

Accelerating Toward a Clean Energy Economy

Capitalizing on the Clean Power Plan and Federal Renewable Energy Tax Credits

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Core Messages

- Federal renewable energy tax credits and the Clean Power Plan provide a powerful 1-2 punch for boosting clean energy development and shifting toward a lower-carbon economy.
 - The tax credit extension drives near-term renewable energy growth and carbon reductions, while the Clean Power Plan continues the momentum and achieves substantial cuts in U.S. power sector global warming emissions by 2030
- Combined, these policies offer an affordable pathway to accelerate the clean energy transition while delivering significant economic and health benefits for all Americans.
- Both policies are essential for helping the U.S. achieve its emissions reduction commitment in 2025 under the Paris Climate Agreement.
- Stronger policies are also needed to secure the much deeper carbon reductions required by 2050 to meet the long term de-carbonization goals of the Paris Agreement to limit climate change.

Federal Policy Timelines

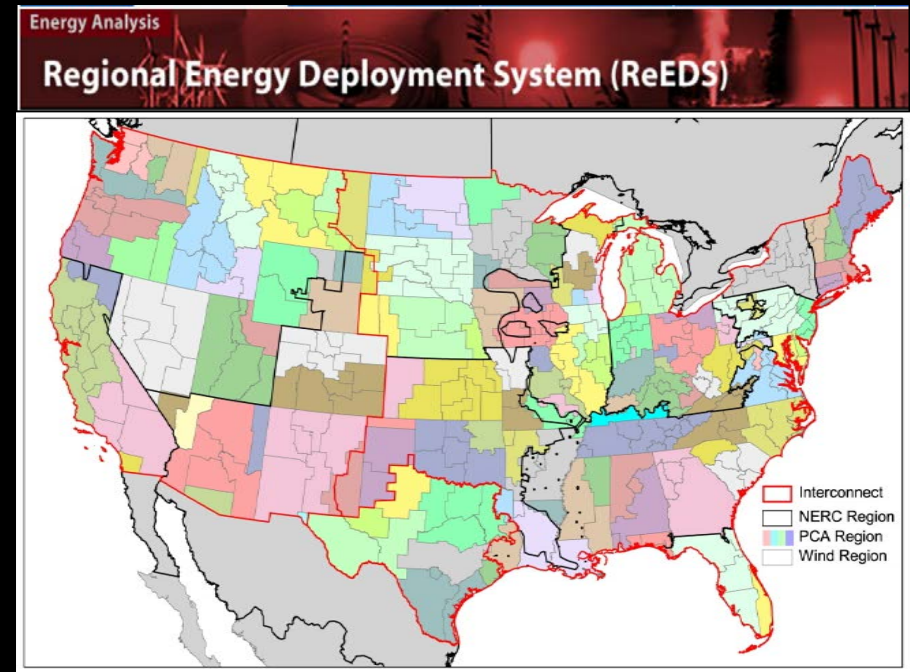
Extension of Federal Tax Credits for renewables provided for projects that commence construction through 2019 for wind and 2021 for solar

Clean Power Plan compliance starts in 2022 and will reduce national power sector carbon emissions by an estimated 32% below 2005 levels by 2030

2016 · 2017 · 2018 · 2019 · 2020 · 2021 · 2022 · 2023 · 2024 · 2025 · 2026 · 2027 · 2028 · 2029 · 2030 · 2031 →

UCS Analysis of Clean Energy Transition

- Examines the affects of the federal renewable energy tax credit extension and the Clean Power Plan on the U.S. power sector, consumers, economy, and environment
- Uses NREL's Regional Energy Deployment System (ReEDS) power sector planning model



See slide 19 for key assumptions. Full methodology and technical appendix available at www.ucsusa.org/AcceleratingCleanEnergy

Modeling Scenarios

Reference Case: includes state and federal policies that were enacted by November 2015, except the Clean Power Plan

Clean Energy Transition Case: includes the Clean Power Plan, assuming all states comply with mass-based targets, including old and new power plants combined, and allows nationwide trading of carbon allowances. Also includes federal tax credit extensions for wind, solar, and other renewables, as adopted in December 2015.

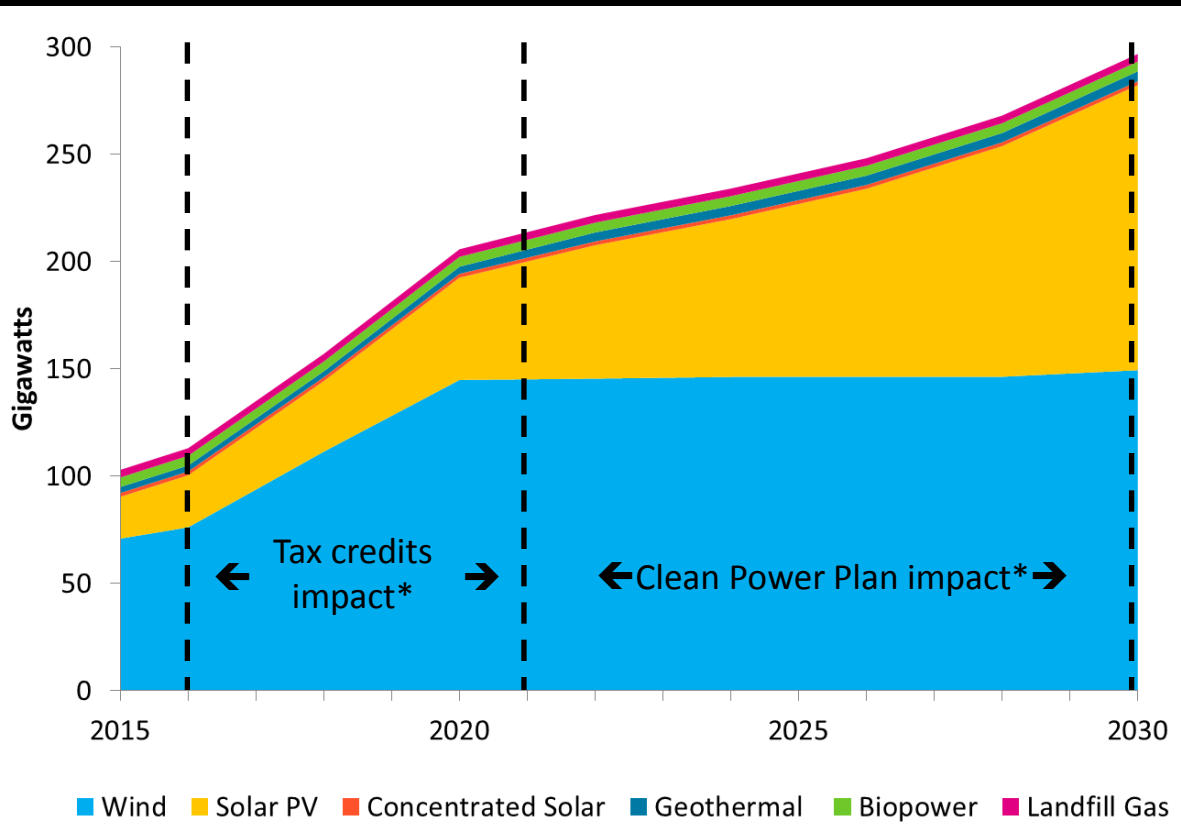
Scenario for Comparison Purposes: Clean Power Plan only, with no PTC/ITC extension

Key Results

- 129 gigawatts (GW) of new renewable capacity by 2022 and 204 GW by 2030, stimulating \$216 billion in new capital investments
- \$64 billion in efficiency improvements by 2030, reducing electricity sales by nearly 7%
- Net consumer savings of \$30.5 billion from electricity expenditures and carbon allowance revenues from 2016 to 2030
- Typical household electricity bills lower in every year of forecast; annual savings of \$17 (1.9%) by 2030
- \$127 billion in health and economic benefits through 2030 by decreasing CO₂, SO₂, and NO_x pollution



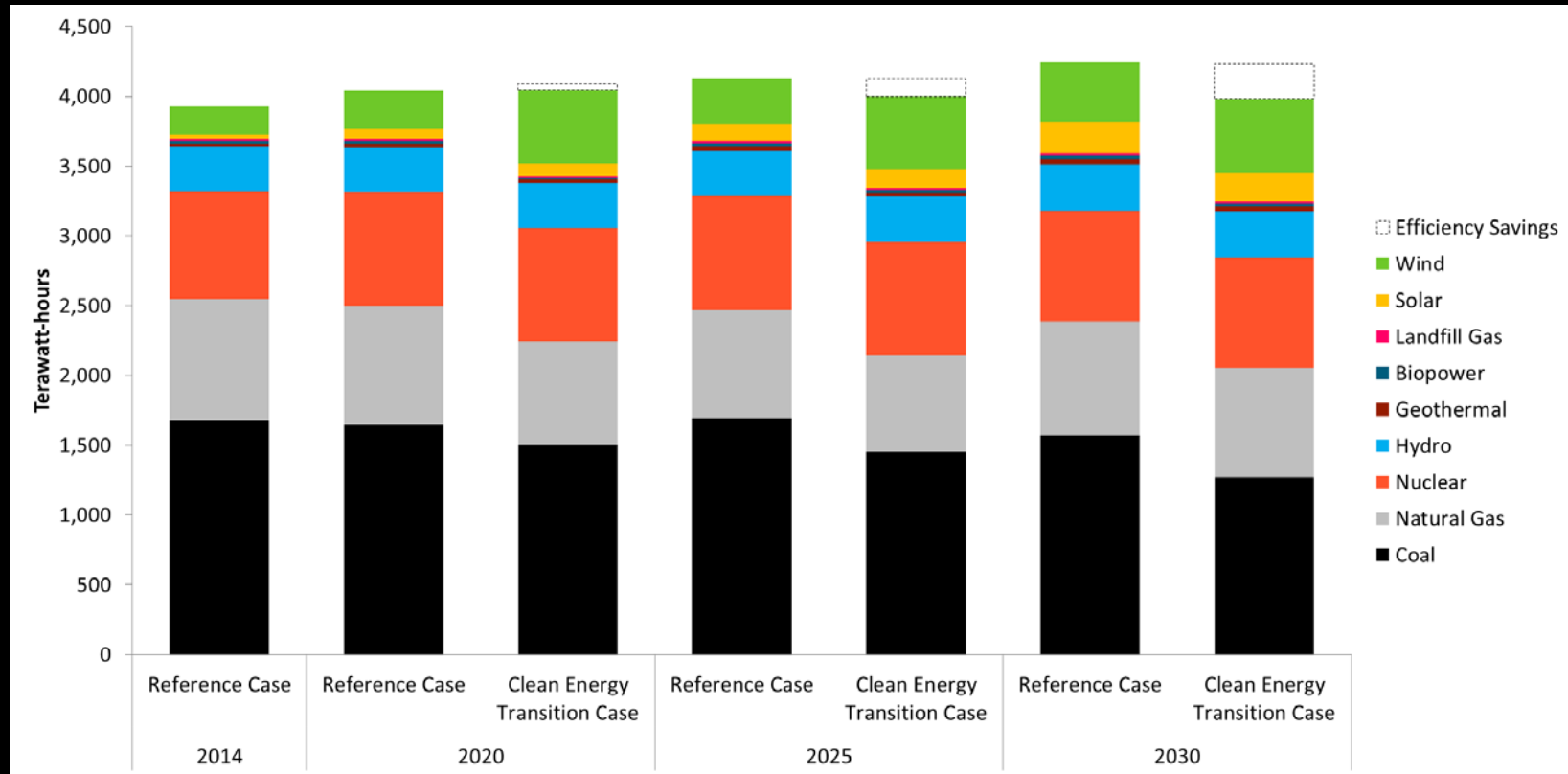
Renewable Energy Capacity Nearly Triples Under the Clean Energy Transition policies



- Federal tax credits help spur 129 GW of new renewable capacity by 2022 — 71 GW more than the reference case
- CPP helps continue growth, resulting in 204 GW of new renewables by 2030—spurring \$216 billion in capital investments
- Renewables account for 21.5% of total U.S. power sales by 2030

* Not all of the renewable energy growth is exclusively attributable to the federal tax credits and Clean Power Plan. State policies—such as renewable electricity standards—and economic builds also contribute to the renewable energy development shown here.

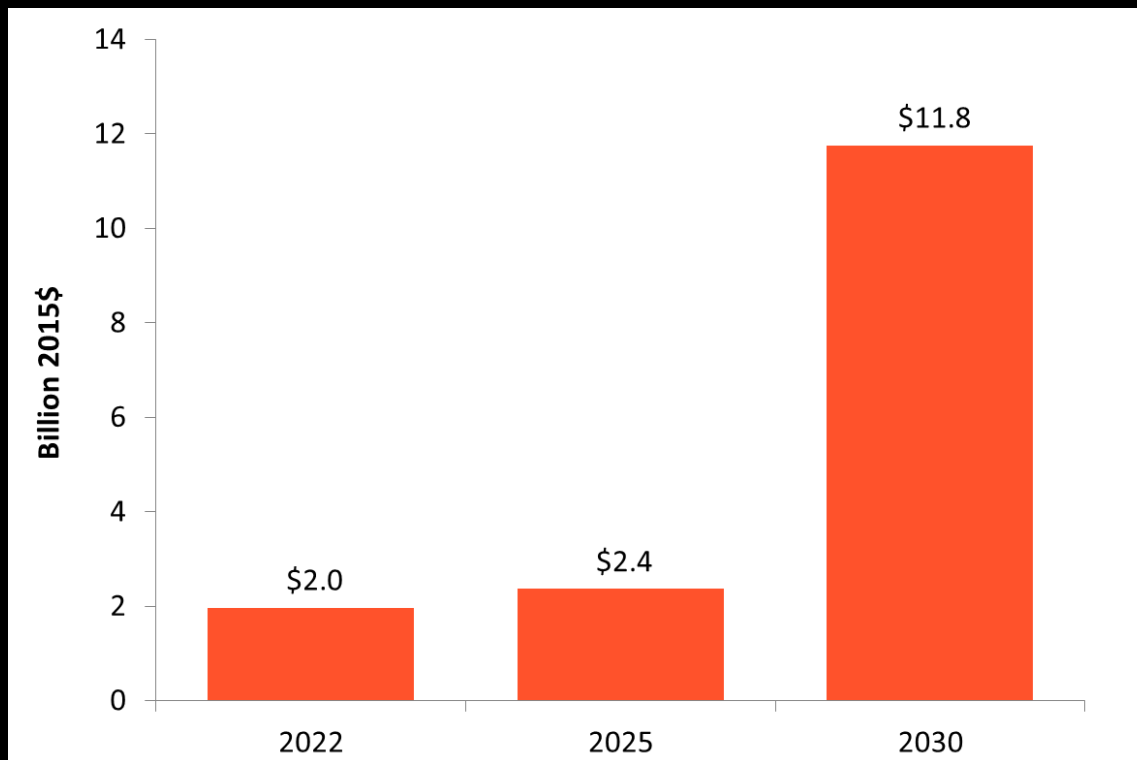
Clean Energy Transition Policies Help Diversify Our Nation's Electricity Supply



- Coal generation 19% lower compared with Reference Case in 2030
- Renewables and efficiency account for 25% of total U.S. generation in 2030, helping to prevent an over-reliance on natural gas

Clean Energy Transition Policies Result in Net Savings to the U.S. Power Sector

Total Net Savings* to the Power Sector for the Clean Energy Transition Case Relative to the Reference Case

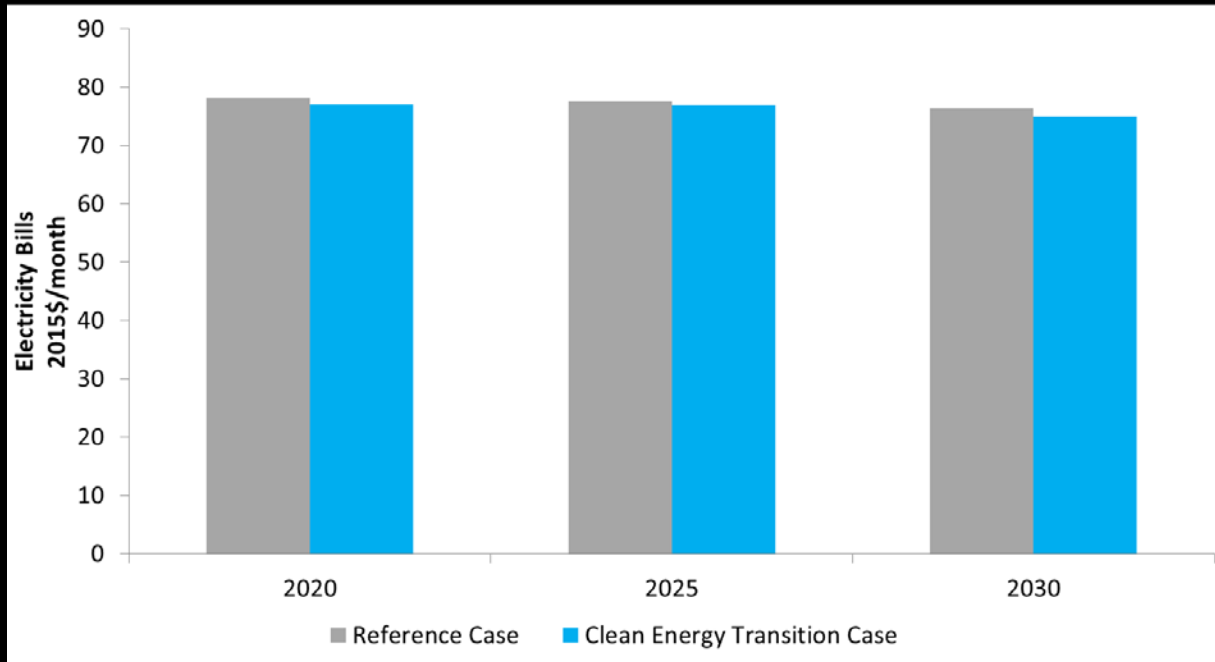


- Net savings to the power sector every year from 2016 to 2030
- Cumulative* net savings of \$30.5 billion through 2030
- Tax credit extension helps make CPP and RES compliance more affordable for states

* Net Savings reflect electricity system expenditures (electricity prices include the costs of implementing the Clean Power Plan as well as the renewable energy and efficiency investments) plus revenues from carbon allowances, which can be reinvested for consumer benefit. Cumulative results are expressed in present-value dollars.

Clean Energy Transition Policies

Deliver Modest Savings on Household Electricity Bills

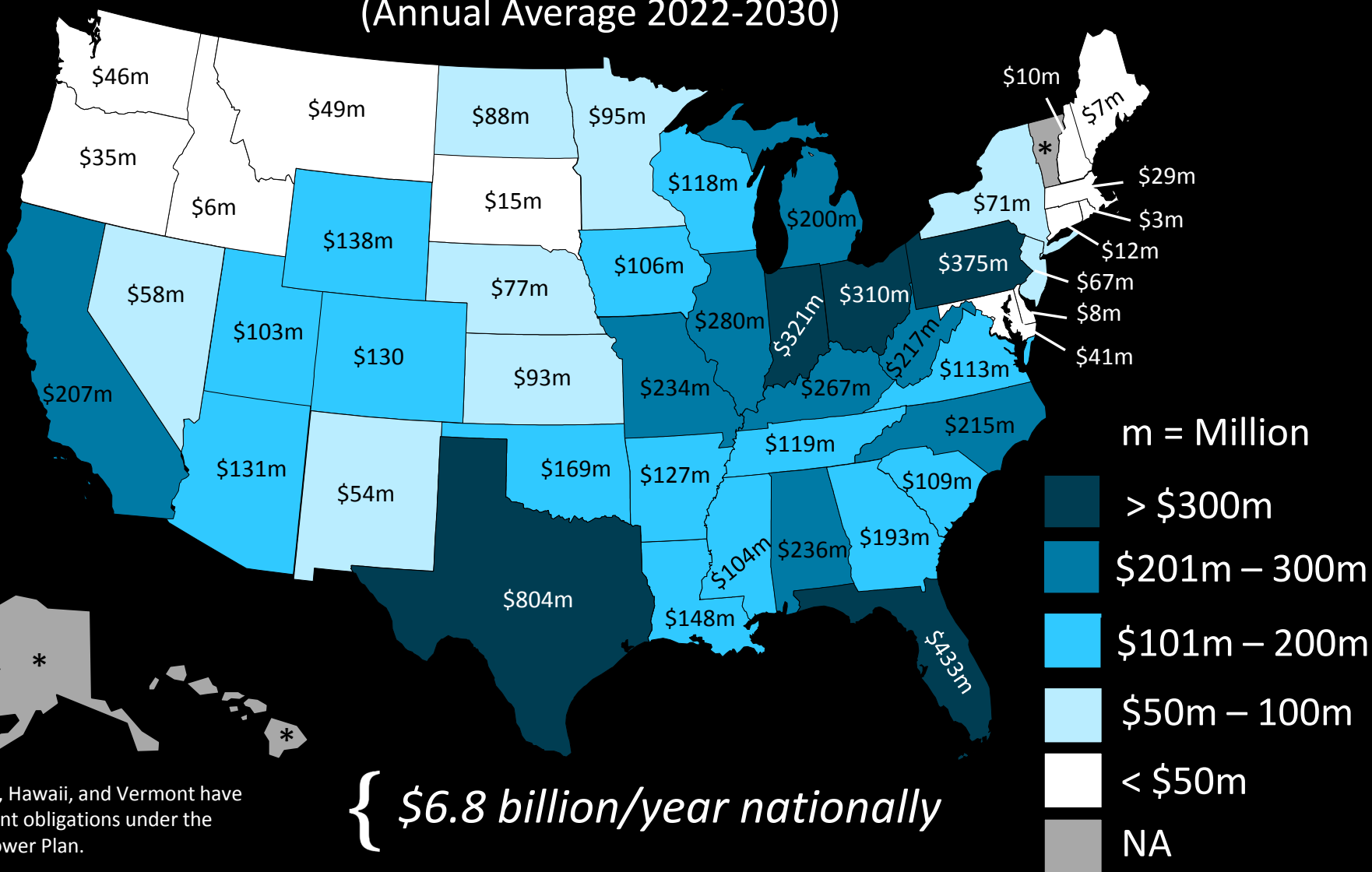


- Modest electricity bill savings for typical households* every year from 2016 to 2030
- Annual household electricity bill savings of \$17 (1.9%) by 2030

* Electricity costs in the Reference Case are based on the monthly consumption of 600 kilowatt-hours (kWh) for a typical residential nonelectric heating customer. In the Clean Energy Transition Case, average monthly consumption is lower in 2030 (563 kWh) due to the implementation of stronger energy efficiency programs.

Revenues from Trading of Carbon Allowances under the Clean Power Plan

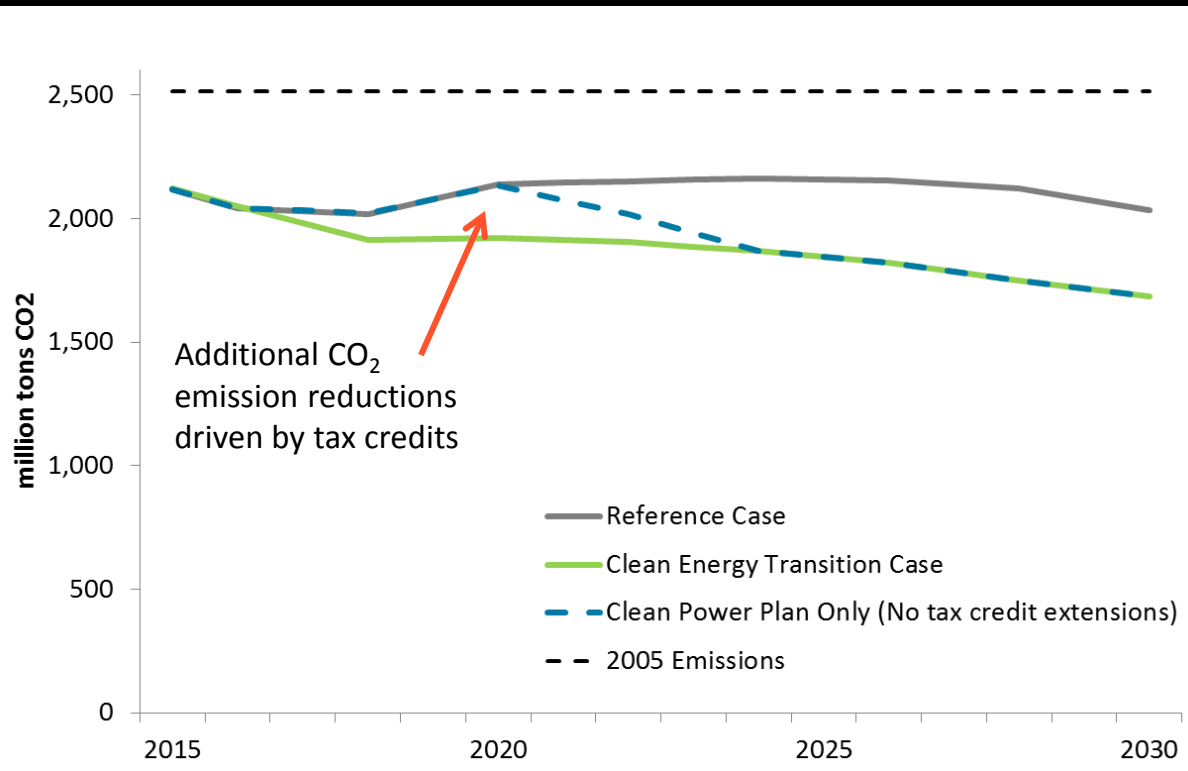
(Annual Average 2022-2030)



* Alaska, Hawaii, and Vermont have no current obligations under the Clean Power Plan.

Clean Energy Transition Policies

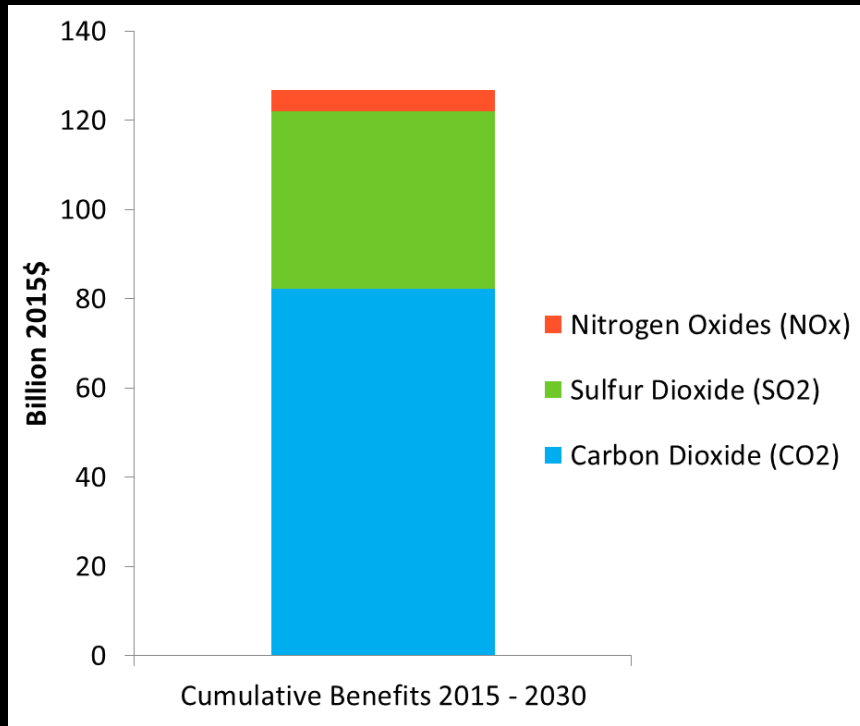
Reduce Power Sector Carbon Dioxide Emissions



* See <http://www.nrel.gov/docs/fy16osti/65571.pdf>

- Cuts U.S. power sector CO₂ emissions 33% below 2005 levels by 2030
- Tax credits help avoid 31% more CO₂ emissions cumulatively (or 854 million tons) through 2030
- Results consistent with Feb. 2016 National Renewable Energy Laboratory analysis*

Less Pollution under Clean Energy Transition Policies Spurs Health and Economic Benefits



- By 2030, compared with Reference Case, Clean Energy Transition policies reduce power sector CO₂ emissions by 17%, SO₂ emissions by 22%, and NOx emissions by 24%
- Less pollution results in \$127 billion worth of public health and economic benefits through 2030



The multiplier effect of federal tax credits

A \$30.6 billion* investment of federal tax dollars helps:

- Drive 71 GW in incremental new wind and solar capacity by 2022
- Leverage \$96 billion in new capital investments by 2022
- Cut 854 million tons of CO₂ emissions cumulatively through 2025
- Provide billions of dollars in public health benefits by switching to cleaner energy forms
- Foster local economic benefits including jobs, state/local taxes, and land lease payments
- Level the playing field with fossil fuels that have long-benefitted from tax breaks



Credit: NREL

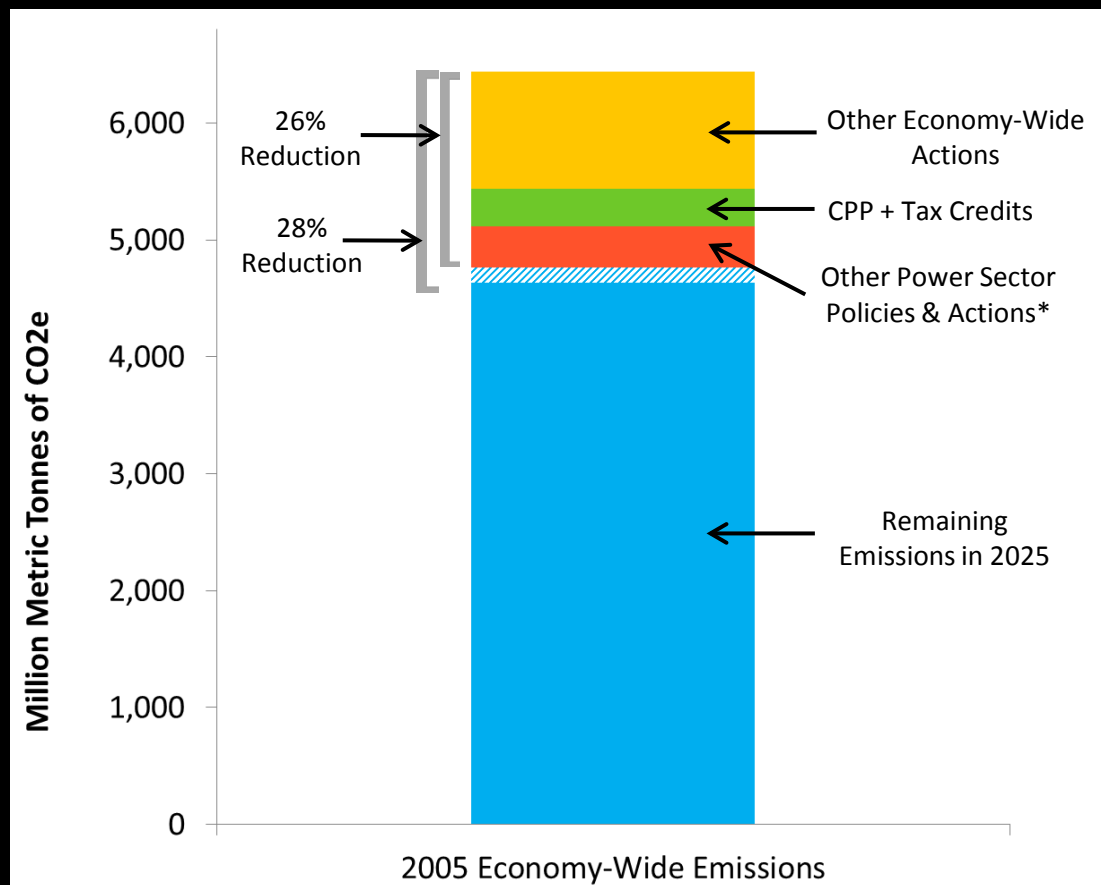


Credit: Solar Cost Guide

* Estimate of the cumulative impact on the U.S. Treasury through 2030 (discounted 2015\$) based on the difference in new wind and solar capacity installations from 2016 to 2022 between the Clean Energy Transition Case and the Reference Case. Since the tax credits apply to all wind and solar capacity additions for the 5-yr period, not just the incremental amount, the total cumulative impact on the U.S. Treasury in the Clean Energy Transition Case is \$41 billion through 2030. Our estimates are greater than those published by the Joint Committee on Taxation (\$25 billion undiscounted 2016-2025) because we project more installed wind and solar capacity and include more years in our analysis.

Achieving U.S. 2025 Emissions Reduction Commitments under the Paris Climate Agreement

Contribution of the Clean Power Plan and Tax Credits to Achieving U.S. 2025 Emissions Reduction Goal under the Paris Climate Agreement

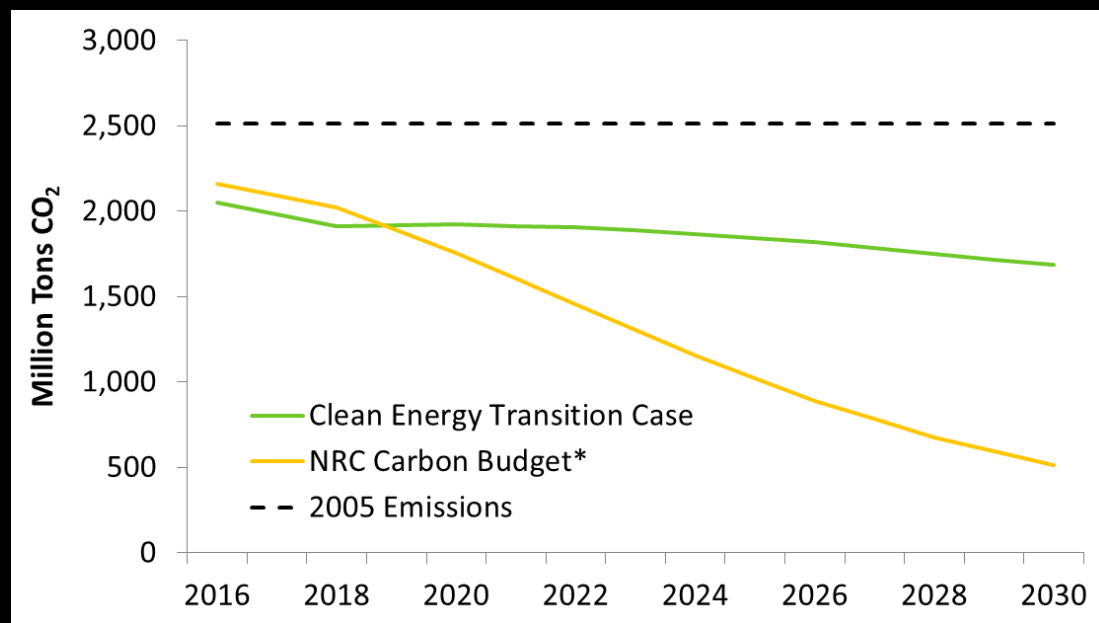


* Includes reductions from past activities and expected state and federal policy actions through 2025 (such as state renewable electricity standards) without the extended federal tax credits and Clean Power Plan.

- The U.S. has set a goal of reducing economy-wide carbon emissions by 26% to 28% below 2005 levels by 2025 under the Paris Climate Agreement
- Clean Power Plan and federal renewables tax credits are essential components of a comprehensive economy-wide strategy for achieving these reductions

Deeper Reductions in Power Sector Carbon Emissions are Needed to Address Climate Change

U.S. Power Sector Carbon Emission Comparison, Clean Energy Transition Case vs. NRC Carbon Budget*



* Power sector emission reduction trajectory adapted from National Research Council (NRC). The NRC recommended an economy-wide carbon budget for the United States that would cut power sector carbon 90 percent from current levels by 2050 as part of an economy-wide emissions reduction goal of greater than 80 percent by 2050. For more info, see www.nap.edu/catalog.php?record_id=12794

- Numerous studies find that a near de-carbonization of the power sector by 2050 is needed to help limit some of the worst consequences of climate change
- Much stronger federal and state policies are needed to secure the deeper carbon reductions necessary by 2050 to meet long-term goals of the Paris Climate Agreement

Recommendations for Accelerating the Clean Energy Transition

- Strengthen and enact strong state and federal clean energy policies, including:
 - renewable electricity standards and energy efficiency resource standards
 - carbon-pricing programs
 - clean energy innovation investments
- States should prioritize renewables and efficiency in CPP compliance plans
- Improve grid operations and resource planning
- Adopt new and stronger policies to reduce economy-wide climate emissions



Ensuring an Equitable Transition to the Clean Energy Economy

Communities of color and low-income communities bear a disproportionate burden of pollution from fossil fuels. To ensure disadvantaged communities benefit from the clean energy transition:

- State CPP compliance plan processes must meaningfully engage with residents and include an environmental justice analysis.
- Complementary measures must be implemented, including targeted investments in clean energy and energy efficiency, tighter limits on co-pollutants, incentives for coal plant retirements, worker/community transition assistance, and economic diversification



Key Modeling Assumptions

- Fuel prices, electricity demand, and costs for mature technologies based on EIA projections
- Emerging technologies (e.g. advanced nuclear and CCS) based on mid-point estimates from several studies
- Renewables assumptions based on actual projects & mid-case projections from DOE Wind Vision and Sunshot studies
- Renewable resource potential based on NREL GIS analysis
- UCS updated the NREL's plant database with recently announced retirements and planned builds based on SNL Energy, AWEA, and SEIA data.
- Full methodology and technical appendix available at www.ucsusa.org/AcceleratingCleanEnergy

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