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EPIC Social Cost of Carbon Calculator

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What is the Social Cost of Carbon?

Social Cost of GHG Emissions:

- Economic measure of the societal benefits of reducing GHG emissions.
- Measures of social cost reflect the cost of a unit of a given GHG in the atmosphere as equivalent to the damage generated by that unit of GHG, e.g.:
 - Agricultural productivity
 - Human health
 - Infrastructure
 - Fisheries
 - Flood risk

What is the Social Cost of Carbon?

- Significant uncertainty related to:
 - Climate change projections
 - Global economic consequences
- Social cost values are therefore scenario-based:
 - Carbon distribution scenarios across multiple integrated assessment models
 - Variety of discount rate assumptions
- The social cost values grow over time due to expected growth in incremental climate-related damages over time.

What is the Social Cost of Carbon?

Source: Interagency Working Group on the Social Cost of Greenhouse Gases, United States Government. (August 2016)
 “Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866.”

Dollar Year of SCC values= 2007 ← Update when replacing data with most recent social cost e

Annual SC-CO2 Values: 2010-2050 (2007\$/short ton CO2)				
Year	5% Average	3% Average	2.5% Average	High Impact (95th Pct at 3%)
2010	\$10.00	\$31.00	\$50.00	\$86.00
2011	\$11.00	\$32.00	\$51.00	\$90.00
2012	\$11.00	\$33.00	\$53.00	\$93.00
2013	\$11.00	\$34.00	\$54.00	\$97.00
2014	\$11.00	\$35.00	\$55.00	\$101.00
2015	\$11.00	\$36.00	\$56.00	\$105.00
2016	\$11.00	\$38.00	\$57.00	\$108.00
2017	\$11.00	\$39.00	\$59.00	\$112.00
2018	\$12.00	\$40.00	\$60.00	\$116.00
2019	\$12.00	\$41.00	\$61.00	\$120.00
2020	\$12.00	\$42.00	\$62.00	\$123.00
2021	\$12.00	\$42.00	\$63.00	\$126.00
2022	\$13.00	\$43.00	\$64.00	\$129.00
2023	\$13.00	\$44.00	\$65.00	\$132.00
2024	\$13.00	\$45.00	\$66.00	\$135.00
2025	\$14.00	\$46.00	\$68.00	\$138.00
2026	\$14.00	\$47.00	\$69.00	\$141.00
2027	\$15.00	\$48.00	\$70.00	\$143.00

What is the EPIC SCC Calculator?

- Excel-based tool to evaluate the social welfare benefits of reductions in GHG emissions over time, either at an individual project level or across a project portfolio.
- The SCC reflects societal willingness-to-pay (\$) for marginal changes in risks of global climate change-related damages.
 - Values reflect **global** changes in climate-related risks
 - The value of a marginal reduction in C in the atmosphere is independent of the location of the source
 - The SCC is shorthand for the social cost of GHGs; global climate-related damage potential varies by gas

Uses for the EPIC SCC Calculator

- GHG emissions change data associated with a project (or portfolio) are available
- To compare with other categories of social welfare costs and benefits of projects over time
- Not for estimating emissions penalties (market prices) or for resource planning (GHG planning price)

EPIC SCC Calculator Structure

- Relies on an established schedule of values for each GHG developed by a Federal Interagency Working Group, most recently updated in August 2016.
 - Based on use of three integrated assessment models (IAMs) to estimate the effects that GHG emissions have on human welfare through their effect on the climate.
 - The IAMs join simplified atmospheric gas and climate models with global economic and human behavior models, which are each run for a set of socio-economic and emissions baseline scenarios.
 - The social cost values then rely on existing academic literature to estimate willingness-to-pay (WTP) for the different scenario outcomes.
- Values vary by gas and by year and are presented according to four scenarios.
 - Due to the degree of uncertainty of modeled outcomes, best practices are to present results for all four scenarios.

EPIC SCC Calculator: Inputs

Changes in CO₂, CH₄, and N₂O emissions by year

- Possible to use CO₂ equivalents for all gases, but not preferred

Discounting assumptions

- Time period of analysis (initial and final year)
- Discount rate (options embedded)
- Dollar year and base year

Emissions changes may be estimated based on the following:

- EPIC Emissions Calculator - currently designed to cut and paste though spreadsheets may be linked
- Other emissions accounting methods and models (e.g., U.S. EPA's AVERT Tool)
- EPIC grant applicant/recipient - directly reported

EPIC SCC Calculator: Outputs

1. Discounted present value benefit of reduction in risk of climate-related damages.
2. Annualized value of this benefit.

Of note, SCC values are an active area of research. The National Academies 2017 report established a 5-year update cycle for these estimates to improve transparency, simplify the modeling, better account for uncertainty, etc. Future updates may replace the underlying data in the tool.

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