
FACT OF THE WEEK 1:

EPA manipulated its modeling assumptions to show smaller impacts on coal

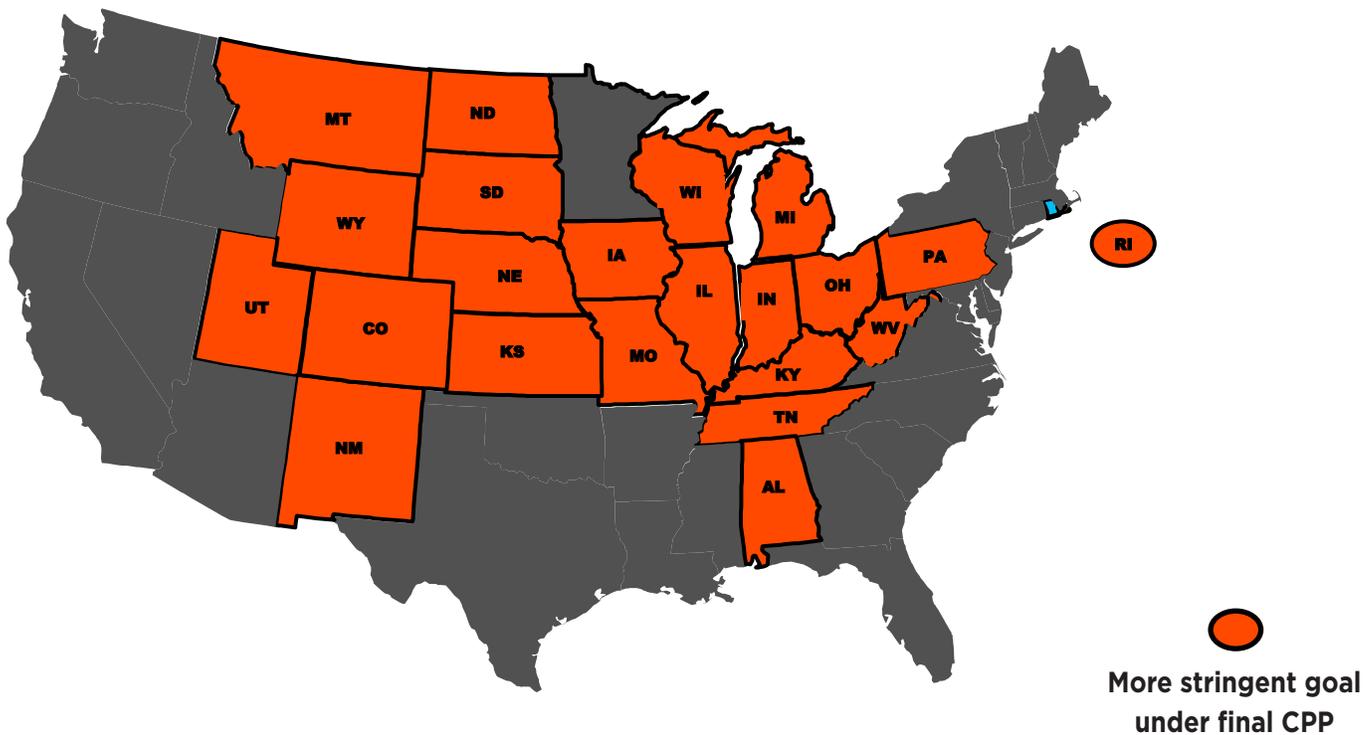
- In assessing the impacts of the final CPP, EPA assumes that a much smaller coal fleet will remain in the near future (“base case”) than EPA assumed in last year’s analysis of the proposed CPP. EPA is now assuming that there will be far fewer coal units by 2020, even without the CPP.
- By assuming a “base case” with more coal retirements, EPA is able to claim that the final rule does less harm to coal because there are fewer coal units to be harmed.
- Compared to the proposal, the final rule assumes that 1/3 of the coal fleet (approximately 100 GW) will have retired by 2020 even without the CPP. This is considerably more than EPA projected for the proposed CPP (66 GW), more than EIA projects (55 GW), and more than ACCCE’s announced retirements (68 GW).
- The projected impacts of the final CPP —i.e., the harm to coal —would have been greater if EPA had used the same “base case” as the proposed CPP:
 - Electricity generation from coal declines by 22% under the final rule in 2030. This would have been a 31% reduction if EPA had used the base case from the proposed CPP.
 - Coal consumption declines by 21% (181 million tons) under the final rule in 2030. This would have been a 29% (282 million tons) reduction if EPA had used the base case from the proposed CPP.

FACT OF THE WEEK 2:

22 states are the biggest losers because the final CPP is more stringent than the proposed CPP

- The final Clean Power Plan (CPP) includes two basic compliance options: one is RATE-BASED and the other is CAP-AND-TRADE — which EPA calls “mass-based” to avoid using the term cap and trade. Although EPA gives states the option of choosing between the two, it is clear that EPA prefers that states, individually or in groups, adopt cap-and-trade programs.
- Under either (or both) a rate-based or a cap-and-trade program, 22 states are the biggest losers because the *final* CPP is more stringent than the *proposed* CPP (Figure 1). All these states — except Rhode Island which has no coal-fired electricity generation — rely on coal to help maintain affordable electricity prices. The collective average retail electricity price for the 21 coal-reliant “biggest loser” states was 12% below the national average in 2014 (EIA). Rhode Island’s electricity price was 49% above the national average (EIA).
- However, the remaining states are not winners. Under a rate-based program, 46 states must reduce their CO₂ emissions rate by 10% or more below their 2012 emissions rate (Figure 2). Under a cap-and-trade program, 33 states must reduce their total CO₂ emissions by 10% or more below what they emitted in 2012 (Figure 3).

FIGURE 1: These are the 22 biggest losers under the final Clean Power Plan because their emission reduction targets are more stringent than they were under the proposed CPP.



FACT OF THE WEEK 3:

A land area the size of Indiana would be needed if all the retiring coal units were replaced by wind

- EPA projects that 38,000 MW of coal capacity will retire by 2030 because of the Clean Power Plan (source: EPA's RIA). EPA also projects that 41,000 MW of non-hydro renewables, such as wind, will be added by 2030 because of the Clean Power Plan (source: EPA's RIA).
- Because of the intermittent nature of wind, less than 20% of its capacity is counted for reliability planning, while over 90% of the capacity of coal generation is counted (source: NERC). Thus, every MW of retired coal capacity would require at least 4.5 MW of wind to replace it, meaning that 38,000 MW of retired coal would require 171,000 MW of replacement wind because of reliability considerations.
- The Grande Prairie wind farm being constructed in Nebraska — and recently purchased by Berkshire Hathaway — has a capacity of 400 MW and spans an area of “over 50,000 acres,” or 125 acres per MW (source: geronimoenergy.com).
- 171,000 MW of wind would require more than 21 million acres, or almost 34,000 square miles. This amount of land would be equivalent to 494 Districts of Columbia, or 16 million football fields, or it would cover almost the entire State of Indiana (35,870 square miles).

FACT OF THE WEEK 4:

A land area the size of 800,000 football fields would be needed if all the retiring coal units were replaced by solar

- EPA projects that 38,000 MW of coal-fired electric generating capacity will retire because of the Clean Power Plan (*source: EPA*). EPA also projects that 41,000 MW of non-hydro renewables, such as solar, will be added because of the Clean Power Plan (*source: EPA*). Currently, the U.S. has a total of 94 GW of non-hydro electric generating capacity (*source: EIA*).
- Because the sun doesn't always shine, approximately 25% of solar electric generating capacity is counted for reliability planning, while over 90% of the capacity of coal-fired generation is counted (*source: NERC*). Thus, each MW of retired coal capacity would require at least 3.5 MW of replacement solar. Consequently, 38,000 MW of retired coal capacity would require 133,000 MW of replacement solar because of reliability considerations.
- 133,000 MW of utility-scale solar would cover 1,064,000 acres — or 800,000 football fields (*NREL estimates 8 acres/MW for utility-scale photovoltaic solar*).

FACT OF THE WEEK 5:

EPA manipulated assumptions about future CO₂ emissions in order to lower compliance costs

- EPA projects that the final CPP will cost approximately \$3 billion to \$4 billion per year, whereas EPA projected that the proposed CPP would cost twice as much, \$7 billion per year.
- However, EPA's analysis of the final rule is based on new assumptions that lowered future CO₂ emissions *without* the CPP. Under these new assumptions, the CPP has to reduce *less* CO₂ in the future to achieve a 32% reduction by 2030; accordingly, the economic impacts of the final CPP are *lower*. In fact, the final CPP now has to reduce CO₂ emissions by roughly 3.6 billion tons *less* under EPA's new assumptions over the period 2016 – 2030 than it did under the old assumptions.
- Table 1 below compares future electric sector CO₂ emissions that EPA projected in 2014 (“EPA 2014”) with future emissions that EPA is now projecting one year later (“EPA 2015”). Both show EPA's version of future CO₂ emissions *without* the CPP.

TABLE 1: EPA's CO₂ Projections in 2014 vs. EPA's Projections in 2015

	2016	2020	2025	2030
“EPA 2014”	2,285 M tons	2,377 M tons	2,454 M tons	2,482 M tons
“EPA 2015”	2,102 M tons	2,151 M tons	2,160 M tons	2,223 M tons
Difference between old and new projection	183 M tons less, or 8% less CO₂ in the new projection	226 M tons less, or 10% less CO₂ in the new projection	294 M tons less, or 12% less CO₂ in the new projection	259 M tons less, or 12% less CO₂ in the new projection

- *How did EPA come up with these lower projections for future CO₂ emissions?* Compared to last year's assumptions, EPA now assumes that (1) more coal plants will retire early, (2) less electricity will be generated with coal, (3) more electricity will be generated with natural gas, (4) more electricity will be generated with renewables, and (4) consumers will use less electricity. All these assumptions cause future CO₂ emissions to be lower than EPA projected last year (Table 1 above).
- Table 2 below compares a few of EPA's new assumptions with EIA's recent projections for the year 2020. This is an apples-to-apples comparison because both are future projections without the Clean Power Plan.

TABLE 2: Projections for 2020 without the Clean Power Plan

	“EPA 2015”	“EIA 2015”	COMPARED TO EIA, EPA PROJECTS THE FOLLOWING
CO ₂	2,151 M tons	2,318 M tons	7% lower CO ₂ emissions
Coal Capacity	208,000 MW	260,000 MW	52,000 MW more retirements
Coal	1,448 TWh	1,709 TWh	15% less coal-fired generation
Natural Gas	1,209 TWh	1,135 TWh	7% more gas-fired generation
Renewables	716 TWh	679 TWh	5% more renewable generation
Total Electricity Generated	4,190 TWh	4,350 TWh	4% lower overall electricity consumption

FACT OF THE WEEK 6:

The benefits of the CPP are at least 95% less than EPA claims

“Benefits” of the Clean Power Plan

Executive Order 12866 requires agencies to “assess both the costs and the benefits” of major regulations and adopt regulations “only upon a reasoned determination that the benefits of the intended regulation justify its costs.” Not surprisingly, EPA concluded that the benefits of the Clean Power Plan exceed its costs because of (1) a presumed reduction in climate change impacts and (2) health co-benefits from reducing conventional air pollutants, especially fine particulate matter (“fine particles” or “PM_{2.5}”) and ozone. By 2030, EPA claims that the benefits of the Clean Power Plan exceed its costs by almost \$43 billion (Table 2 below). However, some 60% of the benefits EPA claims in 2030 for the Clean Power Plan are based on reducing conventional air pollutants, not on reducing potential climate change impacts.

EPA’s approach to calculating the benefits of its rules has been the subject of extensive criticism.¹ The purpose of this paper is to illustrate what happens to the benefits of the Clean Power Plan when only two of these criticisms are taken into account.

Social Cost of Carbon

The climate change effects resulting from the Clean Power Plan are meaningless. For example, the Clean Power Plan will reduce global sea level rise by the thickness of two sheets of paper.² In 2012, EPA stopped projecting changes in atmospheric CO₂ concentrations, temperature, and sea level rise because the changes were so tiny. Instead, EPA now uses a theoretical “social cost of carbon” to project climate change benefits.³

Co-Benefits

EPA often estimates not only the benefits of reducing the specific pollutant targeted by a regulation, but also the benefits of accidental reductions in other emissions that result from the regulation (“co-benefits”). One criticism of EPA’s regulatory impact analyses is that EPA often includes large PM_{2.5} co-benefits to justify rules that are not intended to reduce PM_{2.5}. For example, between 1997 and 2011, EPA pointed to PM_{2.5} co-benefits to support 21 of 26 major air rulemakings.⁴

Adjusted Benefits

When only two adjustments are made to the social cost of carbon and to EPA’s co-benefits, the estimated benefits of the Clean Power Plan are reduced by at least 95%. The tables on the next page illustrate that the costs of the Clean Power Plan are at least six to 13 times greater than its benefits. In 2020, the Clean Power Plan costs \$2.5 billion (according to EPA) but provides less than \$200 million in benefits. In 2030, the Clean Power Plan costs \$8.4 billion (according to EPA) but provides only \$1.4 billion in benefits. For illustrative purposes, we assume that the social cost of carbon is valid, provided it is adjusted to reflect U.S.-only benefits.

FACT OF THE WEEK 6:

The benefits of the CPP are at least 95% less than EPA claims

TABLE 1: 2020

EPA's compliance costs are \$2.5 billion in 2020 ⁵	EPA	Adjusted
Climate benefits ⁶	\$2.8 billion	\$196 million
Co-benefits ⁷	\$1.7 billion	zero
TOTAL BENEFITS⁸	\$4.5 BILLION	\$196 MILLION

TABLE 2: 2030

EPA's compliance costs are \$8.4 billion in 2030	EPA	Adjusted
Climate benefits	\$20 billion	\$1.4 billion
Co-benefits	\$31 billion	zero
TOTAL BENEFITS	\$51 BILLION	\$1.4 BILLION

FACT OF THE WEEK 7:

U.S. GDP would be reduced by \$430 trillion to meet international climate change goals

- EPA says that its Clean Power Plan is a necessary part of global action to reduce greenhouse gas (GHG) emissions.⁹ The bullets below and the attached slides show how such “global action” would affect U.S. economic growth.
- By way of background, gross domestic product (GDP) is commonly used as an indicator of the economic health of a country, as well a way to gauge a country’s standard of living. U.S. GDP last year was slightly more than \$17 trillion, making the U.S one of the wealthiest countries in the world.¹⁰
- Last summer, EPA released “*Climate Change in the United States, Benefits of Global Action.*”¹¹ The report claims benefits to the U.S. of a worldwide 92% reduction in GHG emissions below projected 2100 levels.¹² According to climate models, this reduction approaches what would be necessary to limit global average temperature increase to 2°C above preindustrial levels, a goal that has been agreed to in international negotiations.¹³
- This massive reduction means that total worldwide GHG emissions would have to be reduced to approximately 11 billion tonnes by 2100.¹⁴ For comparison, China and India by themselves emit 12 billion tonnes of CO₂ today and are projected to emit 15 billion tonnes by 2030.¹⁵
- This worldwide reduction also means the U.S. would have to cut its CO₂ emissions to 1907 levels – during Teddy Roosevelt’s presidency – when U.S. GDP was less than \$1 billion, an insignificant fraction of U.S. GDP today.¹⁶
- The EPA report does not provide any estimate of the compliance costs necessary to achieve this worldwide emissions reduction. However, an MIT analysis¹⁷ that provides backup for the EPA report projects that U.S. GDP would be reduced by an average of 9.1% per year, or \$5 trillion per year, over the period 2015-2100. GDP losses for the U.S. over the entire period would total almost \$430 trillion – equivalent to completely wiping out 25 years’ worth of U.S. GDP.¹⁷

FACT OF THE WEEK 8:

Consumers will pay more than \$800 billion to reduce electricity use because of the Clean Power Plan

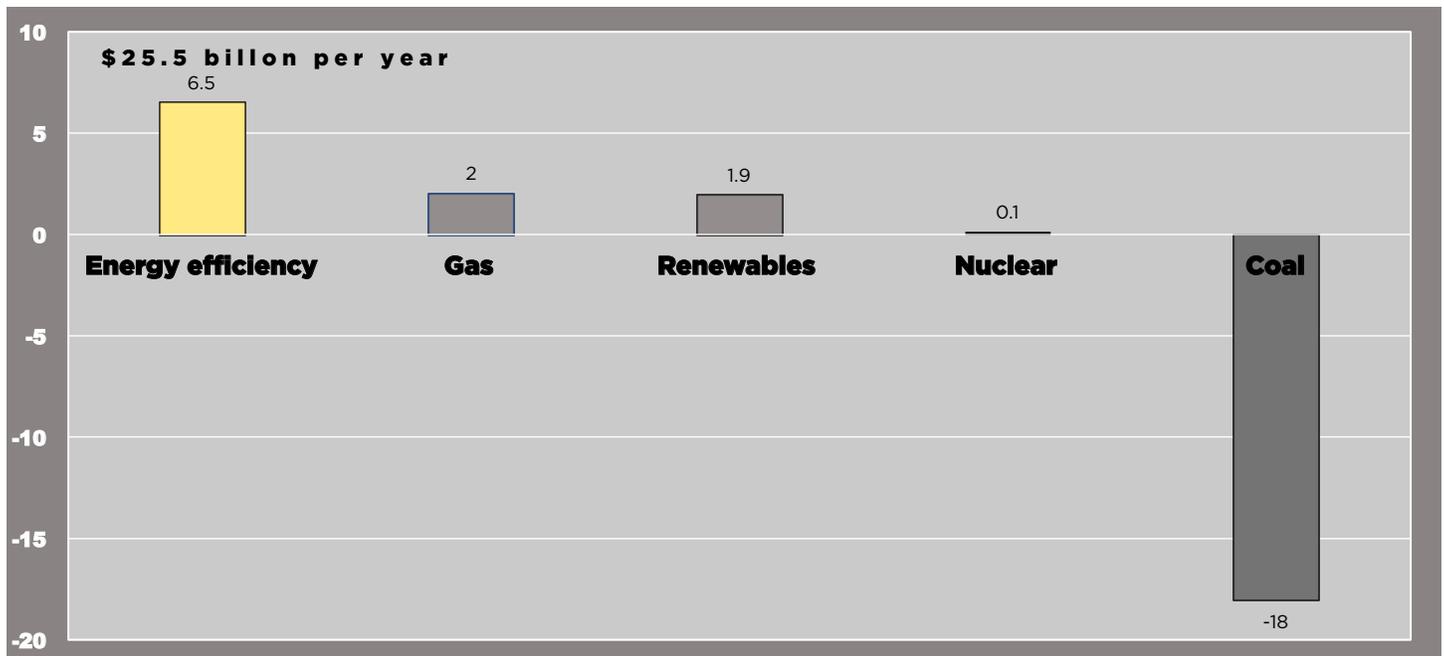
According to EPA's analysis, what energy source is the biggest winner under the Clean Power Plan?

The biggest winner is NOT wind, solar, natural gas, or nuclear power. The biggest winner is “energy efficiency” (EE) ... which means that consumers pay for ways to reduce their electricity use. EPA projects that consumers will spend more than \$25 billion per year — for a total of \$806 billion — to use less electricity because of the Clean Power Plan. (Source: EPA's Regulatory Impact Analysis for the final CPP)

Electricity Sources Under The Clean Power Plan

- EPA projects that consumers will spend more than \$25 billion per year to reduce electricity use because of the Clean Power Plan. According to EPA data, the cost to reduce electricity use will total \$806 billion by 2050.
- Both NERA and EPA project that consumers will spend \$300 billion to reduce electricity use during only the first 12 years of the Clean Power Plan.
- At the same time consumers spend more than \$25 billion per year to reduce electricity use, EPA projects that —
 - Renewables increase slightly,
 - Nuclear power does not increase at all,
 - Natural gas use increases slightly, and
 - Coal use is reduced considerably.

The ACCCE chart below uses EPA data to show (1) the % reduction in overall electricity generation due to energy efficiency (striped bar) and (2) the % increase in electricity generation from natural gas, renewables, and nuclear (which does not increase at all) during 2025 - 2030. During the same period, electricity generation from coal is reduced by 18%.



FACT OF THE WEEK 9:

EPA's projections about coal retirements are not even close to what has happened in the real world

Epa's Projection in 2011

EPA projected that the Cross State Air Pollution Rule (CSAPR) and the Mercury and Air Toxics Standards (MATS) rule would cause a total of 9,500 MW of coal to retire by 2015 – 4,800 MW due to CSAPR and 4,700 MW due to MATS. EPA's projection made the impacts of CSAPR and MATS appear smaller.

Reality

50,000 MW of coal capacity will have retired, due mostly to MATS, by the end of this year. In this instance, EPA underestimated retirements for 2015 by more than 40,000 MW.

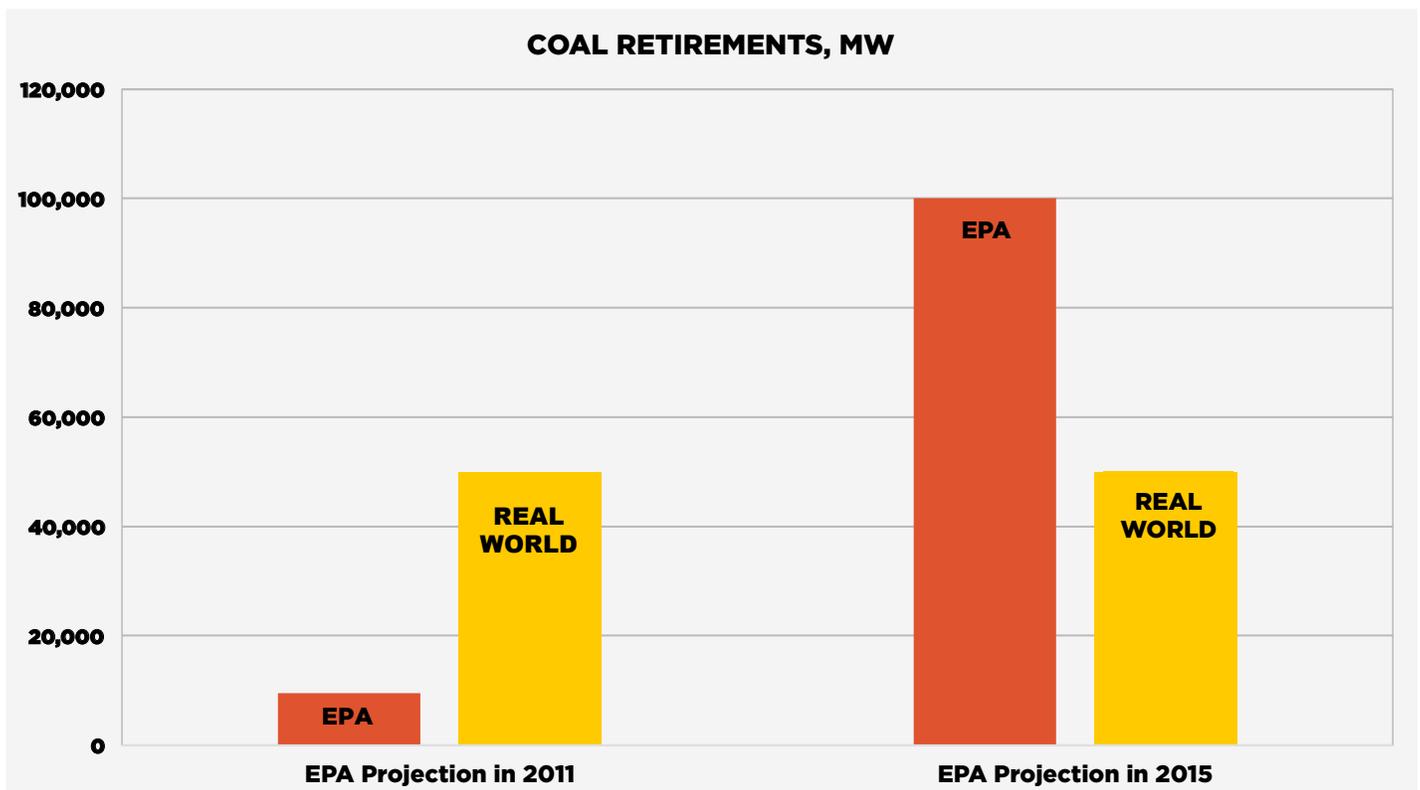
EPA's Projection in 2015

For its analysis of the Clean Power Plan four years later, EPA assumed that 100,000 MW of coal will retire by the end of 2015. This makes the impacts of the Clean Power Plan look smaller by projecting a large number of coal retirements before the Clean Power Plan takes effect in 2022, rather than showing the large number of retirements that will actually be caused by the Clean Power Plan.

Reality

50,000 MW of coal capacity will have retired by the end of this year. In this instance, EPA overestimated retirements for 2015 by 50,000 MW.

TABLE 1: EPA'S projections for coal retirements in 2015 versus the real world in 2015



FACT OF THE WEEK 10:

Who's suing EPA over the Clean Power Plan

Quotable Quotes (continued)

Stay motion filed by utilities, rural electric cooperatives, and labor:

- “EPA asserts that a mere five words in a rarely used provision of the Clean Air Act ... give it unprecedented authority to require States to restructure the nation’s energy industry.” (p. 1)
- “Our constitutional structure... requires an agency to have clear statutory authority from Congress before it adopts a sweeping regulation imposing billions in costs.” (p. 2)

Stay motion filed by the U.S. Chamber of Commerce and 15 other trade organizations:

- “The Rule ... sweeps virtually all aspects of electricity production within EPA’s control.” (p. 1)
- “The Executive Branch may be frustrated that Congress rebuffed attempts to enact laws authorizing ... cap and trade ... but EPA cannot circumvent the political process by legislating through regulation.” (p. 7)
- “A stay is warranted because these fundamental changes will cause ... immediate, irreparable harm. According to Secretary Kerry, the Rule’s purpose is to ‘take a bunch of [coal-fired power plants] out of commission.’” (p. 17)
- “The government acknowledges that ‘even if the United States were to reduce its greenhouse gas emissions to zero, that step would be far from enough to avoid substantial climate change.’” (p. 19)

Stay motion filed by the National Mining Association and ACCCE:

- “EPA would thus transform itself from its Congressionally-created role as an air quality regulator to the nation’s electricity czar.” (p. 10)
- “Using EPA’s theory of how sensitive the climate is to atmospheric CO₂ concentrations, the rule will reduce global temperatures by a mere 0.016°C by 2050 and lower sea level rise by the width of three sheets of paper.” (p. 20)

FACT OF THE WEEK 11: Litigation Over the Clean Power Plan

So far, 27 states have sued EPA in opposition to the Clean Power Plan:

Alabama, Arkansas, Arizona, Colorado, Florida, Georgia, Indiana, Kansas, Kentucky, Louisiana, Michigan, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Jersey, Ohio, Oklahoma, South Carolina, South Dakota, Texas, Utah, Wisconsin, West Virginia, and Wyoming.

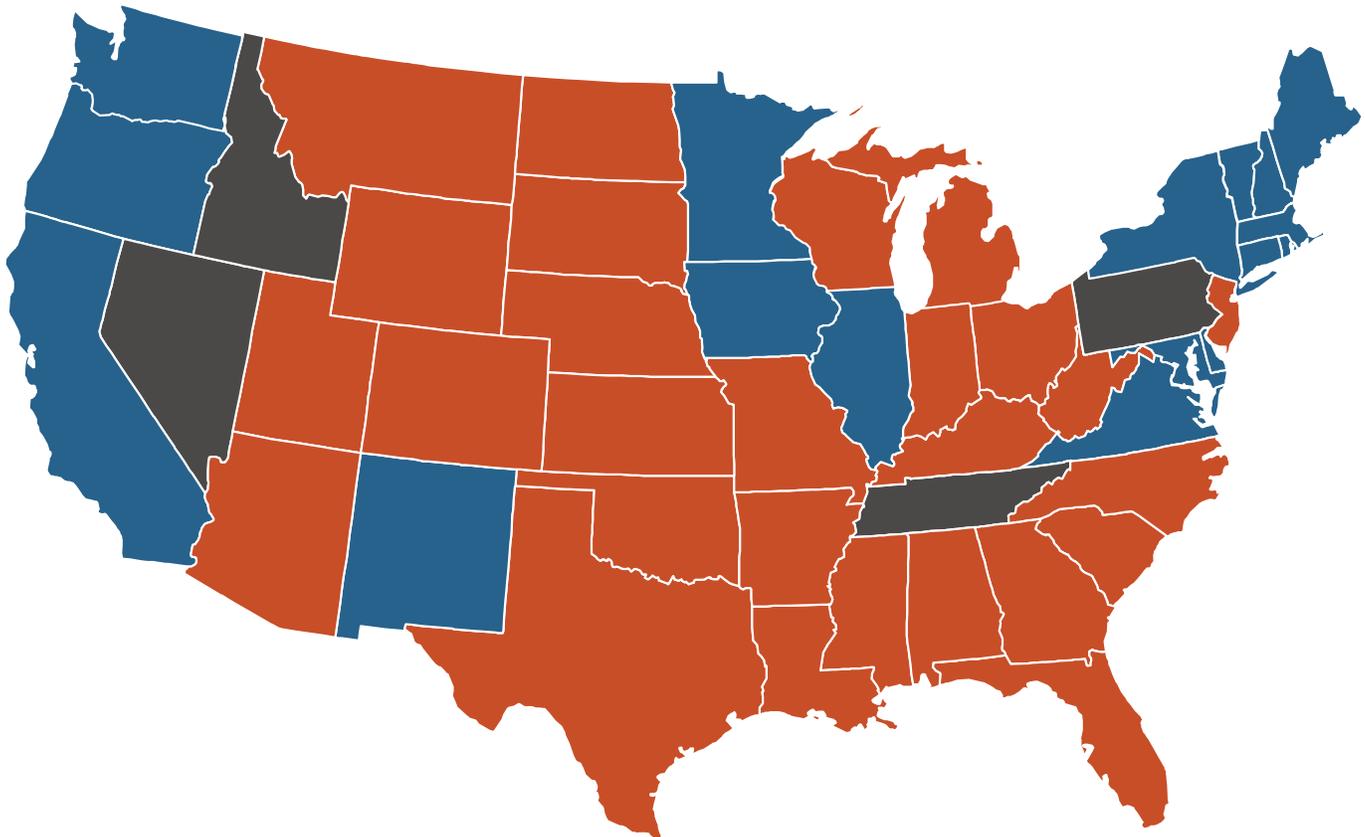
NERA projects that the peak year electricity price increase for these 27 states ranges from as much as 13% (South Carolina) to as much as 62% (North Dakota) because of the Clean Power Plan. Collectively, the average for all 27 states is 31%.

Eighteen (18) states have intervened on behalf of EPA in support of the Clean Power Plan:

California, Connecticut, Delaware, Hawaii, Iowa, Illinois, Massachusetts, Maryland, Maine, Minnesota, New Hampshire, New Mexico, New York, Oregon, Rhode Island, Virginia, Vermont, and Washington.

NERA projects that the collective average peak year electricity price increase for these 18 states is as much as 14% because of the Clean Power Plan. However, most of the northeastern states and California have increases ranging from 3% to 7%.

FIGURE 1: The 27 states in orange have sued EPA in opposition to the Clean Power Plan. The eighteen states in blue, including Hawaii, have intervened in support of EPA. Five states (in gray), including Alaska, have not taken any legal action.



FACT OF THE WEEK 12:

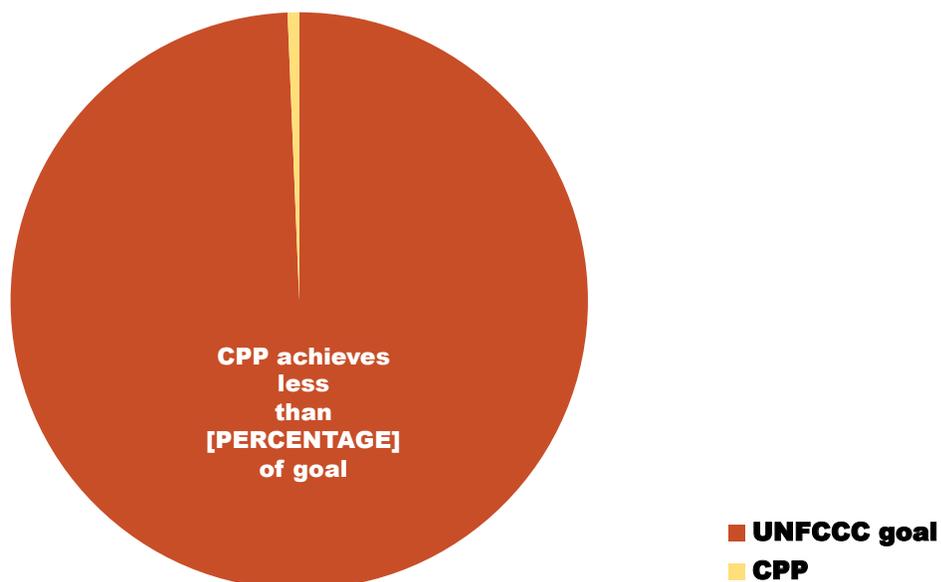
Six Facts to Put the Clean Power Plan and COP-21 (Paris) into Perspective

1. The Clean Power Plan is projected to cost at least **\$29 billion per year** and cause double digit electricity price increases in **41 states**.²⁰
2. Despite its cost, the Clean Power Plan will reduce atmospheric CO₂ concentrations by a meaningless **0.2%**, temperature by **0.006° C**, and sea level rise by **two sheets of paper** or **two human hairs**.²¹
3. U.S. GDP could be reduced by **\$430 trillion** over the remainder of this century to achieve the international goal of limiting global temperature increase to 2° C. Also, the U.S. would have to reduce its CO₂ emissions to levels emitted over 100 years ago when **Teddy Roosevelt** was President.²²
4. Even with COP-21/Paris commitments (“intended nationally determined contributions”) by the U.S. and other countries, global CO₂ emissions will **increase** by 13% (by 7.1 billion tonnes) by 2025 and by 17% (by 8.6 billion tonnes) by 2030 from today’s levels.²³
5. The emissions increase from other countries by 2025 cancels out **30 years’** worth of emission reductions from the Clean Power Plan.²⁴
6. The Clean Power Plan is responsible for more than **10%** of global emission reductions by 2030, even though the U.S. power sector is responsible for only **4%** of global emissions.²⁵

FACT OF THE WEEK 13: Meaningless Temperature Changes

- The U.S. and other countries have signed the U.N. Framework Convention on Climate Change (UNFCCC), which has a goal of limiting global average temperature increase to 2° Celsius (C) above pre-industrial levels. Since 1995, parties to the UNFCCC have been meeting on an annual basis at Conferences of the Parties (COPs). The upcoming Paris meeting is COP21. Currently, there are 147 parties to the UNFCCC. As of October 1, parties had submitted 119 “intended nationally determined contributions” (INDCs) that outline the climate actions each country plans to take under a new international agreement. The Clean Power Plan is part of the U.S. INDC.
- ACCCE and others have analyzed the climate effects that would result from the Clean Power Plan; all analyses show meaningless changes in global temperature, especially in relation to the 2° C UNFCCC goal.
- Recently, Dr. Bjorn Lomborg, Director of the Copenhagen Consensus Center, published an evaluation of the temperature impact of not only the Clean Power Plan, but also the temperature impact of all INDCs that had been submitted for COP21 (“Impact of Current Climate Proposals,” Global Policy (2015)). Dr. Lomborg used MAGICC, a climate model that has been used by EPA, MIT, and others. Dr. Lomborg projects that the Clean Power Plan will reduce global temperature rise by, at most, 0.013° C (approximately 1/80th of a degree) by 2100 (see Chart 1), and that all INDCs together will reduce global temperature rise by, at most, 0.17°C (about 1/6th of a degree) by 2100 (see Chart 2).
- Dr. Lomborg is also a visiting professor at Copenhagen Business School and has written numerous books. He was named one of TIME magazine’s 100 most influential people in the world.

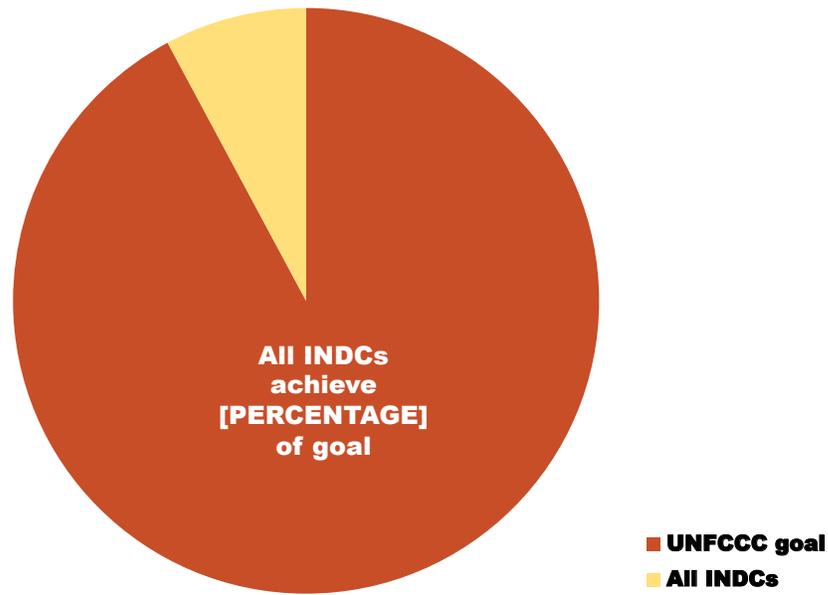
CHART 1: The Clean Power Plan is projected to reduce global temperature increase by 0.013° C (about 1/80th of a degree) by 2100. The pie chart below represents the UNFCCC goal of 2° C. Despite its cost of almost \$300 billion, the Clean Power Plan’s contribution to achieving the UNFCCC goal is meaningless.



Based on modeling results reported in “Impact of Current Climate Proposals,” Bjorn Lomborg, Copenhagen Consensus Center

FACT OF THE WEEK 13: Meaningless Temperature Changes

CHART 2: The pie chart below represents the UNFCCC goal of 2° C. All the commitments countries have made for COP21 are projected to reduce global temperature increase by 0.17° C (about 1/6th of a degree). This very small temperature reduction will achieve less than 1/10th of the UNFCCC goal.



Based on modeling results reported in "Impact of Current Climate Change Proposals," Bjorn Lomborg, Copenhagen Consensus Center

Endnotes

- ¹ See, for example, the comments of the U.S. Chamber of Commerce, the American Chemistry Council, the American Coalition for Clean Coal Electricity, and 17 other trade associations on the Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order No. 12866; Docket ID OMB-OMB-2013-0007 (February 26, 2014); Prepared Statement of Susan E. Dudley, Director, GW Regulatory Studies Center, Research Professor, Trachtenberg School of Public Policy and Public Administration, The George Washington University, Hearing on Mercury Pollution's Impact to Public Health and the Environment before the Committee on Environment and Public Works, Subcommittee on Clean Air and Nuclear Safety, United States Senate, April 17, 2012. See also the source in endnote 4.
- ² ACCCE, "Climate Effects" of EPA's Final Clean Power Plan, August 2015.
- ³ *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866*, Interagency Working Group on Social Cost of Carbon, United States Government, May 2013, Revised November 2013; as well as *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866*, Interagency Working Group on Social Cost of Carbon, United States Government, May 2013, Revised July 2015.
- ⁴ *An Evaluation of the PM2.5 Health Benefits Estimates in Regulatory Impact Analyses for Recent Air Regulations*, Anne Smith, Ph. D., NERA, December 2011.
- ⁵ *RIA*, page ES-9. We did not include 2025 because the cost for the rate-based program in that year (\$1.0 billion) appears anomalously low.
- ⁶ *RIA*, page ES-20. We used the 3% discount rate because it is the central value reported by the Interagency Working Group on the Social Cost of Carbon (2010, updated 2014 and 2015). These are global benefits; that is, benefits to all 196 countries in the world.
- ⁷ *Ibid.* We used the 7% discount rate.
- ⁸ *Ibid.*
- ⁹ EPA, *Clean Power Plan for Existing Power Plants*, <http://www2.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants>, stating "[the Clean Power Plan] also shows the world that the United States is committed to leading global efforts to address climate change."
- ¹⁰ The World Bank, Data, GDP (current U.S. \$); U.S. Department of Commerce, Bureau of Economic Analysis, *U.S. Economy at a Glance*.
- ¹¹ EPA, *Climate Change in the United States: Benefits of Global Acts*, June 22, 2015, hereafter, "EPA report."
- ¹² *Ibid.*, Figure 1a, page 11.
- ¹³ The EPA report states on page 10 that the emissions scenarios used are based on Paltsev, et. al., 2013 ("Integrated Economic and Climate Projections for Impact Assessment," *Climactic Change*, DOI 10.1007/s10584-013-0892-3, October 8, October 2013). The supplementary material available online includes spreadsheets with projections of population, GDP, and emissions for both a "Reference" and a "Mitigation" scenario. U.N. Framework Convention on Climate Change, Conference of the Parties, *Report of the Conference of the Parties on its fifteenth session, held in Copenhagen from 7 to 19 December 2009. Addendum. Part Two: Action taken by the Conference of the Parties at its fifteenth session (2009)*.
- ¹⁴ EPA report, Figure 1a, page 11.
- ¹⁵ Borden, T.A., G. Marland, and R.J. Andres, 2015 Global, Regional, and National Fossil-Fuel CO₂ Emissions, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, DOI10.3334/CDIAC/0001_v2010; U.S. EIA, *International Energy Outlook*, April 2013; China 2030 modified to reflect 2009 and 2014 pledges using projections from *Climate Action Tracker, China* (December 2014).
- ¹⁶ Paltsev, et.al. supplementary material shows U.S. CO₂ emissions at 1.262 billion tonnes in 2100 in the "Mitigation" scenario. Oak Ridge National Laboratory's Carbon Dioxide Information Analysis Center publishes U.S. CO₂ emissions from fossil fuel burning since the year 1800 and states that U.S. CO₂ emissions in the year 1907 were 1.2 billion tonnes (Borden, et. al.). Louis Johnston and Samuel H. Williamson, "What Was the U.S. GDP Then?" Measuring Worth, 2015, <http://www.measuringworth.org/usgdp/>.
- ¹⁷ Paltsev, et. al. (2013).
- ¹⁸ The MIT analysis assumes that GHG reductions would be achieved through a global carbon tax with revenues recycled within each region of the world. The paper does not explain how the revenues would be recycled.
- ²⁰ Impacts are based on NERA's analysis of the final Clean Power Plan. Annual costs range from \$29 billion to \$39 billion for four cap-and-trade scenarios NERA modeled.
- ²¹ ACCCE analysis, "Climate Effects of EPA's Final Clean Power Plan," August 5, 2015. The ACCCE analysis relied exclusively on EPA data to estimate climate effects, which are consistent with the results of analysis by others such as the CATO Institute.

Endnotes (continued)

- ²² GDP impacts are based on MIT Joint Program on the Science and Policy of Global Change Report No. 243, "Integrated Economic and Climate Projections for Impact Assessment," May 2013. The MIT report was partially funded by EPA. The report assumed that countries adopt a carbon tax that would reduce emissions to a level that approximates the level necessary to limit global average temperature increase to 2 degrees Celsius. In the underlying analysis for the MIT report, U.S. GDP was reduced by an average of 9.1% annually (\$5 trillion per year) through 2100. The MIT report was also the subject of Fact of the Week #7.
- ²³ United Nations Framework Convention on Climate Change, COP-21, "Synthesis Report on the Aggregate Effect of the Intended Nationally Determined Contributions," October 30, 2015. Global emissions are estimated to be 48.1 billion tonnes in 2010 (page 40). Even with INDCs, global emissions are projected to grow to 55.2 billion tonnes (an increase of 7.1 billion tonnes) in 2025 and 56.7 billion tonnes (an increase of 8.6 billion tonnes) in 2030 (page 9).
- ²⁴ COP-21 Synthesis Report (above). According to EPA's RIA, the Clean Power Plan reduces CO2 emissions by 240 million tonnes in 2025. An increase of 7.1 billion tonnes in 2025 (see above) is equal to 29.6 years of emission reductions (240 million tonnes in 2025) from the Clean Power Plan.
- ²⁵ According to EPA's RIA, the Clean Power Plan reduces emissions by 375 million tonnes in 2030, and global emissions are reduced by 3.6 billion tonnes in 2030 according to the COP-21 Synthesis Report (pages 10 and 43). Therefore, the U.S. power sector is responsible for more than 10% of global reductions in 2030. In 2014, the U.S. power sector emitted 2 billion tonnes of CO2 and global emissions were approximately 50 billion tonnes. Therefore, the U.S. power sector is responsible for approximately 4% of global emissions.