REGULATORY IMPACT ANALYSIS FOR THE CARBON POLLUTION EMISSION GUIDELINES SUPPLEMENTAL PROPOSAL

1 Introduction

On June 18, 2014, the Environmental Protection Agency (EPA) proposed emission guidelines for states to follow in developing plans to address greenhouse gas (GHG) emissions from existing fossil fuel-fired electric generating units (EGUs). In this supplemental action, the EPA is proposing emission guidelines for areas of Indian country and U.S. territories with existing fossil fuel-fired EGUs. Specifically, the EPA is proposing rate-based goals for carbon dioxide (CO_2) emissions from areas of Indian country and U.S. territories with existing fossil fuel-fired EGUs, as well as guidelines for plans to achieve the goals. This rule, as proposed, would continue progress already underway to reduce CO_2 emissions from existing fossil fuel-fired power plants in the United States. This regulatory impact analysis (RIA) examines the potential costs and benefits of the proposed goals.

2 Legal and Economic Basis for this Rulemaking

2.1 Statutory Requirement

On January 8, 2014, the EPA proposed standards for CO_2 emissions from newly constructed fossil fuel-fired EGUs under section 111(b) of the Clean Air Act (CAA) (79 FR 1430).[1] When the EPA establishes section 111(b) standards of performance for newly constructed, modified, or reconstructed sources in a particular source category for a pollutant that is not regulated as a criteria pollutant or hazardous air pollutant, the EPA must establish requirements for existing sources in that source category for that pollutant under section 111(d). Under section 111(d), the EPA develops "emission guidelines" that the states must develop plans to meet. On June 18, 2014, the EPA proposed state-specific rate-based goals for CO_2 emissions from the power sector, as well as guidelines for states to follow in developing plans to achieve

[1] 79 FR 1430.

those state-specific goals under the authority of CAA section 111(d).[2] In that proposal, the EPA indicated that it intended to publish a supplemental proposal to establish emission performance goals for Indian country and U.S. territories with affected EGUs under section CAA section 111(d).

2.2 Market Failure

Many regulations are promulgated to correct market failures, which lead to a suboptimal allocation of resources within the free market. Air quality and pollution control regulations address "negative externalities" whereby the market does not internalize the full opportunity cost of production borne by society as public goods such as air quality are unpriced.

GHG emissions impose costs on society, such as negative health and welfare impacts that are not reflected in the market price of the goods produced through the polluting process. For this regulatory action the good produced is electricity. These social costs associated with the health and welfare impacts are referred to as negative externalities. If an electricity producer pollutes the atmosphere when it generates electricity, this cost will be borne not by the polluting firm but by society as a whole. The market price of electricity will fail to incorporate the full opportunity cost to society of generating electricity. All else equal, given this externality, the quantity of electricity generated in a free market will not be at the socially optimal level. More electricity will be produced than would occur if the power producers had to account for the full opportunity cost of production including the negative externality. Consequently, absent a regulation on emissions, the social cost of the last unit of electricity produced will exceed its social benefit.

[2] 79 FR 34830.

3 Background for the Proposed Emission Guidelines

3.1 Definition of Affected Sources[3]

This action proposes rate-based goals, and guidelines for plans to achieve the goals for areas of Indian country and U.S. territories with affected EGUs. The EPA is aware of three areas of Indian country with affected EGUs: lands of the Navajo Nation, lands of the Ute Tribe of the Uintah and Ouray Reservation and lands of the Fort Mojave Tribe. The EPA is aware of two U.S. territories with affected EGUs: Puerto Rico and Guam.

As in the June 2014 proposal, the EPA is proposing that an affected EGU be defined as any fossil fuel-fired EGU that was in operation or had commenced construction as of January 8, 2014, and is therefore an "existing source" for purposes of CAA section 111, and that in all other respects would meet the applicability criteria for coverage under the proposed GHG standards for new fossil fuel-fired EGUs. The January 8, 2014, proposed GHG standards for new EGUs generally define an affected EGU as any boiler, integrated gasification combined cycle (IGCC), or combustion turbine (in either simple cycle or combined cycle configuration) that (1) is capable of combusting at least 250 million British thermal units (Btu) per hour; (2) combusts fossil fuel for more than 10 percent of its total annual heat input (stationary combustion turbines have an additional criteria that they combust over 90 percent natural gas); (3) sells 219,000 megawatt-hour (MWh) per year or one-third of its potential electrical output to a utility distribution system, whichever is greater; and (4) was not in operation or under construction as of January 8, 2014.

3.2 Proposed Goals

The goals for each area are shown in Table 1. To set these area-specific CO_2 goals, the EPA analyzed the practical and affordable strategies that are already being used to lower carbon pollution from the power sector. These strategies reflect the "building blocks" applied in the June 2014 proposal, including:

[3] For general background information about the electric power sector, please see Chapter 2 of the RIA for the June 2014 proposal.

- improvements in fuel efficiency at carbon-intensive power plants
- programs that enhance the dispatch priority of, and spur private investments in, low emitting power sources
- programs that enhance the dispatch priority of, and spur private investments in, renewable power sources, and
- programs that help homes and businesses use electricity more efficiently.

Each of these goal approaches presented (Option 1 and Option 2) use the four building blocks described above at different levels of stringency. Option 1 involves greater deployment of the four building blocks but allows a longer timeframe to comply (2030) whereas Option 2 has lower deployment levels of the four building blocks over a shorter timeframe (2025). The EPA is co-proposing two alternatives for the application of building block 3 (renewable energy) for U.S. territories with affected EGUs. The first co-proposal alternative mirrors the proposed methodology from the June 2014 proposal for determining renewable energy (RE), which applies, for each jurisdiction, an annual growth factor to the area's baseline (that is, the year 2012) amount of RE. The EPA is also proposing this alternative for the application of building block 3 to areas of Indian country. Because each territory and area of Indian country has a baseline amount of RE equal to zero, the application of the growth factor (that is, multiplying the baseline amount of zero by the growth factor) results in each of those areas having an RE amount of zero for building block 3. Therefore, applying the methodology from the June 2014, proposal for building block 3 results in no additional emission reductions required, and, therefore, no change to the goals for these areas. This co-proposal is labeled "Approach A" in this analysis.

The second co-proposal alternative option for U.S. territories (labeled "Approach B" in this analysis) includes an adjustment to the proposed methodology, which results in a positive amount of RE for building block 3 for each territory. This adjustment is based on the EPA's view that there is in fact potential for renewable generation in each of the affected areas. With this adjustment, the EPA changed the amount of RE in 2017 to be 0.37 percent of the 2012 total

electricity generation, which is consistent with the lowest amount among the 50 states in 2012.[4] These goals are shown in Table 2.

In addition, in calculating each CO_2 emission rate goal, the EPA took into consideration the area's fuel mix and numerous other factors through the same goal-setting process as was used in the June 2014 proposal. Thus, each goal reflects the unique conditions for each area of Indian country or U.S. territory. More details about the strategies applied in the building blocks used to construct the goals can be found in the preamble.

Table 1. Proposed Goals for Areas of Indian Country and Territories – Approach A

		Option 1 – Approach A		Option 2 – Approach A	
	Area	**2020-2029 Interim Goal (lb/MWh)**	**2030 Goal (lb/MWh)**	**2020-2024 Interim Goal (lb/MWh)**	**2025 Goal (lb/MWh)**
Area of Indian Country	Navajo	1,991	1,989	2,035	2,034
	Ute	2,000	1,988	2,052	2,048
	Fort Mojave	856	855	857	857
Territory	Puerto Rico	1,470	1,413	1,542	1,521
	Guam	1,733	1,586	1,854	1,794

Table 2. Proposed Goals for Territories – Approach B

		Option 1 – Approach B		Option 2 – Approach B	
	Area	**2020-2029 Interim Goal (lb/MWh)**	**2030 Goal (lb/MWh)**	**2020-2024 Interim Goal (lb/MWh)**	**2025 Goal (lb/MWh)**
Territory	Puerto Rico	1,459	1,399	1,533	1,510
	Guam	1,708	1,556	1,831	1,768

[4] With 0.37 percent, Kentucky had the lowest percentage of renewable generation in 2012. See 79 FR 34868 and Table 4-1 in the "GHG Abatement Measures" TSD on page 4-6.

4 Impacts of the Proposed Goals

This proposal sets out area-specific rate-based goals but does not prescribe how each area should meet its goal. Each area will have the flexibility to design a program to meet its goal in a manner that reflects its particular circumstances and energy and environmental policy objectives. As in the RIA for the June 2014 proposal, the analysis of costs and benefits in this RIA is illustrative of one set of strategies an area may choose to implement in order to meet its goal. The actual actions taken by each area, and the resulting costs and benefits, may differ from what is presented here.

4.1 Emission Reductions, Costs, and Benefits of Goals for Areas of Indian Country

Units in areas of Indian country are expected to meet the proposed goals for Option 1 – Approach A and Option 2 – Approach A based on existing generation decisions, compliance with other regulations, or in response to market-forces induced by the June 2014 proposal. As a result, we do not expect additional emission reductions, costs, or benefits associated with this subset of options for these EGUs. In Navajo territory, units are expected to shut down in order to comply with requirements for Best Available Retrofit Technology (BART) prior to the target date for the goals proposed in this action.[5] These units represented approximately 30 percent of total EGU CO_2 emissions in Navajo territory in 2012. The EPA expects that the CO_2 reductions resulting from these shutdowns will be sufficient to meet the proposed goal for the Navajo territory without further action if the goal is converted to a mass-based goal.

There is one affected unit on Ute territory. This unit was not an affected unit in the June 2014 111(d) proposal, but had the option to implement a heat rate improvement in the system-wide electricity sector modeling conducted for that proposal using the Integrated Planning Model (IPM).[6] The modeling for the state and regional compliance scenarios of the proposed option predicted that this unit would adopt the optional heat rate improvement by 2020, which is equivalent to the goal proposed in this action, in response to market forces induced by the

[5] http://www.epa.gov/region9/air/navajo/

[6] See IPM results at: http://www.epa.gov/airmarkets/powersectormodeling/cleanpowerplan.html.

regulation as modeled in the system-wide electricity sector modeling. Therefore, the costs and benefits for emission reductions from this unit have already been accounted for even though the unit was not subject to the regulation in the June 2014 analysis.[7] For this unit and the units on Fort Mojave territory, costs associated with achieving reduced electricity demand levels of building block four as part of this supplemental proposal were previously accounted for in the June proposal within each state. At that time EPA did not separate out electricity demand and associated energy efficiency demand reduction potential from tribal lands from the states in which they are located. For the final rule, these will likely be treated separately.

4.2 Emission Reductions, Costs, and Benefits Goals for Territories

This section describes the estimated emission reductions, costs, and benefits associated with illustrative compliance scenarios of actions territories might take to implement the proposed goals. An electricity dispatch and capacity investment model for these territories comparable to IPM is not available for conducting this analysis. As described below, an engineering cost analysis was conducted for estimating the costs of the illustrative compliance strategies.

Another difference between this analysis and the analysis described in the June 2014 RIA is that this analysis does not attempt to find a least-cost solution to the illustrative compliance strategy. IPM optimizes electricity generation decisions across the power sector in response to the modeled regulation. In the case of the June 2014 proposal, IPM found a least-cost solution to attaining the goals across affected generating sources for two illustrative compliance strategies (see Section 3.5 of EPA 2014 for further details). As a result, the approach taken to estimate the costs of implementation in this supplemental proposal may result in different costs relative to an approach that would use a dispatch and capacity investment model like IPM.

To conduct the illustrative analysis of actions the territories might take to implement the proposed goals, the EPA used data from the EPA Greenhouse Gas Reporting Program, Ventyx

[7] In the analyses for the state and regional illustrative compliance analyses for Option 2 in the June 2014 proposal, this unit does not adopt the heat rate improvement in IPM in response to market forces induced by the regulation. Using that illustrative compliance scenario as the baseline, the unit could adopt a heat rate improvement with consequent benefits and costs. It is expected that the benefits would exceed the costs in that scenario.

Velocity Suite, National Electric Energy Data System (NEEDS) and data provided by the EPA's Regional Offices along with the Puerto Rico Electric Power Authority (PREPA) and Guam Power Authority. In addition, where data were not available it was necessary to make assumptions about the current operations of affected units. For all EGUs, in the absence of data about future generation, we assume that output remains constant at 2012 levels.

To model compliance with the territories' goals in this illustrative analysis, we identify abatement strategies that may be taken by sources affected by the regulation to bring their existing generation-weighted average CO_2 emission rate to the level of the goal. These compliance strategies are described below, and the assumed costs of different abatement techniques are described here. For coal units, we assume that a retrofit of $100/kw capacity is required to achieve a 6 percent heat rate improvement (Option 1) and a 4 percent heat rate improvement (Option 2). The capital cost of heat rate improvements was annualized using a capital charge rate of 14.29 percent,[8] the annualized capital costs are estimated to be $14,300 per MW.

To estimate the cost of re-dispatch to natural gas combined cycle (NGCC), we assume the capacity factor for NGCC generation will increase to 70 percent (Option 1) and 65 percent (Option 2). End use energy efficiency costs were calculated using the same methodology applied in the original 111(d) proposal and described in the GHG Abatement Measures Technical Support Document[9] in the docket for that rulemaking. These costs are shown in Table 3. Consistent with the approach used in the June 2014 proposal, the costs annualized at a discount rate of 3 percent were used to calculate the total costs of the illustrative compliance scenarios in this RIA. Reduced expenditures on fuel due to re-dispatch, heat rate improvements and as a results of energy efficiency have been incorporated into the analysis.

[8] See Chapter 8 of EPA's Base Case using IPM (v5.13) documentation, available at: http://www.epa.gov/powersectormodeling/BaseCasev513.html

[9] http://www2.epa.gov/sites/production/files/2014-06/documents/20140602tsd-ghg-abatement-measures.pdf

Table 3. Annualized Total Cost of Energy Efficiency (millions of 2011$)

		Option 1		Option 2	
		3%	7%	3%	7%
Puerto Rico	2020	$15	$18	$10	$12
	2025	$95	$120	$65	$79
	2030	$170	$200	N/A	N/A
Guam	2020	$1.3	$1.6	$0.88	$1.1
	2025	$8.2	$10	$5.6	$6.8
	2030	$15	$18	N/A	N/A
Total	2020	$16	$20	$11	$13
	2025	$100	$130	$71	$86
	2030	$180	$220	N/A	N/A

Figures independently rounded to two significant digits. Columns may not sum.

In the absence of information about the potential type and cost of potential future renewable generating capacity deployed, the levelized (per megawatt-hour) cost of solar PV from AEO 2014 is used to approximate the costs associated with more stringent application of renewable generation under Approach B. This is currently the highest cost option for renewable generation in AEO 2014 and therefore may overestimate the costs of this approach. More detail on the cost assumptions and the calculation of cost from the illustrative compliance strategies described below can be found in the docket in the "Tribal and Territory Unit-level Inventory, Goal Data and Computation, and Cost Calculations."

4.2.1 Emission Reductions

Through actions taken to meet the proposed standard, the affected units would reduce emissions of CO_2 and may reduce emissions of (SO_2), nitrogen dioxide (NO_x), and fine particulate matter ($PM_{2.5}$), which would lead to lower ambient concentrations of $PM_{2.5}$ and ozone (O_3). Table 4 shows the total expected CO_2 reductions for Puerto Rico and Guam based on the illustrative compliance strategies described below.

Due to data limitations, we are not able to accurately estimate the co-reductions of criteria pollutants that would occur as a result of actions to implement the proposed goals. The data available for emissions rates for these pollutants from units within the continental U.S. is not generalizable to the territorial units, particularly because of the proportion of generation from oil-fired units in the territorial areas.

Table 4. CO_2 Reductions from Illustrative Compliance Scenario (thousand metric tons/year)

		Option 1		Option 2	
		Approach A	**Approach B**	**Approach A**	**Approach B**
Puerto Rico	2020	1,600	1,700	1,500	1,600
	2025	2,400	2,500	1,900	2,000
	2030	2,900	3,100	N/A	N/A
Guam	2020	17	24	13	20
	2025	90	100	54	64
	2030	140	160	N/A	N/A
Total	2020	1,600	1,700	1,500	1,600
	2025	2,400	2,600	2,000	2,100
	2030	3,100	3,300	N/A	N/A

Figures independently rounded to two significant digits. Columns may not sum.

4.2.2 Illustrative Compliance Strategies and Cost

Based on the assumptions described above, the EPA estimated the costs of illustrative compliance strategies each territory may choose to achieve the proposed goals. For Puerto Rico, these strategies include heat rate improvements at the affected units, re-dispatch to NGCC, end use energy efficiency programs, and for Approach B, the cost of renewable generation. The total change in dispatch associated with energy efficiency programs was distributed to affected units based on the percentage of electricity sales attributable to those units in 2012. These programs are assumed to be adopted at the same level as is assumed in the rate-goal calculation. Heat rate improvements were then assumed to be applied to all affected coal boilers with consequent reductions in fuel use. An increase in NGCC generation is applied and generation is assumed to be diverted from affected coal- and oil-fired units based on the proportion of generation from those units in 2012. The generation of non-affected sources is assumed not to change. For Approach B, an additional emission rate improvement is assumed to come from incremental renewable generation, assumed for this analysis to be solar PV with a 25 percent capacity factor. This generation was assumed to displace the most expensive source of existing generation.

For Guam, the goals are assumed to be achieved through end use energy efficiency programs only. As with Puerto Rico, the change in dispatch associated with these programs is distributed to affected units based on their 2012 generation. In Approach B, the additional emission rate improvement is assumed to be achieved with new solar PV generation that displaces the most expensive source of existing generation.

Table 5 and 6 show the total costs for the illustrative compliance scenarios for Option 1. Tables 7 and 8 show the total costs for the illustrative compliance scenarios for Option 2. The total costs also include monitoring, reporting, and recordkeeping (MRR) costs associated with this proposal.

Due to the nature of this analysis, the costs of each component of the compliance strategy technique is calculated independently, rather than as part of collectively using a system-wide optimization model as is done in IPM. The approach taken here allows us to report the cost of each approaches independently, whereas in a model like IPM, because it assures equilibrium in the electricity and fuel markets market, has endogenous prices in those sectors, and identifies a least-cost strategy for compliance, it is not possible to identify independently the costs associated with each compliance method. As discussed previously, this inability to use a dispatch and capacity planning model is a significant difference between the analysis done for this proposal and the analysis of the June 2014 proposal.

Table 5. Costs of Illustrative Compliance Scenario – Option 1, Approach A (millions of 2011$)

		Annualized Capital and EE Costs			Change in Fuel Expenditures	MRR	Annualized Compliance Cost[a]
		HRI	Renewables	EE			
Puerto Rico	2020	$6.5	$0	$15	-$160	$0.79	-$140
	2025	$6.5	$0	$95	-$340	$0.48	-$230
	2030	$6.5	$0	$170	-$510	$0.48	-$330
Guam	2020	$0	$0	$1.3	-$2.7	$0.79	-$0.65
	2025	$0	$0	$8.2	-$16	$0.48	-$7.4
	2030	$0	$0	$15	-$28	$0.48	-$13
Total	2020	$6.5	$0	$16	-$160	$1.6	-$140
	2025	$6.5	$0	$100	-$350	$1.0	-$240
	2030	$6.5	$0	$180	-$540	$1.0	-$350

Figures independently rounded to two significant digits. Rows and columns may not sum.
[a] Annualized compliance cost is calculated as the sum of the other costs or change in expenditures presented in the table: annualized capital and EE costs, change in fuel expenditures, and monitoring, reporting, and recordkeeping costs.

Table 6. Costs of Illustrative Compliance Scenario – Option 1, Approach B (millions of 2011$)

		Annualized Capital and EE Costs			Change in Fuel Expenditures	MRR	Annualized Compliance Cost[a]
		HRI	Renewables	EE			
Puerto Rico	2020	$6.5	$13	$15	-$170	$0.79	-$140
	2025	$6.5	$20	$95	-$360	$0.48	-$240
	2030	$6.5	$27	$170	-$540	$0.48	-$340
Guam	2020	$0	$1.0	$1.3	-$3.9	$0.79	-$0.76
	2025	$0	$1.5	$8.2	-$18	$0.48	-$7.8
	2030	$0	$2.2	$15	-$31	$0.48	-$14
Total	2020	$6.5	$14	$16	-$180	$1.6	-$140
	2025	$6.5	$21	$100	-$380	$1.0	-$250
	2030	$6.5	$29	$180	-$580	$1.0	-$360

Figures independently rounded to two significant digits. Rows and columns may not sum.
[a] Annualized compliance cost is calculated as the sum of the other costs or change in expenditures presented in the table: annualized capital and EE costs, change in fuel expenditures, and monitoring, reporting, and recordkeeping costs.

Table 7. Costs of Illustrative Compliance Scenario – Option 2, Approach A (millions of 2011$)

		Annualized Capital and EE Costs			Change in Fuel Expenditures	MRR	Annualized Compliance Cost[a]
		HRI	Renewables	EE			
Puerto Rico	2020	$6.5	$0	$10	-$150	$0.79	-$130
	2025	$6.5	$0	$65	-$260	$0.48	-$190
Guam	2020	$0	$0	$0.88	-$2.1	$0.79	-$0.38
	2025	$0	$0	$5.6	-$9.7	$0.48	-$3.6
Total	2020	$6.5	$0	$11	-$150	$1.6	-$130
	2025	$6.5	$0	$71	-$270	$1.0	-$190

Figures independently rounded to two significant digits. Rows and columns may not sum.
[a] Annualized compliance cost is calculated as the sum of the other costs or change in expenditures presented in the table: annualized capital and EE costs, change in fuel expenditures, and monitoring, reporting, and recordkeeping costs.

Table 8. Costs of Illustrative Compliance Scenario – Option 2, Approach B (millions of 2011$)

		Annualized Capital and EE Costs			Change in Fuel Expenditures	MRR	Annualized Compliance Cost[a]
		HRI	Renewables	EE			
Puerto Rico	2020	$6.5	$13	$10	-$160	$0.79	-$130
	2025	$6.5	$18	$65	-$280	$0.48	-$190
Guam	2020	$0	$1.0	$0.88	-$3.2	$0.79	-$0.49
	2025	$0	$1.4	$5.6	-$12	$0.48	-$4.0
Total	2020	$6.5	$14	$11	-$170	$1.6	-$130
	2025	$6.5	$19	$71	-$300	$1.0	-$200

Figures independently rounded to two significant digits. Rows and columns may not sum.
[a] Annualized compliance cost is calculated as the sum of the other costs or change in expenditures presented in the table: annualized capital and EE costs, change in fuel expenditures, and monitoring, reporting, and recordkeeping costs.

4.2.3 Benefits

Climate Benefits

In 2009, the EPA Administrator found that "six greenhouse gases taken in combination endanger both the public health and the public welfare of current and future generations." The specific public health and public welfare impacts are detailed in the 2009 Endangerment Finding and its record.

A number of major peer-reviewed scientific assessments have been released since the administrative record concerning the Endangerment Finding closed following the EPA's 2010 Reconsideration Denial. These assessments include the "Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation" (SREX) (IPCC, 2012), the 2013-14 Fifth Assessment Report (AR5) (IPCC, 2013, 2014a, 2014b), the 2014 National Climate Assessment report (Melillo et al., 2014), the "Ocean Acidification: A National Strategy to Meet the Challenges of a Changing Ocean" (Ocean Acidification) (NRC, 2010), "Report on Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia" (Climate Stabilization Targets) (NRC, 2011a), "National Security Implications for U.S. Naval Forces" (National Security Implications) (NRC, 2011b), "Understanding Earth's Deep Past: Lessons for Our Climate Future" (Understanding Earth's Deep Past) (NRC, 2012a), "Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and

Future" (NRC, 2012b), "Climate and Social Stress: Implications for Security Analysis" (Climate and Social Stress) (NRC, 2013a), and "Abrupt Impacts of Climate Change" (Abrupt Impacts) assessments (NRC, 2013b).

The EPA has reviewed these assessments and finds that in general, the improved understanding of the climate system they present are consistent with the assessments underlying the 2009 Endangerment Finding.

The IPCC AR5 assessments (IPCC, 2013, 2014a, 2014b) are generally consistent with the underlying science supporting the 2009 Endangerment Finding. For example, confidence in attributing recent warming to human causes has increased: the IPCC stated that it is extremely likely (>95 percent confidence) that human influences have been the dominant cause of recent warming. Moreover, the IPCC found that the last 30 years were likely (>66 percent confidence) the warmest 30 year period in the Northern Hemisphere of the past 1400 years, that the rate of ice loss of worldwide glaciers and the Greenland and Antarctic ice sheets has likely increased, that there is medium confidence that the recent summer sea ice retreat in the Arctic is larger than has been in 1450 years, and that concentrations of carbon dioxide and several other of the major greenhouse gases are higher than they have been in at least 800,000 years. Climate change-induced impacts have been observed in changing precipitation patterns, melting snow and ice, species migration, negative impacts on crops, increased heat and decreased cold mortality, and altered ranges for water-borne illnesses and disease vectors. Additional risks from future changes include death, injury, and disrupted livelihoods in coastal zones and regions vulnerable to inland flooding, food insecurity linked to warming, drought, and flooding, especially for poor populations, reduced access to drinking and irrigation water for those with minimal capital in semi-arid regions, and decreased biodiversity in marine ecosystems, especially in the Arctic and tropics, with implications for coastal livelihoods. The IPCC determined that "[c]ontinued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gases emissions."

The recently released National Climate Assessment (Melillo et al., 2014) stated, "Climate change is already affecting the American people in far reaching ways. Certain types of extreme

weather events with links to climate change have become more frequent and/or intense, including prolonged periods of heat, heavy downpours, and, in some regions, floods and droughts. In addition, warming is causing sea level to rise and glaciers and Arctic sea ice to melt, and oceans are becoming more acidic as they absorb carbon dioxide. These and other aspects of climate change are disrupting people's lives and damaging some sectors of our economy."

Assessments from these bodies represent the current state of knowledge, comprehensively cover and synthesize thousands of individual studies to obtain the majority conclusions from the body of scientific literature and undergo a rigorous and exacting standard of review by the peer expert community and U.S. government.

Social Cost of Carbon

We estimate the global social benefits of CO_2 emission reductions expected from the proposed guidelines using the SCC estimates presented in the 2013 *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (2013 SCC TSD).[10] We refer to these estimates, which were developed by the U.S. government, as "SCC estimates." The SCC is a metric that estimates the monetary value of impacts associated with marginal changes in CO_2 emissions in a given year. It includes a wide range of anticipated climate impacts, such as net changes in agricultural productivity and human health, property damage from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning. It is typically used to assess the avoided damages as a result of regulatory actions (i.e., benefits of rulemakings that have an incremental impact on cumulative global CO_2 emissions).

[10] Docket ID EPA-HQ-OAR-2013-0495, 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, with participation by Council of Economic Advisers, Council on Environmental Quality, Department of Agriculture, Department of Commerce, Department of Energy, Department of Transportation, Environmental Protection Agency, National Economic Council, Office of Energy and Climate Change, Office of Management and Budget, Office of Science and Technology Policy, and Department of Treasury (May 2013, Revised November 2013). Available at: http://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/technical-update-social-cost-of-carbon-for-regulator-impact-analysis.pdf.

An interagency process that included the EPA and other executive branch entities used three integrated assessment models (IAMs) to develop SCC estimates and selected four global values for use in regulatory analyses. The SCC estimates were first released in February 2010 (2010 SCC TSD)[11] and updated in 2013 using new versions of each IAM. The technical background on the SCC estimates are also discussed in detail in Chapter 4 of "Regulatory Impact Analysis for the Proposed Carbon Pollution Guidelines for Existing Power Plants and Emission Standards for Modified and Reconstructed Power Plants" (USEPA 2014).

The four SCC estimates, updated in 2013, are as follows: $13, $46, $68, and $137 per metric ton of CO_2 emissions in the year 2020 (2011$).[12] The first three values are based on the average SCC from the three IAMs, at discount rates of 5, 3, and 2.5 percent, respectively. SCC estimates for several discount rates are included because the literature shows that the SCC is quite sensitive to assumptions about the discount rate, and because no consensus exists on the appropriate rate to use in an intergenerational context (where costs and benefits are incurred by different generations). The fourth value is the 95th percentile of the SCC from all three models at a 3 percent discount rate. It is included to represent higher-than-expected impacts from temperature change further out in the tails of the SCC distribution (representing less likely, but potentially catastrophic, outcomes). Table 9 presents the updated global SCC estimates for the years 2020, 2025, and 2030. The SCC increases over time because future emissions are expected to produce larger incremental damages as physical and economic systems become more stressed in response to greater climate change.

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[11] Docket ID EPA-HQ-OAR-2009-0472-114577, Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866, Interagency Working Group on Social Cost of Carbon, with participation by Council of Economic Advisers, Council on Environmental Quality, Department of Agriculture, Department of Commerce, Department of Energy, Department of Transportation, Environmental Protection Agency, National Economic Council, Office of Energy and Climate Change, Office of Management and Budget, Office of Science and Technology Policy, and Department of Treasury (February 2010). Available at: http://www.whitehouse.gov/sites/default/files/omb/inforeg/for-agencies/Social-Cost-of-Carbon-for-RIA.pdf

[12] The 2010 and 2013 TSDs present SCC in 2007$. The estimates were adjusted to 2011$ using GDP Implicit Price Deflator, http://www.gpo.gov/fdsys/pkg/ECONI-2013-02/pdf/ECONI-2013-02-Pg3.pdf.

The EPA has applied the SCC estimates to the CO_2 reductions described above for the territories. In order to calculate the dollar value for emission reductions, the SCC estimate for each emissions year would be applied to changes in CO_2 emissions for that year, and then discounted back to the analysis year using the same discount rate used to estimate the SCC.[13] Tables 10 and 11 report the incremental climate benefits estimated in the analysis years for Option 1 (2020, 2025, and 2030). Tables 12 and 13 report the incremental climate benefits estimated in the analysis years for Option 2 (2020 and 2025) for the illustrative analysis of actions the territories may take to implement the proposed goals.

Table 9. Social Cost of Carbon Values per Metric Tonne (2011$)

	5% (Average)	3% (Average)	2.5% (Average)	3% (95th Percentile)
2020	$13	$46	$68	$137
2025	$15	$50	$74	$153
2030	$17	$55	$80	$170

[13] This analysis considered the climate impacts of only CO_2 emission change. As discussed below, the climate impacts of other pollutants were not calculated for the proposed guidelines. Furthermore, the U.S. Interagency Working Group on the Social Cost of Carbon has so far only considered estimates for the social cost of CO_2. While CO_2 is the dominant GHG emitted by the sector, we recognize the representative facilities within these comparisons may also have different emission rates for other climate forcers that will serve a minor role in determining the overall social cost of generation.

Table 10. Estimated Global Climate Benefits of Illustrative CO_2 Reductions – Option 1, Approach A (millions of 2011$)*

	Discount Rate and Statistic	2020	2025	2030
Puerto Rico	Thousand Metric tonnes of CO_2 reduced	1,600	2,400	2,900
	5% (average)	$20	$35	$50
	3% (average)	$73	$120	$160
	2.5% (average)	$110	$170	$230
	3% (95th percentile)	$210	$400	$500
Guam	Thousand Metric tonnes of CO_2 reduced	17	90	140
	5% (average)	$0.22	$1.3	$2.5
	3% (average)	$0.79	$4.5	$8.0
	2.5% (average)	$1.2	$6.6	$12
	3% (95th percentile)	$2.3	$14	$24
Total	Thousand Metric tonnes of CO_2 reduced	1,600	2,400	3,100
	5% (average)	$20	$37	$53
	3% (average)	$73	$120	$170
	2.5% (average)	$110	$180	$250
	3% (95th percentile)	$220	$370	$520

* The SCC values are dollar-year and emissions-year specific. SCC values represent only a partial accounting of climate impacts. Figures independently rounded to two significant digits. Columns may not sum.

Table 11. Estimated Global Climate Benefits of Illustrative CO_2 Reductions – Option 1, Approach B (millions of 2011$)*

	Discount Rate and Statistic	2020	2025	2030
Puerto Rico	Thousand Metric tonnes of CO_2 reduced	1,700	2,500	3,100
	5% (average)	$21	$37	$53
	3% (average)	$76	$120	$170
	2.5% (average)	$110	$180	$250
	3% (95th percentile)	$230	$380	$530
Guam	Thousand Metric tonnes of CO_2 reduced	24	100	160
	5% (average)	$0.31	$1.5	$2.7
	3% (average)	$1.1	$5.0	$8.8
	2.5% (average)	$1.7	$7.4	$13
	3% (95th percentile)	$3.3	$15	$27
Total	Thousand Metric tonnes of CO_2 reduced	1,700	2,600	3,300
	5% (average)	$22	$39	$56
	3% (average)	$77	$130	$180
	2.5% (average)	$120	$190	$260
	3% (95th percentile)	$230	$390	$550

* The SCC values are dollar-year and emissions-year specific. SCC values represent only a partial accounting of climate impacts. Figures independently rounded to two significant digits. Columns may not sum.

Table 12. Estimated Global Climate Benefits of Illustrative CO_2 Reductions – Option 2, Approach A (millions of 2011$)*

	Discount Rate and Statistic	2020	2025
Puerto Rico	Thousand Metric tonnes of CO_2 reduced	1,500	1,900
	5% (average)	$19	$29
	3% (average)	$68	$96
	2.5% (average)	$100	$140
	3% (95th percentile)	$200	$290
Guam	Thousand Metric tonnes of CO_2 reduced	13	54
	5% (average)	$0.16	$0.81
	3% (average)	$0.59	$2.7
	2.5% (average)	$0.88	$4.0
	3% (95th percentile)	$1.8	$8.3
Total	Thousand Metric tonnes of CO_2 reduced	1,500	2,000
	5% (average)	$19	$29
	3% (average)	$68	$99
	2.5% (average)	$100	$150
	3% (95th percentile)	$200	$300

* The SCC values are dollar-year and emissions-year specific. SCC values represent only a partial accounting of climate impacts. Figures independently rounded to two significant digits. Columns may not sum.

Table 13. Estimated Global Climate Benefits of Illustrative CO_2 Reductions – Option 2, Approach B (millions of 2011$)*

	Discount Rate and Statistic	2020	2025
Puerto Rico	Thousand Metric tonnes of CO_2 reduced	1,600	2,000
	5% (average)	$20	$30
	3% (average)	$72	$100
	2.5% (average)	$110	$150
	3% (95th percentile)	$210	$310
Guam	Thousand Metric tonnes of CO_2 reduced	20	64
	5% (average)	$0.26	$0.96
	3% (average)	$0.91	$3.2
	2.5% (average)	$1.4	$4.7
	3% (95th percentile)	$2.7	$9.8
Total	Thousand Metric tonnes of CO_2 reduced	1,600	2,100
	5% (average)	$20	$31
	3% (average)	$73	$110
	2.5% (average)	$110	$150
	3% (95th percentile)	$220	$320

* The SCC values are dollar-year and emissions-year specific. SCC values represent only a partial accounting of climate impacts. Figures independently rounded to two significant digits. Columns may not sum.

Health Co-Benefits

This section qualitatively describes the air pollution health co-benefits associated with reducing exposure to ambient pollutants that may come with associated emission reductions. Because there are no additional emission reductions proposed for the areas of Indian country, the discussion that follows applies only to the U.S. territories identified in this proposal. While we expect that avoided emissions in the U.S. territories will result in improvements in air quality and reduce health effects associated with exposure to air pollution associated with these emissions, we have not quantified or monetized the health co-benefits of reducing these emissions for this rulemaking. This is because of the significant number and magnitude of data, resource, and methodological limitations that preclude us from doing so. For example, we do not have air

quality modeling data available to estimate the air pollution health co-benefits from implementation of these proposed guidelines.[14] This does not imply that there are no health co-benefits associated with these emission reductions. The following describes the important drivers of health co-benefits in a qualitative manner, focusing on two pollutants of primary interest, $PM_{2.5}$ and O_3.

The proposed guidelines would reduce emissions of precursor pollutants (e.g., SO_2, NO_x, and directly emitted particles) in the territories, which in turn would lower ambient concentrations of $PM_{2.5}$ and O_3. As is described in the June 2014 proposal, reducing exposure to $PM_{2.5}$ is associated with significant human health benefits, including avoiding premature mortality for adults and infants, cardiovascular morbidities such as heart attacks, hospital admissions, and respiratory morbidities such as asthma attacks, acute bronchitis, hospital and emergency department visits, work loss days, restricted activity days, and respiratory symptoms. Reducing exposure to O_3 is also associated with significant human health benefits, including avoiding mortality and respiratory morbidity such as fewer asthma attacks, hospital and ER visits, and school loss days.

4.2.4 Comparison of Benefits and Costs

This section presents the benefits, costs, and net benefits of the Option 1 and Option 2 illustrative compliance scenarios for both approaches to building block 3 in setting the rate-based goal. As discussed earlier, the EPA is proposing two options for rate-based CO_2 goals that reflect application of measures from four building blocks. For both Options 1 and 2, illustrative compliance scenarios, reflecting possible compliance approaches with area-specific CO_2 goals, are analyzed in this RIA. Additionally, for each option, two alternative building block 3

[14] In the June 2014 proposal, we used benefits per ton (BPT) estimates combined with the proposed emission reductions to monetize health co-benefits. The BPT estimates were developed for three U.S. regions (and based on the 48 contiguous U.S. states) for three pollutants (SO_2, NOx, and directly emitted particles) by combining complex source apportionment air quality modeling (to estimate ambient pollutant concentrations) with health benefits modeling (to monetize impact of pollutant concentrations on health). See Appendix 4A of the June 2014 RIA for details. The BPT estimates developed for the main proposal are not appropriate to use in estimating co-benefits for the U.S. territories because those territories were not represented in the air quality modeling used to generate the BPT estimate.

approaches are presented. The guidelines allow flexibility of compliance, and EPA recognizes that actual compliance may differ from the illustrative approaches analyzed in this RIA.

The EPA has used the social cost of carbon estimates to analyze CO_2 climate impacts of this rulemaking. We refer to these estimates, which were developed by the U.S. government, as "SCC estimates." The SCC is an estimate of the monetary value of impacts associated with a marginal change in CO_2 emissions in a given year. The four SCC estimates are associated with different discount rates (model average at 2.5 percent discount rate, 3 percent, and 5 percent; 95th percentile at 3 percent), and each increases over time. In this comparison of benefits and costs, the EPA provides the estimate of climate benefits associated with the SCC value deemed to be central in the SCC TSD (the model average at 3% discount rate). We expect health co-benefits associated with reductions in $PM_{2.5}$, SO_2, and NO_X, but are not able to quantify them for this analysis.

As Table 14 shows, assuming a 3 percent discount rate (model average), the EPA estimates that under the proposed Option 1 – Approach A, the monetized climate benefits (in 2011$) range from $73 million in 2020 to $170 million in 2030. The annual, illustrative compliance costs (in 2011$) of Option 1 – Approach A - are estimated to be approximately -$140 million in 2020 and -$350 million in 2030. The quantified net benefits (the difference between monetized benefits and costs in 2011$) of Option 1 – Approach A are $210 million in 2020 and $520 million in 2030.

Table 14. Summary of Estimated Monetized Benefits, Compliance Costs, and Net Benefits for the Proposed Guidelines – Option 1, Approach A (millions of 2011$) [a]

		2020	2025	2030
Puerto Rico	Climate Benefits [b]			
	5% discount rate	$20	$35	$50
	3% discount rate	$73	$120	$160
	2.5% discount rate	$110	$170	$230
	95th percentile at 3% discount rate	$220	$360	$500
	Total Compliance Costs [c]	-$140	-$230	-$330
	Net Benefits [d]	$210	$350	$490
Guam	Climate Benefits [b]			
	5% discount rate	$0.22	$1.3	$2.5
	3% discount rate	$0.79	$4.5	$8.0
	2.5% discount rate	$1.2	$6.6	$12
	95th percentile at 3% discount rate	$2.3	$14	$24
	Total Compliance Costs [c]	-$0.65	-$7.4	-$13
	Net Benefits [d]	$1.4	$12	$21
Total	Climate Benefits [b]			
	5% discount rate	$20	$37	$53
	3% discount rate	$73	$120	$170
	2.5% discount rate	$110	$180	$250
	95th percentile at 3% discount rate	$220	$370	$520
	Total Compliance Costs [c]	-$140	-$240	-$350
	Net Benefits [d]	$210	$360	$520
	Non-Monetized Benefits	Health effects of $PM_{2.5}$, ozone, SO_2 and NO_2 Exposure to hazardous air pollutants such as Hg and HCl Ecosystem effects Visibility impairment		

[a] All estimates rounded to two significant figures, so figures may not sum.

[b] The climate benefit estimates in this summary table reflect global impacts from CO_2 emission changes and do not account for changes in non-CO_2 GHG emissions. The SCC estimates are year-specific and increase over time.

[c] Total social costs are approximated by the illustrative compliance costs. The capital costs are annualized at a capital charge rate of 14.29 percent. This estimate also includes monitoring, recordkeeping, and reporting costs, demand side energy efficiency program and participant costs annualized at a 3 percent discount rate, and changes in fuel expenditures.

[d] The estimates of net benefits in this summary table are calculated using the global SCC at a 3 percent discount rate (model average).

As Table 15 shows, assuming a 3 percent discount rate (model average), the EPA estimates that under the proposed Option 1 – Approach B, the monetized climate benefits (in 2011$) are $77 million in 2020 and $180 million in 2030. The annual, illustrative compliance costs (in 2011$) of Option 1 – Approach B are estimated to be approximately -$140 million in 2020 and -$360 million in 2030. The quantified net benefits (the difference between monetized

benefits and costs in 2011$) of Option 1 – Approach B are $220 million in 2020 and $540 million in 2030.

Table 15. Summary of Estimated Monetized Benefits, Compliance Costs, and Net Benefits for the Proposed Guidelines – Option 1, Approach B (millions of 2011$) [a]

		2020	2025	2030
Puerto Rico	Climate Benefits [b]			
	5% discount rate	$21	$37	$53
	3% discount rate	$76	$120	$170
	2.5% discount rate	$110	$180	$250
	95th percentile at 3% discount rate	$230	$380	$530
	Total Compliance Costs [c]	-$140	-$240	-$340
	Net Benefits [d]	$210	$360	$510
Guam	Climate Benefits [b]			
	5% discount rate	$0.31	$1.5	$2.7
	3% discount rate	$1.1	$5.0	$8.8
	2.5% discount rate	$1.7	$7.4	$13
	95th percentile at 3% discount rate	$3.3	$15	$27
	Total Compliance Costs [c]	-$0.76	-$7.8	-$14
	Net Benefits [d]	$1.9	$13	$23
Total	Climate Benefits [b]			
	5% discount rate	$22	$39	$56
	3% discount rate	$77	$130	$180
	2.5% discount rate	$120	$190	$260
	95th percentile at 3% discount rate	$230	$390	$550
	Total Compliance Costs [c]	-$140	-$250	-$360
	Net Benefits [d]	$220	$370	$540
	Non-Monetized Benefits	Health effects of $PM_{2.5}$, ozone, SO_2 and NO_2 Exposure to hazardous air pollutants such as Hg and HCl Ecosystem effects Visibility impairment		

[a] All estimates rounded to two significant figures, so figures may not sum.

[b] The climate benefit estimates in this summary table reflect global impacts from CO_2 emission changes and do not account for changes in non-CO_2 GHG emissions. The SCC estimates are year-specific and increase over time.

[c] Total social costs are approximated by the illustrative compliance costs. The capital costs are annualized at a capital charge rate of 14.29 percent. This estimate also includes monitoring, recordkeeping, and reporting costs, demand side energy efficiency program and participant costs annualized at a 3 percent discount rate and changes in fuel expenditures.

[d] The estimates of net benefits in this summary table are calculated using the global SCC at a 3 percent discount rate (model average).

As Table 16 shows, assuming a 3 percent discount rate (model average), the EPA estimates that under the proposed Option 2 – Approach A, the monetized climate benefits (in 2011$) are $68 million in 2020 and $96 million in 2025. The annual, illustrative compliance costs (in 2011$) of Option 2 – Approach A are estimated to be approximately -$130 million in

2020 and -$190 million in 2025. The quantified net benefits (the difference between monetized benefits and costs in 2011$) of Option 2 – Approach A are $200 million in 2020 and $290 million in 2025.

Table 16. Summary of Estimated Monetized Benefits, Compliance Costs, and Net Benefits for the Proposed Guidelines – Option 2, Approach A (millions of 2011$) [a]

		2020	2025
Puerto Rico	Climate Benefits [b]		
	5% discount rate	$19	$29
	3% discount rate	$68	$96
	2.5% discount rate	$100	$140
	95th percentile at 3% discount rate	$200	$290
	Total Compliance Costs [c]	-$130	-$190
	Net Benefits [d]	$200	$290
Guam	Climate Benefits [b]		
	5% discount rate	$0.16	$0.81
	3% discount rate	$0.59	$2.7
	2.5% discount rate	$0.88	$4.0
	95th percentile at 3% discount rate	$1.8	$8.3
	Total Compliance Costs [c]	-$0.38	-$3.6
	Net Benefits [d]	$0.97	$6.3
Total	Climate Benefits [b]		
	5% discount rate	$19	$29
	3% discount rate	$68	$99
	2.5% discount rate	$100	$150
	95th percentile at 3% discount rate	$200	$300
	Total Compliance Costs [c]	-$130	-$190
	Net Benefits [d]	$200	$290
	Non-Monetized Benefits	Health effects of $PM_{2.5}$, ozone, SO_2 and NO_2 Exposure to hazardous air pollutants such as Hg and HCl Ecosystem effects Visibility impairment	

[a] All estimates rounded to two significant figures, so figures may not sum.

[b] The climate benefit estimates in this summary table reflect global impacts from CO_2 emission changes and do not account for changes in non-CO_2 GHG emissions. The SCC estimates are year-specific and increase over time.

[c] Total social costs are approximated by the illustrative compliance costs. The capital costs are annualized at a capital charge rate of 14.29 percent. This estimate also includes monitoring, recordkeeping, and reporting costs, demand side energy efficiency program and participant costs annualized at a 3 percent discount rate and changes in fuel expenditures.

[d] The estimates of net benefits in this summary table are calculated using the global SCC at a 3 percent discount rate (model average).

As Table 17 shows, assuming a 3 percent discount rate (model average), the EPA estimates that under the proposed Option 2 – Approach B, the monetized climate benefits (in

2011$) are $73 million in 2020 and $110 million in 2025. The annual, illustrative compliance costs (in 2011$) of Option 2 – Approach B are estimated to be approximately -$130 million in 2020 and -$200 million in 2025. The quantified net benefits (the difference between monetized benefits and costs in 2011$) of Option 2 – Approach B are $210 million in 2020 and $300 million in 2025.

Table 17. Summary of Estimated Monetized Benefits, Compliance Costs, and Net Benefits for the Proposed Guidelines – Option 2, Approach B (millions of 2011$) [a]

		2020	2025
Puerto Rico	Climate Benefits [b]		
	5% discount rate	$20	$30
	3% discount rate	$72	$100
	2.5% discount rate	$110	$150
	95th percentile at 3% discount rate	$210	$310
	Total Compliance Costs [c]	-$130	-$190
	Net Benefits [d]	$200	$300
Guam	Climate Benefits [b]		
	5% discount rate	$0.26	$0.96
	3% discount rate	$0.91	$3.2
	2.5% discount rate	$1.4	$4.7
	95th percentile at 3% discount rate	$2.7	$9.8
	Total Compliance Costs [c]	-$0.49	-$4.0
	Net Benefits [d]	$1.4	$7.2
Total	Climate Benefits [b]		
	5% discount rate	$20	$31
	3% discount rate	$73	$110
	2.5% discount rate	$110	$150
	95th percentile at 3% discount rate	$220	$320
	Total Compliance Costs [c]	-$130	-$200
	Net Benefits [d]	$210	$300
	Non-Monetized Benefits	Health effects of $PM_{2.5}$, ozone, SO_2 and NO_2 Exposure to hazardous air pollutants such as Hg and HCl Ecosystem effects Visibility impairment	

[a] All estimates rounded to two significant figures, so figures may not sum.

[b] The climate benefit estimates in this summary table reflect global impacts from CO_2 emission changes and do not account for changes in non-CO_2 GHG emissions. The SCC estimates are year-specific and increase over time.

[c] Total social costs are approximated by the illustrative compliance costs. The capital costs are annualized at a capital charge rate of 14.29 percent. This estimate also includes monitoring, recordkeeping, and reporting costs, demand side energy efficiency program and participant costs annualized at a 3 percent discount rate and changes in fuel expenditures.

[d] The estimates of net benefits in this summary table are calculated using the global SCC at a 3 percent discount rate (model average).

Based upon the foregoing discussion, it is clear that this proposal's climate benefits alone are substantial and far outweigh the compliance costs for all of the regulatory options under the illustrative compliance approaches. The EPA could not monetize important categories of impacts. For example, in addition to reductions in CO_2 emissions, implementing these proposed guidelines is expected to reduce emissions of SO_2 and NO_X, which are precursors to formation of ambient $PM_{2.5}$, as well as directly emitted fine particles. Therefore, reducing these emissions would also reduce human exposure to ambient $PM_{2.5}$ and ozone precursors, thus the incidence of $PM_{2.5}$- and ozone related health effects.

4.3 Economic and Employment Impacts

Changes in supply or demand for electricity, natural gas, oil, and coal can impact markets for goods and services produced by sectors that use these energy inputs in the production process or that supply those sectors. Changes in cost of production may result in changes in price and/or quantity produced and these market changes may affect the profitability of firms and the economic welfare of their consumers. The EPA recognizes that these guidelines provide significant flexibilities and the areas implementing the guidelines may choose to mitigate impacts to some markets outside the EGU sector. Similarly, demand for new generation or energy efficiency can result in changes in production and profitability for firms that supply those goods and services. The guidelines provide flexibility for areas that may want to enhance demand for goods and services from those sectors.

Executive Order 13563 directs federal agencies to consider regulatory impacts on job creation and employment. According to the Executive Order, "our regulatory system must protect public health, welfare, safety, and our environment while promoting economic growth, innovation, competitiveness, and job creation. It must be based on the best available science" (Executive Order 13563, 2011). Although standard benefit-cost analyses can include macroeconomic analysis of net impacts on national employment they have not typically included

a separate analysis of regulation-induced employment impacts in specific affected industries,[15] during periods of sustained high unemployment, sector-specific employment impacts are of particular concern and questions may arise about their existence and magnitude.

This section qualitatively discusses potential employment impacts of the Supplemental Proposal for areas of Indian country and territories. For a more detailed and quantitative discussion of employment impacts, please see Chapter 6 and Appendix 6A of the RIA for the June 2014 proposal. The June 2014 analysis uses cost projections from the engineering-based IPM to project sector-specific labor demand impacts of the proposed guidelines for the electricity generation sector (fossil and renewable), and the fuel production sector (coal and natural gas). The June 2014 RIA also projected labor requirements for demand-side energy efficiency activities.

In this supplemental proposal, the EPA is proposing emission guidelines for areas of Indian country and territories to use in developing plans to address greenhouse gas emissions from existing fossil fuel-fired EGUs. As mentioned in Section 4.1 of this RIA, EGUs in areas of Indian country are expected to meet the proposed goals based on existing generation decisions or compliance with other regulations for most of the evaluated options. As a result, we do not expect the proposed actions to have any impacts on employment in areas of Indian country.

In all of the approaches analyzed for the territories of Guam and Puerto Rico, the annualized costs of the illustrative compliance strategies are expected to be negative for each year in the analysis as a result of reductions in fuel expenditures that outweigh other costs of reducing emission. As each area has the responsibility and flexibility to implement policies and practices for compliance with Proposed EGU GHG Existing Source Guidelines, and, given the wide range of approaches that may be used, quantifying the associated employment impacts is difficult.

EGUs may respond to these proposed guidelines by placing new orders for efficiency-related or renewable energy equipment and services to reduce GHG emissions. Installing and operating new equipment or improving heat rate efficiency could increase labor demand in the electricity generating sector itself, as well as associated equipment and services sectors.

[15] Labor expenses do, however, contribute toward total costs in the EPA's standard benefit-cost analyses.

Specifically, the direct employment effects of supply-side initiatives include changes in labor demand for manufacturing, installing, and operating higher efficiency or renewable energy electricity generating assets supported by the initiative while reducing the demand for labor that would have been used by less efficient or higher emitting generating assets. Once implemented, increases in operating efficiency would impact the power sector's demand for fuel and plans for EGU retirement and new construction.

In addition, EPA expects compliance plans to also include demand-side energy efficiency policies and programs that typically change energy consumption patterns of business and residential consumers by reducing the quantity of energy required for a given level of production or service. Demand-side initiatives generally aim to increase the use of cost-effective energy efficiency technologies (e.g., including more efficient appliances and air conditioning systems, more efficient lighting devices, more efficient design and construction of new homes and businesses), and advance efficiency improvements in motor systems and other industrial processes. Demand-side initiatives can also directly reduce energy consumption, such as through programs encouraging changing the thermostat during the hours a building is unoccupied or motion-detecting room light switches. Such demand-side energy efficiency initiatives directly affect employment by encouraging firms and consumers to shift to more efficient products and processes than would otherwise be the case. Employment in the sectors that provide these more efficient devices and services would be expected to increase, while employment in the sectors that produce less efficient devices would be expected to contract.

A critical component of the overall labor impacts of implementing the GHG guidelines is the impact of the labor associated with the demand-side energy efficiency activities. As the 2014 RIA indicated, the EPA anticipates that this rule may stimulate investment in clean energy technologies and services, resulting in considerable increases in demand-side energy efficiency in particular. We expect these increases in demand-side energy efficiency projects, specifically, to support a significant amount of employment in energy efficiency-related industries.

4.4 Limitations of Analysis

As discussed previously, in the absence of an optimization model for electric systems in Guam and Puerto Rico, this analysis does not attempt to find a least-cost solution to the illustrative compliance strategy. As a result, the approach taken to estimate the costs of

implementation in this supplemental proposal may result in different costs relative to an approach that would use a dispatch and capacity investment model like IPM. Additionally, this analysis only reflects an approach similar to a state-based approach modeled in the June 2014 proposal. As in the June 2014 proposal, a regional approach to meeting the goals would likely result in lower costs.

Puerto Rico has a Renewable Portfolio Standard (RPS) which sets goals for 2015 and 2035. Guam's RPS required 5 percent of net electricity sales to come from renewables by 2015, rising to 25 percent by 2035. Actions taken to comply with the RPS may be used by these territories in their compliance strategies to attain the rate-based goals. Accounting for these actions may result in lower total compliance costs than those projected in this analysis.

For Puerto Rico, we used AEO projections for No. 2 distillate fuel, No. 6 fuel oil, coal, and natural gas for the South Atlantic region in 2020, 2025, and 2030. An additional $3.50/mmBtu was applied to the cost of natural gas to reflect the additional costs of liquefaction and transport from the Gulf region to the liquefied natural gas (LNG) terminal on Puerto Rico. The additional cost is based on a report developed by Galway, a consulting firm, and PREPA and presented in the Government Development Bank for Puerto Rico's Natural Gas Diversification Strategy for PREPA.[16] Using this methodology, we project natural gas prices of $9.40/mmBtu in 2020, $10.06/mmBtu in 2025, and $10.71/mmBtu in 2030 (all figures in 2011$). Other available data suggests prices for delivered LNG could be lower. For example, U.S. Census Bureau data regarding 2012 LNG imports from Trinidad and Tobago and Nigeria estimates a cost of approximately $5/mmBtu (2011$).

The difference between the prices of natural gas and distillate or fuel oil is responsible for a portion of the cost savings attributable to the rule. (This change in fuel expenditures is shown in Table 5.) For Puerto Rico, fuel expenditure changes result from moving generation from oil-fired units to natural gas fired units, as well as reduced electricity demand from energy efficiency. In Guam, the fuel expenditure change is smaller because it results only from reduced electricity demand from energy efficiency. This raises the question of why this disparity in price

[16] http://www.gdb-pur.com/investors_resources/documents/GNRoundtable-v2FINAL-GS.pdf

would not result in increased natural gas generation in the absence of this proposal. A 2012 two-year contract between PREPA and Gas Natural Fenosa at approximately $14-15/mmBtu[17] suggests that 2012 natural gas prices (on which the baseline generation projections for this analysis were made) were closer to the prices of other fuel choices but may decline in the future. EPA's approach, using AEO-projected regional natural gas prices with an adder for liquefaction and transport provides a consistent set of assumptions for future fuel costs, and reflects the proposed LNG strategy for PREPA.[18]

Additionally, the prices of imported LNG depend on investment and operational decisions of supplying regions as well as the availability of infrastructure within the LNG receiving regions. To the extent that there may be expected benefits to enhancing its natural gas infrastructure absent this proposal, Puerto Rico might invest in enhancing its fuel switching capacity in the absence of this rule. In this scenario, the EPA may be over-estimating reductions in fuel expenditures and emissions reductions attributable to this rule.

We apply the demand reductions resulting from energy efficiency and renewable energy investments to generation in the different areas from affected EGUs. The reduced electricity consumption from investments in energy efficiency are assumed to offset the most expensive generation affected by the rule – electricity from No. 6 distillate fuel boilers and combustion turbines. The reduced generation is not assigned to any specific EGU, but is taken from the aggregate fleet of No. 6 distillate fuel EGUs. The change in fuel expenditures is calculated by multiplying the electricity demand change attributable to energy efficiency investments by the average fuel consumption per MWh for No. 6 distillate fuel EGUs. This value is then multiplied by the projected future fuel prices from the AEO to derive the value of the change in expenditures. Similarly, CO_2 emission reductions are calculated by multiplying the electricity demand reduction attributable to energy efficiency investments by the average CO_2 emission rate (lb/MWh) for the aggregate fleet of No. 6 distillate fuel EGUs. To the extent that affected EGU's

[17] http://www.caribbeanbusinesspr.com/prnt_ed/puerto-rico-in-advanced-talks-with-sabine-pass-for-u.s.-lng-7994.html

[18] http://www.gdb-pur.com/investors_resources/documents/GNRoundtable-v2FINAL-GS.pdf

follow different strategies in responding to demand reductions from energy efficiency programs, the resulting costs and emissions reduction may differ from those presented in this RIA.

We welcome comments providing additional data or analysis regarding the energy systems in Guam and Puerto Rico and the assumptions made in this analysis.

5 Statutory and Executive Order Requirements

5.1 Executive Order 12866, Regulatory Planning and Review, and Executive Order 13563, Improving Regulation and Regulatory Review

Under section 3(f) (1) of Executive Order 12866 (58 FR 51735, October 4, 1993), this action is an "economically significant regulatory action" because it is likely to have an annual effect on the economy of $100 million or more or to adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities. The $100 million threshold can be triggered by either costs or benefits, or a combination of them. Accordingly, the EPA submitted this action to OMB for review under Executive Orders 12866 and 13563 (76 FR 3821, January 21, 2011), and any changes made in response to OMB recommendations have been documented in the docket for this action.

Consistent with EO 12866 and EO 13563, the EPA estimated the costs and benefits for illustrative compliance approaches of implementing the proposed guidelines. This proposal sets goals to reduce CO_2 emissions from the electric power industry in U.S. territories and in Indian country. Actions taken to comply with the proposed guidelines will also reduce the emissions of directly emitted $PM_{2.5}$, SO_2 and NO_X. The benefits associated with these PM, SO_2 and NO_X reductions are referred to as co-benefits, as these reductions are not the primary objective of this rule.

The EPA has used the USG SCC estimates (i.e., the monetary value of impacts associated with a marginal change in CO_2 emissions in a given year), to analyze CO_2 climate impacts of this rulemaking. The four USG SCC estimates are associated with different discount rates (model average at 2.5 percent discount rate, 3 percent, and 5 percent; 95th percentile at 3 percent), and each increases over time. In this summary, the EPA provides the estimate of climate benefits

associated with the SCC value deemed to be central by the USG (the model average at 3 percent discount rate). There will be health benefits associated with reductions of SO_2 and NO_X, however, the EPA is unable to quantify air pollution health co-benefits in the U.S. territories because the benefit-per-ton values used are only appropriate for areas within the continental U.S. In addition, the EPA could not monetize other important benefits, including climate benefits from reducing emissions of non-CO_2 GHG and co-benefits from reducing exposure to HAP (e.g., mercury and hydrogen chloride) concentrations, as well as ecosystem and visibility benefits.

For Guam and Puerto Rico, the EPA estimates that in 2020, the illustrative compliance approach for Option 1 – Approach A will yield monetized climate benefits of approximately $73 million with a 3 percent model average (2011$). The annual illustrative compliance costs are a savings of approximately $140 million (2011$) in 2020. The EPA estimates that in 2030, the illustrative compliance approach for Option 1 - Approach A in Guam and Puerto Rico will yield monetized climate benefits of approximately $170 million with a 3 percent model average (2011$). The annual illustrative compliance costs are a savings of approximately $350 (2011$) in 2030. For Option 2 – Approach A, the illustrative compliance approach for Guam and Puerto Rico will yield monetized climate benefits of approximately $68 million with a 3 percent model average (2011$) in 2020. The annual illustrative compliance costs are a savings of approximately $130 million (2011$) in 2020. The EPA estimates that in 2025, the illustrative compliance approach for Option 2 – Approach A in Guam and Puerto Rico will yield monetized climate benefits of approximately $99 million with a 3 percent model average (2011$). The annual illustrative compliance costs result in a savings of approximately $190 million (2011$) in 2025, including changes in fuel expenditures associated with energy efficiency programs and re-dispatch.

For Guam and Puerto Rico, the EPA estimates that in 2020, the illustrative compliance approach for Option 1 – Approach B will yield monetized climate benefits of approximately $77 million with a 3 percent model average (2011$). The annual illustrative compliance costs are a savings of approximately $140 million (2011$) in 2020. The EPA estimates that in 2030, the illustrative compliance approach for Option 1 – Approach B in Guam and Puerto Rico will yield monetized climate benefits of approximately $180 million with a 3 percent model average (2011$). The annual illustrative compliance costs are a savings of approximately $360 million

(2011$) in 2030. For Option 2 – Approach B, the illustrative compliance approach for Guam and Puerto Rico will yield monetized climate benefits of approximately $73 million with a 3 percent model average (2011$) in 2020. The annual illustrative compliance costs are a savings of approximately $130 million (2011$) in 2020. The EPA estimates that in 2025, the illustrative compliance approach for Option 2 in Guam and Puerto Rico will yield monetized climate benefits of approximately $110 million with a 3 percent model average (2011$). The annual illustrative compliance costs result in a net savings of approximately $200 million (2011$) in 2025, including changes in fuel expenditures associated with energy efficiency programs and re-dispatch.

For affected units in Indian country, we do not expect any costs or benefits because these units are already expected to meet the proposed goal.

5.2 Paperwork Reduction Act

The information collection requirements in this proposed rule have been submitted for approval to OMB under the PRA, 44 U.S.C. 3501 *et seq*. The Information Collection Request (ICR) document prepared by the EPA has been assigned the EPA ICR number 2503.02.

This proposal does not directly impose specific requirements on EGU sources, including those located in U.S. territories and in Indian country. The proposal also does not impose specific requirements on tribal governments that have affected EGUs located in their area of Indian country. For Indian country, the proposal establishes CO_2 emission performance goals that could be addressed through either tribal or federal plans. A tribe would have the opportunity under the TAR, but not the obligation, to apply to the EPA for TAS for purposes of a section 111(d) plan and, if approved by the EPA, to establish a CAA section 111(d) plan for its area of Indian country. To date, no tribe has requested or obtained TAS eligibility for purposes of a section 111(d) plan. For areas of Indian country with affected sources where a tribe has not applied for TAS and submitted any needed plan, if the EPA determines that a CAA section 111(d) plan is necessary or appropriate, the EPA would have the responsibility to establish the plans. Because tribes are not required to implement section 111(d) plans and because no tribe has yet sought TAS eligibility for this purpose, this proposed action is not anticipated to impose any information collection burden on tribal governments over the 3-year period covered by this ICR.

This proposal does impose specific requirements on U.S. territory governments that have affected EGUs. Their information collection requirements are based on the recordkeeping and reporting burden associated with the requirement that the two affected U.S. territories (i.e., Puerto Rico and Guam) develop, implement and enforce a plan to limit CO_2 emissions from existing sources in the power sector within those U.S. territories. These recordkeeping and reporting requirements are specifically authorized by CAA section 114 (42 U.S.C. 7414). All information submitted to the EPA pursuant to the recordkeeping and reporting requirements for which a claim of confidentiality is made is safeguarded according to agency policies set forth in 40 CFR part 2, subpart B.

The annual burden for this collection of information for the territories (averaged over the first 3 years following promulgation of this proposed action) is estimated to be 29,200 hours at a total annual labor cost of $2.07 million. The total annual burden for the federal government (averaged over the first 3 years following promulgation of this proposed action) is estimated to be 2,530 hours at a total annual labor cost of $141,000. Burden means the total time, effort or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a federal agency. This includes the time needed to review instructions; develop, acquire, install and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for the EPA's regulations in 40 CFR are listed in 40 CFR part 9.

To comment on the agency's need for this information, the accuracy of the provided burden estimates, and any suggested methods for minimizing respondent burden, the EPA has established a public docket for this rule, which includes this ICR, under Docket ID Number EPA-HQ-OAR-2013-0602. Submit any comments related to the ICR to the EPA and to OMB.

See the **ADDRESSES** section at the beginning of the preamble for where to submit comments to the EPA. Send comments to OMB at the Office of Information and Regulatory Affairs, Office of Management and Budget, 725 17th Street, NW, Washington, DC 20503, Attention: Desk Officer for the EPA. Since OMB is required to make a decision concerning the ICR between 30 and 60 days after publication, a comment to OMB is best assured of having its full effect if OMB receives it by 30 days after publication. The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

5.3 Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations and small governmental jurisdictions.

For purposes of assessing the impacts of this rule on small entities, small entity is defined as: (1) A small business that is defined by the Small Business Administration's (SBA's) regulations at 13 CFR 121.201 (for the electric power generation industry, the small business size standard is an ultimate parent entity with less than 750 employees). The North American Industry Classification System (NAICS) codes for the affected industry are in Table 18 below); (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000; and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

Table 18. Potentially Regulated Categories and Entities[a]

Category	NAICS Code	Examples of Potentially Regulated Entities
Industry	221112	Fossil fuel electric power generating units.
State/Territorial/Local Government	221112[b]	Fossil fuel electric power generating units owned by municipalities.

[a] Include NAICS categories for source categories that own and operate electric power generating units (includes boilers and stationary combined cycle combustion turbines).
[b] State, territory or local government-owned and operated establishments are classified according to the activity in which they are engaged.

After considering the economic impacts of this proposed rule on small entities, the EPA certifies that this action will not have a significant economic impact on a substantial number of small entities.

The proposed rule will not impose any requirements on small entities. Specifically, emission guidelines established under CAA section 111(d) do not impose any requirements on regulated entities and, thus, will not have a significant economic impact upon a substantial number of small entities. After emission guidelines are promulgated, each affected U.S. territory establishes standards on existing sources, and it is those requirements that could potentially impact small entities. Our analysis here is consistent with the analysis of the analogous situation arising when the EPA establishes national ambient air quality standards (NAAQS), which do not impose any requirements on regulated entities. As here with regard to U.S. territories, any impact of a NAAQS on small entities would only arise when states take subsequent action to maintain and/or achieve the NAAQS through their state implementation plans. See American Trucking Assoc. v. EPA, 175 F.3d 1029, 1043-45 (D.C. Cir. 1999) (NAAQS do not have significant impacts upon small entities because NAAQS themselves impose no regulations upon small entities).

Nevertheless, the EPA is aware that there is substantial interest in the proposed rule among small entities. As detailed in section II.D of this supplemental proposal and section III.A of the preamble to the proposed carbon pollution emission guidelines for existing EGUs (79 FR 34845-34847, June 18, 2014), the EPA has conducted an unprecedented amount of stakeholder outreach on setting emission guidelines for existing EGUs. While formulating the provisions of the June 18, 2014, proposed rule, as well as this proposed rule, the EPA considered the input

provided over the course of the stakeholder outreach. Sections II.D and VI.F of this supplemental proposal and section III.B of the preamble to the June 18, 2014, proposal (79 FR 34847) describe the key issues and messages from stakeholders. The EPA invites comments on all aspects of this proposal and its impacts, including potential impacts on small entities.

5.4 Unfunded Mandates Reform Act (UMRA)

This proposed action does not contain a federal mandate that may result in expenditures of $100 million or more for state,[19] local and tribal governments, in the aggregate, or the private sector in any one year. The emission guidelines proposed under CAA section 111(d) do not impose any direct compliance requirements on EGU sources. As explained in section VI.B. above, the proposal also does not impose specific requirements on tribal governments that have affected EGUs located in their area of Indian country. The proposal does impose specific requirements on U.S. territory governments that have affected EGUs. Specifically, the U.S. territories are required to develop plans to implement the guidelines under CAA section 111(d) for affected EGUs. The burden for U.S. territories to develop CAA section 111(d) plans in the 3-year period following promulgation of the rule was estimated and is listed in section VI.B. of the preamble, but this burden is estimated to be below $100 million in any one year. Thus, this proposed rule is not subject to the requirements of section 202 or section 205 of the UMRA.

This proposed rule is also not subject to the requirements of section 203 of UMRA because it contains no regulatory requirements that might significantly or uniquely affect small governments. Specifically, the governments with affected EGUs for which this action proposes specific requirements (i.e., the U.S. territories of Puerto Rico and Guam) are not considered small governments.

In light of the interest among governmental entities, the EPA initiated outreach with U.S. territory and tribal governmental entities while formulating the provisions of this proposed rule. Section III.A of the preamble to the proposed carbon pollution emission guidelines for existing

[19] "State" is defined under the Unfunded Mandates Reform Act (UMRA) as "a State of the United States, the District of Columbia, a territory or possession of the United States, and an agency, instrumentality, or fiscal agent of a State but does not mean a local government of a State."

EGUs (79 FR 34845-34847, June 18, 2014) describes the extensive stakeholder outreach the EPA has conducted on setting emission guidelines for existing EGUs. Section II.D of this supplemental proposal details the specific outreach that the EPA conducted to the U.S. territories with potentially affected EGUs. In addition, section VI.F of this supplemental proposal and section XI.F of the preamble to the June 18, 2014, proposed rule describe outreach to tribes and consultation with tribal officials. The EPA considered the input provided over the course of its stakeholder outreach developing the provisions of these proposed emission guidelines.

5.5 Executive Order 13132, Federalism

This action does not have federalism implications. It will not have substantial direct effects on the states, on the relationship between the national government and the states or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. Executive Order 13132 applies only to states, whereas this action proposes emission performance goals covering potentially affected power plants located in the U.S. territories and in specified areas of Indian country.[20] Thus, Executive Order 13132 does not apply to this action.

Nevertheless, as described in section II.D of the supplemental proposal and section III.A of the preamble to the proposed carbon pollution emission guidelines for existing EGUs (79 FR 34845-34847, June 18, 2014), the EPA has conducted an unprecedented amount of stakeholder outreach on setting emission guidelines for existing EGUs. Section II.D of this supplemental proposal details the outreach that the EPA conducted to the U.S. territories with potentially affected EGUs. In addition, section VI.F of the supplemental proposal and section XI.F of the preamble to the June 18, 2014, proposed rule describe outreach to tribes and consultation with tribal officials.

[20] "State" or "States" are defined under E.O. 13132 as "the States of the United States of America, individually or collectively, and, where relevant, to State governments, including units of local government and other political subdivisions established by the States."

In the spirit of Executive Order 13132, and consistent with the EPA's policy to promote communications between the EPA and State and local governments, the EPA welcomes comment on this proposed action from U.S. territory and tribal officials.

5.6 Executive Order 13175, Consultation and Coordination with Indian Tribal Governments

Subject to Executive Order 13175 (65 FR 67249, November 9, 2000) the EPA may not issue a regulation that has tribal implications, that imposes substantial direct compliance costs on tribal governments and that is not required by statute, unless the federal government provides the funds necessary to pay the direct compliance costs incurred by tribal governments, or the EPA consults with tribal officials early in the process of developing the proposed regulation and develops a tribal summary impact statement.

The EPA has concluded that this action may have tribal implications. However, it will neither impose substantial direct compliance costs on tribal governments, nor preempt tribal law. Tribes are not required to develop or adopt CAA programs, but they may apply to the EPA for TAS and, if approved, do so. Tribes are not required to develop plans to implement the guidelines under CAA section 111(d) for affected EGUs in their areas of Indian country. To the extent that a tribal government seeks and attains TAS status for that purpose, these proposed emission guidelines would require that planning requirements be met and emission management implementation plans be executed by the tribes. The EPA notes that this proposal does not directly impose specific requirements on affected EGUs, including those located in Indian country, but provides guidance to any tribe approved by the EPA to address CO_2 emissions from EGU sources found subject to section 111(d) of the CAA. The EPA also notes that none of the affected EGUs are owned or operated by tribal governments.

The June 18, 2014, proposed rule and this supplemental proposal were developed after extensive and vigorous outreach to stakeholders, including tribes. Tribes were invited to participate in the national informational webinar, "Building a Common Understanding: Clean Air Act and Upcoming Carbon Pollution Guidelines for Existing Power Plants," held August 27, 2013. The EPA also held a series of listening sessions prior to development of this proposed action. Tribes participated in a session on September 9, 2013, together with the state agencies, as well as in a separate tribe-only session on September 26, 2013. In addition, an outreach meeting

was held on September 9, 2013, with tribal representatives from some of the 566 tribes.

As part of the outreach to tribes, EPA representatives also met with tribal environmental staff with the National Tribal Air Association, by teleconference, on July 25, 2013, December 19, 2013, June 26, 2014, and August 4, 2014. In those teleconferences, the EPA provided background information on the GHG emission guidelines to be developed and a summary of issues being explored by the agency. Tribes have expressed varied points of view. Some tribes raised concerns about the impacts of the regulations on EGUs and the subsequent impact on jobs and revenue for their tribes. Other tribes expressed concern about the impact the regulations would have on the cost of water to their communities as a result of increased costs to the EGU that provide energy to transport the water to the tribes. Other tribes raised concerns about the impacts of climate change on their communities, resources, ways of life and hunting and treaty rights. The tribes were also interested in the scope of the guidelines being considered by the agency (e.g., over what time period, relationship to state and multi-state plans) and how tribes will participate in these planning activities.

The EPA conducted outreach to tribal environmental staff and offered consultation with tribal officials in developing this action. Because this supplemental proposal would directly affect sources located within Indian country, the EPA offered consultation with tribal officials early in the process of developing the proposed regulation to permit tribes to have meaningful and timely input into its development. The EPA sent consultation letters to the leaders of all of the federally recognized tribes. The letters provided information regarding the EPA's development of emission guidelines for existing power plants and offered consultation. The EPA held a consultation with the Ute Tribe, the Crow Nation, and the MHA Nation on July 18, 2014. On August 22, 2014, the EPA held a consultation with the Fort Mojave Tribe. On September 15, 2014, the EPA held a consultation with the Navajo Nation. The Navajo Nation sent a letter to the EPA on September 18, 2014, summarizing the information presented at the consultation and the Navajo Nation's position on this supplemental proposal. One issue raised by tribal officials was the potential impacts of the June 18, 2014, proposal and this supplemental proposal on tribes with budgets that are dependent on revenue from coal mines and power plants, as well as employment at the mines and power plants. The tribes noted the high unemployment rates and lack of access to basic services on their lands. Tribal officials also asked whether the rules will

have any impact on a tribe's ability to seek TAS. Tribal officials also expressed interest in agency actions with regard to facilitating power plant compliance with regulatory requirements. The Navajo Nation made the following recommendations in their letter of September 18, 2014: the Navajo Nation supports a mass-based CO_2 emission standard based on the highest historical CO_2 emissions since 1996; the Navajo Nation requests that the EPA grant the Navajo Nation carbon credits and that the Navajo Nation retains ownership and control of such credits; building block 2 is not appropriate for the Navajo Nation because there are no NGCC plants located on the Navajo Nation; building block 3 is not appropriate for the Navajo Nation because the Navajo people already receive virtually all of their electricity from carbon-free sources (mostly hydroelectric power) and their use of electricity is negligible compared to the generation at the power plants; building block 4 is not appropriate for the Navajo Nation because of the inadequate access to electricity, and the goal should allow for an increase in energy consumption on the Navajo Nation; the supplemental proposal should consider the useful life of the power plants located on the Navajo Nation; and the supplemental proposal should clarify that RE projects located within the Navajo Nation that provide electricity outside the Navajo Nation should be counted toward meeting the relevant state's RE goals under the Clean Power Plan.

The EPA will continue the ongoing dialogue with tribal officials regarding this proposed action. During the public comment period for this proposal, the EPA will hold meetings with tribal environmental staff to inform them of the content of this proposal, as well as offer further consultation with tribal elected officials, where it is appropriate. The EPA specifically solicits additional comment on this proposed action from tribal officials.

During the public comment period for this proposal, the EPA will hold meetings with tribal environmental staff to inform them of the content of this proposal, as well as offer further consultation with tribal elected officials where it is appropriate. The EPA specifically solicits additional comment on this proposed action from tribal officials.

5.7 Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks

The EPA interprets Executive Order 13045 (62 FR 19885, April 23, 1997) as applying to those regulatory actions that concern health or safety risks, such that the analysis required under

section 5-501 of the Executive Order has the potential to influence the regulation. This action is not subject to Executive Order 13045 because it does not involve decisions on environmental health or safety risks that may disproportionately affect children. The EPA believes that the CO_2 emission reductions resulting from implementation of the proposed guidelines, as well as substantial ozone and $PM_{2.5}$ emission reductions as a co-benefit, would further improve children's health.

5.8 Executive Order 13211, Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use

This action is not a "significant energy action" as defined in Executive Order 13211 (66 FR 28355 (May 22, 2001)), because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Affected EGUs in areas of Indian country are expected to meet the proposed goals based on existing generation decisions or compliance with other regulations. In U.S. territories, the EPA anticipates a small degree of re-dispatch from coal- and oil-fired generation to natural gas-fired generation. It is possible that some portion of this shift away from coal- and oil-fired generation may occur in the absence of the rule, due primarily to the relatively high cost of petroleum-based fuel and electricity in these areas. For example, PREPA plans to add natural gas capacity at existing petroleum-burning plants. Additionally, both Guam and Puerto Rico are implementing Renewable Portfolio Standards programs which may contribute to implementing these goals at a different cost than projected in the RIA. The "Technical Support Document for Calculating Carbon Pollution Goals for Existing Power Plants in U.S. Territories and in Indian Country" provides additional information about PREPA's planned expansion of natural gas electricity generation and the Guam and Puerto Rico Renewable Portfolio Standards programs. The EPA does not account for these existing trends in this analysis due to data limitations. Additionally, since the EPA estimated these impacts without the use of an economic dispatch model, the EPA is potentially overstating the costs of implementation in these areas.

5.9 National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act (NTTAA) of 1995 (Public Law No. 104-113; 15 U.S.C. 272 note) directs the EPA to use voluntary consensus

standards (VCS) in its regulatory and procurement activities unless to do so would be inconsistent with applicable law or otherwise impractical. VCS are technical standards (e.g., materials specifications, test methods, sampling procedures and business practices) that are developed or adopted by one or more VCS bodies. The NTTAA directs the EPA to provide Congress, through OMB, explanations when the agency does not use available and applicable VCS. This proposed rulemaking does not involve technical standards.

The EPA welcomes comments on this aspect of the proposed rulemaking and specifically invites the public to identify potentially-applicable VCS and to explain why such standards should be used in this action.

5.10 Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order 12898 (59 FR 7629, February 16, 1994) establishes federal executive policy on environmental justice. Its main provision directs federal agencies, to the greatest extent practicable and permitted by law, to make environmental justice part of their mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies and activities on minority populations and low-income populations in the U.S.

Section II.A of the preamble to the proposed carbon pollution emission guidelines for existing EGUs (79 FR 34841-34843, June 18, 2014) summarizes the public health and welfare impacts from GHG emissions that were detailed in the 2009 Endangerment Finding under CAA section 202(a)(1).[21] As part of the Endangerment Finding, the Administrator considered climate change risks to minority or low-income populations, finding that certain parts of the population may be especially vulnerable based on their circumstances. These include the poor, the elderly, the very young, those already in poor health, the disabled, those living alone, and/or indigenous populations dependent on one or a few resources. The Administrator placed weight on the fact

[21] "Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act," 74 FR 66496 (Dec. 15, 2009) ("Endangerment Finding").

that certain groups, including children, the elderly and the poor, are most vulnerable to climate-related health effects.

Strong scientific evidence that the potential impacts of climate change raise environmental justice issues is found in the major assessment reports by the U.S. Global Change Research Program, the Intergovernmental Panel on Climate Change and the National Research Council of the National Academies, summarized in the record for the Endangerment Finding. Their conclusions include that poor communities can be especially vulnerable to climate change impacts because they tend to have more limited adaptive capacities and are more dependent on climate-sensitive resources such as local water and food supplies. In addition, Native American tribal communities possess unique vulnerabilities to climate change, particularly those on established reservations that are restricted to reservation boundaries and, therefore, have limited relocation options. Tribal communities whose health, economic well-being and cultural traditions depend upon the natural environment will likely be affected by the degradation of ecosystem goods and services associated with climate change. Southwest native cultures are especially vulnerable to water quality and availability impacts. Native Alaskan communities are likely to experience disruptive impacts, including shifts in the range or abundance of wild species crucial to their livelihoods and well-being. The most recent assessments continue to strengthen scientific understanding of climate change risks to minority and low-income populations.

This proposed rule would limit GHG emissions by establishing CO_2 emission guidelines for use in developing section 111(d) plans to address CO_2 emissions from affected EGUs. In addition to reducing CO_2 emissions, implementing the proposed rule through the development of section 111(d) plans would reduce other emissions from EGUs that become dispatched less frequently due to their relatively low energy efficiency. These emission reductions will include SO_2 and NOx, which form ambient $PM_{2.5}$ and ozone in the atmosphere, and HAP, such as mercury and hydrochloric acid. In the final rule revising the annual $PM_{2.5}$ NAAQS,[22] the EPA identified persons with lower socioeconomic status as an at-risk population for experiencing adverse health effects related to PM exposures. Persons with lower socioeconomic status have

[22] "National Ambient Air Quality Standards for Particulate Matter, Final Rule," 78 FR 3086 (Jan. 15, 2013).

been generally found to have a higher prevalence of pre-existing diseases, limited access to medical treatment, and increased nutritional deficiencies, which can increase this population's risk to PM-related and ozone-related effects.[23] Therefore, in areas where this rulemaking ultimately results in reductions in exposure to $PM_{2.5}$, ozone and methylmercury, persons with low socioeconomic status would also benefit.

While there will be many locations with improved air quality for $PM_{2.5}$, ozone and HAP, there may also be EGUs whose emissions of one or more of these pollutants or their precursors increase as a result of implementation of the proposed emission guidelines for existing fossil fuel-fired EGUs. This may occur at EGUs that become dispatched more intensively than in the past because they become more energy efficient. The EPA has considered the potential for such increases and the environmental justice implications of such increases.

As we noted in the preamble for the June 18, 2014, proposal, as part of a jurisdiction's section 111(d) plan, the jurisdiction may require an affected EGU to undertake physical or operational changes to improve the unit's efficiency that result in an increase in the unit's dispatch and an increase in the unit's annual emissions of GHGs and/or other regulated pollutants. However, a jurisdiction can take steps to avoid increased utilization of particular EGUs and emissions of regulated pollutants whose environmental effects would be more localized around the affected EGU. To the extent that jurisdictions take this path, there would be no new environmental justice concerns in the areas near such EGUs. In addition, the applicable jurisdiction or federal permitting program can adjust its section 111(d) plan to ensure that there are no new NAAQS exceedances and that no existing NAAQS exceedances are made worse. For those EGUs in a permitting situation for which the EPA is the permit reviewing authority, the EPA will consider environmental justice issues as required by Executive Order 12898.

In addition to some EGUs possibly being required by a jurisdiction to make modifications for increased energy efficiency, another potential effect of the proposed CO_2 emission guidelines for existing fossil fuel-fired EGUs would be increased utilization of other,

[23] U.S. Environmental Protection Agency (U.S. EPA). 2009. *Integrated Science Assessment for Particulate Matter (Final Report)*. EPA-600-R-08-139F. National Center for Environmental Assessment – RTP Division. December. Available on the Internet at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546.

unmodified EGUs with relatively low GHG emissions per unit of electrical output, in particular high efficiency gas-fired EGUs. Such plants would have more hours in the year in which they operate and emit pollutants, including pollutants whose environmental effects if any would be localized rather than global as is the case with GHG emissions. Changes in utilization already occur now as demands for and sources of electrical energy evolve, but the proposed CO_2 emission guidelines for existing fossil fuel-fired EGUs can be expected to cause more such changes. Because gas-fired EGUs emit essentially no mercury, increased utilization would not increase methylmercury concentrations in their vicinities. Increased utilization generally would not cause higher peak concentrations of $PM_{2.5,}$ NOx, or ozone around such EGUs than is already occurring because peak hourly or daily emissions generally would not change, but increased utilization may make periods of relatively high concentrations more frequent. It should be noted that the gas-fired sources that are likely to become dispatched more frequently than at present have very low emissions of primary PM, SO_2 and HAP per unit of electrical output, such that local (or regional) air quality for these pollutants is likely to be affected very little. For natural gas-fired EGUs, the EPA found that regulation of HAP emissions "is not appropriate or necessary because the impacts due to HAP emissions from such units are negligible based on the results of the study documented in the utility RTC [response to comments]."[24] In studies done by the U.S. Department of Energy National Energy Technology Laboratory comparing cost and performance of coal- and natural gas-fired generation, they assumed SO_2, PM (and Hg) emissions to be "negligible." Their studies predict NOx emissions from a NGCC unit to be approximately 10 times lower than a subcritical or supercritical coal-fired boiler. Many are also very well controlled for emission of NOx through the application of after combustion controls such as selective catalytic reduction, although not all gas-fired sources are so equipped. Depending on the specificity of the jurisdiction's CAA section 111(d) plan, the jurisdiction may be able to predict which EGUs and communities may be in this type of situation and to address any concerns about localized NOx concentrations in the design of the CAA section 111(d) program, or separately from the CAA section 111(d) program but before its implementation. In any case, existing tracking systems will allow jurisdictions and the EPA to be aware of the EGUs whose utilization has increased most significantly, and, thus, to be able to prioritize our efforts to

[24] 65 FR 79831.

assess whether air quality has changed in the communities in the vicinity of such EGUs. There are multiple mechanisms in the CAA to address situations in which air quality has degraded significantly. In conclusion, this proposed rule would result in regional and national pollutant reductions; however, there likely would also be some locations with more times during the year of relatively higher concentrations of pollutants with potential for effects on localized communities than would be experienced in the absence of the proposed rule. The EPA cannot exactly predict how emissions from specific EGUs would change as an outcome of the proposed rule due to the jurisdiction-led implementation. Therefore, the EPA has concluded that it is not practicable to determine whether there would be disproportionately high and adverse human health or environmental effects on minority, low income or indigenous populations from this proposed rule.

In order to provide opportunities for meaningful involvement early on in the rule making process, the EPA has hosted webinars and conference calls on August 27, 2013, and September 9, 2013, for the June 18, 2014, proposal specifically for environmental justice and tribal communities and has taken all comments and suggestions into consideration in the design of the emission guidelines. Additionally, after the June 18, 2014, rule was proposed the EPA hosted public hearings in Denver, Colorado, Atlanta, Georgia, Washington D.C. and Pittsburgh, Pennsylvania from July 29-August 1, 2014. Additionally, as referenced in the public hearing section of this proposal, the EPA will also be holding a public hearing on this supplemental proposal.

The public is invited to submit comments or identify peer-reviewed studies and data that assess effects of exposure to the pollutants addressed by this proposal.

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