

ISSUE BRIEF

# THE BIDEN ADMINISTRATION MUST SWIFTLY COMMIT TO CUTTING CLIMATE POLLUTION AT LEAST 50 PERCENT BY 2030

Now that President Biden has acted to have the United States rejoin the Paris Climate Agreement, the next step is to promptly develop a new U.S. 2030 Nationally Determined Contribution (NDC) emissions target that will put America on the path to achieving its long-term climate goals. This issue brief calls on the Biden administration to adopt a 2030 NDC target of **reducing net greenhouse gas (GHG) emissions by at least 50 percent below 2005 levels**. This is a key step along a just and equitable pathway to net-zero GHG emissions no later than 2050. The target is ambitious, but it is achievable. More than that, it is necessary: reaching this goal will help to avert the most harmful impacts of climate change, position the country on a path to net-zero emissions, help to achieve post-pandemic public health and economic goals, create jobs, increase resiliency in communities and natural ecosystems, avoid locking in more expensive pathways, and encourage more ambitious goals from other nations ahead of the UN Climate Change Conference of the Parties in November.

## I. NRDC'S ANALYSIS DEMONSTRATES THAT A 53 PERCENT NET GHG REDUCTION BY 2030 IS TECHNOLOGICALLY FEASIBLE AND PRODUCES NET BENEFITS FOR AMERICANS.<sup>1</sup>

A 50 percent reduction in net GHGs below 2005 levels is both feasible and necessary. In fact, NRDC worked with Evolved Energy Research to model various deep decarbonization pathways for the United States and found that a **53 percent net GHG reduction target by 2030** is technologically feasible and can be achieved by relying on the three well-established decarbonization pillars—energy efficiency, clean energy, and end-use electrification—in addition to reducing non-CO<sub>2</sub> emissions and investing in the expansion of natural carbon sinks (see Technical Appendix for greater detail on the model, key assumptions, and the scenarios investigated).<sup>2</sup> This strategy can also produce net benefits for Americans.



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**FIGURE 1: 2030 ANNUAL NET COSTS, ENVIRONMENTAL BENEFITS, AND ELECTRICITY-ONLY PUBLIC HEALTH BENEFITS ASSOCIATED WITH ACHIEVING A 53 PERCENT REDUCTION IN NET GHGS BY 2030**

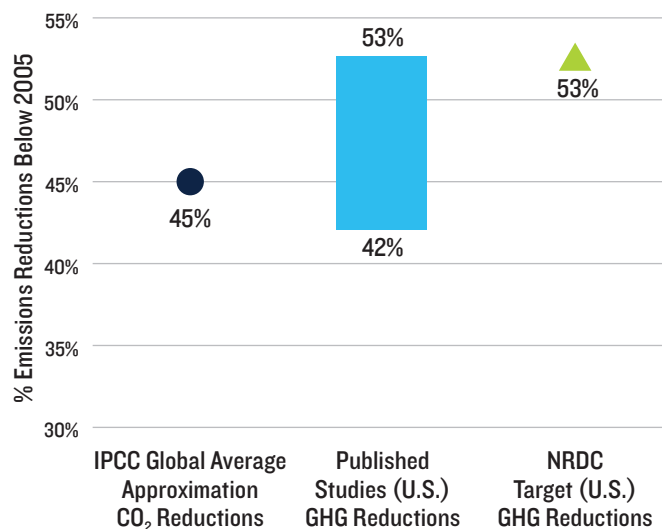


Our 53 percent target is in line with the upper range of 2030 targets modeled across recently published decarbonization studies for the United States (Figure 2).<sup>6</sup> It builds on the numerous analyses confirming the feasibility of achieving at least 50 percent net GHG reduction below 2005 by 2030 with ambitious federal action and is commensurate with the overriding climate-science imperative (Box 1).<sup>7</sup> Cumulative GHG emissions in our analysis are also markedly lower than those in alternative models that adopt a straight-line emissions abatement path between now and 2050 and result in a less ambitious 2030 target.<sup>8</sup> The level of cumulative emissions is the principal factor in achieving eventual climate stabilization. The Environmental Defense Fund (EDF) notes the significant climate benefits associated with a “front-loaded” trajectory such as ours, including

slowing down the rate of global warming, reducing the risk of catastrophic tipping points, and allowing flexibility down the road as the United States takes on the more intractable sectors of the economy, such as aviation and maritime shipping.<sup>9</sup>

The multitude of technological and policy pathways that underpins a more than 50 percent reduction target, evaluated across the literature, underscores the goal’s feasibility and credibility among global partners, which is critical to bolster confidence in the effectiveness of the Paris Agreement. We urge the Biden administration to commit to a strong 2030 U.S. NDC of at least 50 percent net GHG reductions below 2005 levels to regain a leadership role in the global fight to protect our climate, help avoid an irreversible climate crisis, maximize economic activity for Americans in a post-pandemic era, and deliver large public health benefits to citizens—especially the most vulnerable, who have suffered a disproportionate air pollution burden for decades.<sup>10</sup>

**FIGURE 2: RANGE OF 2030 CARBON DIOXIDE AND NET GHG REDUCTION TARGETS BELOW 2005 LEVELS**



Published studies include: Princeton (2020), NAS (2021), Williams et al. (2021), EDF (2021), Hultman et al. (2021), Energy Innovation (2021), Bloomberg (2019).<sup>11</sup> The lower end of the range (42 percent to 43 percent) reflects studies that adopt a straight-line GHG or carbon reduction trajectory starting from today’s levels to net-zero by 2050. The upper end of the range (51 percent to 60 percent) reflects studies that adopt a more rapid reduction trajectory in the near term, commensurate with the technologically feasible and affordable decarbonization potential across the economy along with the climate science imperative.

a The public health benefits only reflect reduced emissions of health-damaging sulfur dioxide and nitrogen oxides in the power sector. Accounting for air pollution avoided by transitioning away from fossil fuels in other sectors—namely transportation—would deliver much larger benefits. Those estimates will be included in NRDC’s forthcoming comprehensive report

## THE UNITED STATES CAN AND MUST BE MORE AMBITIOUS THAN THE GLOBAL AVERAGE

In its 2018 Special Report on Global Warming of 1.5°C, the Intergovernmental Panel on Climate Change (IPCC) estimates that global carbon dioxide emissions must be slashed by around 45 percent below 2010 levels by 2030 to stay consistent with a 1.5-degree warming trajectory.<sup>12</sup> With this scientific imperative in the background, countries can then determine their own climate targets, based on their historical contribution to climate change and the unique technological, economical, and political circumstances facing each country. Considering the United States' significant contribution to the problem of climate change as the world's largest historical GHG emitter together with its unique resources as the world's largest economy, the United States must adopt a target exceeding the science-derived global average and join the ranks of current climate leaders with ambitious targets, such as the European Union and the UK, which have committed to respectively reducing their net GHGs by at least 55 and 68 percent below 1990 levels.<sup>13</sup> NRDC assessed an ambitious 2030 GHG reductions target that reflects both feasibility considerations and the climate science, modeling a 50 percent net GHG reductions target below 2010 levels for the United States, which translates to a 53 percent reduction target below 2005 levels. As discussed in this brief, this ambitious target is feasible, credible, and would deliver net benefits to Americans.

### 2. THANKS TO THE SPECTACULAR ADVANCEMENT IN CLEAN ENERGY TECHNOLOGY, WE CAN ACHIEVE A 53 PERCENT NET GHG REDUCTION BY RELYING ON FAMILIAR AND WELL-ESTABLISHED PILLARS OF DECARBONIZATION.

NRDC's analysis relies on the sector-by-sector assumptions below. These assumptions are consistent with advances in clean energy technology and recent market trends.



#### Clean and zero-carbon electricity

- In 2030, about 80 percent of electricity is sourced using clean and zero-carbon electricity: wind, solar, hydro, and nuclear. The power sector is the linchpin of emissions reductions in this decade. By 2035, the share of clean and zero-carbon electricity generation ranges between 83 and 87 percent.
- The coal fleet fully retires by 2030.
- Fossil gas generation drops from about 40 percent today to less than 20 percent by 2030.



#### Electrification of vehicles, buildings, and industry

- Consumer investment choices shift rapidly toward zero-emission vehicles (ZEVs), such that 57 percent of light-duty vehicle sales in 2030 are ZEVs, as are 55 percent of medium and heavy-duty trucks sales.
- Electric heating equipment in buildings replaces gas-reliant equipment, such that by 2030 more than 95 percent of space heating and nearly 100 percent of water heating equipment sold for buildings are electric.
- Electric boilers are deployed to supply low-temperature steam for various industrial processes.



#### Energy efficiency in buildings and industrial plants

- A little over 1 percent of existing buildings undertake deep envelope retrofits every year to improve building insulation and curb energy use for space conditioning. This amounts to about 14 million existing housing units retrofitted by 2030.
- Retiring appliances and equipment in buildings are replaced with commercially available products with the highest efficiency.
- A 1.05 percent annual reduction in industrial energy intensity (measured in energy use per dollar of industrial output) is maintained between 2020 and 2050.



#### Reductions in non-CO<sub>2</sub> GHG emissions and investments in preserving and enhancing land carbon sinks

- Non-CO<sub>2</sub> GHGs—methane, nitrous oxides, and fluorinated gases—are reduced by 8 percent by 2030, compared to today's levels. This is a modest target relative to the abatement potential estimated by other groups, with EDF evaluating that a 40 percent reduction in economy-wide methane emissions below 2005 levels would be achievable and cost-effective by 2030.<sup>14</sup>
- Natural carbon sinks are expanded at two levels, through a combination of forest protection, reforestation, afforestation, and improved agricultural soil management. The 53 percent target is achievable with both a 7 percent and a 24 percent expansion of carbon sinks by 2030 compared to today. The lower land sink levels drive modest additional clean energy deployment to replace fossil fuel use in the power and industry sectors to make up the difference.

Of the four energy sectors, the greatest carbon reduction potential in this decade lies in the power sector, followed by transportation. Building and industry emissions reductions further accrue after 2030 as the share of clean technologies

and highly efficient buildings sharply increases. This is preconditioned on strong decarbonization measures being implemented this decade, which would lay the foundation for rapid emissions reductions after 2030 (Figure 3).<sup>15</sup>

These underlying assumptions—which allow the United States to reach a 53 percent reduction by 2030—are supported by a host of decarbonization studies, current market trends, and existing subnational policies and corporate commitments. Published decarbonization studies largely agree in regard to the necessary near-term sectoral actions, with some variation on the level of ambition in specific measures. For example, while we assume more rapid electrification rates in medium and heavy-duty trucks relative to other studies, other studies assume deeper reductions in non-CO<sub>2</sub> GHG emissions such as methane or a larger land sink expansion to also achieve a more than 50 percent net GHG reduction target. This pathway flexibility only underscores the feasibility of an ambitious 2030 target, with multiple pathways pointing toward the same end goal.

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The technical appendix discusses our sector-level assumptions in greater detail and contextualizes the level of ambition within existing policies, technological advancements, market trends, and salient corporate commitments.

### 3. REDUCING NET GHG EMISSIONS BY AT LEAST 50 PERCENT WILL REQUIRE UNPRECEDENTED POLICY, FINANCIAL, AND SOCIETAL COMMITMENTS.

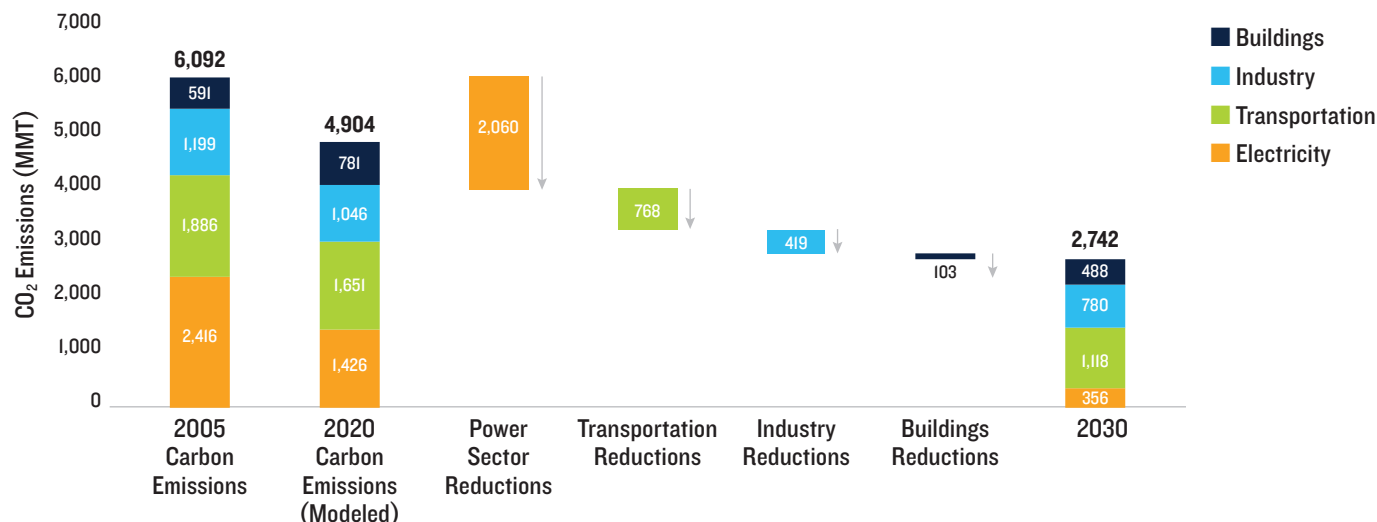
A minimum of a 50 percent net GHG reduction by 2030 is technologically feasible and achievable with net benefits for Americans. The primary challenge lies in shaping the policy, financial, and societal commitments needed to deliver the required pace of transformation. All parts of American society will need to rise to the challenge and opportunity presented by the climate crisis. In particular, the near-term transition requires unprecedented levels of clean energy infrastructure planning, permitting, and construction activity driven by federal, state, and local policy and reforms. It also requires a robust policy framework to shape consumer behavior, align investment decisions with the clean energy transition, and strengthen natural climate solutions. If enacted early in this decade, the following set of high-value federal administrative and congressional actions would catalyze the transition already underway at some level in many states, cities, and companies and put the United States on a firm path toward net zero by midcentury.

A successful policy package should include standards and regulations coupled with incentives and funding programs, such as the following, to deliver affordable and robust emissions mitigation across all sectors.

- **Power sector:** strong carbon and pollutant standards for existing and new power plants set according to existing statutory authorities, an ambitious clean energy standard, expanded tax incentives for clean energy, and federal funding for the build-out of interstate electricity transmission infrastructure. Already, a large number of states, cities, and companies have strong renewable energy or clean energy standards.<sup>16</sup>

**FIGURE 3: CO<sub>2</sub> REDUCTIONS BY SECTOR, BELOW 2005 (MILLION METRIC TONS)<sup>17</sup>**

Economy-wide carbon emissions dropped by about 13 percent between 2005 and 2019, largely owing to strong progress in the power sector towards clean energy along with energy efficiency improvements in transportation and buildings. Thanks to this progress, we are already close to a quarter of the way towards achieving 53 percent net GHG reductions below 2005 levels.<sup>18</sup>



Individual bars reflect sector-level emissions reductions by 2030, below 2005 levels. 2005, 2020, and 2030 stacked bars reflect total CO<sub>2</sub> emissions broken out by energy sector.

- **Transportation sector:** restored and strengthened GHG and multi-pollutant standards, minimum ZEV targets for all vehicle segments, expanded federal tax incentives for electric vehicle purchases, and funding for the build-out of ubiquitous charging infrastructure while ensuring access to these technologies by low-income communities. A growing number of automakers, states, and countries are moving toward 100 percent ZEVs by the early 2030s.<sup>19</sup>
- **Buildings:** strong minimum federal efficiency standards for appliances reflecting best-in-class commercial technology, tax incentives for the purchase of electric alternatives to gas heating equipment, and sizeable funds for a home-weatherization campaign prioritizing low-income households. These measures have been consistently proven to deliver substantial savings to American consumers on their electricity bills while providing the same level of service.<sup>20</sup>
- **Industry:** strengthened methane leakage regulations for oil and gas production, along with tax incentives and funding for the deployment of efficiency measures or low-carbon equipment in industrial plants. Increasing numbers of industries are committing to zero-emissions plans and deploying new technologies to achieve that goal.
- **Land sector:** robust regulations on federal land to keep existing carbon resources—older forests and larger trees—in place and optimally storing carbon, programs to actively restore more degraded forests, incentives for landowners to increase forest carbon storage on private land, policies to increase the protection and restoration of grasslands and wetlands, and reforms to agricultural policies to support emissions reductions and enhanced carbon sequestration and storage on farms and rangeland. The campaign to protect 30 percent of our lands, waters, and ocean areas by 2030 is a vehicle for conserving existing land sinks, consistent with the above policy goals.

Phasing out fossil fuel leasing on federal lands and waters, and developing strong standards governing oil and gas pollution and safety is also a key cross-sectoral approach to accelerate the transition. In addition, increased funding for the Department of Energy’s clean energy research and development budget is critical in this decade to develop clean solutions for challenging sectors—such as aviation, cement, and maritime shipping—and to expand the solution toolkit to maintain optionality and hedge against unforeseen challenges and constraints in the long term.

Within these broad suggestions, the federal government can adopt a multitude of policy packages capable of achieving the 2030 target, largely owing to the pathway flexibility discussed in the previous section. In fact, both EDF and University of Maryland have concluded through their bottom-up analyses that there exists **a multitude of**

**policy approaches** that could deliver a 51 percent net GHG reduction target by 2030.<sup>21</sup> In addition, Energy Innovation’s latest bottom-up analysis shows that a comparatively small package of familiar policies can achieve both a 53 percent net GHG reductions target by 2030 and the net-zero goal by 2050.<sup>22</sup>

#### **4. AN NDC ACHIEVING AT LEAST 50 PERCENT NET GHG REDUCTIONS CAN DELIVER SUBSTANTIAL PUBLIC HEALTH AND ECONOMIC BENEFITS, WHICH ALIGNS WITH THE ADMINISTRATION’S BUILD BACK BETTER PRIORITIES AND POST-PANDEMIC ECONOMIC GOALS.**

A strong NDC could advance several national public health and economic objectives simultaneously: significantly curbing harmful air pollution; stimulating economic activity post-pandemic; creating new high-quality jobs; and revitalizing American manufacturing. When it comes to public health, Princeton University’s Net-Zero America analysis estimates that in the 2020s, a transition away from coal and gas power plants and oil-guzzling vehicles could substantially reduce air pollution and avoid about 40,000 premature deaths and nearly \$400 billion in health-related costs.<sup>23</sup> Those immense benefits would more than offset the costs of ambitious climate action in that decade, and prioritizing those emission reductions in pollution-overburdened communities, low-income communities, and communities of color could help address historical inequities.

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The United States also stands to reap substantial economic benefits from an ambitious 2030 NDC and net-zero decarbonization pathway, commensurate with post-pandemic economic priorities. Energy Innovation’s study on a pathway to U.S. climate leadership estimates that achieving 53 percent net GHG reductions by 2030 could increase U.S. GDP by nearly \$500 billion annually by 2030 and create more than three million new job-years (defined as one job retained for one year).<sup>24</sup> Similarly, the Princeton analysis projects that in the 2020s, a committed transition to a clean economy could create an average of about three million supply-side energy jobs annually, as new construction activity in clean infrastructure, such as wind and solar plants and electric transmission lines, creates new jobs that vastly offset employment losses in oil, gas, and coal. This would be a substantial net increase of up to one million jobs annually, relative to a business-as-usual scenario. Increasing the domestic manufacturing and deployment of clean technologies such as electric vehicles



and vehicle-charging networks would also create large numbers of new jobs.

In addition, energy efficiency is already the largest job creator across the nation's energy sector.<sup>25</sup> The Biden administration must tap into this economic engine by kicking off a large-scale campaign to retrofit buildings for energy efficiency to create much-needed employment opportunities for Americans. This effort could also advance equity by prioritizing support for low-income households, thereby lowering their energy bills and improving their health and comfort.<sup>26</sup> It is estimated that more than half a million new full-time jobs could be created and sustained over a decade by retrofitting approximately 40 percent of the U.S. building stock.<sup>27</sup> The protection and restoration of high-carbon landscapes also provides opportunities for tribes and communities to pursue sustainable economies that empower local decision-making and tribal self-determination.

To ensure that Americans share equitably in the benefits of the energy-system transition, any policy framework must be implemented to promote fair access to new long-term employment opportunities, particularly for historically marginalized communities and those most impacted by the transition from a fossil-based economy to a clean economy.

## **5. A STRONG 2030 NDC IS CRITICAL TO ENSURING THAT THE UNITED STATES IS WELL POSITIONED TO COST-EFFECTIVELY ACHIEVE THE LONG-TERM GOAL OF REACHING NET-ZERO CARBON EMISSIONS BY 2050.**

An insufficient pace of transformation in this decade could jeopardize the United States' ability to achieve its long-term climate targets by substantially increasing the costs and risk profile of meeting the net-zero goal. Investing now in climate-friendly vehicles, buildings, industrial

facilities, and power plants—both to replace aging assets as they retire and to meet new demand—will prevent the country from unnecessarily locking in new, long-lived, fossil-dependent resources that will be expensive to replace or otherwise decarbonize as we move closer to 2050. For example, studies by Princeton and Williams et al. found that a slower and reduced electrification rate for vehicles and buildings beginning in this decade could ultimately increase the net cost of achieving net-zero by 2050 by up to \$2 trillion—or 50 percent, compared to pathways characterized by more rapid action—because decarbonizing a large stock of fossil-fueled assets so close to the deadline would require expensive and pre-commercial resources such as negative emissions technologies and carbon-neutral synthetic hydrocarbon fuels. The studies also estimate that a higher reliance on those resources would require more land compared to pathways with higher electrification, increasing the risk of running into land-use issues.<sup>28</sup> These risks emphasize the necessity of comprehensive policy frameworks, incentivized by a strong 2030 NDC, to shift new investments in this decade from fossil-dependent assets to zero-carbon alternatives and minimize the need for costly solutions in subsequent decades. In contrast, for example, our analysis results in a lower deployment of expensive synthetic hydrocarbons and negative emissions technologies—such as bioenergy with carbon capture and direct air capture—by 2050.

## **CONCLUSION**

We stand at a pivotal juncture in the global and national climate fight. Clean technologies are advancing at spectacular speeds, clean energy is affordable and reliable, and momentum is building toward the electrification of buildings and vehicles. The new administration recognizes the urgency of the climate threat and has placed environmental justice and equity at the forefront of its efforts. The 2020s are a pivotal decade in our fight against the climate crisis and necessitate bold and sweeping action across all levels of government. An ambitious yet achievable 2030 U.S. NDC of at least 50 percent below 2005 levels is critical to accelerate the transition of the energy system and send a strong signal that this administration is committed to taking swift action to create a prosperous and durable clean energy economy. President Biden has committed to rallying more ambitious climate goals from other nations, and a strong and credible 2030 NDC would provide important leverage toward achieving that goal and allow the United States to once again be a leader in inspiring global action and setting the world on a firm path to net-zero by midcentury. The Biden administration must put words into action and adopt an ambitious 2030 NDC of reducing U.S. emissions by at least half by the end of this decade.

## ENDNOTES

- 1 NRDC contracted Evolved Energy Research to conduct detailed, in-depth modeling to investigate the implications of achieving a net-zero-GHG economy in the United States by midcentury, assuming a range of technology and policy choices. The technical appendix accompanying this brief includes greater detail on the model, key assumptions, and the scenarios investigated. In this brief, the discussion focuses on the critical 2021-to-2030 time frame.
- 2 This brief will be followed by a set of comprehensive reports, including a detailed discussion of the technological transformation of the U.S. energy system over the course of the 30-year transition to a GHG-neutral economy by 2050; the public health, macroeconomic, and employment impacts associated with the transition; and a policy manual targeting all levels of government that could enable the pace and scale of the transformation.
- 3 The \$90 to \$100 billion reflect total net costs relative to a business-as-usual case—i.e., the costs of deploying new clean energy technologies minus the savings that Americans would reap from reduced fossil-fuel-related expenses. The estimation that 2030 net costs are equivalent to six weeks' worth of economic growth is based on the total annual U.S. GDP growth between 2018 and 2019.
- 4 Actual costs would likely be even lower than projected in our model, owing to continued clean technology advancement and resulting cost reductions that are not fully captured by the current best available projections.
- 5 The \$150 billion in total benefits reflect climate benefits from avoided carbon pollution and public health benefits from avoided air pollutant emissions. Climate benefits are based on the recently published interim social cost of carbon estimates: Interagency Working Group on Social Cost of Greenhouse Gases, *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates Under Executive Order 13990*, U.S. Government, February 2021, [https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument\\_SocialCostofCarbonMethaneNitrousOxide.pdf](https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf). Estimates for public health benefits are grounded in the health co-benefits metrics adopted by the U.S. Environmental Protection Agency: U.S. Environmental Protection Agency, *Regulatory Impact Analysis for the Clean Power Plan Final Rule*, October 2015, <https://19january2017snapshot.epa.gov/sites/production/files/2015-08/documents/cpp-final-rule-ria.pdf>. The public health benefits only reflect avoided air pollution in the power sector. Accounting for air pollution avoided by transitioning away from fossil fuels in other sectors—namely transportation—would deliver much larger benefits. Those estimates will be included in NRDC's forthcoming comprehensive report.
- 6 The recently published decarbonization studies that we refer to throughout the document include the following set: Environmental Defense Fund, *Recapturing U.S. Leadership on Climate*, March 2021, <https://www.edf.org/climate/recapturing-us-climate-leadership>; Energy Innovation, "A 1.5 Celsius Pathway to Climate Leadership for the United States," February 2021, <https://energyinnovation.org/wp-content/uploads/2021/02/A-1.5-C-Pathway-to-Climate-Leadership-for-The-United-States.pdf>; Nathan Hultman et al., "Charting an Ambitious U.N. NDC of 51% Reductions by 2030," University of Maryland, March 2021, <https://cgs.umd.edu/research-impact/publications/working-paper-charting-ambitious-us-ndc-51-reductions-2030>; James H. Williams et al., "Carbon-Neutral Pathways for the United States," *AGU Advances* 2, no. 1 (January 2021), <https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2020AV000284>; Princeton University, "Net-Zero America Project," December 2020, <https://acee.princeton.edu/rapidswitch/projects/net-zero-america-project/>; National Academies of Sciences, Engineering, and Medicine, *Accelerating Decarbonization of the U.S. Energy System* (Washington, DC: National Academies Press, 2021), <https://www.nationalacademies.org/our-work/accelerating-decarbonization-in-the-united-states-technology-policy-and-societal-dimensions>; Bloomberg Philanthropies, *Accelerating America's Pledge*, December 2019, <https://www.americaspledgeonclimate.com/accelerating-americas-pledge-2/>.
- 7 Bloomberg, *Accelerating*.
- 8 For example, the 2020–2030 cumulative GHGs in our analysis are 2.5 gigatonnes lower than Princeton's "Net-Zero America" study, equivalent to nearly half of the U.S. total annual carbon emissions before the COVID-19 pandemic. The 2020–2050 cumulative GHGs are 8.3 gigatonnes lower than Princeton's, a reduction equivalent to nearly zeroing out U.S. annual carbon emissions pre-COVID-19 for a year and a half.
- 9 EDF, *Recapturing U.S. Leadership*.
- 10 Jonathan Colmer et al., "Disparities in PM2.5 Air Pollution in the United States," *Science* 369, no. 6503 (July 31, 2020), <https://doi.org/10.1126/science.aaz9353>.
- 11 Refer to endnote 7 for the list of published studies considered.
- 12 Intergovernmental Panel on Climate Change, *Special Report: Global Warming of 1.5 °C*, October 2018, <https://www.ipcc.ch/sr15/>.
- 13 European Commission, "Progress Made in Cutting Emissions," accessed on March 3, 2021, [https://ec.europa.eu/clima/policies/strategies/progress\\_en](https://ec.europa.eu/clima/policies/strategies/progress_en); UK Government, "UK Sets Ambitious New Climate Target Ahead of UN Summit," news release, December 3, 2020, <https://www.gov.uk/government/news/uk-sets-ambitious-new-climate-target-ahead-of-un-summit>.
- 14 EDF, *Recapturing U.S. Leadership*.
- 15 It bears noting that the buildings emissions reductions in Figure 4 do not reflect the significant role of strong building energy efficiency measures adopted in this decade—including appliance efficiency standards and upgrading electric-resistance heat and hot water to highly efficient heat pumps—in achieving the 2030 target. The impacts of those measures are reflected in the power-sector wedge.
- 16 Sophia Ptacek, "Race to 100% Clean," NRDC, February 2020, <https://www.nrdc.org/experts/sophia-ptacek/race-100-clean>.
- 17 2005 emissions data is sourced from the U.S. Energy Information Administration and U.S. Environmental Protection Agency.
- 18 2020 emissions data from EIA remains preliminary. As a consequence, we estimate progress towards the 2030 goal using the final 2019 data.
- 19 Neal E. Boudette and Coral Davenport, "G.M. Will Sell Only Zero-Emission Vehicles by 2035," *New York Times*, January 28, 2021, <https://www.nytimes.com/2021/01/28/business/gm-zero-emission-vehicles.html>; Jasper Jolly, "Volvo Says It Will Make Only Electric Cars by 2030," *Guardian*, March 2, 2021, <https://www.theguardian.com/business/2021/mar/02/volvo-electric-cars-2030-sell-online>.
- 20 U.S. Department of Energy, "Saving Energy and Money with Appliance and Equipment Standards in the United States," January 2017, [https://www.energy.gov/sites/prod/files/2017/01/f34/Appliance%20and%20Equipment%20Standards%20Fact%20Sheet-011917\\_0.pdf](https://www.energy.gov/sites/prod/files/2017/01/f34/Appliance%20and%20Equipment%20Standards%20Fact%20Sheet-011917_0.pdf); U.S. Department of Energy, "Weatherization Works!" June 2019, <https://www.energy.gov/sites/prod/files/2019/07/f64/WAP-Fact-Sheet-2019.pdf>.
- 21 EDF, *Recapturing U.S. Leadership*.
- 22 Energy Innovation, "A 1.5 Celsius Pathway."
- 23 Princeton, "Net-Zero America"; The \$400 billion figure estimated by the Princeton analysis exceeds the NRDC \$150 billion estimate, largely because Princeton includes public health benefits from pollution reduction in both the power and transportation sectors, whereas NRDC limits its analysis to the power sector.
- 24 Energy Innovation, "A 1.5 Celsius Pathway."
- 25 E2, "Energy Efficiency Jobs in America: 2019," September 2019, <https://e2.org/reports/energy-efficiency-jobs-in-america-2019/>.
- 26 Lauren Urbanek and Khalil Shahyd, "Biden Plan Promises Better Buildings, for Climate and Equity," NRDC, November 2020, <https://www.nrdc.org/experts/lauren-urbanek/biden-plan-promises-better-buildings-climate-and-equity>.
- 27 Bracken Hendricks and Jorge Madrid, "A Star Turn for Energy Efficiency Jobs," Center for American Progress, September 2011, <https://www.americanprogress.org/issues/green/reports/2011/09/07/10332/a-star-turn-for-energy-efficiency-jobs/>.
- 28 Williams et al., "Carbon-Neutral Pathways."