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Federal Citations to the Social Cost of Greenhouse Gases

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Introduction

Executive Order 12866 requires that federal agencies assess the cost and the benefits of intended regulations as part of their regulatory impact analyses (RIAs). The 1993 executive order stated that "recognizing that some costs and benefits are difficult to quantify, [each agency shall] propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs."[1] In 2008, a federal appeals court remanded a rule in part because, despite acknowledging the uncertainty, the agency did not monetize climate-related benefits of anticipated emission reductions in its RIA.[2] In response, in 2008, federal agencies began using various values of the *social cost of carbon* (SCC or SC-CO_2) as a means to estimate the climate-related benefits of abating emissions of carbon dioxide (CO_2). Since then, they have begun using similar estimates for the benefits of reducing emissions of other greenhouse gases (GHG), including methane (CH_4) and nitrous oxide (N_2O).

The SC-CO_2 is an "estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year," according to a federal Interagency Working Group (IWG).[3] This group[4] developed a range of SC-CO_2 values "to make it possible for agencies to incorporate the social benefits from reducing carbon dioxide emissions into cost-benefit analyses of regulatory actions that have small, or 'marginal,' impacts on cumulative global emissions."[5] In the United States, the SC-CO_2 has been expressed as U.S. dollars per metric ton of carbon dioxide ($/t CO_2) for a given year's emissions. Agencies primarily used their own, differing SC-CO_2 values until the IWG recommended in 2009 a set of values to improve consistency across regulations. Estimations of the *social cost of methane* (SC-CH_4) and the *social cost of nitrous oxide* (SC-N_2O) have used methods similar to those for the SC-CO_2. Federal agencies began using the SC-CO_2 in regulatory actions in 2008, the SC-CH_4 in 2015, and SC-N_2O in 2016. Since August 2016, federal agencies collectively call these analyses and applications the *social cost of greenhouse gases* (SC-GHG).

This report compiles a table of *Federal Register* notices of 160 federal regulatory actions that specifically cite the SC-CO_2, SC-CH_4, SC-N_2O, or SC-GHG. The actions listed in **Table 1** were identified by searches online of the *Federal Register*[6] for the terms "social cost of carbon," "social cost of methane," "social cost of nitrous oxide," and "social cost." The table below reflects searches completed by March 20, 2017. **Table 1** first lists the actions that used the SC-CO_2 estimate and then the actions citing other SC-GHG estimates. The table includes proposed, final, and additional actions, sometimes for the same rule (so a simple count of entries in the table would double-count the number of regulations with benefits calculated using the SC-GHG estimates). All non-regulatory notices are omitted, including notices of funding availability for

[1] "Executive Order 12866 of September 30, 1993: Regulatory Planning and Review," 58 *Federal Register* 51735, October 4, 1993.

[2] *Center for Biological Diversity v. National Highway Traffic Safety Administration*, 538 F.3d 1172 (9th Cir. 2008).

[3] Interagency Working Group on Social Cost of Carbon, *Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866*, Office of Management and Budget, May 2013, revision of July 2015, http://www.whitehouse.gov/sites/default/files/omb/assets/inforeg/technical-update-social-cost-of-carbon-for-regulator-impact-analysis.pdf. This document was revised and released again on July 2, 2015.

[4] The original IWG was comprised of officials from the Executive Office of the President (Council of Economic Advisers, Council on Environmental Quality, National Economic Council, Office of Energy and Climate Change, Office of Management and Budget, Office of Science, and Technology Policy), along with the Departments of Agriculture, Commerce, Energy, Transportation, and Treasury and the Environmental Protection Agency. After 2010, the Department of Agriculture gained participation as well.

[5] Ibid.

[6] Federalregister.gov.

grant programs. One column identifies which version of the SC-CO_2, SC-CH_4, or SC-N_2O was cited in each regulatory action. In this report, CRS does not analyze the social cost values or methods used in the cited agency actions. In addition, this report does not review or analyze the listed actions.

Table 1. U.S. Federal Regulatory Actions Referring to the Social Cost of Carbon, the Social Cost of Methane, or the Social Cost of Nitrous Oxide

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a] [b]
			SOCIAL COST OF CARBON ACTIONS	
04/07/08	DOE	proposed	Energy Conservation Program (ECP)[c] for Commercial and Industrial Equipment: Packaged Terminal Air Conditioner and Packaged Terminal Heat Pump Energy Conservation Standards. 73 FR 18858.	IPCC 2007
05/02/08	DOT	proposed	Corporate Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015. 73 FR 24352.	own
07/30/08	EPA	advance notice	Advance Notice of Proposed Rulemaking for Regulating Greenhouse Gas Emissions Under the Clean Air Act. 73 FR 44354.	none
08/25/08	DOE	proposed	Commercial Ice-Cream Freezers; Self-Contained Commercial Refrigerators, Commercial Freezers, and Commercial Refrigerator-Freezers Without Doors; and Remote Condensing Commercial Refrigerators, Commercial Freezers, and Commercial Refrigerator-Freezers. 73 FR 50072.	IPCC 2007
10/07/08	DOE	final	ECP[b] for Commercial and Industrial Equipment: Packaged Terminal Air Conditioner and Packaged Terminal Heat Pump Energy Conservation Standards. 73 FR 58772.	IPCC 2007
10/17/08	DOE	proposed	ECP: Energy Conservation Standards (ESC) for Commercial Ice-Cream Freezers; Self-Contained Commercial Refrigerators, Commercial Freezers, and Commercial Refrigerator- Freezers Without Doors; and Remote Condensing Commercial Refrigerators, Commercial Freezers, and Commercial Refrigerator-Freezers. 73 FR 44354.	none
7/30/08	EPA & DOT	advance notice	Advance Notice of Proposed Rulemaking, Regulating Greenhouse Gas Emissions Under the Clean Air Act. FRL-8694-2.	own
01/09/09	DOE	final	ECS for Commercial Ice-Cream Freezers; Self-Contained Commercial Refrigerators, Commercial Freezers, and Commercial Refrigerator- Freezers Without Doors; and Remote Condensing Commercial Refrigerators, Commercial Freezers, and Commercial Refrigerator-Freezers. 74 FR 1092.	IPCC 2007 (corrects year of dollars)

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a b]
03/30/09	DOT	final	Corporate Average Fuel Economy Standards Passenger Cars and Light Trucks Model Year 2011. 74 FR 14196.	2009
04/08/09	DOE	final (amended)	Amends final rule ECS[b] for Certain Consumer Products (Dishwashers, Dehumidifiers, Microwave Ovens, and Electric and Gas Kitchen Ranges and Ovens) and for Certain Commercial and Industrial Equipment (Commercial Clothes Washers), and additional actions. 74 FR 16040. The *Federal Register* notice stated that DOE and other federal agencies were reviewing methodologies on the monetary value of reductions of CO_2 and other greenhouse gas emissions and would consider comments that are part of the public record on issues in this and other rulemakings. 74 FR 16040. (FR p. 16079).	own
04/13/09	DOE	proposed	ECS for General Service Fluorescent Lamps and Incandescent Reflector Lamps. 74 FR 16920.	own
05/26/09	DOE	proposed	ECS for General Service Fluorescent Lamps and Incandescent Reflector Lamps. 74 FR 24904.	own
05/26/09	EPA	proposed	Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program. 74 FR 24904.	own
05/29/09	DOE	proposed	ECS for Refrigerated Bottled or Canned Beverage Vending Machines. 74 FR 26020.	own
07/14/09	DOE	final	ECS and Test Procedures for General Service Fluorescent Lamps and Incandescent Reflector Lamps. 74 FR 34080.	own
07/22/09	DOE	final	ECS Energy Conservation Standards and Test Procedures for Commercial Heating, Air-Conditioning, and Water-Heating Equipment. 74 FR 36312.	own
08/31/09	DOE	final	Refrigerated Bottled or Canned Beverage Vending Machines. 74 FR 44914.	own
09/25/09	DOT	proposed	Proposed Rule and Notice of Availability of a Draft Environmental Impact Statement (DEIS) for New Corporate Average Fuel Economy Standards; Notice of Public Hearing. 74 FR 48894.	own
09/28/09	EPA & DOT	proposed	Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards. 74 FR 49454. This action marks the first FR notice of the federal interagency working group's 2010 values for SC-CO_2. The rule uses joint EPA/DOT values for SC-CO_2.	own

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a] [b]
11/09/09	DOE	proposed	ECS for Certain Consumer Products (Dishwashers, Dehumidifiers, Microwave Ovens, and Electric and Gas Kitchen Ranges and Ovens) and for Certain Commercial and Industrial Equipment (Commercial Clothes Washers). 74 FR 57738.	own
11/24/09	DOE	proposed	ECS for Small Electric Motors. 74 FR 61410.	2009
12/11/09	DOE	proposed	ECS for Residential Water Heaters, Direct Heating Equipment, and Pool Heaters. 74 FR 65852.	own
01/08/10	DOE	final	ECS for Certain Consumer Products (Dishwashers, Dehumidifiers, Microwave Ovens, and Electric and Gas Kitchen Ranges and Ovens) and for Certain Commercial and Industrial Equipment (Commercial Clothes Washers). 75 FR 1121.	own
03/09/10	DOE	final	ECS for Small Electric Motors. 75 FR 10874.	2009
03/26/10	EPA	final	Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program. 75 FR 14669.	2009
04/16/10	DOE	final	ECS for Residential Water Heaters. 75 FR 20112.	2010
05/07/10	EPA & DOT	final	Light Duty Vehicle GHG Emissions and Corporate Average Fuel Economy Standards. 75 FR 25324. The notice states, "As part of the interagency group, EPA and NHTSA have critically evaluated the new SCC estimates and endorse them for use in these regulatory analyses, for the reasons presented below."	2010
05/01/10	DOT	final	Automatic Dependent Surveillance—Broadcast (ADS–B) Out Performance Requirements to Support Air Traffic Control Service. 75 FR 30160.	2010
06/21/10	EPA	other	Hazardous and Solid Waste Management System; Identification and Listing of Special Wastes; Disposal of Coal Combustion Residuals from Electric Utilities. 75 FR 35127.	2009
08/02/10	EPA	proposed	Federal Implementation Plans to Reduce Interstate Transport of Fine Particulate Matter and Ozone. 75 FR 45210.	2010
09/27/10	DOE	proposed	ECS for Residential Refrigerators, Refrigerator-Freezers, and Freezers. 75 FR 59469.	2010
10/14/10	EPA	proposed	Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Sewage Sludge Incineration Units. 75 FR 63260.	2010

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a] [b]
11/30/10	EPA & DOT	proposed	Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles. 75 FR 74151.	2010
12/08/10	EPA	proposed	2017 and Later Model Year Light-Duty Vehicle GHG Emissions and CAFE Standards: Supplemental Notice of Intent.	none
03/14/11	EPA	proposed	National Emission Standards for Mercury from Mercury Cell Chlor-Alkali Plants. 76 FR 13852.	2010
03/21/11	EPA	final	National Emission Standards for Industrial, Commercial, and Institutional Boilers and Process Heaters. 76 FR 15608.	2010
03/21/11	EPA	final	National Emission Standards for Industrial, Commercial, and Institutional Boilers and Process Heaters. 76 FR 15554.	2010
03/21/11	EPA	final	Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units. 76 FR 15703.	2010
04/21/11	DOE	final and proposed	ECS for Residential Clothes Dryers and Room AC. 76 FR 22454.	2010
06/27/11	DOE	final and proposed	ECS for Residential Furnaces and Residential Central AC and Heat Pumps. 76 FR 37408.	2010
08/08/11	EPA	final	Interstate Transport of Fine PM and Ozone. 76 FR 48208.	2010
08/23/11	EPA	proposed	Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews. 76 FR 52737.	2010
09/15/11	EPA & DOT	final	GHG Emission Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Vehicles. 76 FR 57105.	2010
09/15/11	DOE	final	ECS for Residential Refrigerators. 76 FR 57516.	2010
11/14/11	DOE	final	ECS for Fluorescent Lamp Ballasts. 76 FR 70548.	2010
12/01/11	EPA & DOT	proposed	2017 and Later Model Year Light Duty Vehicle GHG Emissions and Corporate Average Fuel Economy Standards. 76 FR 74854.	2010
12/23/11	EPA	proposed	New Source Performance Standards: Commercial and Industrial Solid Waste Incineration Units. 76 FR 80452.	2010
01/17/12	DOE	proposed	ECS for Commercial Heating, AC, and Water Heating Equipment. 77 FR 2356.	2010

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a] [b]
02/10/12	DOE	proposed	ECS for Distribution Transformers. 77 FR 7282.	2010
02/14/12	DOE	proposed	ECS for Standby Mode and Off Mode for Microwave Ovens. 77 FR 8526.	2010
02/16/12	EPA	final	National Emission Standards for Hazardous Air Pollutants from Coal- and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-, Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units. 77 FR 9303.	2010
03/27/12	DOE	proposed	ECS for Battery Chargers and External Power Supplies. 77 FR 18477.	2010
04/13/12	EPA	proposed	Standards of Performance for Greenhouse Gas Emissions for New Stationary Sources; Electric Utility Generating Units. 77 FR 22391.	2010
05/16/12	DOE	final	ECS for Certain Industrial Equipment: Energy Conservation Standards and Test Procedures for Commercial Heating, Air-Conditioning, and Water-Heating Equipment. 77 FR 28927.	2010
05/30/12	DOE	final	ECS for Certain Industrial Equipment: Energy Conservation Standards and Test Procedures for Commercial Heating, Air-Conditioning, and Water-Heating Equipment. 77 FR 28927.	2010
05/30/12	DOE	final	ECS for Residential Dishwashers. 77 FR 31917.	2010
05/31/12	DOE	proposed	ECS for Residential Clothes Washers. 77 FR 32381.	2010
05/31/12	DOE	final	Direct final rule ECS Residential Clothes Washers. 77 FR 32307.	2010
08/16/12	EPA	final	Oil and Natural Gas Sector: New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants Reviews. 77 FR 49489.	2010
09/12/12	EPA	lifted stay on final rule	EPA lifts stay on 2008 final rule Standards of Performance for Petroleum Refineries; Standards of Performance for Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced after May 14, 2007. 77 FR 56421.	2010
10/01/12	DOT	final (confirms)	Confirms final rule Energy Conservation Program: Energy Conservation Standards for Dishwashers. 77 FR 59712.	2010
10/15/12	EPA & DOT	final	2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards. 77 FR 62623.	2010

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a] [b]
01/31/13	EPA	final	National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters. 78 FR 7137.	2010
04/18/13	DOE	final	ECS for Distribution Transformers. 78 FR 23335.	2010
06/07/13	EPA	proposed	Effluent Limitation Guidelines and Standards for the Steam Electric Power Generating Point Source Category. 78 FR 34431.	2010
06/17/13	DOE	final	ECS for Standby Mode and Off Mode for Microwave Ovens. 78 FR 36315.	2013a
08/16/13	DOE	request for comments	Energy Conservation Program for Consumer Products: Landmark Legal Foundation; Petition for Reconsideration.	none
08/20/13	DOE	proposed	ECS for Metal Halide Lamp Fixtures. 78 FR 51463.	2013a
09/11/13	DOE	proposed	ECS for Walk-In Coolers and Freezers. 78 FR 55889.	2013a
09/11/13	DOE	proposed	ECS for Commercial Refrigeration Equipment. 78 FR 55781.	2013a
10/25/13	DOE	proposed	ECS for Residential Furnace Fans. 78 FR 64067.	2013a
12/06/13	DOE	proposed	ECS for Commercial and Industrial Electric Motors. 78 FR 73589.	2013b
01/08/14	EPA	reproposed	Standards of Performance for Greenhouse Gas Emissions from New Stationary Sources: Electric Utility Generating Units. 79 FR 1429	2013b
02/10/14	DOE	final	ECS for Metal Halide Lamp Fixtures. 79 FR 7745.	2013b
02/10/14	DOE	final	ECS for External Power Supplies. 79 FR 7845.	2013b
03/04/14	DOE	proposed	ECS for Commercial Clothes Washers. 79 FR 12301.	2013b
03/17/14	DOE	proposed	ECS for Automatic Commercial Ice Makers. 79 FR 14845.	2013b
03/28/14	DOE	final	ECS for Commercial Refrigeration Equipment. 79 FR 17725.	2013b
04/15/14	HUD, USDA	notice of preliminary determination	Preliminary Affordability Determinations: Energy Efficiency Standards. 79 FR 21259.	2013b

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a b]
04/29/14	DOE	proposed	ECS for General Service Fluorescent Lamps and Incandescent Reflector Lamps. 79 FR 24067.	2013b
05/29/14	DOE	final	ECS for Commercial and Industrial Electric Motors. 79 FR 30933.	2013b
06/03/14	DOE	final	ECS for Walk-In Coolers and Freezers. 79 FR 32049.	2013b
06/18/14	EPA	proposed	Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units. 79 FR 34829.	2013b
06/18/14	EPA	proposed	Carbon Pollution Standards for Modified and Reconstructed Stationary Sources: Electric Utility Generating Units. 79 FR 34959.	2013b
07/03/14	DOE	final	ECS for Residential Furnace Fans; Final Rule. 79 FR 38129.	2013b
08/15/14	EPA	final	National Pollutant Discharge Elimination System: Cooling Water Intake Structures at Existing Facilities and Phase I Facilities; Requirements. 79 FR 48299.	2013b
09/11/14	DOE	revised analysis	ECS for Automatic Commercial Ice Makers: Availability of Revised Rulemaking Analysis; Notice of Data Availability (NODA). 79 FR 54215.	2013b.
09/16/14	DOE	proposed	ECS for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps; Notice of Proposed Rulemaking (NOPR). 79 FR 55537.	2013b
09/30/14	DOE	proposed	ECS for Small, Large, and Very Large Air-Cooled Commercial Package Air Conditioning and Heating Equipment. 79 FR 58947.	2013b
10/14/14	DOE	proposed	Fossil-Fuel-Generated Energy Consumption Reduction for New Federal Buildings and Major Renovations of Federal Buildings. 79 FR 61693.	2013b
11/04/14	EPA	proposed	Carbon Pollution Emission Guidelines for Existing Stationary Sources: EGUs in Indian Country and U.S. Territories; Multi-Jurisdictional Partnerships. 79 FR 65481.	2013b
12/15/14	DOE	final	ECS for Commercial Clothes Washers. 79 FR 74491.	2013b
12/19/14	DOE	proposed	ECS for Residential Dishwashers. 79 FR 76141.	2013b
12/30/14	DOE	proposed	ECP for Certain Industrial Equipment: ECS for Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps. 79 FR 78613.	2013b

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a] [b]
01/08/15	DOE	proposed	ECP for Certain Industrial Equipment: ECS and Test Procedures for Commercial Heating, Air-Conditioning, and Water-Heating Equipment. 80 FR 1171.	2013b
01/26/15	DOE	final	ECS for General Service Fluorescent Lamps and Incandescent Reflector Lamps. 80 FR 4041.	2013b
01/28/15	DOE	final	ECS for Automatic Commercial Ice Makers. 80 FR 4645.	2013b
02/04/15	DOE	proposed	ECP for Certain Industrial Equipment: ECS for Commercial Warm Air Furnaces. 80 FR 6181.	2013b
02/09/15	DOE	proposed	ECP for Consumer Products: ECS for Hearth Products. 80 FR 7081.	2013b
03/12/15	DOE	proposed	ECP for Consumer Products: ECS for Residential Furnaces. 80 FR 13119.	2013b
03/16/15	EPA	proposed	Standards of Performance: New Residential Wood Heaters, New Residential Hydronic Heaters and Forced-Air Furnaces. 80 FR 13671.	2013b
03/31/15	DOE	proposed	ECS for Residential Boilers. 80 FR 17221.	2013b
04/02/15	DOE	proposed	ECS for Pumps. 80 FR 17825.	2013b
05/06/15	USDA, HUD	final	Final Affordability Determination Energy Efficiency Standards. 80 FR 25901.	2013b
05/21/15	DOT	proposed	Pipeline and Hazardous Materials Safety Administration: Draft Regulatory Impact Analysis for Plastic Pipe Rule. Posted in docket.	2013b
06/03/15	DOE	proposed	ECS for Residential Dehumidifiers. 80 FR 31645.	2013b
06/10/15	DOE	proposed	ECS for Residential Conventional Ovens. 80 FR 33029.	2013b
07/09/15	DOE	proposed	ECS for Commercial Prerinse Spray Valves. 80 FR 39485.	2013b
07/13/15	EPA	proposed	Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles-Phase 2. 80 FR 40137.	2013b
07/17/15	DOE	final	ECP for Certain Industrial Equipment: Energy Conservation Standards and Test Procedures for Commercial Heating, Air-Conditioning, and Water-Heating Equipment. 80 FR 42613.	2013b

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a] [b]
07/21/15	DOE	final	ECS for Packaged Terminal Air Conditioners and Packaged Terminal Heat Pumps. 80 FR 43161.	2013b
07/27/15	DOI	proposed	Office of Surface Mining Reclamation and Enforcement. Stream Protection Rule. 80 FR 44435.	2013b
08/13/15	DOE	proposed	ECS for Ceiling Fan Light Kits. 80 FR 48623.	2013b
08/09/15	DOE	proposed	ECS for Refrigerated Bottled or Canned Beverage Vending Machines. 80 FR 50461.	2015
08/27/15	EPA	proposed	Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills. 80 FR 52099.	2015
09/01/15	DOE	proposed	ECS for Battery Chargers. 80 FR 52849.	2015
09/23/15	DOE	final	ECS for Single Package Vertical Air Conditioners and Single Package Vertical Heat Pumps. 80 FR 57437.	2015
10/23/15	EPA	proposed	Federal Plan Requirements for Greenhouse Gas Emissions From Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations. 80 FR 64965.	2015
10/23/15	EPA	final	Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units. 80 FR 64661.	2015
11/03/15	EPA	final	Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category. 80 FR 67837.	2013b
11/20/15	FS	proposed	Roadless Area Conservation; National Forest System Lands in Colorado. 80 FR 72665.	2015
12/03/15	EPA	proposed	Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS. 80 FR 75705.	2015
01/06/16	DOE	final	ECS for Ceiling Fan Light Kits. 81 FR 579.	2015
01/08/16	DOE	final	ECS for Refrigerated Bottled or Canned Beverage Vending Machines. 81 FR 1027.	2015
01/13/16	DOE	proposed	ECS for Ceiling Fans. 81 FR 1687.	2015
01/15/16	DOE	final	ECS for Residential Boilers. 81 FR 2319.	2015

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a] [b]
01/15/16	DOE	direct final	ECP for Certain Industrial Equipment: ECS for Small, Large, and Very Large Air-Cooled Commercial Package Air Conditioning and Heating Equipment and Commercial Warm Air Furnaces. 81 FR 2419.	2015
01/26/16	DOE	final	ECS for Pumps. 81 FR 4367.	2015
01/27/16	DOE	final	ECS for Commercial Prerinse Spray Valves. 81 FR 4747.	2015
02/09/16	FAA	proposed	Stage 5 Airplane Noise Standards. Cost-benefit analysis referenced in 81 FR 1923.	2015
03/07/16	FAA	proposed	Minimum Training Requirements for Entry-Level Commercial Motor Vehicle Operators.	2015
03/17/16	DOE	proposed	ECS for General Service Lamps. 81 FR 14527.	2015
03/24/16	DOE	proposed	ECS for Commercial Packaged Boilers. 81 FR 15835.	2015
05/19/16	DOE	proposed	ECS for Compressors. 81 FR 31679.	2015
05/31/16	DOE	proposed	ECS for Commercial Water Heating Equipment. 81 FR 34439.	2015
06/13/16	DOE	proposed	ECS for Portable Air Conditioners. 81 FR 38397.	2015
06/13/16	DOE	final	ECS for Battery Chargers. 81 FR 38265.	2015
06/13/16	DOE	final	ECS for Dehumidifiers. 81 FR 38337.	2015
06/17/16	DOE	proposed	ECS for Manufactured Housing. 81 FR 39755.	2015
07/13/16	EPA, NHTSA	final	Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles-Phase 2. 80 FR 40137.	GWP and 2015
08/05/16	DOE	proposed	ECS for Uninterruptible Power Supplies. 81 FR 52195.	2015
08/29/16	EPA	final	Standards of Performance for Municipal Solid Waste Landfills. 81 FR 59331.	2015
08/29/16	EPA	final	Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills. 81 FR 59275.	2015

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a] [b]
09/02/16	DOE	proposed	ECS for Residential Conventional Cooking Products. 81 FR 60783.	2015
09/13/16	DOE	proposed	ECS for Walk-In Cooler and Freezer Refrigeration Systems. 81 FR 62979.	2015
09/23/16	DOE	proposed	ECS for Residential Furnaces. 81 FR 65719.	2015
10/26/16	EPA	final	Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS. 81 FR 74504.	2015
10/28/16	DOE	final	ECS for Miscellaneous Refrigeration Products. 81 FR 75194.	2015
11/18/16	BLM	final	Waste Prevention, Production Subject to Royalties, and Resource Conservation.	2014
12/08/16	FMCSA	final	Minimum Training Requirements for Entry-Level Commercial Motor Vehicle Operators. 81 FR 88732.	2015
12/13/16	DOE	final	ECS for Residential Dishwashers. 81 FR 90072.	2015
12/19/16	FS	final	Roadless Area Conservation; National Forest System Lands in Colorado. 81 FR 91811.	2015
12/20/16	SMREO	final	Stream Protection Rule. 81 FR 93066.	2015
01/06/17	DOE	direct final	ECS for Residential Central Air Conditioners and Heat Pumps. 82 FR 1786.	2015
01/18/17	DOE	direct final	ECS for Dedicated-Purpose Pool Pumps. 82 FR 5650.	2015
01/18/17	DOE	final	ESC for Ceiling Fans. 82 FR 6826.	2015
			SOCIAL COST OF METHANE ACTIONS	
08/27/15	EPA	proposed	Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills. 80 FR 52099.	2015
09/18/15	EPA	proposed	Oil and Natural Gas Sector: Emission Standards for New and Modified Sources. 80 FR 56593.	2015
02/08/16	BLM	proposed	Waste Prevention, Production Subject to Royalties, and Resource Conservation. 81 FR 6615.	2015

Date	Agency	Regulatory or Related Action	Action	Version of Estimate Used[a b]
06/03/16	EPA	final	Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources. 81 FR 35823.	2015
06/13/16	EPA and NHTSA	final	Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles-Phase 2. 80 FR 40137. (Also listed for SC-CO_2 and SC-N_2O.)	GWP and 2015
08/29/16	EPA	final	Standards of Performance for Municipal Solid Waste Landfills. 81 FR 59331.	2015
08/29/16	EPA	final	Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills. 81 FR 59275.	2015
09/13/16	DOE	proposed	ECS for Walk-In Cooler and Freezer Refrigeration Systems. 81 FR 62979. (Also listed for SC-CO_2 and SC-N_2O.)	2015
11/18/16	BLM	final	Waste Prevention, Production Subject to Royalties, and Resource Conservation.	2014
12/19/16	FS	final	Roadless Area Conservation; National Forest System Lands in Colorado. 81 FR 91811.	2015
01/18/17	DOE	direct final	ECS for Dedicated-Purpose Pool Pumps. 82 FR 5650.	2016
			SOCIAL COST OF NITROUS OXIDE	
10/15/12	EPA, NHTSA	final	2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards. 77 FR 62623.	Sensitivity analysis only[d]
07/13/16	EPA, NHTSA	final	Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles-Phase 2. 80 FR 40137. (Also listed for SC-CO_2 and SC-CH_4.)	GWP and 2015
08/29/16	EPA	final	Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills. 81 FR 59275.	2015
09/13/16	DOE	proposed	ECS for Walk-In Cooler and Freezer Refrigeration Systems. 81 FR 62979. (Also listed for SC-CO_2 and SC-CH_4.)	2015
10/28/16	DOE	final	ECS for Miscellaneous Refrigeration Products. 81 FR 75194. (Also listed for SC-CO_2 and SC-CH_4.)	2015
01/18/17	DOE	direct final	ECS for Dedicated-Purpose Pool Pumps. 82 FR 5650.	2016

Source: CRS, from searches in FederalRegister.gov. This table includes regulation-related actions only, not other federal actions, such as grant programs. It also does not include notices of comments received except when accompanied by the agency responses to comments.

Notes:

"GWP" means Global Warming Potential, an index that weights GHG according to an estimate of their effect on average temperature change relative to the same mass of carbon dioxide.

Abbreviations for offices, departments, and agencies are as follows:

BLM: Department of the Interior Bureau of Land Management

CEQ: Executive Office of the President Council on Environmental Quality

DOE: Department of Energy

DOI: Department of the Interior

DOT: Department of Transportation

EPA: Environmental Protection Agency

FAA: Department of Transportation Federal Aviation Administration

FS: Department of Agriculture Forest Service

FMCSA: Department of Transportation, Federal Motor Carrier Safety Administration

HUD: Department of Housing and Urban Development

NHTSA: Department of Transportation National Highway Traffic Safety Administration

OMB: Executive Office of the President Office of Management and Budget

SMREO: Department of the Interior, Surface Mining Reclamation and Enforcement Office

USDA: Department of Agriculture

a. "SCC" and "SC-CO_2" both mean Social Costs of Carbon. "SC-CH_4" means Social Costs of Methane. "SC-N_2O" means Social Costs of Nitrous Oxide.

b. Tables of the SC-CO_2 values from the 2010 to 2016 references for this column are in an Appendix to this report. This column provides the date and origin of the values of SC-CO_2 or SC-CH_4 referred to in the associated federal action. Versions formerly available on whitehouse.gov are no longer available there.

"None" means that, although the SC-CO_2 or SC-CH_4 may have been mentioned, no quantitative value appeared to be used in that action; some cited actions invite comment on the use of such values.

"IPCC" means SC-CO_2 values from the 2007 assessment of the Intergovernmental Panel on Climate Change (IPCC); "own" means values developed by an agency (sometimes in collaboration with another) and reported in that regulatory action;

"2009" means interim interagency values as published in Table III.H.6–3, p. 29617 of the joint EPA and DOT-NHTSA "Proposed Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards," 74 *Federal Register* 186, September 28, 2009; "2010" means agreed interagency values released in Interagency Working Group on Social Cost of Carbon, "Technical Support Document: Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," February 2010;

"2013a" means updated values released in Interagency Working Group on Social Cost of Carbon, "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," May 2013;

"2013b" means revised (corrected) values released in Interagency Working Group on Social Cost of Carbon, "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," May 2013, revised November 2013.

"2015" means the July 2, 2015 revision to the Technical Update document.

The 2015 source for the SC-CH4 is A. L. Marten et al., "Incremental CH4 and N2O Mitigation Benefits Consistent with the U.S. Government's SC-CO2 Estimates," Climate Policy (2014, online publication; 2015, print publication); and Marten et al., "Corrigendum," Climate Policy, vol. 15, no. 5 (2015);

"2016" is the Interagency Working Group on Social Cost of Greenhouse Gases, "Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide." August 2016.

c. "ECP" means Energy Conservation Program. "ECS" means Energy Conservation Standard(s).

d. The *Federal Register* notice described two methods to compute the social costs of non-CO_2 gases, a "GWP approach" and the "Marten approach." The proposed rule noted that EPA was undertaking peer review of the application of the Marten et al. (2014) non-CO_2 social cost estimates in regulatory analysis. Pending a favorable peer review, EPA planned to include estimated monetized benefits of CH_4 and N_2O emission reductions in the main benefit-cost analysis of the RIA for the final rule, using the directly modeled estimates of SC-CH_4 and SC-N_2O from Marten et al. The Federal Register notice sought comments on the use of the Marten approach for non-CO_2 GHG. It also noted that work was in progress to develop methods to calculate the social cost of tropospheric ozone on climate change, though none was applied for this proposal.

Appendix. Versions of the Social Cost of GHG Used in Federal Regulatory Actions, 2010 to 2015

Table A-1. Social Costs of Carbon Used Prior to Interagency Working Group

per metric ton of carbon dioxide

Source	Estimate(s) Used	Year of Dollars	Comments
IPCC 2007	0-14a	Treated as if 2007	Derived from mean of a literature review (Tol 2005), inflating year of dollars from 2000 to 2007 then discounting streams of estimated benefits to 2007 present values at 3% and 7%
NHTSA	7, growing at 2.4% per year of emissions	2011	Based also on Tol 2005, using it as an upper bound with 0 as a lower bound and using the midpoint of that range. Performed sensitivity analysis for 0 and 14.
EPA and NHTSA	0-11 for global benefits; 0.3-1.9 for domestic benefits	2006	Proposed rules states, "Given the current uncertainty regarding the social cost of carbon, Table VI-2 does not include a monetized value for the reduction in GHG emissions. We present here a number of different values and indicate what impact they would have on the net social benefits for our updated analysis. Presentation of these values does not represent, and should not be interpreted to represent, any determination by EPA as to what the social cost of carbon should be for purposes of calculating benefits pursuant to the Clean Air Act."
IPCC 2007	0-20	2007	In 2009, DOE corrected the year of dollars from that used in IPCC 2007 cited above. It used updated estimate in Tol 2007. See https://www.federalregister.gov/documents/2009/01/09/E8-31449/energy-conservation-program-for-commercial-and-industrial-equipment-energy-conservation-standards.

Source: DOE, "Energy Conservation Program (ECP)[c] for Commercial and Industrial Equipment: Packaged Terminal Air Conditioner and Packaged Terminal Heat Pump Energy Conservation Standards," 73 *Federal Register* 18858, April 7, 2008; NHTSA, "Corporate Average Fuel Economy Standards, Passenger Cars and Light Trucks; Model Years 2011-2015," 73 *Federal Register* 24352, May 2, 2008, https://www.federalregister.gov/documents/2008/05/02/08-1186/average-fuel-economy-standards-passenger-cars-and-light-trucks-model-years-2011-2015; R. S. J. Tol, "The Social Cost of Carbon: Trends, Outliers, and Catastrophes," *Research Unit Sustainability and Global Change,* Working Paper FNU-144*,* Hamburg University, 2007.

Notes:

a. DOE reports, "The literature review (Tol 2005) from which this mean was derived did not report the year in which these dollars are denominated. However, since the underlying studies spanned several years on either side of 2000, the estimate is often treated as year 2000 dollars. Updating that estimate to 2007 dollars yields a SCC of $14 per ton of carbon dioxide."

Table A-2. 2010 Interagency Working Group on the Social Cost of Carbon

(2007 dollars per metric ton of CO_2)

Discount Rate	5% Average	3% Average	2.5% Average	3% 95th Percentile
2010	4.7	21.4	35.1	64.9
2015	5.7	23.8	38.4	72.8
2020	6.8	26.3	41.7	80.7
2025	8.2	29.6	45.9	90.4
2030	9.7	32.8	50.0	100.0
2035	11.2	36.0	54.2	109.7
2040	12.7	39.2	58.4	119.3
2045	14.2	42.1	61.7	127.8
2050	15.7	44.9	65.0	136.2

Source: Interagency Working Group on Social Cost of Carbon, "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," February 2010.

Table A-3. May 2013 Technical Update of the Social Cost of Carbon

Revised social cost of CO_2, 2010-2050 (in 2007 dollars per metric ton of CO_2)

Discount Rate:	5% Average	3% Average	2.5% Average	3% 95th Percentile
2010	11	33	52	90
2015	12	38	58	109
2020	12	43	65	129
2025	14	48	70	144
2030	16	52	76	159
2035	19	57	81	176
2040	21	62	87	192
2045	24	66	92	206
2050	27	71	99	221

Source: Interagency Working Group on Social Cost of Carbon, "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," May 2013.

Table A-4. July 2015 Revision of the May 2013 Technical Update of the Social Cost of Carbon

in 2007 dollars per metric ton of CO_2

Discount Rate	5.0% Average	3.0% Average	2.5% Average	3.0% 95th Percentile
2010	10	31	50	86
2015	11	36	56	105
2020	12	42	62	123
2025	14	46	68	138
2030	16	50	73	152
2035	18	55	78	168
2040	21	60	84	183
2045	23	64	89	197
2050	26	69	95	212

Source: Interagency Working Group on Social Cost of Carbon, "Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," May 2013, revised November 2013.

Table A-5. August 2016 Revision of the Social Cost of Carbon

in 2007 dollars per metric ton CO_2

Discount Rate:	5% Average	3% Average	2.5% Average	3% 95th percentile
2015	11	36	56	105
2020	12	42	62	123
2025	14	46	68	138
2030	16	50	73	152
2035	18	55	78	168
2040	21	60	84	183
2045	23	64	89	197
2050	26	69	95	212

Source: Interagency Working Group on Social Cost of Greenhouse Gases, "Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866," May 2013, Revised August 2016.

Table A-6. 2015 Social Cost of Methane (SC-CH_4)

in 2007 dollars per metric ton of CH_4

Discount Rate	5.0% Average	3.0% Average	2.5% Average	3.0% 95th Percentile
2012	$430	$1,000	$1,400	$2,800
2015	490	1,100	1,500	3,000
2020	580	1,300	1,700	3,500
2025	700	1,500	1,900	4,000
2030	820	1,700	2,200	4,500
2035	970	1,900	2,500	5,300
2040	1,100	2,200	2,800	5,900
2045	1,300	2,500	3,000	6,600
2050	1,400	2,700	3,300	7,200

Source: A. L. Marten et al., "Incremental CH_4 and N_2O Mitigation Benefits Consistent with the U.S. Government's SC-CO_2 Estimates," *Climate Policy* (2014, online publication; 2015, print publication); and Marten et al., "Corrigendum," *Climate Policy*, vol. 15, no. 5 (2015).

Notes: The values are emissions-year specific. Estimates using several discount rates are included because the literature shows that estimates of the SC-CO_2 (and SC-CH_4) are 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 SC-CH_4 estimates across three models using a 3% discount rate. It is included to represent higher-than-expected impacts from temperature change further out in the tails of the SC-CH_4 distribution. Marten et al., adjusted the estimates in this table to reflect the 2015 minor technical corrections to the SC-CO_2 estimates.

Table A-7. August 2016 Social Cost of Methane (SC-CH_4)

in 2007 dollars per metric ton CH_4

Discount Rate:	5% Average	3% Average	2.5% Average	3% 95th percentile
2015	450	1,000	1,400	2,800
2020	540	1,200	1,600	3,200
2025	650	1,400	1,800	3,700
2030	760	1,600	2,000	4,200
2035	900	1,800	2,300	4,900
2040	1,000	2,000	2,600	5,500
2045	1,200	2,300	2,800	6,100
2050	1,300	2,500	3,100	6,700

Source: Interagency Working Group on Social Cost of Greenhouse Gases, "Addendum to the Technical Support Document for the Social Cost of Carbon: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide," August 2016.

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