

CLIMATE EFFECTS OF EPA'S PROPOSED CARBON REGULATIONS

On June 2, 2014, EPA proposed a program to regulate carbon dioxide (CO₂) emissions from U.S. fossil fuel-fired power plants.¹ EPA estimated that its proposal would cost between \$7.3 billion and \$8.8 billion in 2030, but did not project the effects of its proposed rule on climate change, *even though the express purpose of the rule is to address the effects of climate change.*² Therefore, this paper assesses the climate effects that would result from the proposal. We assess the same three climate effects that EPA analyzed in a previous rulemaking: atmospheric CO₂ concentrations, temperature changes, and changes in sea level.

SUMMARY

Our assessment, which is based on EPA's analysis for another rulemaking, shows that future climate effects are negligible under EPA's proposal:

- **Atmospheric CO₂ concentrations** would be reduced by 1.52 ppm, or less than 1 percent, in 2050. For perspective, the Intergovernmental Panel on Climate Change (IPCC) projects concentrations of 450 to 600 ppm in 2050.
- **Global average temperature** increase would be reduced by 0.016 degree Fahrenheit in 2050. The IPCC projects an increase of 1.8 to 3.6 degrees Fahrenheit in 2050.
- **Sea level rise** would be reduced by 0.3 millimeters (the thickness of three sheets of paper), or 1/100th of an inch. The IPCC projects a sea level rise of 5.9 to 11.8 inches in 2050.

METHODOLOGY

In 2012, EPA assessed the climate impacts of its proposed greenhouse gas (GHG) emission standards for its light-duty vehicle rule. EPA's Regulatory Impact Assessment (RIA) for that rule includes annual projections of GHG emission reductions resulting from the standards and estimates the effect of those emission reductions on global average CO₂ concentrations, global average

temperature, and sea level rise (“climate effects”).³ According to EPA’s analysis, the cumulative CO₂-equivalent⁴ (CO₂-eq) reductions for its light-duty standards total 10.61 billion metric tons (tonnes) over the period 2017 to 2050. For 2050, the RIA projects that the EPA standards will reduce the IPCC’s projected atmospheric CO₂ concentration by 1 part per million (ppm), reduce projected global mean temperature by a maximum of 0.006 degree Celsius (°C), and reduce global mean sea level rise by as much as 0.02 centimeter (cm). EPA acknowledged in its RIA that “... modeling results of the impacts of this [light-duty vehicle] rule alone show small differences in climate effects.”⁵

STEP 1 (CUMULATIVE REDUCTIONS) In 2013, CO₂ emissions from the U.S. coal fleet totaled 1.575 billion tonnes. This total represents approximately 3 percent of global greenhouse gas (GHG) emissions (approximately 49 billion tonnes).⁶ In 2013, CO₂ emissions from the U.S. electric sector totaled 2.05 billion tonnes, or approximately 4 percent of global GHG emissions.⁷ We use the Energy Information Administration’s projected CO₂ emissions⁸ to calculate cumulative CO₂ reductions through 2050 from the U.S. electric sector under EPA’s proposed rule. EPA’s proposed CO₂ emission program for fossil fuel-fired power plants includes two options for state target-level emission rates, and models two options for compliance, one based on each state achieving its goals, and one based on regional trading. We use the “Option 1 State” scenario because it provides the largest emission reductions, and therefore maximum potential climate effects. EPA’s RIA provides projected electric sector CO₂ emissions in 2020, 2025, and 2030.⁹ We extrapolate linearly between the 2020, 2025, and 2030 reported emissions and assume that electric sector emissions are capped at 2030 levels through 2050. This methodology produces a cumulative reduction of 16.12 billion tonnes of CO₂ from the electric sector over the period 2016 to 2050.

STEP 2 (CLIMATE RATIO) We calculate the ratio of cumulative reductions from the U.S. electric sector under the EPA proposal to cumulative reductions from EPA’s light-duty vehicle rule. The climate ratio is 1.52 (16.12 billion tonnes reduced from the electric sector/10.61 billion tonnes reduced from light duty vehicles).

STEP 3 (CLIMATE EFFECTS) We assume EPA’s climate effects modeling is accurate and calculate climate effects as the product of the climate ratio and the climate effects from EPA’s light-duty vehicle rule. For example, atmospheric CO₂ concentrations under EPA’s proposal are calculated as 1.52 multiplied by a reduction in CO₂ of 1 ppm from EPA’s light-duty vehicle rule. Therefore, the atmospheric CO₂ concentration would be reduced by, at most, 1.52 ppm by 2050 under EPA’s proposal. Applying the ratio (1.52) to the change in atmospheric CO₂ concentration, change in average global temperature, and change in sea level rise that EPA projected for its light-duty vehicle rule, we estimate the following climate effects for 2050 resulting from EPA’s proposal:

- Global atmospheric CO₂ concentration would be reduced by, at most, only 1.52 ppm, or about three-tenths of one percent (0.03 percent) in 2050. The current atmospheric CO₂ concentration is approximately 400 ppm, and the IPCC projects CO₂ concentrations to be 450 ppm to 600 ppm by 2050.¹⁰
- Global average temperature would be reduced by, at most, 0.009°C (0.016°F). For perspective, the IPCC projects a global temperature increase of 1.0° C to 2.0° C (1.8° F to 3.6° F) in 2050.¹¹
- Sea level rise would be reduced, at most, by 0.3 millimeters (approximately 1/100th of an inch). This is the thickness of three sheets of printer paper or three one dollar bills.

CAVEAT Our use of EPA’s analysis to estimate climate effects does not imply an endorsement of its assumptions or conclusions.

June 2, 2014

¹ U.S. EPA, *Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, June 2, 2014.

² U.S. EPA, *Regulatory Impact Analysis for the Proposed Carbon Pollution Guidelines for Existing Power Plants and Emission Standards for Modified and Reconstructed Power Plants*, June 2014, pages ES-7 and 4-2.

³ U.S. EPA, *Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, August 2012.

⁴ CO₂-equivalent (CO₂-eq) represents the climate impact of non-CO₂ greenhouse gases converted to CO₂-equivalent emissions using their relative global warming potential (GWP).

⁵ U.S. EPA, *Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, August 2012, page 6-115.

⁶ IPCC, *Climate Change 2014: Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*; EIA, *Monthly Energy Review*, February 2014.

⁷ *Ibid.*

⁸ U.S. EIA, *Annual Energy Outlook 2014*, reference case.

⁹ U.S. EPA, *Regulatory Impact Analysis for the Proposed Carbon Pollution Guidelines for Existing Power Plants and Emission Standards for Modified and Reconstructed Power Plants*, June 2014, page 3-20.

¹⁰ National Oceanic and Atmospheric Administration, Earth System Research Laboratory, "Recent Monthly Average Mauna Loa CO₂." The concentration in April 2014 was 401.3 ppm CO₂. IPCC, *Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Chapter 1, page 148.

¹¹ IPCC, *Climate Change 2013: The Physical Science Basis: Working Group I Contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Chapter 12, pages 1054-1055.