CLEAN ELECTRICITY TAX CREDITS IN THE INFLATION REDUCTION ACT WILL REDUCE EMISSIONS, GROW JOBS, AND LOWER BILLS

On August 16, 2022, President Biden signed the Inflation Reduction Act of 2022 (IRA) into law. The IRA provides $369 billion in strategic investment to promote clean energy and climate justice. It is the strongest congressional climate action plan yet, one that will reduce energy bills, create hundreds of thousands of jobs, spur clean energy innovation, and strengthen domestic manufacturing.

This funding will flow to clean energy investments across all sectors—transportation, industry, buildings, and power—as well as support agricultural management and conservation practices. Preliminary analysis shows that these investments, if properly implemented, will reduce greenhouse gas (GHG) emissions by 40 percent or more by 2030 below 2005 levels.[1] This would propel the United States more than halfway to the Biden administration's target of 50–52 percent GHG reduction from 2005 levels by 2030 and accelerate progress toward the goal of 80 percent clean electricity by 2030. Future action—like new rules, standards, and policies at the federal, regional, state, and local levels—will be needed to fill the remaining gap.

The biggest near-term GHG emission reductions resulting from the IRA will come from the power sector, accounting for roughly 35–40 percent of all emission reductions in 2030.[2] The bill contains more than $100 billion in clean electricity tax incentives, which will lower the cost of developing such projects, and more than $20 billion in clean electricity loans, grants, research funding, procurement, and other programs to support transmission and planning.[3] Eligibility requirements for the tax credits will ensure that clean electricity projects provide high-road jobs,

encourage domestic manufacturing, and incentivize clean electricity investments in low-income and "energy" (fossil) communities.

NRDC analyzed the potential energy, emissions, and economic benefits of the IRA's extension and enhancement of clean electricity credits. To do so, we evaluated a modeled package very similar to the IRA's final tax package, including the bulk of the IRA's power-related elements. Our analysis finds that these enhanced clean electricity tax credits can:

1. Grow renewable, storage, and other low-carbon capacity on the grid by 280 GW by 2030 and 580 GW by 2035, relative to today's levels—the fastest and most sustained build-out of renewables and other clean electricity resources in U.S. history.

2. Lower energy costs for Americans and businesses, reducing the average residential energy bill 3.4 percent by 2030 and 4.6 percent by 2035, compared with a case without the tax package, saving households between $37 and $52 annually (2021$) on their electricity bills by the 2030s. In total, these tax credits will save U.S. households $60 billion on electricity bills over the next 15 years (2021$).

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3. Help create 153,000 to 169,000 high-quality clean energy jobs in the U.S. economy in 2030, growing to 341,000 to 382,000 jobs in 2035.

4. Create a cleaner grid, reducing carbon emissions from the power sector by an additional 275 million tons in 2030 relative to a case without the tax credits, and cutting power sector carbon pollution by 66 percent from 2005 levels by the end of this decade.

5. Slash health-harming air pollution, delivering $9 billion in public health benefits annually by 2030 and a cumulative public health benefit of almost $75 billion over the next 15 years, as compared with a case without the tax credits.

The IRA's extension and enhancement of clean electricity tax credits are also expected to complement climate action at the local, state, and federal levels. The benefits listed above do not include additional compounding benefits of other policies and regulations at the state and federal levels, such as revised clean air rules, carbon pollution standards, state clean energy standards, and utility generation and resource planning decisions.

The modeling also does not capture additional "bonus" credits for projects located in low-income or energy (fossil) communities, nor the $20 billion in clean electricity funding programs offered beyond tax credits. As such, this analysis offers a lower-bound assessment of the climate, health, and economic benefits of the IRA's clean electricity provisions, and also does not consider the impact from any non-power sector provisions in the IRA. The full suite of clean energy investments outlined in the bill, alongside complementary local, state, and federal actions, will drive climate, public health, and economic benefits more quickly and on an even greater scale than those discussed in this report.

METHODOLOGY

NRDC used a variety of modeling tools and methodologies to assess the clean electricity tax credit package. A detailed explanation of our models, assumptions, and methodology is included in the accompanying technical appendix.

Energy modeling was conducted using ICF's Integrated Planning Model (IPM®), with all assumptions and policy scenarios developed by NRDC.[4] IPM is a detailed model of the electric power system that is used routinely by the electricity industry and regulators, including the U.S. Environmental Protection Agency (EPA), to assess the effects of environmental and energy regulations and policies. IPM determines the least-cost pathway for the construction, economic retirement, and use of power plants, subject to resource adequacy requirements, existing state and federal policies, and other constraints. On this pathway, IPM predicts impacts on power plant builds and retirements by fuel; generation and capacity factors by fuel; fuel costs and prices; wholesale energy and capacity prices; retail (residential) prices and bills; total system costs; and power-related carbon dioxide (CO_2), nitrogen oxides (NOx), and sulfur dioxide (SO_2) emissions.[5]

This assessment compared two cases:

A. A business-as-usual scenario that models existing state and federal policy as of the spring of 2022.

B. A clean electricity tax package scenario that models a set of tax credit extensions and enhancements representing key provisions in the IRA.

The clean electricity tax package was modeled as:

■ Production Tax Credit (PTC) for wind at 2.5¢/kWh (2022$) through 2024.[6]

■ Investment Tax Credit (ITC) at 30% for solar through 2024.[7]

■ PTC for new zero-emission technologies at 1.5¢/kWh (1992$) from 2025 until 2032 or until power sector emissions are 75 percent below 2022 levels, whichever is later.[8]

■ ITC at 30% for battery storage, with phasedown matching the PTC for new zero-emissions technologies.[9]

■ 45Q credit at $85/ton (geologic storage) and $60/ton (utilization) for power plants with carbon capture through 2032, tied to inflation.[10]

■ 45U credit for existing nuclear plants at 1.5¢/kWh (2022$) through 2032, tied to inflation, unless wholesale revenue is greater than 2.5¢/kWh, at which point the credit is reduced by 80%.[11]

Power sector-related health and jobs impacts were estimated from IPM outputs. Macroeconomic impacts were assessed using the Eco-IDeA tool, a multisectoral model developed by Synapse Energy Economics for NRDC that enables users to estimate the macroeconomic impacts of changes in investment spending across the electric, transportation, and buildings sectors. The EPA's benefit-per-ton methodology was used to determine the health impacts, and equivalent monetary benefits, from projected NOx and SO_2 reductions in NRDC's IPM modeling of the IRA.

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CLEAN ELECTRICITY TAX CREDITS WILL GREATLY ACCELERATE THE TRANSITION TO A CLEAN POWER GRID

NRDC's modeling shows that the clean electricity tax credits will be highly effective at accelerating the expansion of clean electricity resources and progress toward the Biden administration's goal of an 80 percent clean grid by 2030, while also lowering electricity prices and household electricity bills. Continuing to build out these resources with speed and at scale is crucial for decarbonizing the power sector and ultimately achieving the U.S. commitment to cut GHG pollution in half or more by 2030. Generating carbon-free electricity, such as from wind and solar, will also be central to decarbonizing other areas of the economy, like transportation and buildings, as those sectors begin to electrify.

With the clean electricity tax credits, generation from utility-scale wind and solar power will grow to nearly one-third of the nation's electricity mix by 2030 and to 46 percent of the mix by 2035 (Figure 1), compared with around 12 percent in 2021. In total, low- and zero-carbon resources will supply around 57 percent of all electricity needs in 2030, compared with around 40 percent today.

Almost 280 GW of new clean and low-carbon resources can be supported by these tax credits between now and 2030, growing to more than 580 GW of new clean and low-carbon capacity by 2035 (Figure 2).[12] This would more than double U.S. renewable and battery storage capacity between now and the end of this decade and almost quadruple that capacity by 2035.[13]

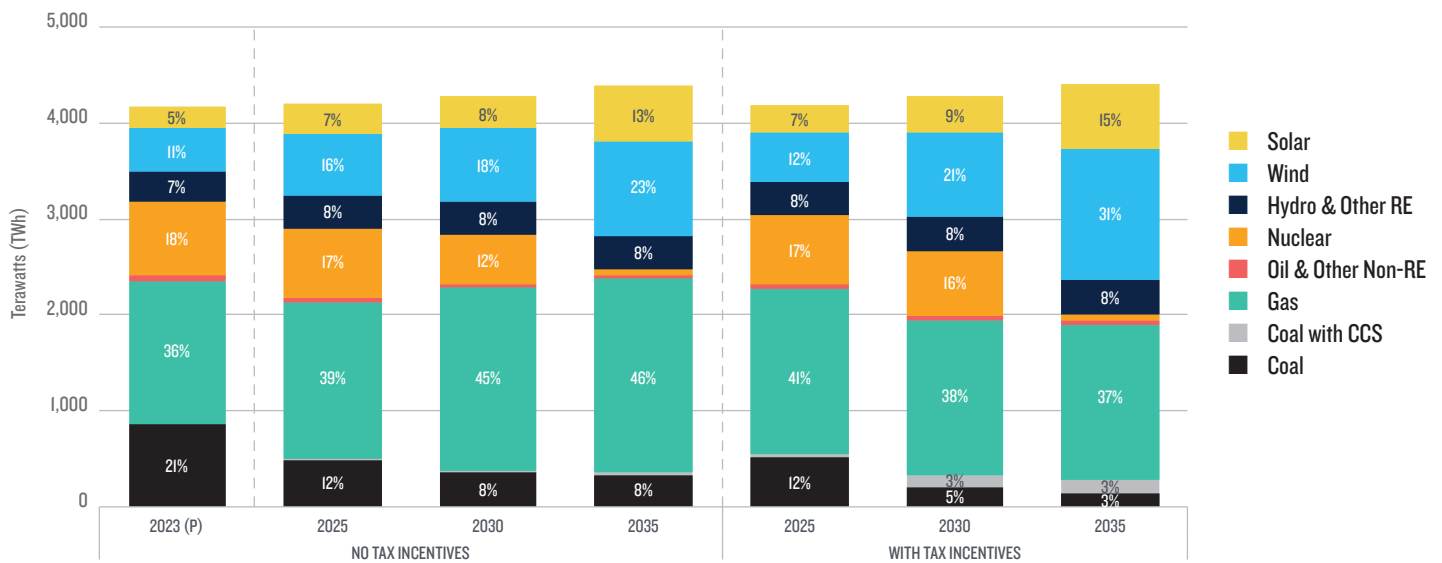### FIGURE 1: U.S. GENERATION MIX WITH AND WITHOUT CLEAN ELECTRICITY TAX INCENTIVES BETWEEN 2023 AND 2030

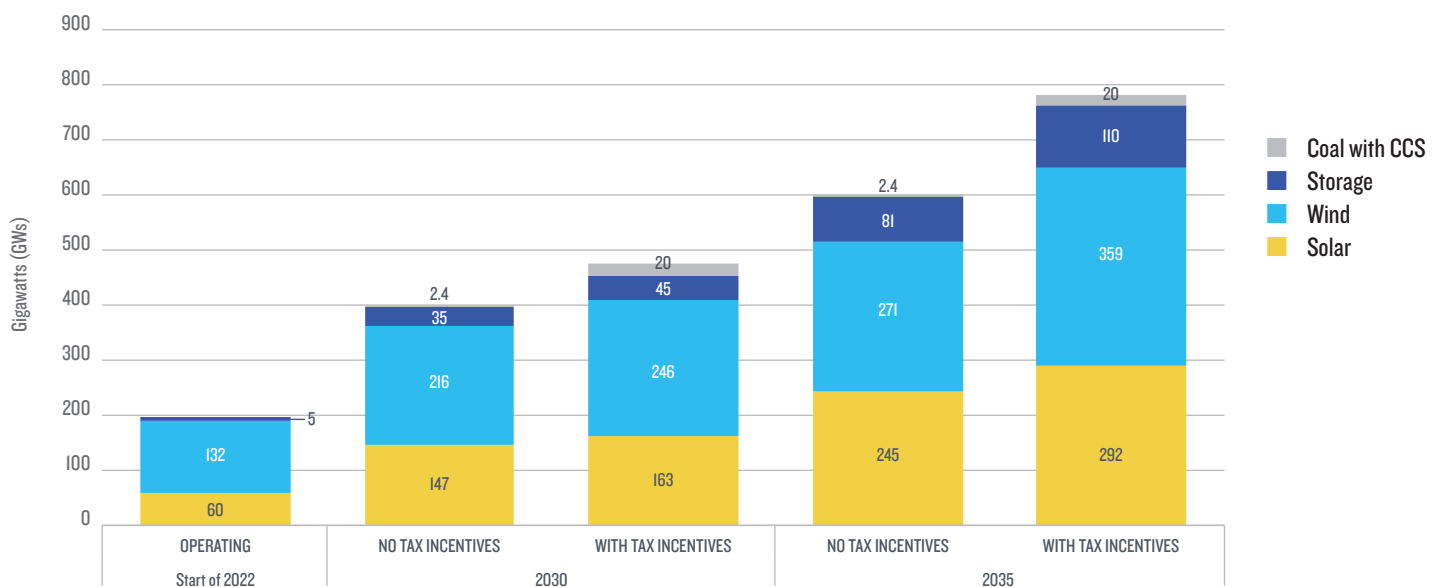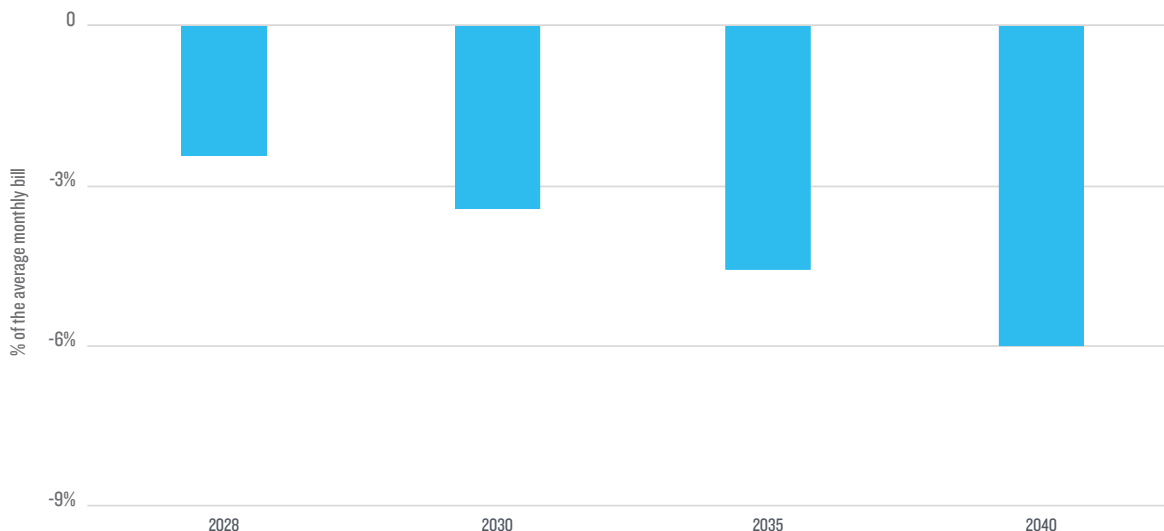### FIGURE 2: U.S. CLEAN ENERGY CAPACITY IN 2022, 2030, AND 2035 WITH AND WITHOUT CLEAN ELECTRICITY TAX INCENTIVES

MORE RENEWABLES ON THE GRID MEAN LOWER COSTS FOR AMERICANS AND BUSINESSES

Clean electricity tax credits will reduce the electricity cost burdens shouldered by Americans and businesses alike. Once built, wind and solar plants have minimal marginal cost, which helps lower power prices by reducing the need for more expensive sources of generation. In addition, by investing in wind and solar, consumers will be insulated from volatile fossil fuel prices, like the spike in natural gas prices we have seen over the past year, by reducing the need to fuel and operate these fossil plants.

The tax credits are projected to cut the average residential bill by 3.4 percent in 2030 and 4.6 percent in 2035, relative to business as usual (Figure 3). This amounts to annual electricity bill savings of $37 and $52 in 2030 and 2035 (2021$), respectively, for the average U.S. household. The total this comes to $60 billion in electricity bill savings for U.S. households over the next 15 years (2021$).

MORE RENEWABLES MEAN NEW ECONOMIC OPPORTUNITIES

These investments in renewables and storage will create new economic opportunities and new jobs for the United States. Some 3.2 million Americans across all 435 congressional districts are already employed in renewable energy, energy efficiency, storage, grid modernization, and clean fuels.[14] Clean energy and clean transportation employ more than 40 percent of all energy workers in America and make up over half of all energy jobs added in 2021.[15]

Wind and solar jobs, already expected to be among the country's fastest-growing occupations over the next decade, will get an additional boost from the IRA.[16] The power sector investments supported by the IRA will support

153,000 to 169,000 new jobs in the clean energy industry (such as wind technicians and solar installers) by 2030 and 341,000 to 382,000 clean energy-related jobs by 2035.

This build-out of new projects could also drive $23 to $25 billion in new economic activity in 2030 and $52 to $58 billion in 2035. In total, these new power sector investments supported by the IRA would create $420 to $467 billion in economic activity over the next 15 years.

CLEAN ELECTRICITY TAX CREDITS WILL DELIVER LOWER EMISSIONS

The extension and enhancement of clean electricity tax credits not only will support a large deployment of renewables and the economic benefits of a sustained build-out of these technologies, but will cut both climate-warming and health-harming air pollution.

NRDC's modeling finds that the IRA's tax credits cut an additional 275 million tons of CO_2 pollution from the power sector in 2030, compared with a case without the tax incentives (Figure 4). This is equal to the carbon pollution from every power plant in Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia in 2021.[17] By 2030, carbon pollution from the power sector falls to 66 percent below 2005 levels.

Because the new technology-neutral tax credit lasts until 2032 or until power sector emissions are 75 percent below 2022 levels (whichever is later), these tax credits result in a continued and lasting transition to clean power. By 2035, these tax credits cut an additional 340 million tons of CO_2 pollution annually, relative to a case without tax incentives. Cumulatively, these power sector tax credits reduce power sector pollution by an additional 2.9 billion tons of CO_2 over the next 15 years, compared with a case without these incentives.
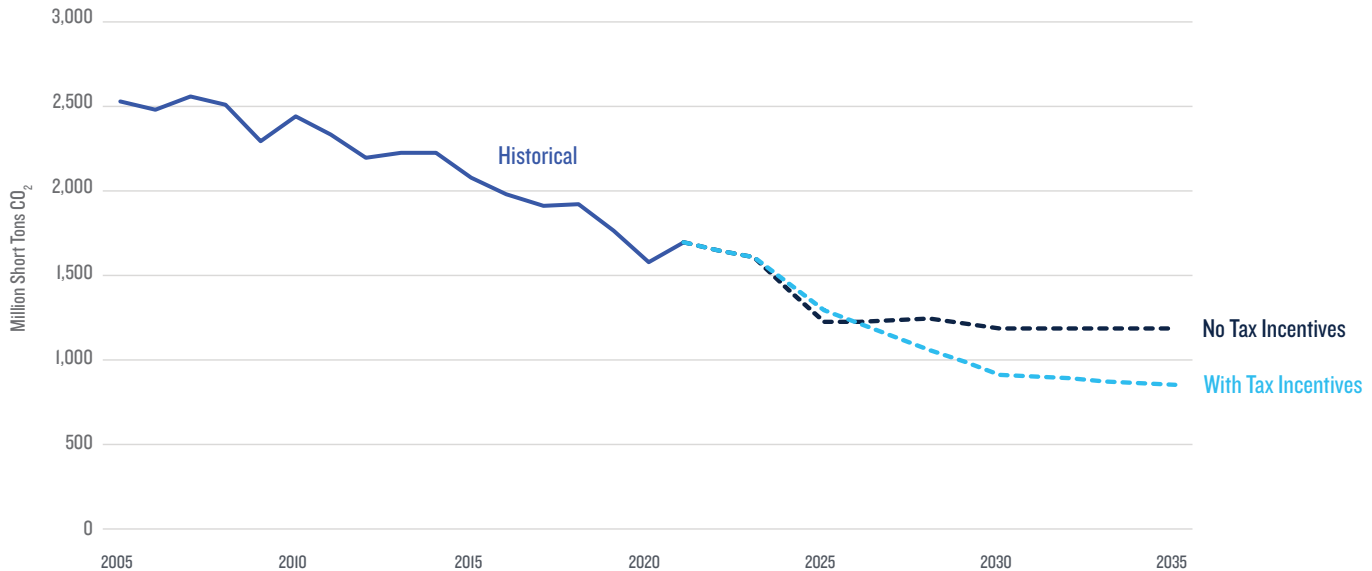
These reductions are driven by the shift to clean and lower-carbon forms of electricity, like wind and solar, that replace generation from dirtier forms of power generation. Additionally, by making clean energy easier and cheaper to deploy, these tax credits may encourage states, utilities, cities, and businesses to set more ambitious clean energy targets than previously seemed possible, setting up a virtuous cycle.

In addition to reducing climate-warming pollution, moving away from the dirtiest forms of power generation also helps slash health-threatening air pollutants. Emissions of compounds such as nitrogen oxides (NOx) and sulfur dioxide (SO_2) create soot and smog, which are linked to chronic health impacts on local communities.[18] These public health threats disproportionately affect low-income communities and people of color, who are often the ones living next to this polluting infrastructure and facing the greatest health harms from our energy system.[19]

By 2030, the annual national health benefits from these reductions in NOx and SO_2 stemming from the Inflation Reduction Act amount to $8.6 to $9.0 billion (2021$), growing to $9.5 to $10.1 billion annually by 2035. These figures represent the monetized benefits of avoided health issues, including avoided premature deaths, fewer ER visits and hospital admissions, fewer lost workdays and school days, and reduced childhood asthma attacks.[20]

Over the next 15 years, these tax credits have a cumulative health benefit of more than $74 billion (2021$), with SO_2 and NOx emissions falling by 75 percent and 64 percent, respectively, from today's levels by 2035. Our modeling finds that these tax credits can help prevent up to 9,200 premature deaths; 18,700 asthma attacks, cardiac arrests, and strokes; and 6.1 million lost school and workdays over the next 15 years.

CONCLUSION

The Inflation Reduction Act is poised to usher in a new era of the U.S. clean energy transition. The enhanced and expanded clean electricity tax credits will support the fastest and most sustained build-out of renewables and other low- and no-carbon energy resources in the country's history. This clean energy deployment will support new economic and job opportunities in the clean energy economy; lower electricity prices for all consumers by reducing our exposure to spiking and volatile fossil fuel prices; cut climate-warming pollution; and lead to large reductions in other air pollutants that contribute to local soot, smog, and ozone and harm our health.

Now is the time to build upon this congressional success by ensuring swift implementation of these provisions and using other existing regulatory tools to help achieve the president's goal of an 80 percent clean grid by 2030.

ENDNOTES

1   See, for example, Derek Murrow and Amanda Levin, "Congress Acts on Climate and Hands the Baton to Biden," NRDC Expert Blog, August 25, 2022, https://www.nrdc.org/experts/derek-murrow/congress-acts-climate-and-hands-baton-biden; Megan Mahajan et al., *Updated Inflation Reduction Act Modeling Using the Energy Policy Simulator*, Energy Innovation, August 23, 2022, https://energyinnovation.org/publication/updated-inflation-reduction-act-modeling-using-the-energy-policy-simulator/; Jesse D. Jenkins et al., *Preliminary Report: The Climate and Energy Impacts of the Inflation Reduction Act of 2022*, REPEAT Project, August 2022, https://repeatproject.org/docs/REPEAT_IRA_Prelminary_Report_2022-08-04.pdf; and U.S. Department of Energy, *The Inflation Reduction Act Drives Significant Emissions Reductions and Positions America to Reach Our Climate Goals,* August 18, 2022, https://www.energy.gov/sites/default/files/2022-08/8.18%20InflationReductionAct_Factsheet_Final.pdf .

2   See Jesse D. Jenkins et. al (2022) and Derek Murrow and Amanda Levin (2022).

3   Derek Murrow, Amanda Levin, and Sam Krasnow, "Massive Clean Electricity Progress in Sight," NRDC Expert *Blog,* July 29, 2022, https://www.nrdc.org/experts/derek-murrow/massive-clean-electricity-progress-sight.

4   NRDC's report represents the assumptions of NRDC based on consultation with industry participants and private sector energy and power investors. Full documentation of the IPM model can be found on the U.S. EPA's website at https://www.epa.gov/power-sector-modeling/epas-power-sector-modeling-platform-v6-using-ipm-summer-2021-reference-case.

5   Retail prices are calculated based on the IPM outputs similar to the approach used by EPA.

6   See Section 13101. Equal to 1.5 ¢/kWh $2002, with credit value tied to inflation.

7   See Section 13102.

8   See Section 13702. Credit value is tied to inflation, with phase down over 3 years after applicable year is reached (100%, 75%, 50%). New wind, solar, small hydro, and nuclear projects are eligible in our analysis.

9   See Section 13102.

10 See Section 13104.

11 See Section 13105.

12 This includes wind, solar, battery storage, and retrofits of existing coal plants with 90–99% capture technologies, noted as coal with CCS (carbon capture and sequestration) in Figure 2.

13 At the start of 2022, 197 GW of wind, solar, and storage were operating. U.S. Energy Information Administration, "Capacity," chapter 6 in *Electric Power Monthly*, February 2022, https://www.eia.gov/electricity/monthly/.

14 Environmental Entrepreneurs, *Clean Jobs America 2022,* August 2022, https://e2.org/reports/clean-jobs-america-2022/.

15 Ibid.

16 U.S. Bureau of Labor Statistics, "Employment Projections: Fastest Growing Occupations," Table 1.3A, Fastest growing occupations, 2020 and projected 2030, excluding occupations with above average cyclical recovery," https://www.bls.gov/emp/tables/fastest-growing-occupations-alt.htm, accessed September 17, 2022.

17 EPA, "Clean Air Markets Program Data," https://campd.epa.gov/data/custom-data-download, accessed September 17, 2022.

18 EPA, "Sulfur Dioxide (SO_2) Pollution: Sulfur Dioxide Basics," last updated March 9, 2022, https://www.epa.gov/so2-pollution/sulfur-dioxide-basics#effects; EPA, "Nitrogen Dioxide (NO_2) Pollution: Basic Information About NO_2," last updated August 2, 2022, https://www.epa.gov/no2-pollution/basic-information-about-no2.

19 See EPA, "Study Finds Exposure to Air Pollution Higher for People of Color Regardless of Region or Income," September 20, 2021, https://www.epa.gov/sciencematters/study-finds-exposure-air-pollution-higher-people-color-regardless-region-or-income; Harvard T. H. Chan School of Public Health, "Racial, Ethnic Minorities and Low-Income Groups in U.S. Exposed to Higher Levels of Air Pollution," January 12, 2022, https://www.hsph.harvard.edu/news/press-releases/racial-ethnic-minorities-low-income-groups-u-s-air-pollution/.

20 NRDC used the EPA'S benefit-per-ton and incident-per-ton figures from "Estimating the Benefit per Ton of Reducing Directly Emitted PM2.5, PM2.5 Precursors and Ozone Precursors From 21 Sectors," last updated January 13, 2022, https://www.epa.gov/benmap/estimating-benefit-ton-reducing-directly-emitted-pm25-pm25-precursors-and-ozone-precursors.