-electric and zero-energy ready.²⁰⁹ Investment can be specifically targeted to address current health and housing access inequities.



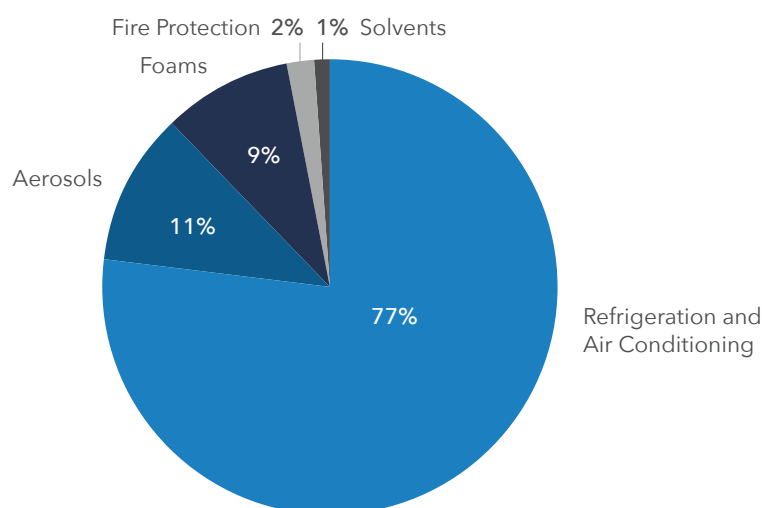
05 HFCs



HFCs currently account for approximately 2.5% of total US emissions and result primarily from refrigeration and air conditioning, as well as aerosols, foams, fire protection, and solvents.²¹⁰ In the absence of abatement efforts, HFC emissions are expected to grow 12% by 2030.²¹¹

In *Accelerating America's Pledge*, we found that expanded climate action in a Bottom-Up scenario could avoid 55 MMTCO₂e in HFC emissions, accounting for approximately 3% of the projected economy-wide total avoided emissions in 2030.

Exhibit 10 US HFC Emissions by End Use



Source: US Environmental Protection Agency, "Inventory of U.S. Greenhouse Gases and Sinks 1990-2018," 2020

Trends Assessment

The following are major drivers of HFC emissions with potential long-term impacts:²¹²

- *State-level HFC action is expanding*, with 16 states now having passed or proposed HFC policies, up from 11 since the 2019 report. Reacting to this momentum, the heating, ventilation, and air conditioning (HVAC) industry has increased efforts in pushing for federal legislation requiring high-global warming potential (GWP) HFC phasedowns in line with the Kigali Amendment.
- *Federal regulatory rollbacks are counteracting state-level action*, with the EPA rolling back national refrigerant management regulations.

Recent trends in transportation – particularly how they relate to mobile air conditioning systems – are not discussed here, since HFC leakage rates from these systems do not significantly depend on whether the system is in operation. We also do not discuss recent trends regarding consumers delaying HVAC maintenance and upgrades. While this may lead to increased HFC emissions in the short term, many manufacturers believe the industry will take fewer than six months to recover.²¹³ Furthermore, maintenance and upgrades to HVAC systems are likely to quickly return to pre-pandemic levels or higher because they are recommended by health experts and the American Society of Heating, Refrigerating and Air-Conditioning Engineers to reduce aerosol transmission of COVID-19.²¹⁴

Overall, significant momentum in state-level HFC policies and a push for federal legislation outweigh federal regulatory rollbacks, increasing confidence in the country's ability to achieve the HFC emissions reductions modeled in *Accelerating America's Pledge*.

Overall Change in Confidence for HFCs



INCREASED



Increased

Key Driver #1 State HFC Action Is Expanding

The pandemic and economic crisis have not diminished state efforts to legislate HFC emissions reductions. In May 2020, Colorado and Virginia joined California, Washington, Vermont, and New Jersey in requiring the phaseout of high-GWP HFCs, bringing the total number of states having passed or proposed HFC policies to 16, up from 11 since the 2019 report.²¹⁵ These 16 states are members of the US Climate Alliance—which comprises 24 states and represents 55% of the US population and 60% of US GDP—working together to address HFC emissions.²¹⁶

These state actions and pledges have provided economic incentives for industry leaders to push for federal legislation requiring HFC phasedowns in line with Kigali Amendment guidelines, which is currently being considered in the US House and Senate, even amid the COVID-19 crisis.²¹⁷ HVAC industry stakeholders, such as Honeywell and Chemours, support US ratification of the Kigali Amendment and passage of the American Innovation in Manufacturing (AIM) Act. They believe these policies would ensure global competitiveness of American firms,



provide job security for American employees, and result in the creation of 33,000 jobs and \$12.5 billion in direct economic benefits.²¹⁸

Although these actions are not expected to immediately affect direct HFC emissions, we expect them to drive emissions down in the medium term and long term. This will increase momentum towards the 2030 emissions reductions modeled in *Accelerating America's Pledge*, where we assumed that half of US states would take action regarding HFC refrigerants by 2030.

Exhibit 11 **Cycle of Ambition: HFC Example**





Decreased

Key Driver #2

Federal Regulatory Rollback Is Countering State-Level Action

Efforts by the EPA to deregulate the HVAC industry have continued in 2020 with the rescission of HFC regulations contained in Section 608 of the Clean Air Act.²¹⁹

Section 608, also known as the National Recycling and Emission Reduction Program, contained regulations mandating the inspection, repairing, reporting, retrofitting, and maintaining of records of HFC leaks in HVAC systems containing more than

50 pounds of refrigerant. In the absence of federal legislation, these deregulatory actions taken by the EPA could have long-term effects and result in a slowing of HFC emissions reductions. However, if industry is successful in pushing for passage of federal legislation, these regulatory actions would be superseded and become inconsequential in the long run.

Climate Action Spotlight: Aldi Grocery Stores Adopt Low-Global Warming Potential Refrigerants in Hundreds of Stores



The EPA's GreenChill Partnership works with supermarkets to help them reduce HFC emissions. Since the 2019 report, GreenChill Partnership's platinum, gold, and silver store certifications have increased 56%—from 372 to 582—currently accounting for 29% of all stores nationwide.

This growth is largely driven by the actions of one supermarket chain: Aldi. Aldi supermarkets are rapidly adopting low-GWP refrigeration technologies in both large and small retail refrigeration equipment.²²⁰ In 2019, Aldi installed central CO₂ (GWP of 1)

refrigeration systems in 110 additional stores, bringing its total EPA GreenChill Platinum certifications to 326 across the United States.²²¹ Aldi has also committed to using propane (GWP less than 3) in all new, small, self-contained refrigeration equipment such as spot merchandisers and beverage coolers, and ammonia (GWP of 0) in all warehouses.²²² These commitments anticipate state-level regulations, including California's proposed requirement for all new supermarket refrigeration systems to use only refrigerants with a GWP less than 150 beginning in 2022.

Job Trends and Stimulus Opportunities

The HVAC industry has been hit hard by the COVID-19 crisis, with consumers delaying maintenance and upgrades of existing systems and retailers taking a cautious approach to inventory management.²²³ The effects of this have been seen in the closing of manufacturing facilities and the furloughing of installation and repair technicians.²²⁴

As part of stimulus and recovery, the following areas could accelerate progress toward the emissions reductions previously discussed, while creating jobs and promoting equity:

- **Tax Credits for HVAC installers:**

The HVAC industry has adapted to the COVID-19 pandemic by offering virtual system checks and other online services. These initiatives will result in greater efficiency and safety for industry workers and consumers, but they require investments by contractors, who have seen a sharp decline in business in recent months.²²⁵ Direct tax credits aimed at industry installers would provide much-needed funds that could be used to adapt to the changing needs of consumers and prepare the industry for similar crises.

- **Consumer efficiency incentives:**

Government stimulus incentives directed towards consumers would directly affect leakage repair trends, providing them with funds to properly repair and replace existing HVAC systems. For example, an extension of energy efficiency tax credits to cover electrification and low-HFC refrigerants would provide stimulus for the HVAC industry and result in short-

and long-term HFC emissions reductions. Without government stimulus, layoffs and furloughs in the HVAC industry can be expected to continue for the duration of the economic downturn due to a lack of demand for products and services.

- **Funding for end-of-life HFC disposal:**

Federal stimulus to fund existing and new state programs that treat and destroy end-of-life, high-GWP HFCs could reduce lifecycle HFC emissions by 90% and offer an annual reduction opportunity of 75 to 80 MMTCO₂e.²²⁶



Conclusion



In each sector we considered, recent changes—including COVID-19 and the economic recession—have accelerated emissions reductions in some areas and slowed emissions reductions in other areas. In four of the five sectors—electricity, transportation, methane, and HFCs—the net sum of recent trends increases confidence in the ability of states, cities, and businesses to deliver the modeled 2030 emissions reductions. In these sectors, the pace and number of increased emissions reduction opportunities is exceeding new risks and barriers. In the remaining sector—buildings—prospects for emissions reductions appear substantially unchanged. Together these five sectors represented over 75% of US GHG emissions in 2018 and provided nearly 95% of the economy-wide total avoided emissions in 2030 in the Bottom-Up scenario in *Accelerating America's Pledge*.

Devastating as it has been, the COVID-19 pandemic has not substantially shaken the

climate commitment of US states, cities, and businesses. Even in the face of enormous challenges posed by the pandemic, social unrest, and slashed budgets; states, cities, businesses, universities, and others have steadily demonstrated commitments to strong climate and clean energy leadership. Although some climate action has been delayed by disrupted legislative sessions, the challenges posed by COVID-19 have not substantively derailed state, city, and business climate action to date.^{xiii} Furthermore, clean technologies, particularly renewable electricity, are proving more resilient than legacy technologies, demonstrating that we have passed a tipping point in the energy transition and that these clean technologies are here to stay.

Continued progress on clean electricity (the biggest driver of 2030 emissions reductions in the 2019 report) suggests that state, city, and business action and strong economic fundamentals for clean energy continue to

^{xiii} Based on research through early August 2020.

provide a strong foundation for the needed transition. This is despite the enormous disruption posed by COVID-19 across the economy.

In the 2019 *Accelerating America's Pledge*, we showed how states, cities, and businesses across the United States could achieve 37% emissions reductions below 2005 levels by 2030 with significantly expanded action. We also showed how to achieve 49% emissions reductions below 2005 levels by 2030 with aggressive federal reengagement starting in 2021. All the emissions reduction opportunities identified in the 2019 report are still available. Although COVID-19 and the uncertain path toward economic recovery has increased the economy-wide uncertainty about 2030 emissions, the response to date has increased our confidence in the ability of states, cities, and businesses to deliver on the bottom-up action modeled in our 2019 analysis.

As noted in *Accelerating America's Pledge*, achieving this ambitious level of emissions reductions will require accelerated market transformation and significant social and political mobilization around climate action. A massive effort is still needed from states, cities, and businesses that are supported and complemented by a renewed federal commitment to deploy clean energy and other technologies at the speed and scale envisioned in the past year's scenarios. The federal government must work in partnership with states, cities, businesses, and others to implement a comprehensive, coordinated, all-in climate strategy to put the United States on a path toward a net-zero emissions future.

Economic recovery and stimulus packages provide a critical opportunity to spur this needed climate action. Federal stimulus

packages accounting for the needs of states, cities, and businesses must be implemented quickly to galvanize creativity, action, and energy before ongoing strain derails progress. Working together, the federal government and states, cities, and businesses can implement policies and programs to stimulate the economy, create jobs, improve public health, reduce air pollution, promote equity, and address climate change. Specifically, economic stimulus and recovery packages could prioritize the following actions to help us get onto a 1.5°C-aligned emissions reduction pathway. Investments in public transit and methane leak reduction are particularly critical to avoid recent threats to modeled emissions reductions.

- **Electricity:** renewable energy and storage financial incentives, grid modernization, and just transition support
- **Transportation:** support for public transit, electric vehicle manufacturing, and charging infrastructure; purchase incentives; workforce training; and complete streets
- **Methane:** programs to address idle and abandoned wells and other infrastructure, advanced monitoring and efficiency, and support for state and local governments and at-risk communities
- **Buildings:** zero-emissions buildings and appliance incentives, weatherization and efficiency retrofits, and prioritizing low-income housing for efficiency and electrification
- **HFCs:** heating, ventilation, and air-conditioning (HVAC) industry and consumer incentives for climate-friendly conversions and end-of-life HFC disposal

The robustness of public attitudes and institutional commitments to clean energy progress, even in the face of one of the greatest tragedies of American history, is a strong validator of public opinion and market forces underlying the *America's Pledge* analysis.

The signs of these robust attitudes and commitments are everywhere. Climate leadership continues to flow from tech companies, automakers, utilities, and chemical producers. Cities like Houston and Dallas have committed to 100% clean electricity in the middle of the pandemic and its economic devastation. Only weeks after California announced its heavy-duty vehicle electrification program, it was joined by the

commitment of 15 other states. And finally, public opinion polls show unprecedented insistence that the federal government act on climate. The signs are clear—there are powerful and resilient winds of change sweeping America's energy landscape.



Public Opinion Polling Shows American Voters Support a Clean Energy Future

One of the important premises underlying the *Accelerating America's Pledge* scenarios was the overall trend of public attitudes toward the need for a clean energy transition that provides strong and accelerating momentum toward decarbonization. Polling data demonstrate the robustness of these public attitudes even in the face of a global pandemic. Polling data released on June 26 shows that, across the board, American voters support building a clean energy future:²²⁷

- 71% support achieving a 100% clean economy by 2050
- 70% support prioritizing the clean energy industry over fossil fuel industry in pandemic stimulus responses

- 67% support protecting communities of color from climate impacts
- 65% support a carbon tax
- 65% support requiring utilities to generate 100% of electricity from clean sources by 2040
- 73% support stronger fuel efficiency standards for cars and trucks

In addition, polling released on August 24 shows that the community that feels climate change is extremely important to them personally—the “issue public” around climate change—has nearly doubled between 2015 and 2020, from 13% to 25%.²²⁸

Endnotes

1. US Energy Information Administration, "Preliminary Monthly Electric Generator Inventory," August 25, 2020, <https://www.eia.gov/electricity/data/eia860m/>.
2. Gary Silberg, Bala Lakshman, Tom Mayor, Yoshi Suganuma, Jono Anderson, Todd Dubner, and Nehal Doshi, "Automotive's New Reality: Fewer Trips, Fewer Miles, Fewer Cars?," KPMG, 2020, <https://advisory.kpmg.us/content/dam/advisory/en/pdfs/2020/automotives-new-reality.pdf>.
3. NESCAUM, "Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding," July 13, 2020, <https://www.nescaum.org/documents/multistate-truck-zev-governors-mou-20200714.pdf>.
4. TransitCenter, "Estimated Financial Impact of COVID-19 on US Transit Agencies: \$26-\$40 Billion Annually," April 7, 2020, https://transitcenter.org/estimated-financial-impact-of-covid-19-on-u-s-transit-agencies-26-38-billion-annually/#_ftn6.
5. John Schwartz, "Climate Is Taking On a Growing Role for Voters, Research Suggests," The New York Times, August 24, 2020, <https://www.nytimes.com/2020/08/24/climate/climate-change-survey-voters.html>.
6. Barb Rosewicz and Mike Maciag, "How COVID-19 is Driving Big Job Losses in State and Local Government," *The Pew Charitable Trusts*, June 16, 2020, <https://www.pewtrusts.org/en/research-and-analysis/articles/2020/06/16/how-covid-19-is-driving-big-job-losses-in-state-and-local-government>.
7. Kate Larsen, Hannah Pitt, John Larsen, Whitney Herndon, Trevor Houser, Hannah Kolus, Shashank Mohan, and Emily Wimberger, *Taking Stock 2020: The Covid-19 Edition*, Rhodium Group, 2020, <https://www.rhg.com/research/taking-stock-2020/>.
8. US Environmental Protection Agency, "Sources of Greenhouse Gas Emissions," Updated April 11, 2020, <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>.
9. US EIA, "Electricity Data Browser," <https://www.eia.gov/electricity/data/browser/#/to pic/0?agg=2,0,1axefuel=vtv&geo=g&sec=g&linechart=ELEC.GEN.ALL-US-99.M~ELEC.GEN.COW-US-99.M~ELEC.GEN.NG-US-99.M~ELEC.GEN.NUC-US-99.M~ELEC.GEN.HYC-US-99.M~ELEC.GEN.WND-US-99.M~ELEC.GEN.TSN-US-99.M&columnchart=ELEC.GEN.ALL-US-99.M~ELEC.GEN.COW-US-99.M~ELEC.GEN.NG-US-99.M~ELEC.GEN.NUC-US-99.M~ELEC.GEN.HYC-US-99.M~ELEC.GEN.WND-US-99.M~ELEC.GEN.TSN-US-99.M&map=ELEC.GEN.ALL-US-99.M&freq=M&start=201806&end=202005&ctype=linechart<ype=pin&rtype=s&m aptype=0&rse=0&pin=>.
10. US EIA, Short-term Energy Outlook, <https://www.eia.gov/outlooks/steo/>.
11. Moody's, "US Coronavirus-related power demand reductions drive lower carbon emissions," June 30, 2020, https://www.moody's.com/researchdocumentcontentpage.aspx?docid=PBC_1228704; Everett Wheeler, "Economists wonder: Did COVID-19 accelerate timeline for peak oil demand?" S&P Global Market Intelligence, <https://www.spglobal.com/marketintelligence/en/news-insights/blog/essential-energy-insights-june-11-2020>.
12. Moody's, "Coronavirus-driven economic weakness crushes demand outlook for 2020," May 31, 2020, https://www.moody's.com/researchdocumentcontentpage.aspx?docid=PBC_1230273.
13. WRI analysis of EIA "Preliminary Monthly Electric Generator Inventory," January and June, 2020, <https://www.eia.gov/electricity/data/eia860m/>.
14. JEA, "JEA Board Approves Plant Scherer Transaction," June 26, 2020, https://www.jea.com/About/Media_Relations/2020_06_26_JEA_Board_Approves_Plant_Scherer_Transaction/.
15. Tucson Electric Power, "2020 Integrated Resource Plan," June 26, 2020, <https://www.tep.com/wp-content/uploads/TEP-2020-Integrated-Resource-Plan-Lo-Res.pdf>.
16. Arizona Public Service, "APS sets course for 100 percent clean energy future," January 22, 2020, <https://www.aps.com/en/About/Our-Company/Newsroom/Articles/APS-sets-course-for-100-percent-clean-energy-future>.
17. Alliant Energy, "Alliant Energy announces accelerated sustainability goals in new Corporate Responsibility Report," July 22, 2020, <https://www.alliantenergy.com/AlliantEnergyNews/NewsReleases/NewsRelease072220>.
18. WEC Energy Group, "WEC Energy Group aims for carbon neutral electric generation by 2050," July 30, 2020, <https://investor.wecenergygroup.com/investors/news-releases/press-release-details/2020/WEC-Energy-Group-aims-for-carbon-neutral-electric-generation-by-2050/default>.

- aspx; WEC Energy Group, "Committed to a cleaner energy future that is safe, reliable and affordable," <https://www.wecenergygroup.com/home/generation-reshaping-plan.htm>.
19. WRI analysis of EIA Monthly Electric Generator Inventory, June 2020.
 20. Ibid.
 21. Brian Murphy, "COVID-19 is disrupting the sector, but declining costs, technological advances and financial innovation will drive long-term growth," *Ernst & Young LLP*, May 19, 2020, https://www.ey.com/en_us/power-utilities/why-us-renewables-are-looking-beyond-subsidies.
 22. EIA, "STEO," March 2020, <https://www.eia.gov/outlooks/steo/archives/mar20.pdf>.
 23. Short-Term Energy Outlook Data Browser, US Energy Information Administration, https://www.eia.gov/outlooks/steo/data/browser/#/?v=22&f=A&s=0&start=2016&end=2021&type=linechart&maptype=0&linechart=~CL&EPGEN_US~RTEPGEN_US&map=.
 24. EIA, "STEO," <https://www.eia.gov/outlooks/steo/outlook.php#issues2020>.
 25. Austin Perea, "The US Residential Solar Market Is Set For Major Change in the 2020s," *Greentech Media*, December 18, 2019, <https://www.greentechmedia.com/articles/read/the-us-residential-solar-market-is-in-for-major-change-in-the-2020s>.
 26. EIA, "Preliminary Monthly Electric Generator Inventory," August 25, 2020, <https://www.eia.gov/electricity/data/eia860m/>.
 27. New Mexico Public Regulation Commission meeting minutes, May 13, 2020, http://www.nmprc.state.nm.us/docs/May_13_2020_Minutes.pdf.
 28. Edison International, "SCE Grows Clean Energy Portfolio, Enhances System Reliability With 770 Megawatts of New Energy Storage Capacity," May 1, 2020, <https://newsroom.edison.com/releases/sce-grows-clean-energy-portfolio-enhances-system-reliability-with-770-megawatts-of-new-energy-storage-capacity>.
 29. Aparna Sankaran, "Renewable energy sector is expected to bounce back quickly despite the impact of COVID-19," *EY*, May 19, 2020, https://www.ey.com/en_si/news/2020/05/renewable-energy-sector-is-expected-to-bounce-back-quickly-despite-the-impact-of-covid-19.
 30. American Council on Renewable Energy, "Expectations for Renewable Energy Finance in 2020-2023," July 2020, <https://acore.org/wp-content/uploads/2020/07/Expectations-for-Renewable-Energy-Finance-in-2020-2023.pdf>.
 31. Deloitte, "Midyear 2020 Renewable Energy Industry Outlook," July 2020, <https://www2.deloitte.com/us/en/pages/energy-and-resources/articles/renewable-energy-outlook.html>.
 32. McKinsey & Company, "Oil and gas after COVID-19: The day of reckoning or a new age of opportunity?" May 15, 2020, <https://www.mckinsey.com/industries/oil-and-gas/our-insights/oil-and-gas-after-covid-19-the-day-of-reckoning-or-a-new-age-of-opportunity>.
 33. Hiroko Tabuchi and Brad Plumer, "Is This the End of New Pipelines?" *The New York Times*, July 8, 2020, <https://www.nytimes.com/2020/07/08/climate/dakota-access-keystone-atlantic-pipelines.html>.
 34. Duke Energy News Center, "Duke Energy reaffirms capital investments in renewables and grid projects to deliver cleaner energy, economic growth," July 5, 2020, <https://news.duke-energy.com/releases/releases-20200705-6806042>.
 35. Charles Teplin, Mark Dyson, and Grant Glazer, "Prospects for Gas Pipelines in the Era of Clean Energy," *Rocky Mountain Institute*, September 2019, <https://rmi.org/insight/clean-energy-portfolios-pipelines-and-plants>.
 36. Jeff St. John, "2 More Western Utilities Move to Close Coal Plants Early, Shifting to Renewables and Storage," *Greentech Media*, June 29, 2020, <https://www.greentechmedia.com/articles/read/two-more-western-utilities-move-to-close-coal-plants-early-shift-to-renewables-and-storage>.
 37. New Mexico Public Regulation Commission meeting minutes, July 29, 2020, http://www.nmprc.state.nm.us/docs/Minutes_July_29_2020_Open_Meeting.pdf.
 38. Smart Electric Power Alliance, "Utilities' path to a carbon-free energy system by 2050," <https://sepapower.org/utility-transformation-challenge/utility-carbon-reduction-tracker/>.
 39. EIA, "Preliminary Monthly Electric Generator Inventory," August 25, 2020, <https://www.eia.gov/electricity/data/eia860m/>.
 40. Stephen Tsao and Richard Martin, "Overpowered: Why a US Gas-Building Spree Continues Despite Electricity Glut, S&P Global," <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/overpowered-why>.

- a-us-gas-building-spree-continues-despite-electricity-glut-54188928.**
41. Michael Banker, Stephen Abbott, and Ali Rotatori, "The Clean Economy Act Is a Breakthrough for Virginia and the South," *Rocky Mountain Institute*, April 15, 2020, <https://rmi.org/the-clean-economy-act-is-a-breakthrough-for-virginia-and-the-south/>.
 42. New York State Energy Research and Development Authority, "New York State Announces Passage of Accelerated Renewable Energy Growth and Community Benefit Act as Part of 2020-2021 Enacted State Budget," April 3, 2020, <https://www.nyserda.ny.gov/About/Newsroom/2020-Announcements/2020-04-03-NEW-YORK-STATE-ANNOUNCES-PASSAGE-OF-ACCELERATED-RENEWABLE-ENERGY-GROWTH-AND-COMMUNITY-BENEFIT-ACT-AS-PART-OF-2020-2021-ENACTED-STATE-BUDGET>.
 43. Office of the Mayor of Cincinnati, "Cincinnati to Construct Nation's Largest City-Led Solar Project," November 21, 2019, <https://www.cincinnati-oh.gov/mayor/news/cincinnati-to-construct-nation-s-largest-city-led-solar-project/>.
 44. Honolulu City Council, Bill 25, passed May 20, 2020, [http://www4.honolulu.gov/docushare/dsweb/Get/Document-259848/BILL025\(19\)%2c%20CD2%2c%20PROPOSED%20FD1%20-%20RM1.pdf](http://www4.honolulu.gov/docushare/dsweb/Get/Document-259848/BILL025(19)%2c%20CD2%2c%20PROPOSED%20FD1%20-%20RM1.pdf).
 45. Office of the Mayor of Houston, "The City of Houston Commits to 100% Renewable Energy," April 30, 2020, <https://www.houstontx.gov/mayor/press/2020/100-percent-renewable-energy.html>; City of Chicago Office of the City Clerk, "Support For Implementation of Clean Energy Transition Plan," April 10, 2019, <https://chicago.legistar.com/LegislationDetail.aspx?ID=3886265&GUID=081AC4BD-E6F4-4789-AD80-53BF25764855>.
 46. Office of the Mayor of Houston, "The City of Houston Commits to 100% Renewable Energy," Minutes of the Dallas City Council, May 27, 2020, <http://citysecretary2.dallascityhall.com/pdf/CC2020/052720Min.pdf>.
 47. Shell, "Wells Fargo expands renewable energy purchases with Shell Energy and MP2 Energy," <https://www.washingtonpost.com/climate-environment/2020/06/23/shell-wells-fargo-solar-deal/>.
 48. Brian Eckhouse, "Facebook Expanding Renewables Footprint With Big Solar, Wind Buy," *Bloomberg*, August 6, 2020, <https://www.bloomberg.com/news/articles/2020-08-06/facebook-expanding-renewables-footprint-with-big-solar-wind-buy?sref=rzkNxfE>.
 49. Catherine Morehouse, "How COVID-19 is impacting 5 state energy legislation efforts," *Utility Dive*, March 26, 2020, <https://www.utilitydive.com/news/how-covid-19-is-impacting-5-state-energy-legislation-efforts/574724/>.
 50. Kyle Harrison, "2H 2020 Corporate Energy Market Outlook," *Bloomberg NEF*, August 11, 2020, <https://www.bnef.com/core/insights/23985>.
 51. Sarah Golden, "Corporate renewable energy in the age of COVID-19," *GreenBiz*, March 27, 2020, <https://www.greenbiz.com/article/corporate-renewable-energy-age-covid-19>.
 52. NASEO and EFI. 2020. "The 2020 U.S. Energy and Employment Report." National Association of State Energy Officials and Energy Futures Initiative.
 53. BW Research Partnership, "Clean Energy Employment Initial Impacts from the COVID-19 Economic Crisis," July 2020, <https://assets.morningconsult.com/wp-uploads/2020/08/11173823/Clean-Energy-Jobs-July-COVID-19-Memo-Final.pdf>.
 54. Ibid.
 55. Sierra Club, *Millions of Good Jobs: A Plan for Economic Renewal*, May 2020, <https://www.sierraclub.org/sites/www.sierraclub.org/files/economic-renewal.pdf>; Devashree Saha, "Grid Modernization: Creating Jobs, Cutting Electric Bills, and Improving Resiliency," *World Resources Institute*, April 2020, <https://www.wri.org/publication/grid-modernization-creating-jobs-cutting-electric-bills-and-improving-resiliency>.
 56. Han Chen and Danielle Droitsch, "Time for the US to End Fossil Fuel Subsidies," *NRDC*, June 3, 2018, <https://www.nrdc.org/experts/danielle-droitsch/time-us-end-fossil-fuel-subsidies>; Geoffrey Supran, Peter Erickson, Doug Koplow, Michael Lazarus, Peter Newell, Naomi Oreskes, and Harro van Asselt, "Fossil-Fuel Subsidies Must End," *Scientific American*, February 24, 2020, <https://blogs.scientificamerican.com/observations/fossil-fuel-subsidies-must-end/>.
 57. BW Research Partnership, *Build Back Better, Faster: How a federal stimulus focusing on clean energy can create millions of jobs and restart America's economy*, July 2020, <https://e2.org/wp-content/uploads/2020/07/E2E4-Build-Back-Better-Faster-Stimulus-Projection->

Report-July-2020.pdf.

58. Devashree Saha, "Grid Modernization," BW, *Build Back Better, Faster*; Sierra Club, *Economic Renewal*.
59. BW, *Build Back Better, Faster*.
60. Felix Mormann, Dan Reicher, and Victor Hanna, *A Tale of Three Markets: Comparing the Solar and Wind Deployment Experiences of California, Texas, and Germany*, Steyer-Taylor Center for Energy Policy and Finance, November 17, 2015, <https://www-cdn.law.stanford.edu/wp-content/uploads/2015/11/Tale-of-Three-Markets-Report-Nov-2015-Final-.pdf>; Americans for a Clean Energy Grid, "Texas as a National Model for Bringing Clean Energy to the Grid," October 13, 2017, <https://cleanenergygrid.org/texas-national-model-bringing-clean-energy-grid/>; David Ward, "Wind Energy Brings Big Savings for Texas Consumers," American Wind Energy Association Blog, December 1, 2015.
61. Devashree Saha, "Ensuring a Fair Transition for US Fossil Fuel Workers in Economic Recovery," World Resources Institute Blog, May 19, 2020, <https://www.wri.org/blog/2020/05/coronavirus-fair-transition-fossil-fuel-workers>.
62. US Congress, Senate, *Environmental Justice for All Act*, HR 5986, 116th Cong., 2nd sess., introduced in Senate February 27, 2020, <https://www.harris.senate.gov/imo/media/doc/EJ%20for%20All%20Act%20-%20Final%20Text.pdf>.
63. Mark Paul and Leah Stokes, *State + Local Decarbonization Policies for the South*, The Southern Economic Advancement Project, June 2020, <https://theseap.org/wp-content/uploads/SEAP-State-Local-Climate-Policies-Report.pdf>.
64. Virginia Governor Ralph Northam, "Governor Northam Signs Clean Energy Legislation," April 12, 2020, <https://www.governor.virginia.gov/newsroom/all-releases/2020/april/headline-856056-en.html>.
65. Office of Governor John Bel Edwards, "Gov. Edwards Signs Executive Orders to Address Climate Change and Enhance Coastal Resilience," August 19, 2020.
66. Southern Company, "Southern Company announces transition to net-zero carbon emissions goal," May 27, 2020, <https://www.southerncompany.com/newsroom/2020/may-2020/transition-to-net-zero-carbon-emissions-goal.html>.
67. City of Houston Office of Sustainability, "City Launches Houston's First-Ever Climate Action Plan on 50th Anniversary of Earth Day," April 22, 2020, <http://greenhoustontx.gov/climateactionplan/>; Minutes of the Dallas City Council, May 27, 2020, <http://citysecretary2.dallascityhall.com/pdf/CC2020/052720MIn.pdf>; Dallas Climate Action, <https://www.dallasclimateaction.com/>.
68. County of Travis, TX, "Travis County Climate Action Plan," June 2, 2020, <https://www.traviscountytexas.gov/tnr/environmental-quality/conserve/climate-action-plan>.
69. Alliant Energy, "Alliant Energy announces accelerated sustainability goals in new Corporate Responsibility Report," July 22, 2020, <https://www.alliantenergy.com/AlliantEnergyNews/NewsReleases/NewsRelease072220>.
70. City Council of Kansas City, *Resolution 200005*, adopted May 14, 2020, <http://cityclerk.kcmo.org/LiveWeb/Documents/Document.aspx?q=Ehj5P3N4QcbDoSJ5SnSPFiURkr4DxOnEeHx2l17h75E%2fAxPuZg%2bAYrjhqSqtDVhZuV%2bCfjajl7qVa3%2bwNCEHSA%3d%3d>; Karen Uhlenhuth, "Kansas City poised to adopt the most efficient building code in the country," *Energy News Network*, June 25, 2020, <https://energynews.us/2020/06/25/midwest/kansas-city-poised-to-adopt-the-most-efficient-building-code-in-the-country/>.
71. Board of Aldermen—City of St. Louis, MO, *Building Energy Performance Standard (BEPS)*, Board Bill Number 219, Session 2019-2020, passed May 2020, <https://www.stlouis-mo.gov/government/city-laws/board-bills/boardbill.cfm?bbDetail=true&BBId=13504>.
72. Cailin Crowe, "St. Louis releases inaugural energy benchmarking report for buildings," *Smart Cities Dive*, October 16, 2019, <https://www.smartcitiesdive.com/news/st-louis-releases-inaugural-energy-benchmarking-report-for-buildings/565114/>; Stefan Schaffer and Maria Stamas, "Smaller Cities Like St. Louis Lead on Energy Efficiency," April 20, 2020, <https://www.nrdc.org/experts/stefan-schaffer/small-cities-st-louis-are-leading-energy-efficiency>.
73. Ford Motor Company, "Ford expands climate change goals, sets targets to become carbon neutral by 2050: Annual Sustainability Report," June 24, 2020, <https://media.ford.com/content/fordmedia/fna/us/en/news/2020/06/24/ford-expands-climate-change-goals.html>.
74. Dow, "Dow sets targets to reduce GHG

- emissions, stop plastic waste, and drive toward a circular economy," June 17, 2020, <https://investors.dow.com/en/news/news-details/2020/Dow-sets-targets-to-reduce-GHG-emissions-stop-plastic-waste-and-drive-toward-a-circular-economy/default.aspx>.
75. EPA, "Fast Facts on Transportation Greenhouse Gas Emissions," 2020, <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions>.
 76. Bureau of Transportation Statistics, "Average Age of Automobiles and Trucks in Operation in the United States," 2020, <https://www.bts.gov/content/average-age-automobiles-and-trucks-operation-united-states>.
 77. NESCAUM, "Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding," July 13, 2020, <https://www.nescaum.org/documents/multistate-truck-zev-governors-mou-20200714.pdf>.
 78. Emily Wimberger, Hannah Pitt, Kate Larsen, and Maggie Young, "States Pave the Way for a Zero-Emission Vehicle Future," Rhodium Group, August 13, 2020, <https://rhg.com/research/states-zero-emission-vehicles/>.
 79. Kate Larsen, Hannah Pitt, John Larsen, Whitney Herndon, Trevor Houser, Hannah Kolus, Shashank Mohan, and Emily Wimberger, "Taking Stock 2020 The COVID-19 Edition," Rhodium Group, July 9, 2020, <https://rhg.com/wp-content/uploads/2020/07/Taking-Stock-2020-The-COVID-19-Edition.pdf>.
 80. Federal Highway Administration, "Traffic Volume Trends," June 2020, https://www.fhwa.dot.gov/policyinformation/travel_monitoring/20juntvt/20juntvt.pdf.
 81. US Energy Information Administration, "This Week in Petroleum," August 19, 2020, <https://www.eia.gov/petroleum/weekly/gasoline.php#tabs-gasoline-demand-finished>.
 82. Nicholas Bloom, James Liang, John Roberts, and Zhichun Jenny Ying, "Does Working from Home Work? Evidence from a Chinese Experiment," *Quarterly Journal of Economics*, 2015, <https://nbloom.people.stanford.edu/sites/g/files/sbiybj4746/f/wfh.pdf>; Airtasker, "The Benefits of Working From Home," March 31, 2020, <https://www.airtasker.com/blog/the-benefits-of-working-from-home/>; Nadine Malek, "Prodoscore Research from March/April 2020: Productivity Has Increased, Led By Remote Workers," Prodoscore, May 19, 2020, <https://www.prodoscore.com/press-releases/prodoscore-research-from-march-april-2020-productivity-has-increased-led-by-remote-workers/>; Federal Highway Administration, "Summary of Travel Trends: 2017 National Household Travel Survey," 2017, https://nhts.ornl.gov/assets/2017_nhts_summary_travel_trends.pdf.
 83. Zoe Schiffer, "Square announces permanent work-from-home policy," *The Verge*, May 18, 2020, <https://www.theverge.com/2020/5/18/21261798/square-employees-work-from-home-remote-premanent-policy-ceo>; Rachel Lerman and Jay Greene, "Big Tech was first to send workers home. Now it's in no rush to bring them back," *Washington Post*, May 18, 2020, <https://www.washingtonpost.com/technology/2020/05/18/facebook-google-work-from-home/>; Julia Falcon, "Zillow gives employees the option to work from home through end of the year," *HousingWire*, April 29, 2020, <https://www.housingwire.com/articles/zillow-gives-employees-the-option-to-work-from-home-through-end-of-the-year/>.
 84. Gartner, "Gartner CFO Survey Reveals 74% Intend to Shift Some Employees to Remote Work Permanently," April 3, 2020, <https://www.gartner.com/en/newsroom/press-releases/2020-04-03-gartner-cfo-surey-reveals-74-percent-of-organizations-to-shift-some-employees-to-remote-work-permanently2>.
 85. Christopher L. Weber et al., "Life Cycle Comparison of Traditional Retail and e-Commerce Logistics for Electronic Products: A Case Study of Buy.com," 2009 IEEE International Symposium on Sustainable Systems and Technology, 2009, <https://doi.org/10.1109/issst.2009.5156681>.
 86. Gary Silberg, Bala Lakshman, Tom Mayor, Yoshi Suganuma, Jono Anderson, Todd Dubner, and Nehal Doshi, *Automotive's New Reality: Fewer Trips, Fewer Miles, Fewer Cars?*, KPMG, 2020, <https://advisory.kpmg.us/content/dam/advisory/en/pdfs/2020/automotives-new-reality.pdf>.
 87. "What Are Complete Streets?," *Smart Growth America*, 2020, <https://smartgrowthamerica.org/program/national-complete-streets-coalition/publications/what-are-complete-streets/>.
 88. Winnie Hu, "A Surge in Biking to Avoid Crowded Trains in N.Y.C.," *New York Times*, June 1, 2020, <https://www.nytimes.com/2020/03/14/nyregion/coronavirus-nyc-bike-commute.html>; Darryl C. Murphy, "Philly's bike share

- hits peak ridership as coronavirus concerns grow," *Why*, March 11, 2020, <https://why.org/articles/indego-experiencing-ridership-bump-in-a-warm-weird-winter/>.
89. C40 Cities Climate Leadership Group, "C40 Mayors' Agenda for a Green and Just Recovery," July 2020, <https://www.c40.org/other/agenda-for-a-green-and-just-recovery>.
 90. Bay Area Rapid Transit, "BART updates related to the coronavirus," 2020, <https://www.bart.gov/news/articles/2020/news20200225>; Larry Higgs, "NJ Transit revenues hit rock bottom. From \$1 M in daily ticket sales to \$41K," *NJ.com*, May 1, 2020, <https://www.nj.com/coronavirus/2020/04/nj-transit-revenues-hit-rock-bottom-from-15m-in-daily-ticket-sales-to-41k.html>.
 91. Pranshu Verma, "Public Transit Officials Fear Virus Could Send Systems Into 'Death Spiral'," *The New York Times*, July 19, 2020, <https://www.nytimes.com/2020/07/19/us/coronavirus-public-transit.html>; TransitCenter, "Estimated Financial Impact of COVID-19 on US Transit Agencies: \$26-\$40 Billion Annually," April 7, 2020, https://transitcenter.org/estimated-financial-impact-of-covid-19-on-u-s-transit-agencies-26-38-billion-annually/#_ftn6.
 92. Joshua Fechter, "San Antonio mayor to forego plan to expand public transit in favor of coronavirus recovery," *San Antonio Express-News*, June 2, 2020, <https://www.expressnews.com/news/local/article/San-Antonio-Mayor-Ron-Nirenberg-to-speak-on-15311342.php>.
 93. North Carolina Department of Transportation, "COVID-19 Impact on NCDOT Revenues Forces Delays of Most Projects," April 21, 2020, <https://www.ncdot.gov/news/press-releases/Pages/2020/2020-04-21-covid-19-impact-ncdot-project-revenue.aspx>; General Assembly of North Carolina, House Bill 77, 2020, <https://www.ncleg.gov/Sessions/2019/Bills/House/PDF/H77v7.pdf>.
 94. Verma, "Public Transit."
 95. Nathaniel Minor, "RTD's Budget Crisis Will Likely Mean Deep, Long-Lasting Service Cuts," *Colorado Public Radio*, June 16, 2020, <https://www.cpr.org/2020/06/16/rtds-budget-crisis-will-likely-mean-deep-long-lasting-service-cuts/>.
 96. TransitCenter, "Transit Is Essential: 2.8 Million US Essential Workers Ride Transit to Their Jobs," March 24, 2020, <https://transitcenter.org/2-8-million-u-s-essential-workers-ride-transit-to-their-jobs/>.
 97. Verma, "Public Transit."
 98. TransitCenter, "The CARES Act Came Up Short, Now Transit Agencies Are Running Out of Time," July 9, 2020, <https://transitcenter.org/the-cares-act-came-up-short-now-transit-agencies-are-running-out-of-time/>; US Congress, "H.R.6800 - The Heroes Act," 2020, <https://www.congress.gov/bill/116th-congress/house-bill/6800>; Transportation for America, "House bill proposes \$15 billion for transit. It's not enough," May 13, 2020, t4america.org/2020/05/13/house-bill-proposes-15-billion-for-transit-its-not-enough.
 99. Atlas Public Policy, "Atlas EV Hub," 2020, <https://www.atlasevhub.com>.
 100. International Energy Agency, "Global EV Outlook 2020," 2020, <https://www.iea.org/reports/global-ev-outlook-2020>.
 101. Kalea Hall and Breana Noble, "Automakers could see new rollouts delayed because of pandemic," *The Detroit News*, March 27, 2020, <https://www.detroitnews.com/story/business/autos/2020/03/26/carmakers-could-see-new-rollouts-delayed-because-pandemic/2919145001/>; IHS Markit, COVID-19: *The Future Mobility Delusion*, 2020, <https://cdn.ihsmarkit.com/www/pdf/0620/508778560-0520-CU-AUT-FutureMobility-Whitepaper.pdf>; Michael Wayland, "Coronavirus could help Tesla retain EV lead as traditional automakers pare electric investments," *CNBC*, May 1, 2020, <https://www.cnbc.com/2020/05/01/coronavirus-could-help-tesla-retain-ev-lead-as-traditional-automakers-pare-back-electric-investments.html>.
 102. Washington State Legislature, "SB 5811 - 2019-20," 2020, <https://app.leg.wa.gov/billsummary?BillNumber=5811&Year=2019>; Nevada Division of Environmental Protection, "Clean Cars Nevada," 2020, <https://ndep.nv.gov/air/clean-cars-nevada>.
 103. Sarah Reed, email conversation with author, August 10, 2020.
 104. Lyft, "Leading the Transition to Zero Emissions: Our Commitment to 100% Electric Vehicles by 2030," June 17, 2020, <https://www.lyft.com/blog/posts/leading-the-transition-to-zero-emissions>.
 105. New York State, "Governor Cuomo Announces Nation-Leading Initiatives to Expand Electric Vehicle Use to Combat Climate Change," July 16, 2020, <https://www.governor.ny.gov/>

- news/governor-cuomo-announces-nation-leading-initiatives-expand-electric-vehicle-use-combat-climate.**
106. Xcel Energy, "Xcel Energy's new electric vehicle vision to save customers billions while delivering cleaner air," August 12, 2020, https://www.xcelenergy.com/company/media_room/news_releases/xcel_energy%E2%80%99s_new_electric_vehicle_vision_to_save_customers_billions_while_delivering_cleaner_air.
 107. Western Governors Association, "Gov. Kate Brown announces WGA Chair Initiative, the Electric Vehicles Roadmap," July 14, 2020, <https://westgov.org/news/article/register-gov-kate-brown-to-announce-wga-chair-initiative-the-electric-vehicles-roadmap>.
 108. Alternative Fuels Data Center, "Electric Vehicle Charging Station Locations," 2020, https://afdc.energy.gov/fuels/electricity_locations.html#/analyze?fuel=ELEC&country=US&show_map=true.
 109. Electrify America, "Electrify America Completes Its First of Two Electric Vehicle Fast Charging Cross-Country Routes with the Second Route Across the United States to be Completed by September," June 24, 2020, <https://media.electrifyamerica.com/en-us/releases/100>.
 110. US Energy Information Administration, *Annual Energy Outlook 2020*, 2020, <https://www.eia.gov/outlooks/aeo/data/browser/#/?id=22-AEO2020&cases=ref2020&sourcekey=0>.
 111. California Air Resources Board, "California Takes Bold Step to Reduce Truck Pollution," June 25, 2020, <https://ww2.arb.ca.gov/news/california-takes-bold-step-reduce-truck-pollution>.
 112. NESCAUM, "Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding," July 13, 2020, <https://www.nescaum.org/documents/multistate-truck-zev-governors-mou-20200714.pdf>.
 113. Patricio Portillo, "15 States Take Historic Action on Transportation Pollution," Natural Resources Defense Council, July 14, 2020, <https://www.nrdc.org/experts/patricio-portillo/15-states-take-historic-action-transportation-pollution>.
 114. Emily Wimberger, Hannah Pitt, Kate Larsen, and Maggie Young, "States Pave the Way for a Zero-Emission Vehicle Future," Rhodium Group, August 13, 2020, <https://rhg.com/research/states-zero-emission-vehicles/>.
 115. Los Angeles Cleantech Incubator, "Request for Information for Technology Providers to Support a Zero Emissions Last Mile Delivery Zone," 2020, <https://lincubator.org/zedz-rfi/>.
 116. New York City Department of Transportation, "NYC Clean Trucks Program," 2020, <https://www.nycctp.com/>.
 117. CALSTART prepared for the City of Chicago, "Chicago Commercial Electric Vehicle Readiness Guidelines," March 2020, <https://www.chicago.gov/content/dam/city/progs/env/MDHDCCommercialEVReadiness.pdf>.
 118. Sarah Reed, "Public Fleets Able to Purchase Electric School Buses and Street Sweepers with the Climate Mayors EV Purchasing Collaborative," ACT News, March 26, 2020, <https://www.act-news.com/news/public-fleets-able-to-purchase-electric-school-buses-and-street-sweepers-with-the-climate-mayors-ev-purchasing-collaborative/>.
 119. Sarah Reed, email conversation with author, August 10, 2020.
 120. Nikola Motor Company, "Nikola Receives Landmark Order of 2,500 Battery-Electric Waste Trucks from Republic Services," August 10, 2020, <https://nikolamotor.com/press-releases/nikola-receives-landmark-order-of-2500-battery-electric-waste-trucks-from-republic-services-91>.
 121. San Diego Gas and Electric, "Power Your Drive for Fleets," 2020, <https://www.sdge.com/business/electric-vehicles/power-your-drive-for-fleets>.
 122. California Air Resources Board, "Appendix A - Proposed Regulation Order," 2019, <https://ww3.arb.ca.gov/regact/2019/act2019/30dayatta.pdf>.
 123. Chris Busch, James Fine, and Amanda Myers, *Clean Trucks, Big Bucks: California Energy Policy Simulator evaluation of the proposed Advanced Clean Trucks Rule*, Energy Innovation and Environmental Defense Fund, June 2020, https://energyinnovation.org/wp-content/uploads/2020/06/Clean-Trucks-Big-Bucks_June_17_2020.pdf.
 124. Xiao Wu and Rachel C. Nethery, "COVID-19 PM2.5: A national study on long-term exposure to air pollution and COVID-19 mortality in the United States," Harvard University, April 24, 2020, <https://projects.iq.harvard.edu/covid-pm>.
 125. California Air Resources Board, "Emissions

- Inventory Methods and Results for the Proposed Advanced Clean Trucks Regulation Proposed Modifications," 2020, <https://ww3.arb.ca.gov/regact/2019/act2019/30dayattd.pdf>.
126. West Coast Clean Transit Corridor Initiative Study, "I-5 Electric Truck Charging Sites Mapped Out by Electric Utilities," June 17, 2020, <https://westcoastcleantransit.com/resources/WestCoastCleanTransitNewsRelease-Website.pdf>.
 127. California Air Resources Board, "Advanced Clean Truck Fleets," 2020, <https://ww2.arb.ca.gov/our-work/programs/advanced-clean-fleets>.
 128. Julian Spector, "Southern California Edison Begins Major Rollout of Chargers for Electric Buses and Trucks," *Greentech Media*, July 13, 2020, <https://www.greentechmedia.com/articles/read/sce-begins-construction-on-356m-heavy-duty-ev-charging-program>.
 129. New York State, "Governor Cuomo Announces Nation-Leading Initiatives to Expand Electric Vehicle Use to Combat Climate Change," July 16, 2020, <https://www.governor.ny.gov/news/governor-cuomo-announces-nation-leading-initiatives-expand-electric-vehicle-use-combat-climate>.
 130. West Coast Clean Transit Corridor Initiative Study, "I-5 Electric Truck Charging Sites Mapped Out by Electric Utilities," June 17, 2020, <https://westcoastcleantransit.com/resources/WestCoastCleanTransitNewsRelease-Website.pdf>.
 131. CALSTART, "National Coalition of Heavy Truck Leaders Calls for Major Federal Role, Investments to Support US Leadership in Zero-Emission Trucks," June 2020, <https://calstart.org/zet-coalition-pr-june2020/>; Majority Committee Staff, "Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America," *House Select Committee on the Climate Crisis*, June 2020, <https://climatecrisis.house.gov/sites/climatecrisis.house.gov/files/Climate%20Crisis%20Action%20Plan.pdf>.
 132. California Air Resources Board, "Heavy-Duty Omnibus Regulation," July 10, 2020, <https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslwnox>.
 133. BW Research Partnership prepared for E2, "27,000+ More Clean Energy Jobs Lost in May," June 15, 2020, <https://e2.org/releases/27000-clean-energy-jobs-lost-may-2020/>.
 134. BE Research Partnership prepared for E2, "Clean Energy & COVID-19 Crisis: June 2020 Unemployment Analysis," July 10, 2020, <https://e2.org/reports/clean-jobs-covid-economic-crisis-june-2020/>.
 135. Data for Progress, "A Green New Deal for City and Suburban Transportation," March 2020, t4america.org/wp-content/uploads/2020/03/20.03_GND-Transit_use_v4.pdf; Scott Goldstein, "Coronavirus will have huge impacts on transit systems—here's how Congress should help," *Transportation for America*, March 16, 2020, t4america.org/2020/03/16/coronavirus-will-have-huge-impacts-on-transit-systems-heres-how-congress-should-help/.
 136. Robert Pollin and Shouvik Chakraborty, *Job Creation Estimates Through Proposed Economic Stimulus Measures Modeling Proposals by Various US Civil Society Groups; Macro-Level and Detailed Program-by-Program Job Creation Estimates*, Political Economy Research Institute, University of Massachusetts Amherst, May 21, 2020, <https://www.sierraclub.org/sites/www.sierraclub.org/files/PERI-stimulus-jobs.pdf>.
 137. Greg Carlock, *Public Transit and Transportation Infrastructure: Creating Jobs and Supporting Transit Across the United States*, World Resources Institute, April 2020, <https://www.wri.org/publication/public-transit-and-transportation-infrastructure-creating-jobs-and-supporting-transit>; Economic Development Research Group prepared for American Public Transportation Association, *Economic Impact of Public Transportation Investment: 2020 Update*, April 2020, <https://www.apta.com/wp-content/uploads/APTA-Economic-Impact-Public-Transit-2020.pdf>.
 138. The House Committee on Transportation and Infrastructure, *The Invest in America Act*, 2020, <https://transportation.house.gov/imo/media/doc/2020%20INVEST%20in%20America%20Bill%20Summary.pdf>; Transportation Electrification Partnership, "Federal Stimulus Proposal," 2020, <https://www.documentcloud.org/documents/6878065-TEP-Federal-Stimulus-Proposal.html>; Securing America's Future Energy, "Get America Moving Again (GAMA): Recommendations to Stimulate Renewal, Growth, and Global Leadership and Support

- National Security in the Movement of People and Goods," May 2020, <https://secureenergy.org/gama/>; Ben Holland, Greg Hopkins, Uday Varadarajan, Martha Campbell, Courtney Feldman, Angela Whitney, Julia Meisel, Jessie Lund, Annabelle Sullivan, Jacob Corvidae, Jamie Mandel, Britta Gross, Dave Mullaney, and Carla Frisch, *US Stimulus Strategy: Recommendations for a Zero-Carbon Economic Recovery*, Rocky Mountain Institute, 2020, <https://rmi.org/insight/recommendations-for-a-zero-carbon-economic-recovery/>; Dan Lashof, "Manufacturing Electric School and Transit Buses: Creating Jobs and Economic Growth," World Resources Institute, April 2020, <https://www.wri.org/publication/manufacturing-electric-school-and-transit-buses-creating-jobs-and-economic-growth>.
139. Senate Democrats, "Leader Schumer Unveils New Clean Cars For America Climate Proposal, A Transformative Plan To Reduce Number Of Carbon-Emitting Cars On The Road, Create Jobs, And Accelerate Transition Net-Zero Carbon Emissions," October 25, 2019, <https://www.democrats.senate.gov/newsroom/press-releases/leader-schumer-unveils-new-clean-cars-for-america-climate-proposal-a-transformative-plan-to-reduce-number-of-carbon-emitting-cars-on-the-road-create-jobs-and-accelerate-transition-net-zero-carbon-emissions->.
 140. Jen A. Miller, "Preparing the maintenance workforce for electric trucks," *Transport Dive*, July 17, 2020, <https://www.transportdive.com/news/maintenance-workforce-electric-trucks/581693/>.
 141. The House Committee on Transportation and Infrastructure, The Invest in America Act; Securing America's Future Energy, "Get America Moving Again;" Holland, *US Stimulus Strategy*; Carlock, Public Transit.
 142. Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014: Synthesis Report*. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, 2015, https://www.ipcc.ch/site/assets/uploads/2018/02/SYR_AR5_FINAL_full.pdf.
 143. Jackson et al., "Increasing anthropogenic methane emissions arise equally from agricultural and fossil fuel sources," *Environmental Research Letters*, Vol. 15 - no. 7 (2020), https://iopscience.iop.org/article/10.1088/1748-9326/ab9ed2?utm_campaign=Hot%20News&utm_medium=email&_hsmt=91414666&_hsenc=p2ANqtz-8bD
 144. US Environmental Protection Agency (EPA), Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2018, April 13th, 2020, <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018>.
 145. Alvarez et al., "Assessment of methane emissions from the U.S. oil and gas supply chain," *Science*, Vol. 361 - no. 6398, <https://science.sciencemag.org/content/361/6398/186.full>; Zhang et al., "Quantifying methane emissions from the largest oil-producing basin in the United States from space," *Science Advances*, Vol. 6 - no. 17 (2020), <https://advances.sciencemag.org/content/6/17/eaaz5120>.
 146. Hight et al., *The Role of Gas in the Energy Transition: Using Data and Markets to Curb Methane Emissions*, Rocky Mountain Institute, March 2020, <https://rmi.org/insight/the-role-of-gas-in-the-energy-transition/>.
 147. Moody's Investors Service, "Defaults among US oil and gas companies pick up again in 2019," January 9, 2020, https://www.moody.com/research/Moodys-Defaults-among-US-oil-and-gas-companies-pick-up--PBC_1209700; Sakshi Garg and Dinesh Bacham, "Oil & Gas Sector in Danger: COVID-19 Pushed Chesapeake Energy into Bankruptcy," Moody's Analytics, August 2020, <https://www.moodyanalytics.com/articles/2020/oil-and-gas-sector-in-danger>.
 148. International Energy Agency, *Global EV Outlook 2020*, June 2020, <https://www.iea.org/reports/global-ev-outlook-2020>.
 149. NESCAUM, "Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding," July 13, 2020, <https://www.nescaum.org/documents/multistate-truck-zev-governors-mou-20200714.pdf>.
 150. US Energy Information Administration, "Early 2020 drop in crude oil prices led to write-downs of U.S. oil producers' assets," July 27, 2020, <https://www.eia.gov/todayinenergy/detail.php?id=44516>.
 151. Baker Hughes, North America Rig Count, August 2020, <https://rigcount.bakerhughes.com/na-rig-count>.
 152. US EIA, Short-term Energy Outlook, August 11, 2020, <https://www.eia.gov/outlooks/steo/>.

153. Rystad Energy, "US oil output set to bottom out in June, will not recover to pre-Covid-19 levels in 2021," May 26, 2020, <https://www.rystadenergy.com/newsevents/news/press-releases/us-oil-output-set-to-bottom-out-in-june-will-not-recover-to-pre-covid-19-levels-in-2021/>.
154. "Oil giants want to own only the cheapest, cleanest hydrocarbons," *The Economist*, July 18, 2020, <https://www.economist.com/business/2020/07/18/oil-giants-want-to-own-only-the-cheapest-cleanest-hydrocarbons>.
155. European Space Agency, "Detecting methane emissions during COVID-19," June 1, 2020, https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-5P/Detecting_methane_emissions_during_COVID-19.
156. Adrian Hedden, "Oil and gas wells abandoned during market collapse posing risk to environment, unemployment," *Carlsbad Current Argus*, <https://www.currentargus.com/story/news/local/2020/06/04/oil-and-gas-wells-abandoned-during-market-collapse-pose-risk-environment/3126719001/>; Hiroko Tabuchi, "Fracking Firms Fail, Rewarding Executives and Raising Climate Fears," *The New York Times*, July 12, 2020, <https://www.nytimes.com/2020/07/12/climate/oil-fracking-bankruptcy-methane-executive-pay.html>.
157. Mike Lee, "A five-alarm fire for North Dakota's oil and gas industry," *Environment & Energy News*, July 20, 2020, https://www.eenews.net/energywire/2020/07/20/stories/1063593773?utm_campaign=Hot%20News&utm_medium=email&_hsmi=91732511&_hsenc=p2ANqtz-_8ubnjz9Eb-dmp7kyjHjtf38DRmHz9G6lkSw9kKjhigMXSOlycfjc88yF7HZFHu0KVY8i3faWmtCMkOJQsGyEKzaPXCQ&utm_content=91732511&utm_source=hs_email.
158. Project Astra, The University of Texas at Austin Center for Energy and Environmental Resources, <http://dept.ceer.utexas.edu/ceer/astra>.
159. "Sensor Network Could Change How Methane Emissions Are Detected," *UT News*, <https://news.utexas.edu/2020/05/19/sensor-network-could-change-how-methane-emissions-are-detected/>.
160. US Environmental Protection Agency. "EPA Issues Final Policy and Technical Amendments to the New Source Performance Standards for the Oil and Natural Gas Industry." August 2020, <https://www.epa.gov/controlling-air-pollution-oil-and-natural-gas-industry/epa-issues-final-policy-and-technical>.
161. United States District Court, Northern District of California, Case 4:18-cv-05712-YGR, Document 177, July 15, 2020.
162. State of New Mexico Oil Conservation Division (OCD), Natural Gas Waste Draft Rules, July 20, 2020, <http://www.emnrd.state.nm.us/OCD/documents/NaturalGasWasteDraftRules-July202020.pdf>.
163. Zhang et al., "Quantifying methane emissions from the largest oil-producing basin in the United States from space," *Science Advances*, Vol. 6 – no. 17 (2020), <https://advances.sciencemag.org/content/6/17/eaaz5120>.
164. Pennsylvania Department of Environmental Protection, "Proposed Rulemaking: Control of VOC Emissions from Oil and Natural Gas Sources," *Pennsylvania Bulletin*, May 23, 2020, <http://www.pacodeandbulletin.gov/Display/pabull?file=/secure/pabulletin/data/vol50/50-21/684.html>; and <https://www.colorado.gov/pacific/cdphe/air/oil-and-gas-compliance>.
165. Colorado Department of Public Health and Environment, LDAR Annual Report (2017) Summary, August 22, 2018, <https://drive.google.com/file/d/0B75r4rvnOWbcRUdWxRWEZrZXdhCnpERE9mVUM5Wm9XQUVZ/view>.
166. Rystad Energy, "The U.S. Has Already Lost More Than 100,000 Oil and Gas Jobs," June 14, 2020, <https://oilprice.com/Energy/Energy-General/The-US-Has-Already-Lost-More-Than-100000-Oil-And-Gas-Jobs.html>.
167. Daniel Raimi, Neelesh Nerurkar, and Jason Bordoff, *Green Stimulus for Oil and Gas Workers: Considering a Major Federal Effort to Plug Orphaned and Abandoned Wells*, Columbia University Center on Global Energy Policy, July 2020.
168. US House Select Committee on the Climate Crisis, *Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America*, Majority Staff Report – 116th Congress, June 2020, <https://climatecrisis.house.gov/sites/climatecrisis.house.gov/files/Climate%20Crisis%20Action%20Plan.pdf>; US 116th Congress, H.R.2 – Moving Forward Act, July 1st, 2020 (Engrossed in House), <https://www.congress.gov/bill/116th-congress/house-bill/2/text>; Charles Young, "Oil and

- gas stakeholders back plan for plugging West Virginia's orphaned wells," *WV News*, August 2, 2020, https://www.wvnews.com/news/wvnews/oil-and-gas-stakeholders-back-plan-for-plugging-west-virginias-orphaned-wells/article_8edca807-4ae6-5d2b-b01f-a6fef6530ba4.html; Adrian Hedden, "Oil and gas wells abandoned during market collapse posing risk to environment, unemployment," *Carlsbad Current Argus*, <https://www.currentargus.com/story/news/local/2020/06/04/oil-and-gas-wells-abandoned-during-market-collapse-pose-risk-environment/3126719001/>; Faith Hatton, North Dakota DMR begins well reclamation, *KFYR*, August 17, 2020. https://www.kfyrtv.com/2020/08/17/north-dakota-dmr-begins-well-reclamation/?utm_campaign=Hot%20News&utm_medium=email&_hsmi=93518119&_hsenc=p2ANqtz-8eSmEgc2ayJTaEnY4pQeH5mZpswxinKvy6BGU02KYvcPREft9LdErPy6urREs0y56rav9hrELteTWkAV1WXs1-eEjayA&utm_content=93518119&utm_source=hs_email.
169. Jim Barrett, Rob McCulloch, and Roxanne Johnson, *Plugging the Leaks: Protecting Workers, Reducing Pollution, and Creating Quality Jobs by Reducing Methane Waste in the US Oil and Gas Industry*, BlueGreen Alliance, 2016, <http://wallaby.telicon.com/PA/library/2016/20160927TU.pdf>.
 170. US House Select Committee on the Climate Crisis, *Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America*, Majority Staff Report – 116th Congress, June 2020, <https://climatecrisis.house.gov/sites/climatecrisis.house.gov/files/Climate%20Crisis%20Action%20Plan.pdf>.
 171. Yelena Ogneva-Himmelberger and Liyao Huang, "Spatial distribution of unconventional gas wells and human populations in the Marcellus Shale in the United States: Vulnerability analysis," *Applied Geography*, Vol. 60 (2015), <https://www.sciencedirect.com/science/article/pii/S0143622815000776>.
 172. US Energy Information Administration, "Frequently Asked Questions," <https://www.eia.gov/tools/faqs/faq.php?id=86&t=1>.
 173. Virginia General Assembly, "HB 1526 Virginia Clean Economy Act," March 2020, <https://lis.virginia.gov/cgi-bin/legp604.exe?201+sum+HB1526>.
 174. Dan York, "8 ways efficiency programs can retool during the crisis and plan for a strong recovery," American Council for an Energy-Efficient Economy, June 19, 2020, <https://www.aceee.org/blog-post/2020/06/8-ways-efficiency-programs-can-retool-during-crisis-and-plan-strong-recovery>.
 175. Xcel Energy, "Minnesota COVID-19 Economic Recovery," 2020, https://www.xcelenergy.com/company/rates_and_regulations/filings/minnesota_covid-19_economic_recovery.
 176. Michigan Public Service Commission, State of Michigan, April 15, 2020, <https://mi-psc.force.com/sfc/servlet.shepherd/version/download/068t000000BRC2YAAX>; NYSEDA, "NYSEDA and New York Utilities Collectively Supporting Initiatives to More than Double the Number of Households Receiving Energy Efficiency Services," July 27, 2020, New York State, <https://www.nyserda.ny.gov/About/Newsroom/2020-Announcements/2020-07-27-Governor-Cuomo-Announces-Clean-Energy-Investments-to-Benefit-Over-350000-Low-to-moderate-Income-Households>.
 177. States of California, Connecticut, Illinois, Maine, Michigan, Minnesota, Nevada, New Jersey, New York, Oregon, Vermont, and Washington, the Commonwealth of Massachusetts, the District of Columbia, and the City of New York vs. U.S. Department of Energy, April 14, 2020, <https://oag.ca.gov/system/files/attachments/press-docs/Proc%20Rule%20Petition%20FILED.pdf>.
 178. Robert Walton, "Energy efficiency efforts are shutting down due to COVID-19, threatening jobs and savings", April 6, 2020, *Utility Dive*, <https://www.utilitydive.com/news/energy-efficiency-efforts-are-shutting-down-due-to-covid-19-threatening-jobs/575496/>.
 179. Ibid
 180. Ben Somberg, "Our work is now at a standstill: How COVID-19 is taking efficiency workers off the job," March 31, 2020, American Council for an Energy-Efficient Economy, <https://www.aceee.org/blog-post/2020/03/our-work-now-standstill-how-covid-19-taking-efficiency-workers-job>.
 181. Martin Kushler, "Utility regulators can use efficiency to confront the COVID-19 recession and climate crisis," July 30, 2020, American Council for an Energy-Efficient Economy, <https://www.aceee.org/blog-post/2020/07/utility-regulators-can-use-efficiency-confront-covid-19-recession-and-climate>.
 182. Office of Governor Andrew M. Cuomo, "Governor Cuomo Announces Additional \$2

- Billion in Utility Energy Efficiency and Building Electrification Initiatives to Combat Climate Change," January 16, 2020, <https://www.governor.ny.gov/news/governor-cuomo-announces-additional-2-billion-utility-energy-efficiency-and-building>.
183. Justin Gerdes, "California Moves to Tackle Another Big Emissions Source: Fossil Fuel Use in Buildings," February 4, 2020, *GreenTech Media*, <https://www.greentechmedia.com/articles/read/california-moves-to-tackle-another-big-emissions-source-fossil-fuel-use-in-buildings>; Nora Hawkins, Nate Kinsey, "Self-Generation Incentive Program Heat Pump Water Heater (HPWH) Workshop, March 19, 2020, California Public Utilities Commission," Webinar, https://www.cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/Utilities_and_Industries/Energy/Energy_Programs/Demand_Side_Management/Customer_Gen_and_Storage/SGIP_HPWH_Webinar.pdf.
 184. SMUD, "Heating and cooling rebates," <https://www.smud.org/en/Rebates-and-Savings-Tips/Rebates-for-My-Home/Heating-and-Cooling-Rebates>.
 185. Matt Gough, "California's Cities Lead the Way to a Gas-Free Future," Sierra Club, July 8, 2020, <https://www.sierraclub.org/articles/2020/07/californias-cities-lead-way-gas-free-future>.
 186. Tom DiChristopher, "Gas Ban Monitor: Calif. votes set to rebound; Colo. group aims to preempt bans," June 25, 2020, *S&P Global Market Intelligence*, <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/gas-ban-monitor-calif-votes-set-to-rebound-colo-group-aims-to-preempt-bans-59198934>.
 187. Nik DeCosta-Klipa, "Brookline moved to ban oil and gas pipes in new buildings. Maura Healey says they can't," Boston.com, July 22, 2020, <https://www.boston.com/news/local-news/2020/07/22/maura-healey-brookline-oil-gas-ban-ruling>.
 188. Justin Gerdes, "California Nears Tipping Point on All-Electric Regulations for New Buildings," July 29, 2020, *Greentech Media*, <https://www.greentechmedia.com/articles/read/california-nears-tipping-point-on-all-electric-building-regulations>.
 189. Julia Pyper, "Beginning of the End for New Oil and Gas Pipelines?," *Greentech Media*, July 9, 2020, <https://www.greentechmedia.com/articles/read/beginning-of-the-end-for-new-oil-and-gas-pipelines>.
 190. New York State Department of Public Service, New York State Energy Research and Development Authority, Proceeding on Motion of the Commission to Consider a Clean Energy Fund, Response of DPS and NYSEDA regarding COVID, April 23, 2020, <http://documents.dps.ny.gov/public/MatterManagement/MatterFilingItem.aspx?FilingSeq=245041&MatterSeq=44959>; and Steven Winter Associates, Inc., Electrification Training Series, <https://www.swinter.com/nyserda-electrification-training/>.
 191. Stephen Mushegan, Claire McKenna, "Building Electrification: Opportunities for Job Training while Sheltering in Place," Rocky Mountain Institute, April 29, 2020, <https://rmi.org/building-electrification-opportunities-for-job-training-while-sheltering-in-place/>; and Northeast Energy Efficiency Partnerships, Northeast/Mid-Atlantic Air-Source Heat Pump Market Strategies Report 2016 Update, January 2017.
 192. Pacific Gas & Electric, Electric Heat Pumps for Domestic Space and Water Heating online session; <https://pge.docebosaas.com/learn/course/external/view/webinar/281/ElectricHeatPumpsforDomesticSpaceandWaterHeating>; Efficiency Vermont, Online Trainings, <https://www.efficiencyvermont.com/online-trainings>; and Efficiency Maine, Heat Pump Basics Training Center, <https://www.efficiencymaine-training.com/>.
 193. Jason Plautz, "Arizona set to preempt local natural gas bans," *Smart Cities Dive*, February 21, 2020, <https://www.smartcitiesdive.com/news/arizona-bill-preempt-local-natural-gas-bans/572693/>.
 194. Emily C. Dooley, Jennifer Kay, "Pro-Gas States Pass Laws Barring Natural Gas Bans, Limits," *Bloomberg Law*, May 27, 2020, <https://news.bloomberglaw.com/environment-and-energy/pro-gas-states-pass-laws-barring-local-natural-gas-bans-limits>.
 195. David Iaconangelo, "As natural gas bans go national, can cities fill the gap?," *E&E News*, August 3, 2020, <https://www.eenews.net/stories/1063674561>.

196. Tom DiChristopher, "Gas Ban Monitor: Coronavirus brings building electrification votes to a halt," May 15, 2020, *S&P Global Market Intelligence*, <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/gas-ban-monitor-coronavirus-brings-building-electrification-votes-to-a-halt-58636912>.
197. Air-Conditioning, Heating & Refrigeration Institute, "Monthly Shipments," <http://ahrinet.org/statistics>.
198. New York State Department of Public The 2020 US Energy & Employment Report, <https://www.usenergyjobs.org>; The 2020 US Energy & Employment Report, National Association of State Energy Officials and Energy Futures Initiative, 2020 US Energy and Employment Report (National Association of State Energy Officials and Energy Futures Initiative, 2020).
199. BW Research Partnership prepared for E2, "Clean Energy Unemployment Claims in COVID-19 Aftermath," June 2020, <https://e2.org/reports/clean-jobs-covid-economic-crisis-june-2020/>.
200. Betony Jones, Jason Karpman, Molly Chlebnikow, Alexis Goggans, "California Building Decarbonization: Workforce Needs and Recommendations," UCLA Luskin Center for Innovation, November, 2019, https://innovation.luskin.ucla.edu/wp-content/uploads/2019/11/California_Building_Decarbonization.pdf.
201. US House Select Committee on the Climate Crisis, *Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America*, Majority Staff Report – 116th Congress, June 2020, <https://climatecrisis.house.gov/sites/climatecrisis.house.gov/files/Climate%20Crisis%20Action%20Plan.pdf>.
202. "Growing Renewable Energy and Efficiency Now Act," November 19, 2019, <https://mikethompson.house.gov/sites/mikethompson.house.gov/files/2019-11-19%20GREEN%20Act%20Section-by-Section.pdf>.
203. Ben Holland, Greg Hopkins, Uday Varadarajan, Martha Campbell, Courtney Feldman, Angela Whitney, Julia Meisel, Jessie Lund, Annabelle Sullivan, Jacob Corvidae, Jamie Mandel, Britta Gross, Dave Mullaney, and Carla Frisch, *US Stimulus Strategy: Recommendations for a Zero-Carbon Economic Recovery*, Rocky Mountain Institute, 2020, <https://rmi.org/insight/recommendations-for-a-zero-carbon-economic-recovery/>.
204. US House Select Committee on the Climate Crisis, *Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America*, Majority Staff Report – 116th Congress, June 2020, <https://climatecrisis.house.gov/sites/climatecrisis.house.gov/files/Climate%20Crisis%20Action%20Plan.pdf>; Greg Carlock, *Building Energy Efficiency and Energy Assistance: Creating Jobs and Providing Relief to States Across the Country*, World Resources Institute, April 2020, <https://www.wri.org/publication/building-energy-efficiency-and-energy-assistance>.
205. Greg Carlock, *Building Energy Efficiency and Energy Assistance: Creating Jobs and Providing Relief to States Across the Country*.
206. US House Select Committee on the Climate Crisis, *Solving the Climate Crisis: The Congressional Action Plan for a Clean Energy Economy and a Healthy, Resilient, and Just America*, Majority Staff Report – 116th Congress, June 2020, <https://climatecrisis.house.gov/sites/climatecrisis.house.gov/files/Climate%20Crisis%20Action%20Plan.pdf>.
207. Ben Holland, Greg Hopkins, Uday Varadarajan, Martha Campbell, Courtney Feldman, Angela Whitney, Julia Meisel, Jessie Lund, Annabelle Sullivan, Jacob Corvidae, Jamie Mandel, Britta Gross, Dave Mullaney, and Carla Frisch, *US Stimulus Strategy: Recommendations for a Zero-Carbon Economic Recovery*, Rocky Mountain Institute, 2020, <https://rmi.org/insight/recommendations-for-a-zero-carbon-economic-recovery/>.
208. Greg Carlock, *Building Energy Efficiency and Energy Assistance: Creating Jobs and Providing Relief to States Across the Country*.
209. Ibid.
210. US Environmental Protection Agency, "U.S. Greenhouse Gas Inventory 2020," 2020, <https://www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-2020-main-text.pdf>.
211. Bloomberg Philanthropies, *Accelerating America's Pledge: Going All-in to Build a Prosperous, Low-carbon Economy for the United States*, 2020, <https://assets.bbhub.io/dotorg/sites/28/2019/12/Accelerating-Americas-Pledge.pdf>.
212. Environmental Investigation Agency, "EPA Rescinds Requirements on Super-Pollutant HFCs, Reversing Basic Safeguards on Leaks," February 27, 2020, <https://eia-global.org/press-releases/20200227-epa-rescinds->

- requirements-on-super-pollutant-hfcs-reversing-basic-safeguards-on-leaks.**
213. Maria Taylor, "HVAC Production Persists Despite Covid-19-Related Losses," *The ACHR News*, May 1, 2020, <https://www.achrnews.com/articles/143094-hvac-production-persists-despite-covid-19-related-losses>.
 214. Stephanie Balgeman, et al., "Can HVAC systems help prevent transmission of COVID-19?," McKinsey & Company, July 9, 2020, <https://www.mckinsey.com/industries/advanced-electronics/our-insights/can-hvac-systems-help-prevent-transmission-of-covid-19>; US Environmental Protection Agency, "Is there HVAC guidance that building and maintenance professionals can follow to help protect from COVID-19?," 2020, <https://www.epa.gov/coronavirus/there-hvac-guidance-building-and-maintenance-professionals-can-follow-help-protect-covid>; and American Society of Heating, Refrigerating and Air-Conditioning Engineers, *ASHRAE Epidemic Task Force: Healthcare*, August 20, 2020, <https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-healthcare-c19-guidance.pdf>.
 215. David Doniger and Christina Theodoridi, "Colorado and Virginia Shift from Super-Polluting HFCs," NRDC, May 22, 2020, <https://www.nrdc.org/experts/david-doniger/colorado-and-virginia-shift-super-polluting-hfcs#:~:text=And%20yesterday%20Virginia%20Gov.,to%20adopt%20similar%20HFC%20restrictions.&text=The%20states%20are%20placing%20prohibitions,for%20adopting%20climate%2Dfriendly%20alternatives>.
 216. U.S. Climate Alliance, "U.S. Climate Alliance Fact Sheet," Accessed August 10, 2020, <http://www.usclimatealliance.org/us-climate-alliance-fact-sheet>.
 217. US Congress, Senate, S.2754 - "American Innovation and Manufacturing Act of 2019," <https://www.congress.gov/bill/116th-congress/senate-bill/2754>; US Congress, House, H.R.5544 - "American Innovation and Manufacturing Leadership Act of 2020," <https://www.congress.gov/bill/116th-congress/house-bill/5544/text>; David Doniger, "Bipartisan HFC Bill Gets Socially-Distanced Senate Hearing," May 7, 2020, <https://www.nrdc.org/experts/david-doniger/bipartisan-hfc-bill-gets-socially-distanced-senate-hearing>.
 218. Inforum and JMS Consulting, *Economic Impacts of US Ratification of the Kigali Amendment*, Report Prepared for the AirConditioning, Heating, & Refrigeration Institute and the Alliance for Responsible Atmospheric Policy, April 19, 2018, http://www.alliancepolicy.org/site/usermedia/application/6/Kigali_Economic_Report.pdf.
 219. US Environmental Protection Agency, "Revised Section 608 Refrigerant Management Regulations," February 26, 2020, <https://www.epa.gov/section608/revised-section-608-refrigerant-management-regulations#:~:text=Anyone%20purchasing%20refrigerant%20for%20use,must%20be%20section%20608%2Dcertified%3B&text=All%20used%20refrigerant%20must%20be,sold%20to%20another%20appliance%20owner>; Environmental Investigation Agency, *EPA Rescinds Requirements on Super-Pollutant HFCs, Reversing Basic Safeguards on Leaks*, February 27, 2020, <https://eia-global.org/press-releases/20200227-epa-rescinds-requirements-on-super-pollutant-hfcs-reversing-basic-safeguards-on-leaks>.
 220. Environmental Investigation Agency, "Climate-friendly Supermarkets, ALDI response to questionnaire for 2020 Supermarket Scorecard," 2020, <https://www.climatefriendlysUPERMARKETS.org/scorecard>.
 221. Environmental Investigation Agency, "Climate-friendly Supermarkets, US Map of HFC-free Supermarkets," <https://www.climatefriendlysUPERMARKETS.org/map-us>.
 222. ALDI US, Corporate Responsibility, Environment, Stores and Warehouses, 2020, <https://corporate.aldi.us/en/corporate-responsibility/environment/stores-and-warehouses/>.
 223. Maria Taylor, "HVAC Production Persists Despite Covid-19-Related Losses," *The ACHR News*, May 1, 2020, <https://www.achrnews.com/articles/143094-hvac-production-persists-despite-covid-19-related-losses>.
 224. Ibid.
 225. Ibid.
 226. Environmental Investigation Agency, *Search Reuse and Destroy: How States Can Take the Lead on a 100 Billion Ton Climate Problem*, February 14, 2019, https://content.eia-global.org/posts/documents/000/000/829/original/EIARReport_100billiontonclimateopportunity.pdf?1550165022; Inforum and JMS Consulting, *Economic Impacts of US Ratification of the Kigali Amendment*, Report Prepared for

- the AirConditioning, Heating, & Refrigeration Institute and the Alliance for Responsible Atmospheric Policy, April 19, 2018, http://www.alliancepolicy.org/site/usermedia/application/6/Kigali_Economic_Report.pdf.
227. Climate Nexus, "POLL: Voters Support Stimulus for Clean Energy, Not Fossil Fuels," June 22, 2020, https://climatenexus.org/wp-content/uploads/2015/09/Poll-Voters-Support-Stimulus-for-Clean-Energy-Not-Fossil-Fuels.pdf?utm_campaign=Coronavirus&utm_medium=email&_hsmi=90270857&_hsenc=p2ANqtz-9IDAtGw-VcVyhsKf4JB0PKzw2nL57PEPKzaTkwnrvLdne3g4R2iAyUtmQJ1xrlO9Z0nxpqx-8QoUnXCLNsTPM_IT3UZtEZtq_FVRxuyQ9a8SoilQ0&utm_content=90270857&utm_source=hs_email.
228. John Schwartz, *Climate Is Taking On a Growing Role for Voters, Research Suggests*, *The New York Times*, August 24, 2020, <https://www.nytimes.com/2020/08/24/climate/climate-change-survey-voters.html>; Jon Krosnick and Bo MacInnis, *Climate Insights 2020: Surveying American Public Opinion on Climate Change and the Environment*, <https://www.rff.org/publications/reports/climateinsights2020/>.



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