	Clean Power Plan (2016$)			NSPS for Oil & Gas Sector (2016$)		Light-Duty 2012-2016 (2016$)		Light-Duty 2017-2025 (2016$)		Heavy-Duty 2014-2018 (2016$)		Heavy-Duty 2019-2028 (2016$) [Alt 1a, Method B]	Methane Waste Prevention Rule (2016$) [with subpart OOOOa]		Total		
Emission Impacts	**2020**	**2025**	**2030**	**2020**	**2025**	**2020**	**2030**	**2020**	**2030**	**2020**	**2030**	**2025**	**2020**	**2025**	**2020 (all except heavy-duty rules)**	**2025 (all except both light-duty rules, heavy duty 2014-2018)**	**2030 (all except NSPS for oil & gas, heavy-duty 2019-2028, methane waste prevention rule)**
GHG (metric tons CO2e)	**-74,389,170**	**-239,496,840**	**-374,667,405**	**1,000,000**	**1,200,000**	**-156,300,000**	**-307,000,000**	**-27,000,000**	**-271,000,000**		**-76,000,000**	**-37,400,000**	**-4,014,294**	**-4,059,653**	**-260,703,464**	**-279,756,493**	**-979,667,405**
CO2 (short tons)	-82,000,000	-264,000,000	-413,000,000	1,000,000	1,200,000	-153,296,024	301,214,917	-25,353,160	-272,270,894		-80,415,859	-40,124,132			-259,649,184	-302,924,132	-409,409,137
CH4 (short tons)				-300,000	-510,000	-169,694	-333,393	-44,092	-264,555		117,913	-39,904	-177,000	-179,000	-690,786	-728,904	-642,040
N2O (short tons)						-333	-634	0	0		-208	-141			-333	-141	-634
SO2 (short tons)	-54,000	-185,000	-280,000												-54,000	-185,000	-280,000
NOx (short tons)	-60,000	-203,000	-278,000	510	600	5,881	21,763	-904	-6,509		-245,129	-22,710			-54,513	-225,110	-263,650
SOx (short tons)						13,832	27,443	-1,270	-13,377		-6,888	-6,080			12,562	-6,080	12,796
PM (short tons)				19	22										19	22	0
PM2.5 (short tons)						2,398	4,564	-136	-1,254		356	-1,110			2,262	-1,110	3,174
CO (short tons)				2,800	3,200	3,992	170,675	14,164	224,875		-55,579	-13,254			20,956	-10,054	409,714
HAP (short tons)				1,900	3,900	60,187	-115,542	-11,712	-123,070						50,375	3,900	-250,324
VOC (short tons)				150,000	210,000	-10,278	-20,050	-2,313	-14,646		-29,932	-5,305	-256,000	-265,000	-118,591	-60,305	-37,009
HFC (short tons)											-336	-67				-67	

Benefits (millions)	**2020**	**2025**	**2030**	**2020**	**2025**	**2020**	**2030**	**2020**	**2030**	**2020**	**2030**	**2030**	**2020**	**2025**	**2020 (all except heavy-duty 2019-2028)**	**2025 (Clean Power Plan, NSPS for oil & gas, methane waste prevention)**	**2030 (all except NSPS for oil & gas, methane waste prevention rule)**
SC-GHG, 3% DR	$3,561	$12,948	$21,580	$381	$731	$4,237	$10,191	$697	$9,259	$1,114	$2,785	$5,418	$220	$261	$10,210	$13,939	$49,233
Other Benefits	$5,179	$18,343	$30,212			$52,927	$115,557	$9,852	$115,473	$11,363	$27,404	$32,094	$80	$166	$79,401	$18,509	$320,740
Total Benefits	**$8,740**	**$31,291**	**$51,792**			**$57,209**	**$125,747**	**$10,549**	**$124,732**	**$12,477**	**$30,189**	**$37,512**	**$301**	**$427**	**$89,275**	**$31,718**	**$369,973**
Costs (millions)																	
Compliance	$1,511	$3,237	$5,503	$339	$561	$17,862	$18,091	$10,118	$39,526	$2,228	$2,451	$5,627	$168	$219	$32,226	$4,017	$71,197
Other Costs						$2,634	$5,267	$621	$6,287	$223	$446	$417			$3,477	$0	$12,416
Total Costs	**$1,511**	**$3,237**	**$5,503**	**$339**	**$561**	**$20,496**	**$23,358**	**$10,739**	**$45,813**	**$2,451**	**$2,896**	**$6,044**	**$168**	**$219**	**$35,703**	**$4,017**	**$83,614**
Net Benefits (millions)	**$7,229**	**$28,054**	**$46,397**	**$37**	**$180**	**$34,694**	**$100,417**	**$168**	**$81,364**	**$10,026**	**$27,293**	**$31,468**	**$133**	**$209**	**$52,288**	**$28,443**	**$286,939**

Jobs	**2020**	**2025**	**2030**	**2020 (job-years)**	**2025 (job-years)**	**2020**	**2030**	**2020 (job-years)**	**2030 (job-years)**	**2020**	**2030**	**2020 (job-years)**	**2025 (job-years)**	**2020**	**2025**	**2020 (Clean Power Plan, NSPS, Light-Duty 2017-2015, Heavy Duty 2018-2025)**	**2025 (Clean Power Plan, NSPS, Heavy-Duty 2018-2025)**	**2030 (Clean Power Plan)**
	2500 job-years;	15,000 job-years;	22,800 job-years;														
Jobs ↑	37,570 - 59,700 jobs	52,590 - 83,590 jobs	52,440 to 83,360 jobs	270 one-time; 1,100 annually	270 one-time; 1,800 annually	?		2100 - 10,500		?		0-300	400-4,100	-		14670 job-years; 59,700 jobs	21,170 job-years; 83,500 jobs	22,800 job-years; 83,360 jobs
Jobs ↓	15,700 job-years	41,000 job-years	56,600 job years	?	?	?		?		?		?	?	-		15700 job-years	41,000 job-years	56,600 job-years
	-13,100 job-years;	-26,000 job-years to	-33,700 job-years;															
Net Jobs	37,570 - 59,700 jobs	52,590 - 83,590 jobs	52,440 to 83,360 jobs	~1370	~2070	?		~2100 - 10,500		?		~0-300	~400-4,100	-		**-1030 job-years; 59,700 jobs**	**-19,830 job-years; 83,500 jobs**	**-33,800 job-years; 83,360 jobs**

Public Health Impacts (PM2.5- & ozone-related)	**2020**	**2025**	**2030**	**2020**	**2025**	**2020**	**2030**	**2020**	**2030**	**2020**	**2030**	**2025**	**2020**	**2025**	**2030 (all except NSPS, Heavy-Duty 2019-2028, Methane Waste Prevention Rule)**
Avoided Premature Mortality (adult) [both]			2,920				146		279		440				3,345
Avoided lower respiratory symptoms (age 7-14) [PM]			21,000				1,100		2,100		1,600				24,200
Avoided upper respiratory symptoms (asthmatics age 9-11) [PM]			30,000				850		1,600		1,200				32,450
Asthma exacerbation (age 6 - 18) [PM]							1,000		3,500		1,400				4,500
Emergency room visits for asthma [PM]			440				26		71		311				537
Lost work days (age 18 - 65) [PM]			130,000				7,600		14,000		9,700				151,600
Non-fatal heart attacks (age > 18) [PM]			1,400				100		130		150				1,630
Minor restricted-activity days (age 18-65) [both]			1,170,000				27,000		80,070		357,000				1,277,070
School absence days [ozone]			130,000				-7,700		-850		120,000				121,450

Notes:

- It is not possible to aggregate costs and benefits for all rules in a specific year, as the timeframe for the cost-benefit analysis varies for each rule. Thus, we provide estimates for 2020, 2025, and 2030, as well as information on which rules are covered.
- All figures are drawn from official analyses conducted by the federal agencies promulgating these rules. Third party studies have corroborated these findings and, in some cases, have found that the net benefits are even greater than what the agencies projected. These studies are discussed below.
- All $ values have been updated to 2016$ for consistency across rules. The factor 1.145 was used for conversions from 2007$, 1.114 for 2009$, 1.101 for 2010$, 1.079 for 2011$, 1.059 for 2012$, and 1.042 for 2013$. The Gross Domestic Product: Implicit Price Deflator maintained by the Federal Reserve Bank of St. Louis was used to calculate these factors.
- Net benefits are those as calculated by EPA, and may diverge from the difference of the costs and benefits due to rounding.
- These figures assume EPA's upper-bound estimate for the Clean Power Plan's net benefits under a mass-based compliance approach, applying a 3% discount rate to climate and air quality health co-benefits.
- They also assume EPA's estimate for the net benefits of standards for heavy-duty vehicles, model years 2019-2028, under analysis Method B and in comparison to scenario 1a, in which fuel economy is not expected to improve without regulation.

Clean Power Plan (2016$)			
Emission Impacts [1]	**2020**	**2025**	**2030**
GHG (metric tons CO2e)	**-74,389,170**	**-239,496,840**	**-374,667,405**
↓CO2 (short tons)	-82,000,000	-264,000,000	-413,000,000
↓SO2 (short tons)	-54,000	-185,000	-280,000
↓NOx (short tons)	-60,000	-203,000	-278,000
Climate & Health Benefits (millions) [2]	**2020**	**2025**	**2030**
Climate: SC-CO2, 3% DR	3,561	12,948	21,580
Health: ↓ SO2	4,100	14,027	24,817
Health: ↓ NOx (as PM2.5)	421	1,403	2,158
Health: ↓ NOx (as ozone)	658	2,590	3,777
Total Health co-benefits (non-CO2)	5,179	18,343	30,212
Total Benefits	**8,740**	**30,967**	**52,332**
EPA Total Benefits [3]	**8,740**	**31,291**	**51,792**
Costs (millions), 5% DR [3]	**2020**	**2025**	**2030**
Annual Incremental Compliance Cost (from base case)	**1,511**	**3,237**	**5,503**
Net benefits (millions)	**7,229**	**28,054**	**46,289**
EPA net Benefits (millions) [3]	**7,229**	**28,054**	**46,397**
Jobs [4]	**2020**	**2025**	**2030**
Jobs ↑	2500 job- years; 37,570 - 59,700 jobs	15,000 job-years; 52,590 - 83,590 jobs	22,800 job-years; 52,440 to 83,360 jobs
Jobs ↓	15,700 job-years	41,000 job-years	56,600 job years
Net Jobs	**-13,100 job-years; 37,570 - 59,700 jobs**	**-26,000 job-years to 52,590 - 83,590 jobs**	**-33,700 job-years; 52,440 to 83,360 jobs**
Public Health Impacts, Reductions in Incidence (PM2.5- & ozone-related) [5]	**2020**	**2025**	**2030**
Avoided Premature Mortality (adult) [both]	521	1,830	2,920
Avoided lower respiratory symptoms (age 7-14) [PM]	3,800	13,000	21,000
Avoided upper respiratory symptoms (asthmatics age 9-11) [PM]	5,500	19,000	30,000
Asthma exacerbation (age 6 - 18) [PM]	13,000	46,000	74,000
Emergency room visits for asthma [PM]	110	350	440
Lost work days (age 18 - 65) [PM]	25,000	84,000	130,000
Non-fatal heart attacks (age > 18) [PM]	25	810	1,400
Minor restricted-activity days (age 18-65) [both]	228,000	790,000	1,170,000
School absence days [ozone]	27,000	100,000	130,000

Notes:

- These figures reflect EPA's upper-bound estimate for net benefits under a mass-based compliance approach, applying a 3% discount rate to climate and air quality health co-benefits, and a 5% discount rate to compliance costs.
- Original estimates were in 2011$ and converted to 2016$ using the GDP Implicit Price Deflator maintained by the Federal Reserve Bank of St. Louis (available at https://fred.stlouisfed.org/series/GDPDEF). The factor used was 1.079.
- Metric tons of the gases affected (CO2, SO2, NOx) were converted to short tons for consistency across the rules.
- The number of metric tons of greenhouse gases (GHGs) reduced are calculated from known reductions in CO2, using a formula in which short tons of CO2 were converted to metric tons (factor = 0.907185).
- "Total Benefits" and "Net Benefits" are calculated by adding and subtracting data provided by EPA. These figures may differ from "EPA Total Benefits" and "EPA Net Benefits" because the latter two are EPA's official estimates and may be affected by independent rounding.
- The figures for net jobs reflect an upper-bound estimate.

[1] EPA. *Regulatory Impact Analysis for the Clean Power Plan Final Rule*, EPA-452/R-15-003 (2005), at ES-7.
[2] *RIA* at ES-20; 4-27, 28.
[3] *RIA* at ES-23.
[4] *RIA* at 6-24, 31.
[5] *RIA* at 4-32 to 4-34.

NSPS for Oil and Gas Sector (2016$)			
Emission Impacts [1] [2]	**2020**	**2025**	**2030**
GHG (metric tons CO2e)	**-6,900,000**	**-11,000,000**	
↓ CH4 (short tons)	-300,000	-510,000	
↓ VOC (short tons)	-150,000	-210,000	
↓HAP (short tons)	-1,900	-3,900	
↑ CO2 (short tons)	1,000,000	1,200,000	
↑ NOx (short tons)	510	600	
↑ PM (short tons)	19	22	
↑ CO (short tons)	2,800	3,200	
↑ THC (short tons)	1,100	1,200	
Climate & Health Benefits (millions) [3]	**2020**	**2025**	
SC-CH4, 3% DR	$381	$731	
Costs (millions) [4]	**2020**	**2025**	
Compliance, 7% DR (incl. additional gas revenue)	$339	$561	
Net Benefits	**$42**	**$169**	
EPA Net Benefits (millions) [4]	**$37**	**$180**	
Jobs (FTEs) [5]	**2020**	**2025**	
Jobs ↑	270 one-time; 1,100 annually	270 one-time; 1,800 annually	
Jobs ↓	?	?	
Net Jobs	**~1,370**	**~2,070**	
Public Health Impacts			
?	?	?	

Notes:

• These figures reflect EPA's estimate for net benefits under option 2 (which was chosen for promulgation), applying a 3% discount rate to climate benefits and a 7% discount rate to compliance costs (including estimated revenue from additional natural gas recovery).

• The metric tons of GHGs reduced only take into account reductions in methane emissions.

• Original estimates were in 2012$ and converted to 2016$ using the GDP Implicit Price Deflator maintained by the Federal Reserve Bank of St. Louis (available at https://fred.stlouisfed.org/series/GDPDEF). The factor used was 1.059.

• "Net Benefits" are calculated by adding and subtracting data provided by EPA. The difference may differ from "EPA Net Benefits" because the latter is EPA's official estimate and may be affected by independent rounding.

• Public health impacts were added across cause (e.g. particulate matter-related avoided premature mortalities and ozone-related avoided premature mortalities were summed).

[1] EPA, *Regulatory Impact Analysis of the Final Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources*, EPA-452/R-16-002 (2016), at 3-13.
[2] *RIA* at 4-38, 5-4.
[3] *RIA* at 1-5.
[4] *RIA* at 1-9.
[5] *RIA* at 1-7, 6-37.

Light-Duty 2012-2016 (2016$)				
Emission Impacts [1]	**2020**	**2030**	**2040**	**2050**
GHG (metric tons CO2e)	**-156,300,000**	**-307,000,000**	**-401,500,000**	**-505,900,000**
↓CO2 (short tons)	-153,296,024	-301,214,917	-397,242,150	-505,640,734
↓CH4 (short tons)	-169,694	-333,393	-439,658	-559,629
↓N2O (short tons)	-333	-634	-826	-1,051
↓HFCs (short tons)	-10,278	-20,050	-23,856	-26,344
↓VOC (short tons)	60,187	-115,542		
↑CO (short tons)	3,992	170,675		
↑NOx (short tons)	5,881	21,763		
↑PM2.5 (short tons)	2,398	4,564		
↑SOx (short tons)	13,832	27,443		
↓1,3-Butadiene (short tons)	-95	-21		
↑Acetaldehyde (short tons)	760	668		
↑ Acrolein (short tons)	1	5		
↓Benzene (short tons)	-890	-523		
↓Formaldehyde (short tons)	-49	15		
Annual Fuel Savings (billion gallons gasoline equivalent)	**-12.6**	**-24.7**	**-32.6**	**-41.6**

Climate, Health, & Economic Benefits (millions) [2]	2020	2030	2040	2050	NPV, 3% DR, 2012-2050
SC-CO2, 3% DR	$4,237	$10,191	$16,030	$24,045	$202,322
Criteria Pollutant Benefits		$1,431	$1,431	$1,431	$24,045
Fuel Savings	$40,877	$91,371	$136,599	$196,024	$1,769,712
Energy Security Impacts	$2,519	$5,153	$6,870	$8,702	$93,776
Reduced Refueling	$2,748	$5,496	$7,214	$9,160	$100,646
Value of Increased Driving	$4,809	$10,076	$14,885	$21,068	$196,368
Total benefits	**$57,209**	**$125,747**	**$185,068**	**$262,480**	**$2,386,867**

Quantified Costs (millions) [3]	2020	2030	2040	2050	NPV, 3% DR, 2012-2050
Compliance Cost	$17,862	$18,091	$19,923	$21,755	$396,056
Accidents, Noise, Congestion	$2,634	$5,267	$6,985	$8,931	$97,096
Total Costs	**$20,496**	**$23,358**	**$26,908**	**$30,686**	**$493,152**
Net benefits (millions)	**$36,714**	**$102,389**	**$158,161**	**$231,794**	**$1,893,716**
EPA net Benefits (millions) [3]	**$34,694**	**$100,417**	**$156,178**	**$229,802**	**$1,893,716**

Jobs in regulated sector (job-years) [4]	
Jobs ↑	?
Jobs ↓	?
Net Jobs	?

Reductions in Incidence (PM2.5- & ozone-related) [4]	2030
Premature Mortality (adult) [both]	146
Lower respiratory symptoms (age 7-14) [PM]	1,100
Upper respiratory symptoms (asthmatics age 9-11) [PM]	850
Asthma exacerbation (age 6 - 18) [PM]	1,000
Emergency room visits for asthma [PM]	26
Lost work days (age 18 - 65) [PM]	7,600
Non-fatal heart attacks (age > 18) [PM]	100
Minor restricted-activity days (age 18-65) [both]	27,000
School absence days [ozone]	-7,700

Lifetime Discounted Costs, Benefits, and Net Benefits assuming the $21/ton SCC Value (2007$ billions) [5]	
Program Costs	$51.5
Benefits	$240.2
Net Benefits	**$188.7**

Lifetime Discounted Costs, Benefits, and Net Benefits assuming the $21/ton SCC Value (2016$) [5]	
Program Costs	$59.0
Benefits	$275.0
Net Benefits	**$216.1**

Light-Duty 2017-2025 (2016$)				
Emission Impacts [1] [2]	**2020**	**2030**	**2040**	**2050**
GHG (metric tons CO2e)	**-27,000,000**	**-271,000,000**	**-455,000,000**	**-569,000,000**
↓CO2 (short tons)	-25,353,160	-272,270,894	-459,663,817	-575,406,504
↓CH4 (short tons)	-44,092	-264,555	-440,925	-529,109
↓N2O (short tons)	0	0	0	-3,699
↓HFCs (short tons)	-2,313	-14,646	-21,583	-26,980
↓VOC (short tons)	-11,712	-123,070		
↑CO (short tons)	14,164	224,875		
↓NOx (short tons)	-904	-6,509		
↓PM2.5 (short tons)	-136	-1,254		
↓SOx (short tons)	-1,270	-13,377		
↑1,3-Butadiene (short tons)	1	25		
↑Acetaldehyde (short tons)	3	57		
↑Acrolein (short tons)	0	2		
↓Benzene (short tons)	-16	-101		
↓Formaldehyde (short tons)	-7	-43		
Annual Fuel Savings (billion gallons petroleum gasoline)	**-2.1**	**-23.5**	**-39.9**	**-50.2**

Climate, Health, & Economic Benefits (millions) [2]		2020	2030	2040	2050	NPV, 3% DR, 2017 - 2050
SC-CO2, 3% DR		$697	$9,259	$18,717	$26,864	$187,170
Non-GHG related health impacts	B		$1,101	$1,101	$1,101	$10,118
Fuel Savings		$8,180	$95,126	$170,655	$233,412	$1,761,600
Energy Security Impacts		$408	$5,021	$9,160	$11,450	$93,035
Reduced Refueling		$310	$3,699	$6,991	$9,766	$71,455
Value of Increased Driving		$952	$10,526	$18,717	$15,965	$183,867
Total benefits		**$10,549**	**$124,732**	**$225,342**	**$298,558**	**$2,307,245**

Quantified Costs (millions) [3]	2020	2030	2040	2050	NPV, 3% DR, 2017 - 2050
Compliance Cost	$10,118	$39,526	$45,141	$51,197	$617,661
Accidents, Noise, Congestion	$621	$6,287	$10,625	$13,322	$111,201
Total Costs	**$10,739**	**$45,813**	**$55,766**	**$64,519**	**$728,862**
Net benefits (millions)	**-$190**	**$78,920**	**$169,576**	**$234,040**	**$1,578,383**
EPA net Benefits (millions) [3]	**$168**	**$81,364**	**$173,958**	**$238,917**	**$1,574,430**

Jobs in regulated sector (job-years) [4]	2020
Jobs ↑	2100 - 10,500
Jobs ↓	?
Net Jobs	2100 - 10,500

Public Health Impacts, Reductions in Incidence (PM2.5- & ozone-related) [5]	2030
Premature Mortality (adult) [both]	279
Lower respiratory symptoms (age 7-14) [PM]	2,100
Upper respiratory symptoms (asthmatics age 9-11) [PM]	1,600
Asthma exacerbation (age 6 - 18) [PM]	3,500
Emergency room visits for asthma [PM]	71
Lost work days (age 18 - 65) [PM]	14,000
Non-fatal heart attacks (age > 18) [PM]	130
Minor restricted-activity days (age 18-65) [both]	80,070
School absence days [ozone]	-850

Lifetime Discounted Costs, Benefits, and Net Benefits assuming the 3% discount rate SCC Value (2010$ billions) [6]	
Program Costs	$150
Benefits	$126
Fuel Savings	$475
Net Benefits	**$451**

Lifetime Discounted Costs, Benefits, and Net Benefits assuming the 3% discount rate SCC Value (2016$ billions) [6]	
Program Costs	165.15
Benefits	$139
Fuel Savings	$523
Net Benefits	**$497**

Light-Duty 1 Notes:

- These figures reflect EPA's estimate for net benefits, applying a 3% discount rate to climate benefits. Compliance costs are not discounted.
- Metric tons of some gases affected (CO2, CH4, N2O, HFCs) were converted to short tons for consistency across the rules.
- Original estimates were in 2007$ and converted to 2016$ using the GDP Implicit Price Deflator maintained by the Federal Reserve Bank of St. Louis (available at https://fred.stlouisfed.org/series/GDPDEF). The factor used was 1.114.
- Fuel savings are calculated using pre-tax fuel prices.
- "Net Benefits" are calculated by adding and subtracting data provided by EPA. The difference may differ from "EPA Net Benefits" because the latter is EPA's official estimate and may be affected by independent rounding.
- The Net Present Value (NPV) is discounted at 3% back to 2012.
- The figures for net jobs reflect an upper-bound estimate.
- Public health impacts were added across cause (e.g. particulate matter-related avoided premature mortalities and ozone-related avoided premature mortalities were summed).

[1] EPA, *Regulatory Impact Analysis: Final Rulemaking to Establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, EPA-420-R-10-009 (2010), at 5-31, 5-36.
[2] *RIA* at 8-23, 24.
[3] *RIA* at 8-25.
[4] *RIA* at 7-93, 94.
[5] *RIA* at ES-2.

Light-Duty 2 Notes:

- These figures reflect EPA's estimate for net benefits, applying a 3% discount rate to climate benefits. Compliance costs are not discounted.
- Metric tons CO2e of some gases affected (CO2, CH4, N2O, HFCs) were converted to short tons of the gas for consistency across the rules.
- Original estimates were in 2010$ and converted to 2016$ using the GDP Implicit Price Deflator maintained by the Federal Reserve Bank of St. Louis (available at https://fred.stlouisfed.org/series/GDPDEF). The factor used was 1.101.
- Fuel savings are calculated using pre-tax fuel prices.
- "Net Benefits" are calculated by adding and subtracting data provided by EPA. The difference may differ from "EPA Net Benefits" because the latter is EPA's official estimate and may be affected by independent rounding.
- The Net Present Value (NPV) is discounted at 3% back to 2012.
- The figures for net jobs reflect an upper-bound estimate.
- Public health impacts were added across cause (e.g. particulate matter-related avoided premature mortalities and ozone-related avoided premature mortalities were summed).

[1] EPA, *Regulatory Impact Analysis: Final Rulemaking for 2017-2025 Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards*, EPA-420-R-12-016 (2012), at 4-134 to 138.
[2] *RIA* at 7-25, 26.
[3] *RIA* at 7-27, 28.
[4] *RIA* at 8-28.
[5] *RIA* at 6-80, 81.
[6] *RIA* at ii.

Heavy-Duty 2014-2018 (2016$)				
Emission Impacts [1]	**2020**	**2030**	**2040**	**2050**
GHG (metric tons CO2e)		**-76,600,000**		
↓CO2 (short tons)		-80,415,859		
↓CH4 (short tons)		-117,913		
↓N2O (short tons)		-208		
↓HFC (short tons)		-336		
↓VOC (short tons)		-29,932		
↓CO (short tons)		-55,579		
↓NOx (short tons)		-245,129		
↑PM2.5 (short tons)		356		
↓SOx (short tons)		-6,888		
↓1,3-Butadiene (short tons)		-0.5		
↓Acetaldehyde (short tons)		-1,912		
↓Acrolein (short tons)		-263		
↓Benzene (short tons)		-359		
↓Formaldehyde (short tons)		-6,282		
Annual Fuel Savings (billion gallons of gasoline & diesel)		**-6**		

Quantified Climate, Health, & Economic Benefits (millions) [2]		2020	2030	2040	2050	NPV, 3% DR, 2012-2050
SC-GHG, 3% DR		$1,114	$2,785	$4,010	$5,347	$51,355
Non-GHG Impacts	B		$3,119	$3,119	$3,119	$28,184
Fuel Savings		$10,694	$22,948	$31,192	$40,661	$418,084
Energy Security Impacts		$557	$1,225	$1,671	$1,894	$22,057
Reduced Refueling		$111	$111	$223	$223	$2,785
Total benefits		**$12,477**	**$30,189**	**$40,215**	**$51,244**	**$522,466**

Quantified Costs (millions) [2]	2020	2030	2040	2050	NPV, 3% DR, 2012-2050
Compliance Cost	$2,228	$2,451	$3,008	$3,676	$52,804
Accidents, Noise, Congestion	$223	$446	$668	$668	$8,801
Total Costs	**$2,451**	**$2,896**	**$3,676**	**$4,345**	**$61,604**
Net benefits (millions)	**$10,026**	**$27,293**	**$36,539**	**$46,899**	**$460,862**
EPA net Benefits (millions) [2]	**$10,026**	**$27,293**	**$36,539**	**$46,899**	**$460,862**

Jobs in regulated sector (job years) [3]	
Jobs ↑	?
Jobs ↓	?
Net Jobs	**?**

Public Health Impacts, Reductions in Incidence (PM2.5- & ozone-related) [4]	2030
Premature Mortality (adult) [both]	440
Lower respiratory symptoms (age 7-14) [PM]	1,600
Upper respiratory symptoms (asthmatics age 9-11) [PM]	1,200
Asthma exacerbation (age 6 - 18) [PM]	1,400
Emergency room visits for asthma [PM]	311
Lost work days (age 18 - 65) [PM]	9,700
Non-fatal heart attacks (age > 18) [PM]	150
Minor restricted-activity days (age 18-65) [both]	357,000
School absence days [ozone]	120,000

Lifetime Discounted Fuel Savings, Costs, Benefits, and Net Benefits assuming the Model Average, 3% Discount Rate SCC Value (2009$ billions) [5]	
Program Costs	$8
Fuel Savings	$50
Benefits	$7
Net Benefits	**$49**

Lifetime Discounted Fuel Savings, Costs, Benefits, and Net Benefits assuming the Model Average, 3% Discount Rate SCC Value (2009$ billions) [5]	
Program Costs	$9
Fuel Savings	$56
Benefits	$8
Net Benefits	**$55**

Heavy-Duty 2018-2029 (2016$) [Method B, Alt 1a]			
Emission Impacts [1]	**2025**	**2040**	**2050**
GHG (metric tons CO2e)	**-37,400,000**	**-166,800,000**	**-199,200,000**
↓CO2 (short tons)	-40,124,132	-178,905,126	-213,738,163
↓CH4 (short tons)	-39,904	-177,252	-212,967
↓N2O (short tons)	-141	-392	-392
↓HFC (short tons)	-67	-197	-243
↓VOC (short tons)	-5,305	-25,070	-29,253
↓CO (short tons)	-13,254	-52,594	-63,869
↓NOx (short tons)	-22,710	-101,961	-123,824
↓PM2.5 (short tons)	-1,110	-5,081	-6,100
↓SOx (short tons)	-6,080	-26,933	-32,282
↓1,3-Butadiene (short tons)	-2	-8	-9
↓Acetaldehyde (short tons)	-10	-53	-61
↓Acrolein (short tons)	-1	-4	-5
↓Benzene (short tons)	-35	-165	-192
↓Formaldehyde (short tons)	-40	-187	-227
Annual Fuel Savings (billion gallons of gasoline & diesel)	**-2.8**	**-12.5**	**-14.9**

Quantified Climate, Health, & Economic Benefits (millions) [2]	2030	2040	2050	NPV, 3% DR, 2018-2050
SC-GHG, 3% DR	$5,418	$11,566	$15,838	$120,247
Non-GHG Impacts	$5,939	$11,045	$13,129	$123,790
Fuel Savings	$24,383	$55,330	$66,063	$545,279
Energy Security Impacts	$1,146	$2,605	$3,126	$25,737
Reduced Refueling	$625	$1,146	$1,563	$12,504
Value of Increased Driving	$1,250	$2,084	$2,397	$24,383
Total benefits	**$37,512**	**$81,693**	**$99,719**	**$827,556**

Quantified Costs (millions) [2]	2030	2040	2050	NPV, 3% DR, 2018-2050
Compliance Cost	$5,627	$6,773	$7,815	$94,822
Accidents, Noise, Congestion	$417	$521	$625	$7,086
Total Costs	**$6,044**	**$7,294**	**$8,440**	**$101,908**
Net benefits (millions)	**$31,468**	**$74,399**	**$91,279**	**$725,649**
EPA net Benefits (millions) [2]	**$31,468**	**$74,399**	**$91,279**	**$725,649**

Jobs in regulated sector (job years) [3]	2020	2025
Jobs ↑	0-300	400-4,100
Jobs ↓	?	?
Net Jobs	**~0-300**	**~400-4,100**

Public Health Impacts, Reductions in Incidence (PM2.5- & ozone-related) [4]	2040
Premature Mortality (adult) [both]	640
Lower respiratory symptoms (age 7-14) [PM]	3,600
Upper respiratory symptoms (asthmatics age 9-11) [PM]	5,200
Asthma exacerbation (age 6 - 18) [PM]	175,400
Emergency room visits for asthma [PM]	606
Lost work days (age 18 - 65) [PM]	23,000
Non-fatal heart attacks (age > 18) [PM]	260
Minor restricted-activity days (age 18-65) [both]	550,000
School absence days [ozone]	140,000

Lifetime Discounted Costs, Benefits, and Net Benefits using Method B and Relative to the Flat Baseline and Assuming the 3% Discount Rate SC-GHG Values (2013$ billions) [5]	
Vehicle Program	$27
Maintenance	$2
Fuel Savings	$169
Benefits	$88
Net Benefits	**$229**

Lifetime Discounted Costs, Benefits, and Net Benefits using Method B and Relative to the Flat Baseline and Assuming the 3% Discount Rate SC-GHG Values (2013$ billions) [5]	
Vehicle Program	$28
Maintenance	$2
Fuel Savings	$176
Benefits	$92
Net Benefits	**$239**

Heavy-Duty 1 Notes:
- These figures reflect EPA's estimate for net benefits, applying a 3% discount rate to climate benefits. Compliance costs are not discounted.
- Metric tons CO2e of some gases affected (CO2, CH4, N2O, HFCs) were converted to short tons of the gas for consistency across the rules.
- Original estimates were in 2009$ and converted to 2016$ using the GDP Implicit Price Deflator maintained by the Federal Reserve Bank of St. Louis (available at https://fred.stlouisfed.org/series/GDPDEF). The factor used was 1.145.
- Fuel savings are calculated using pre-tax fuel prices.
- "Net Benefits" are calculated by adding and subtracting data provided by EPA. The difference may differ from "EPA Net Benefits" because the latter is EPA's official estimate and may be affected by independent rounding.
- The Net Present Value (NPV) is discounted at 3% back to 2012.
- The figures for net jobs reflect an upper-bound estimate.
- Public health impacts were added across cause (e.g. particulate matter-related avoided premature mortalities and ozone-related avoided premature mortalities were summed).

[1] EPA, *Final Rulemaking to Establish Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles*, EPA-420-R-11-901 (2011), at 5-2, 5-13.
[2] *RIA* at 9-45, 46.
[3] *RIA* at 9-61.
[4] *RIA* at 8-81 to 83.
[5] *RIA* at ES-2.

Notes:
- These figures reflect EPA's estimate for net benefits, under analysis Method B and in comparison to scenario 1a, in which fuel economy is not expected to improve without regulation. A 3% discount rate is applied to climate benefits. Compliance costs are not discounted.
- Metric tons CO2e of some gases affected (CO2, CH4, N2O, HFCs) were converted to short tons of the gas for consistency across the rules.
- Original estimates were in 2013$ and converted to 2016$ using the GDP Implicit Price Deflator maintained by the Federal Reserve Bank of St. Louis (available at https://fred.stlouisfed.org/series/GDPDEF). The factor used was 1.042.
- Fuel savings are calculated using pre-tax fuel prices.
- "Net Benefits" are calculated by adding and subtracting data provided by EPA. The difference may differ from "EPA Net Benefits" because the latter is EPA's official estimate and may be affected by independent rounding.
- The Net Present Value (NPV) is discounted at 3% back to 2012.
- "Non-GHG Impacts" are calculated as the difference between the total benefits estimated by EPA and the sum of the other benefits, as a range is given for this category and not the specific number used by EPA in its calculations.
- The figures for net jobs reflect an upper-bound estimate.
- Public health impacts were added across cause (e.g. particulate matter-related avoided premature mortalities and ozone-related avoided premature mortalities were summed).

[1] EPA, *Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles - Phase 2*, EPA-420-R-16-900 (2016), at 5-3, 5-5, 5-37, 39.
[2] *RIA* at 8-87.
[3] *RIA* at 8-74.
[4] *RIA* at 8-99, 8-100.
[5] *RIA* at ES-12.

Methane Waste Prevention Rule (2016$) [with subpart OOOOa]		
Emission Impacts [1]	**2020**	**2025**
GHG (metric tons CO2e)	**-4,014,294**	**-4,059,653**
↓CH4 (short tons)	-177,000	-179,000
↓VOC (short tons)	-256,000	-265,000
Climate, Health, & Economic Benefits (millions), 3% DR [2]	**2020**	**2025**
SC-CH4	$220	$261
Cost Savings	$80	$166
Total Benefits	**$301**	**$427**
Quantified Costs (millions), 3% DR [2]	**2020**	**2025**
Compliance Cost	**$168**	**$219**
Net benefits (millions) [2]	**$132**	**$208**
EPA net Benefits (millions)	**$133**	**$209**
Jobs in regulated sector (job-years) [3]		
Jobs ↑	-	
Jobs ↓	-	
Net Jobs	**-**	
Public Health Impacts, Reductions in Incidence (PM2.5- & ozone-related)		
10-Year Total, NPV 3% DR, SC-GHG 3% & Costs 3%: $952 - $1,285 million [4]		

Notes:

• These figures reflect EPA's upper-bound estimate for net benefits, applying a 3% discount rate to climate benefits, and a 3% discount rate to annualized capital costs.

• Original estimates were in 2012$ and converted to 2016$ using the GDP Implicit Price Deflator maintained by the Federal Reserve Bank of St. Louis (available at https://fred.stlouisfed.org/series/GDPDEF). The factor used was 1.059.

• The number of metric tons of greenhouse gases (GHGs) reduced are calculated from known reductions in CH4, using a formula in which short tons of CH4 were converted to metric tons (factor = 0.907185) and then multiplied by the global warming potential of CH4 (25).

• "Net Benefits" are calculated by adding and subtracting data provided by EPA. The difference may differ from "EPA Net Benefits" because the latter is EPA's official estimate and may be affected by independent rounding.

• The cost of compliance includes the social cost of small additions of CO2 to the atmosphere.

[1] Bureau of Land Management, *Regulatory Impact Analysis for: Revisions to 43 CFR 3100 (Onshore Oil and Gas Leasing) and 43 CFR 3600 (Onshore Oil and Gas Operations)* (2016), at 110.
[2] *RIA* at 106, 109, 112.
[3] *RIA* at 8.
[4] *RIA* at 114.

Price Conversions [1]

Light-Duty 1 (2007$)	Factor = 1.145				
Benefits	2020	2030	2040	2050	NPV, 3% DR, 2012-2050
SC-CO2, 3% DR	$3,700	$8,900	$14,000	$21,000	$176,700
Criteria Pollutant Benefits	B	$1,250	$1,250	$1,250	$21,000
Fuel Savings	$35,700	$79,800	$119,300	$171,200	$1,545,600
Energy Security Impacts	$2,200	$4,500	$6,000	$7,600	$81,900
Reduced Refueling	$2,400	$4,800	$6,300	$8,000	$87,900
Value of Increased Driving	$4,200	$8,800	$13,000	$18,400	$171,500
Costs					
Compliance Cost	$15,600	$15,800	$17,400	$19,000	$345,900
Accidents, Noise, Congestion	$2,300	$4,600	$6,100	$7,800	$84,800
EPA net Benefits (millions)	**$30,300**	**$87,700**	**$136,400**	**$200,700**	**$1,653,900**

Light-Duty 1 (2016$)					
	2020	2030	2040	2050	NPV, 3% DR, 2012-2050
	$4,236.50	$10,190.50	$16,030.00	$24,045.00	$202,321.50
		$1,431.25	$1,431.25	$1,431.25	$24,045.00
	$40,876.50	$91,371.00	$136,598.50	$196,024.00	$1,769,712.00
	$2,519.00	$5,152.50	$6,870.00	$8,702.00	$93,775.50
	$2,748.00	$5,496.00	$7,213.50	$9,160.00	$100,645.50
	$4,809.00	$10,076.00	$14,885.00	$21,068.00	$196,367.50
	$17,862.00	$18,091.00	$19,923.00	$21,755.00	$396,055.50
	$2,633.50	$5,267.00	$6,984.50	$8,931.00	$97,096.00
	$34,693.50	**$100,416.50**	**$156,178.00**	**$229,801.50**	**$1,893,715.50**

Program Costs	$52	Program Costs	$58.97
Benefits	$240	Benefits	$275.03
Net Benefits	**$188.7**	**Net Benefits**	**$216.06**

Light-Duty 2 (2010$)	Factor = 1.101				
Benefits	2020	2030	2040	2050	NPV, 3% DR, 2012-2050
SC-CO2, 3% DR	$633	$8,410	$17,000	$24,400	$170,000
Non-GHG related health impacts	B	$1,000	$1,000	$1,000	$9,190
Fuel Savings	$7,430	$86,400	$155,000	$212,000	$1,600,000
Energy Security Impacts	$371	$4,560	$8,320	$10,400	$84,500
Reduced Refueling	$282	$3,360	$6,350	$8,870	$64,900
Value of Increased Driving	$865	$9,560	$17,000	$14,500	$167,000
Costs					
Compliance Cost	$9,190	$35,900	$41,000	$46,500	$561,000
Accidents, Noise, Congestion	$564	$5,710	$9,650	$12,100	$101,000
EPA Net Benefits (millions)	**$153**	**$73,900**	**$158,000**	**$217,000**	**$1,430,000**

Light-Duty 2 (2016$)				
	2020	2030	2040	2050
	$697	$9,259	$18,717	$26,864
		$1,101	$1,101	$1,101
	$8,180	$95,126	$170,655	$233,412
	$408	$5,021	$9,160	$11,450
	$310	$3,699	$6,991	$9,766
	$952	$10,526	$18,717	$15,965
	$10,118	$39,526	$45,141	$51,197
	$621	$6,287	$10,625	$13,322
	$168	**$81,364**	**$173,958**	**$238,917**

Lifetime Discounted Costs, Benefits, and Net Benefits assuming the 3% discount rate SCC Value (2010$ billions)	
Program Costs	$150
Benefits	$126
Fuel Savings	$475
Net Benefits	**$451**

Lifetime Discounted Costs, Benefits, and Net Benefits assuming the 3% discount rate SCC Value (2016$ billions)	
Program Costs	165.15
Benefits	$139
Fuel Savings	$523
Net Benefits	**$497**

Clean Power Plan (2011$)	Factor = 1.079		
Benefits (3% DR)	2020	2025	2030
Climate: SC-CO2	3,300	12,000	20,000
Health: ↓ SO2	3,800	13,000	23,000
Health: ↓ NOx (as PM2.5)	390	1,300	2,000
Health: ↓ NOx (as ozone)	610	2,400	3,500
Total Health co-benefits (non-CO2)	4,800	17,000	28,000
EPA estimate for total	8,100	29,000	48,000
Costs			
Annual Incremental Compliance Cost (5% DR)	1,400	3,000	5,100
EPA net Benefits (millions)	**7**	**26**	**43**

Clean Power Plan (2016$)		
2020	2025	2030
3560.7	12948	21580
4100.2	14027	24817
420.81	1402.7	2158
658.19	2589.6	3776.5
5179.2	18343	30212
8739.9	31291	51792
1510.6	3237	5502.9
7.2293	**28.054**	**46.397**

Conversion Methodology:

• To determine the value of a particular year's dollar in relation to 2009 (=100), an average of the GDP implicit price deflator for the four quarters of that year were taken.

2007: 97.334
2009: 100
2010: 101.217
2011: 103.307
2012: 105.213
2013: 106.91
2016: 111.441

• To convert from the dollars of one year to 2016 dollars, the amount in question was multiplied by the ratio of the price deflator for 2016 to the price deflator for that year. The ratios used for the conversions, by dollar-year converted, were:

2007: 1.145
2009: 1.114
2010: 1.101
2011: 1.079
2012: 1.059
2013: 1.042
2016: 1

[1] Federal Reserve Bank of St. Louis. *Gross Domestic Product: Implicit Price Deflator* (last accessed June 2016).

NSPS Oil & Gas (2012$)	Factor = 1.059	
Benefits	2020	2030
SC-CH4, 3% DR	$360	$690
Costs		
Compliance, 7% DR	$320	$530
Net benefits	**$35**	**$170**

NSPS Oil & Gas (2016$)		
	2020	2030
	$381.24	$730.71
	$338.88	$561.27
	$37.07	**$180.03**

Heavy-Duty 1 (2009$)	Factor = 1.114				
Benefits	2020	2030	2040	2050	NPV, 3% DR, 2012-2050
SC-GHG, 3%	$1,000	$2,500	$3,600	$4,800	$46,100
Non-GHG Impacts	B	$2,800	$2,800	$2,800	$25,300
Fuel Savings	$9,600	$20,600	$28,000	$36,500	$375,300
Energy Security Impacts	$500	$1,100	$1,500	$1,700	$19,800
Reduced Refueling	$100	$100	$200	$200	$2,500
Costs					
Compliance Cost	$2,000	$2,200	$2,700	$3,300	$47,400
Accidents, Noise, Congestion	$200	$400	$600	$600	$7,900
EPA net Benefits (millions)	**$9,000**	**$24,500**	**$32,800**	**$42,100**	**$413,700**

				NPV, 3% DR, 2012-2050
	2020	2030	2040	
	$1,114.000	$2,785.000	$4,010.400	$5,347.200
		$3,119.200	$3,119.200	$3,119.200
	$10,694.400	$22,948.400	$31,192.000	$40,661.000
	$557.000	$1,225.400	$1,671.000	$1,893.800
	$111.400	$111.400	$222.800	$222.800
	$2,228.000	$2,450.800	$3,007.800	$3,676.200
	$222.800	$445.600	$668.400	$668.400
	$10,026.000	$27,293.000	$36,539.200	$46,899.400

Lifetime Discounted Fuel Savings, Costs, Benefits, and Net Benefits assuming the Model Average, 3% Discount Rate SCC Value (2009$ billions)	
Program Costs	$8
Fuel Savings	$50
Benefits	$7
Net Benefits	**$49**

Lifetime Discounted Fuel Savings, Costs, Benefits, and Net Benefits assuming the Model Average, 3% Discount Rate SCC Value (2016$ billions)	
Program Costs	$9.02
Fuel Savings	$55.70
Benefits	$8.13
Net Benefits	**$54.59**

Heavy-Duty 2 (2013$)	Factor = 1.042			
Benefits	2030	2040	2050	NPV, 3% DR, 2018-2050
SC-GHG, 3%	$5,200	$11,100	$15,200	$115,400
Non-GHG Impacts	$5,700	$10,600	$12,600	$118,800
Fuel Savings	$23,400	$53,100	$63,400	$523,300
Energy Security Impacts	$1,100	$2,500	$3,000	$24,700
Reduced Refueling	$600	$1,100	$1,500	$12,000
Value of Increased Driving	$1,200	$2,000	$2,300	$23,400
Costs				
Compliance Cost	$5,400	$6,500	$7,500	$91,000
Accidents, Noise, Congestion	$400	$500	$600	$6,800
EPA net Benefits (millions)	**$30,200**	**$71,400**	**$87,600**	**$696,400**

				NPV, 3% DR, 2018-2050
	2030	2040	2050	
	$5,418.40	$11,566.20	$15,838.40	$120,246.80
	$5,939.40	$11,045.20	$13,129.20	$123,789.60
	$24,382.80	$55,330.20	$66,062.80	$545,278.60
	$1,146.20	$2,605.00	$3,126.00	$25,737.40
	$625.20	$1,146.20	$1,563.00	$12,504.00
	$1,250.40	$2,084.00	$2,396.60	$24,382.80
	$5,626.80	$6,773.00	$7,815.00	$94,822.00
	$416.80	$521.00	$625.20	$7,085.60
	$31,468.40	**$74,398.80**	**$91,279.20**	**$725,648.80**

Lifetime Discounted Costs, Benefits, and Net Benefits using Method B and Relative to the Flat Baseline and Assuming the 3% Discount Rate SC-GHG Values (2013$ billions)	
Vehicle Program	-$27
Maintenance	-$2
Fuel Savings	$169
Benefits	$88
Net Benefits	**$229**

Lifetime Discounted Costs, Benefits, and Net Benefits using Method B and Relative to the Flat Baseline and Assuming the 3% Discount Rate SC-GHG Values (2016$ billions)	
Vehicle Program	-$28.13
Maintenance	-$1.98
Fuel Savings	$176.10
Benefits	$91.70
Net Benefits	**$238.62**

Methane Reduction (2012$)	Factor = 1.059	
Benefits	2020	2025
SC-CH4, 3% DR	$208	$246
Cost Savings	$76	$157

Methane Reduction (2016$)	
2020	2025
$220.27	$260.51
$80.48	$166.26

Costs					
Compliance Cost, 3% DR	$159	$207		$168.38	$219.21
Net benefits	$125	$196			
EPA net Benefits (millions)	**$126**	**$197**		**$133.43**	**$208.62**
	$899				$952.04
10-Year Total, NPV 3% DR, SC-GHG 3% & Costs 3%	$1,214		10-Year Total, NPV 3% DR, SC-GHG 3% & Costs 3%		$1,285.63