

The Social Cost of Carbon

EPA and other federal agencies use the social cost of carbon (SC-CO₂) to estimate the climate benefits of rulemakings. The SC-CO₂ is an estimate of the economic damages associated with a small increase in carbon dioxide (CO₂) emissions, conventionally one metric ton, in a given year. This dollar figure also represents the value of damages avoided for a small emission reduction (i.e., the benefit of a CO₂ reduction).

The SC-CO₂ is meant to be a comprehensive estimate of climate change damages and includes changes in net agricultural productivity, human health, property damages from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning. However, given current modeling and data limitations, it does not include all important damages. The IPCC Fifth Assessment report observed that SC-CO₂ estimates omit various impacts that would likely increase damages. The models used to develop SC-CO₂ estimates, known as integrated assessment models, do not currently include all of the important physical, ecological, and economic impacts of climate change recognized in the climate change literature because of a lack of precise information on the nature of damages and because the science incorporated into these models naturally lags behind the most recent research. Nonetheless, the SC-CO₂ is a useful measure to assess the benefits of CO₂ reductions.

The table below presents the current SC-CO₂ estimates for certain years.

Social Cost of CO₂, 2015-2050 a (in 2014 Dollars per metric ton CO₂)

Source: [Technical Support Document](#) (PDF, 21 pp, 1 MB): Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 (May 2013, Revised July 2015)

	Discount Rate and Statistic			
Year	5% Average	3% Average	2.5% Average	3% 95th percentile
2015	\$12	\$40	\$62	\$117
2020	\$13	\$47	\$69	\$140
2025	\$16	\$51	\$76	\$150
2030	\$18	\$56	\$81	\$170
2035	\$20	\$61	\$87	\$190
2040	\$23	\$67	\$93	\$200
2045	\$26	\$71	\$99	\$220
2050	\$29	\$77	\$106	\$240

a The SC-CO₂ values are dollar-year and emissions-year specific and have been rounded to two significant digits. The 2007\$ estimates were adjusted to 2014\$ using GDP implicit price deflator (108.289) from the [National Income and Product Accounts Tables](#), Table 1.1.9.

EPA has used the SC-CO₂ to analyze the carbon dioxide impacts of various rulemakings since the interagency group first published [SC-CO₂ estimates in 2010](#) (PDF, 51 pp, 847 KB). Some of these rulemakings have directly targeted carbon dioxide emissions, such as the car and truck standards, whereas others have set standards for conventional or toxic pollutants that indirectly affect carbon dioxide emissions, such as the final rulemaking to control [mercury and other air toxic pollutants](#) (PDF, 510 pp, 8.3 MB) from power plants. The rulemakings directly targeting carbon dioxide emissions have projected notable climate-related benefits for society. For example, the projected net present value of carbon dioxide mitigation benefits over the next forty years from three vehicle rulemakings was estimated to range from \$78 billion to \$1.2 trillion (\$2010), depending on which of the four SC-CO₂ estimates were used (i.e., the average SC-CO₂ at 5, 3, and 2.5 percent and the 95th percentile SC-CO₂ at 3 percent). These three rulemakings are:

- [The Joint EPA/Department of Transportation Rulemaking to establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards \(2012-2016\)](#) (PDF, 474 pp, 5.89 MB)
- [Joint EPA/Department of Transportation Rulemaking to establish Medium- and Heavy-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards](#) (PDF, 553 pp, 9.12 MB)
- [Joint EPA/Department of Transportation Rulemaking to establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards \(2017-2025\)](#) (PDF, 555 pp, 8.83 MB)

For more information see the [SC-CO2 Fact Sheet](#) (PDF, 5 pp, 266 KB). See also the following documents for information about ongoing research to improve the SC-CO2.

- EPA and Department of Energy hosted a series of workshops to inform SC-CO2: [workshop one](#), [workshop two](#).
- EPA funded a [workshop](#) on discounting, a critical SC-CO2 modeling input. World-recognized experts discussed how the benefits and costs of regulations should be discounted for projects with long time horizons.
- The Office of Management and Budget (OMB) recently issued a [response to the public comments](#) (PDF, 44 pp, 1085 KB) received through its solicitation for comments on the SC-CO2 estimates used in Federal regulatory analyses. In this response, [OMB announced plans](#) to obtain expert, independent advice from the National Academies of Sciences, Engineering, and Medicine on how to approach future updates to the estimates.