

The Social Cost of Carbon : Methods and Policy Implications

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Social Cost of Carbon (SSC)



*"Economic measure that estimates the **monetary** value of the damages caused by emitting one additional **metric ton of carbon dioxide** into the atmosphere."*

Introduced by: Obama administration (2010)

Developed by: Interagency Working Group (IWG)

It reflects the present value of future costs linked to climate change.





Steps for calculating SSC



According to Resource For Future(RFF), estimates of the SCC are calculated in four steps using specialized computer models.

Step 1: Project future emissions

Step 2: Model future climate responses

Step 3: Assess the impacts

Step 4: Convert future damages into their present-day values





Social Cost of Carbon (SSC)



For Example:

Let the SCC is estimated at **\$51 per ton of CO₂**.

If a new power plant is expected to emit 1 million tons of CO₂ annually, the total annual climate damage is:

$$1,000,000 \times 51 = \$51,000,000.$$

This means the plant's emissions would cause **\$51 million worth of future damages (health costs, agricultural losses, flood risks, etc.)**.

We can use this estimate to decide whether stricter emission controls, renewable investments, or carbon pricing would be more cost-effective.





Impacts



The SCC in the U.S. is a **decision-making tool** for the government

- ❑ Regulatory Impact Analysis
- ❑ Infrastructure and Federal Projects
- ❑ Policy Design & Justification
- ❑ Legal and Court Cases





SCC with different discount rates



Discount Rate (%)	Social Cost of Carbon (US\$ per Ton CO ₂)
1.5%	\$308
2.0%	\$185
2.5%	\$118
3.0%	\$80



Rennert et al. (2022). For more information about the SCCs associated with the 2 and 3 percent discount rates, visit RFF's [SCC Explorer](#).

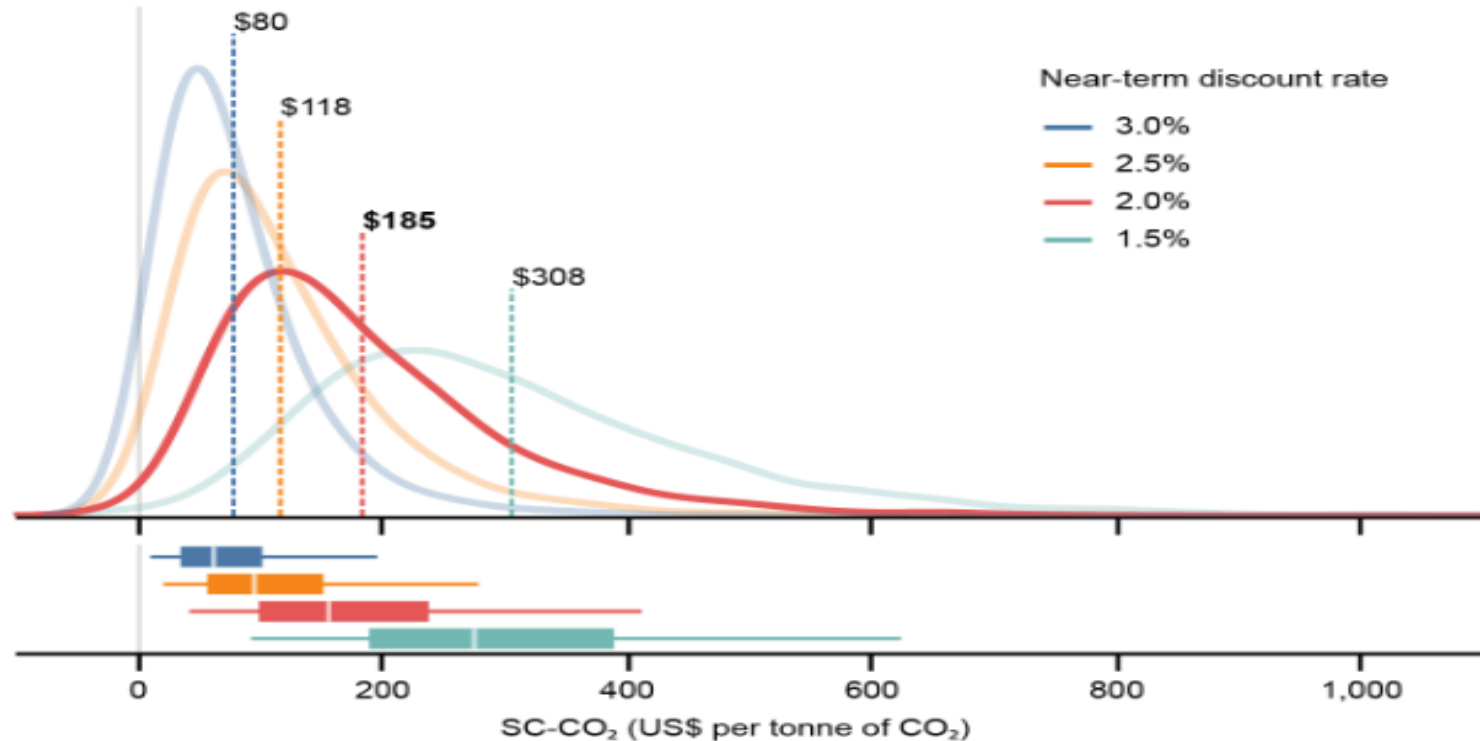




SCC with different discount rates

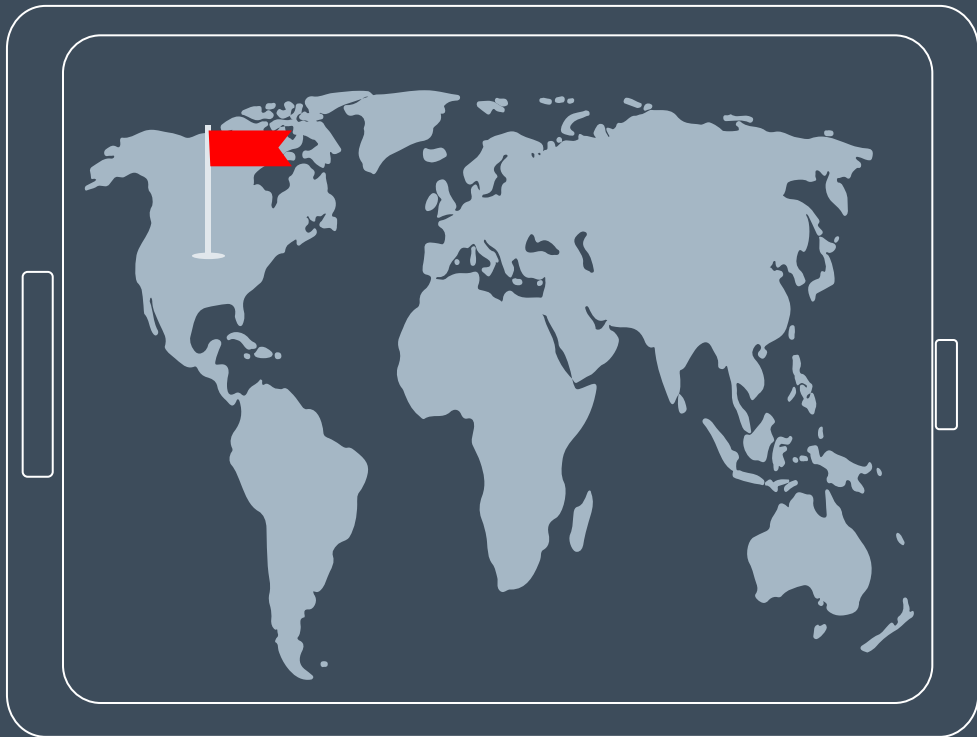


The Range of Values of the SCC



Rennert et al. (2022). This figure shows the range of SCC values from RFF's GIVE model for four different discount rates: 3%, 2.5%, 2.0% (the central case), and 1.5%.





USA:

A Case

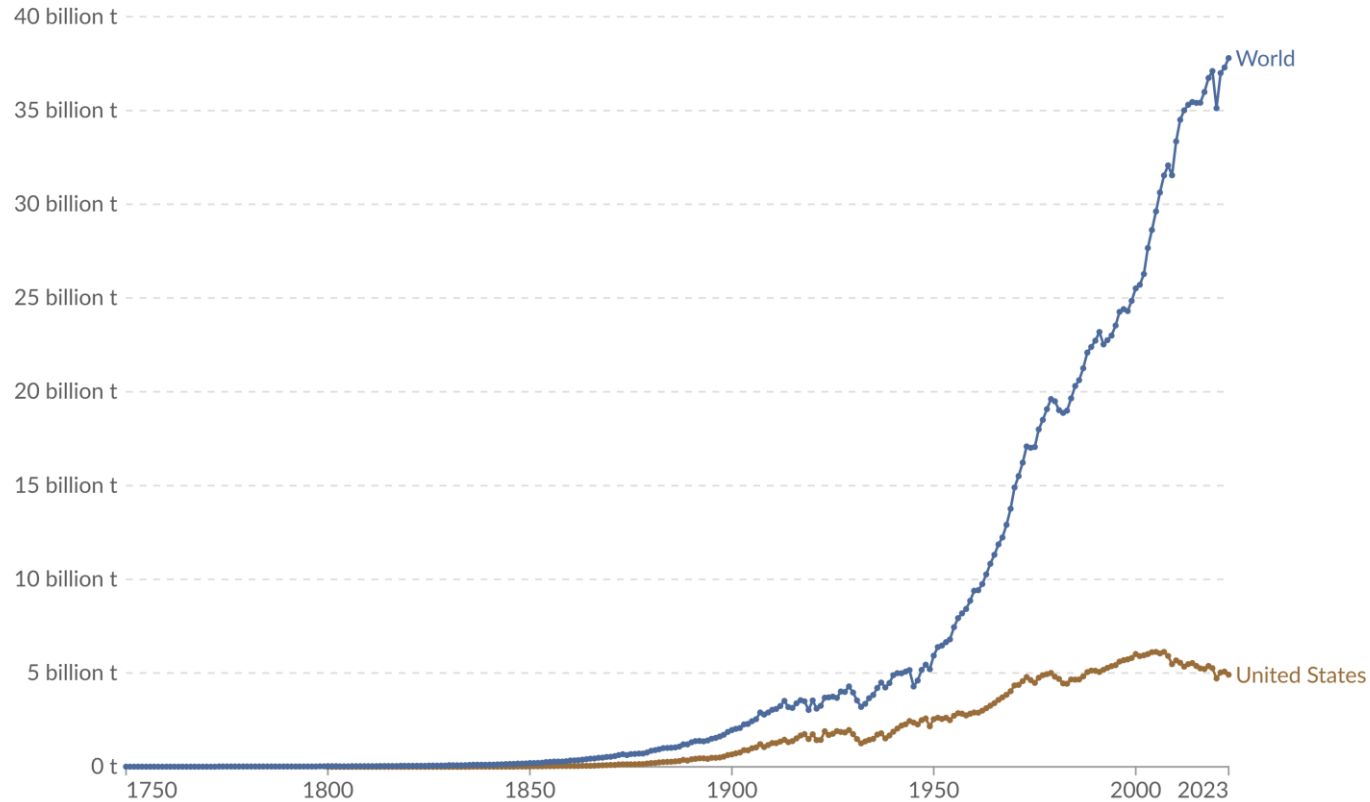
Study



Annual CO₂ emissions

Our World
in Data

Carbon dioxide (CO₂) emissions from fossil fuels and industry. Land-use change is not included.



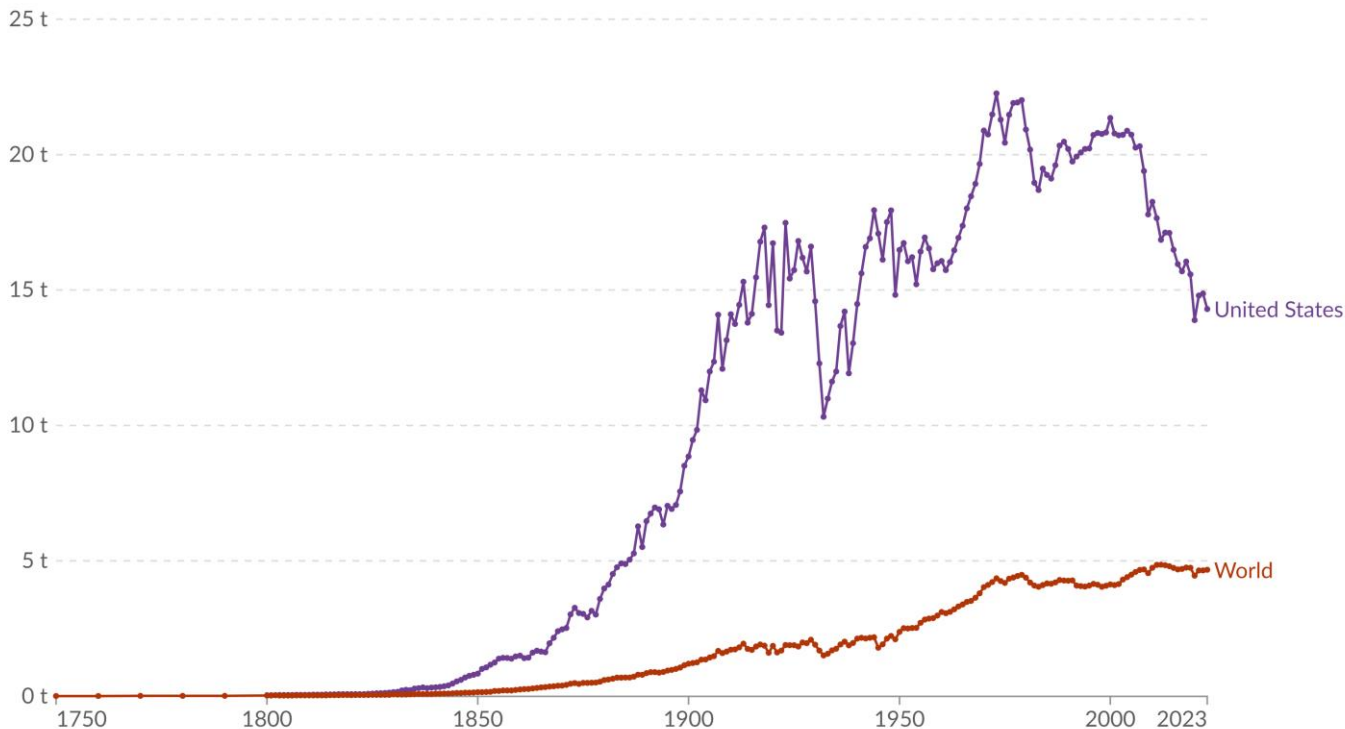
Data source: Global Carbon Budget (2024)

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

CO₂ emissions per capita

Our World
in Data

Carbon dioxide (CO₂) emissions from burning fossil fuels and industrial processes. This includes emissions from transport, electricity generation, and heating, but not land-use change.



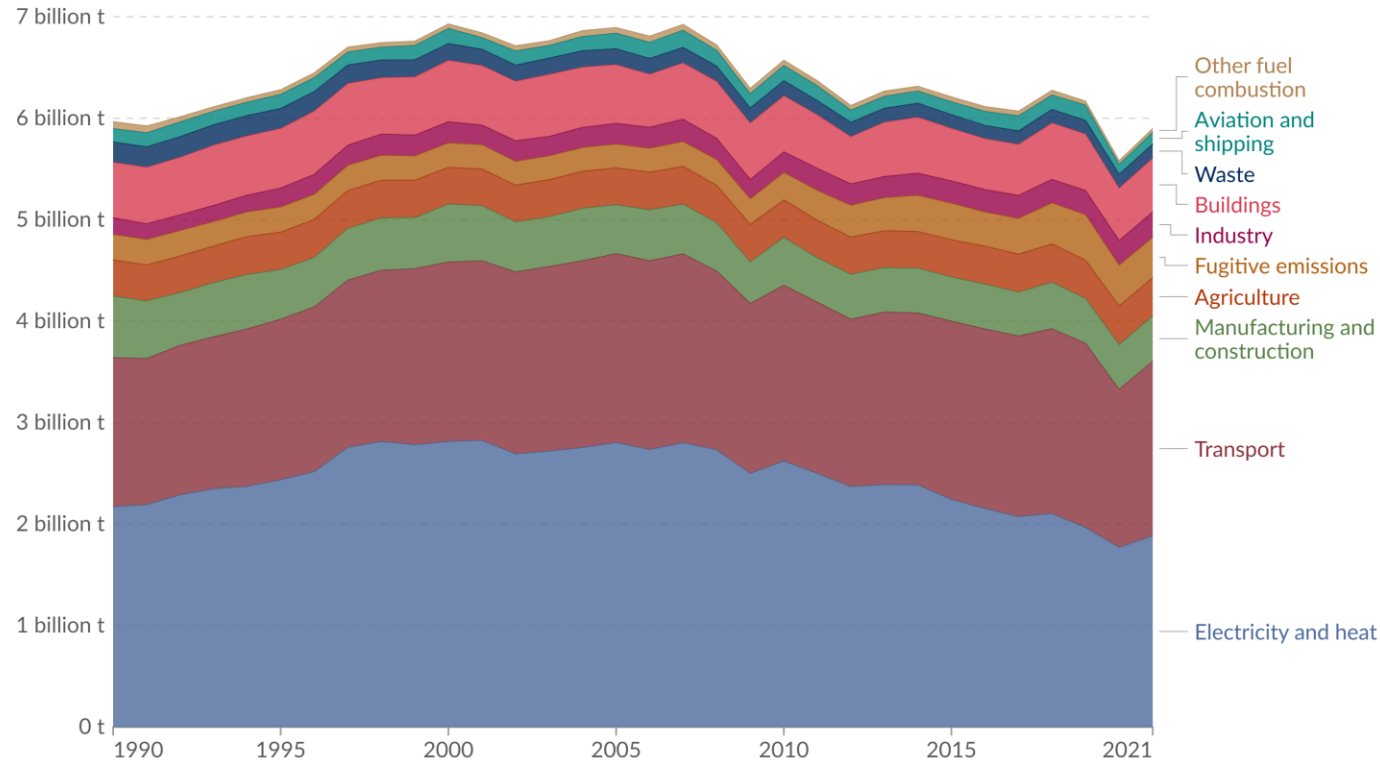
Data source: Global Carbon Budget (2024); Population based on various sources (2024)

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Greenhouse gas emissions by sector, United States, 1990 to 2021

Our World
in Data

Greenhouse gas emissions are measured in tonnes of carbon dioxide-equivalents over a 100-year timescale. Land-use change emissions are not included.



Data source: Climate Watch (2024)

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Timeline of Social Cost of Carbon(SCC) in USA



2017–2021

2009–2016

**Obama
Administration**

Major climate and
conservation
initiatives launched



Trump Administration



Environmental
regulations rolled
back, climate action
halted



2017–2020

2021–202

016

—2020

2021–2024

2025–Pres

**Biden
Administration**

Renewed focus on
climate and
environmental
restoration



Trump Administration



Return to
deregulation and
fossil fuel emphasis



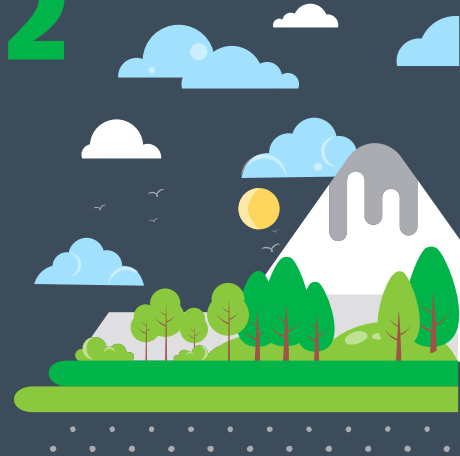
2025–Present

–2024

2009–2016: The Obama Administration

IWG's estimate for the SCC :

US \$ 41/tCO₂



2009–2016: The Obama Administration

Formal Adoption in Federal policy making.

Creation of Interagency Working Group (IWG).

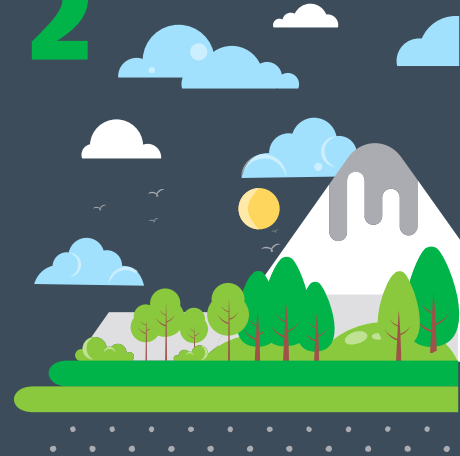
Key Estimate:

IWG Estimate: 41/t CO₂ SCC used in cost–benefit analyses for fuel efficiency and power plant regulations.

2017–2020: The Trump Administration

Estimate for the SCC :

US \$ 1-7/tCO₂





2017–2020: The Trump Administration

Disbanded the IWG.

Reduced SCC:

- Focused on **domestic damages**, ignoring global impacts.
- Using **higher discount rates** (3-7%).

Policy Impact:

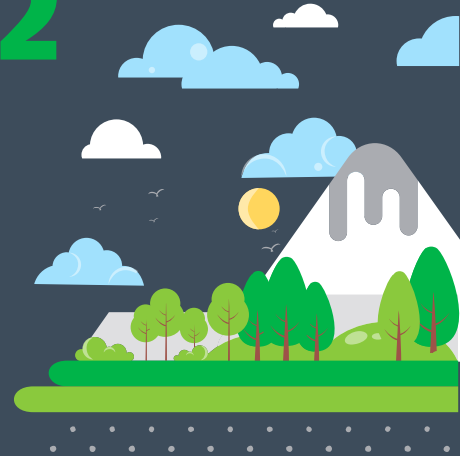
Weakened economic justification for new climate regulations.



2021–2024: The Biden Administration

Estimate for the SCC :

US \$ 51/tCO₂

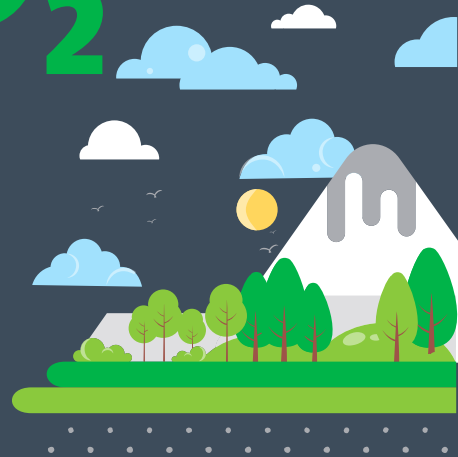


2021–2024: The Biden Administration

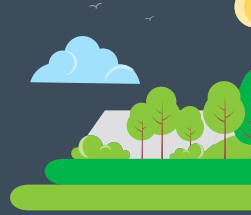
Estimate Proposed by Environmental Protection Agency
(EPA):

US \$ 190/tCO₂

Not adopted



2021–2024: The Biden Administration



Reinstatement of the IWG.

Interim Estimate: \$51/ton SCC applied for regulatory analysis pending update.

Comprehensive Review:

- RFF's GIVE Model (Rennert et al., 2022): **\$185/ton CO₂**
- EPA (Environmental Protection Agency) Update, 2023: Adopted RFF findings, raising SCC to **\$190/ton CO₂**.





2025–Present: The Trump Administration

SCC Discontinued: Unless legally required.

Deregulation Focus: Seen as limiting economic growth and energy production.

Impact on Policy: Weakened EPA ability to justify emission rules.



SCC as a Guide for Indian Policy & Investment

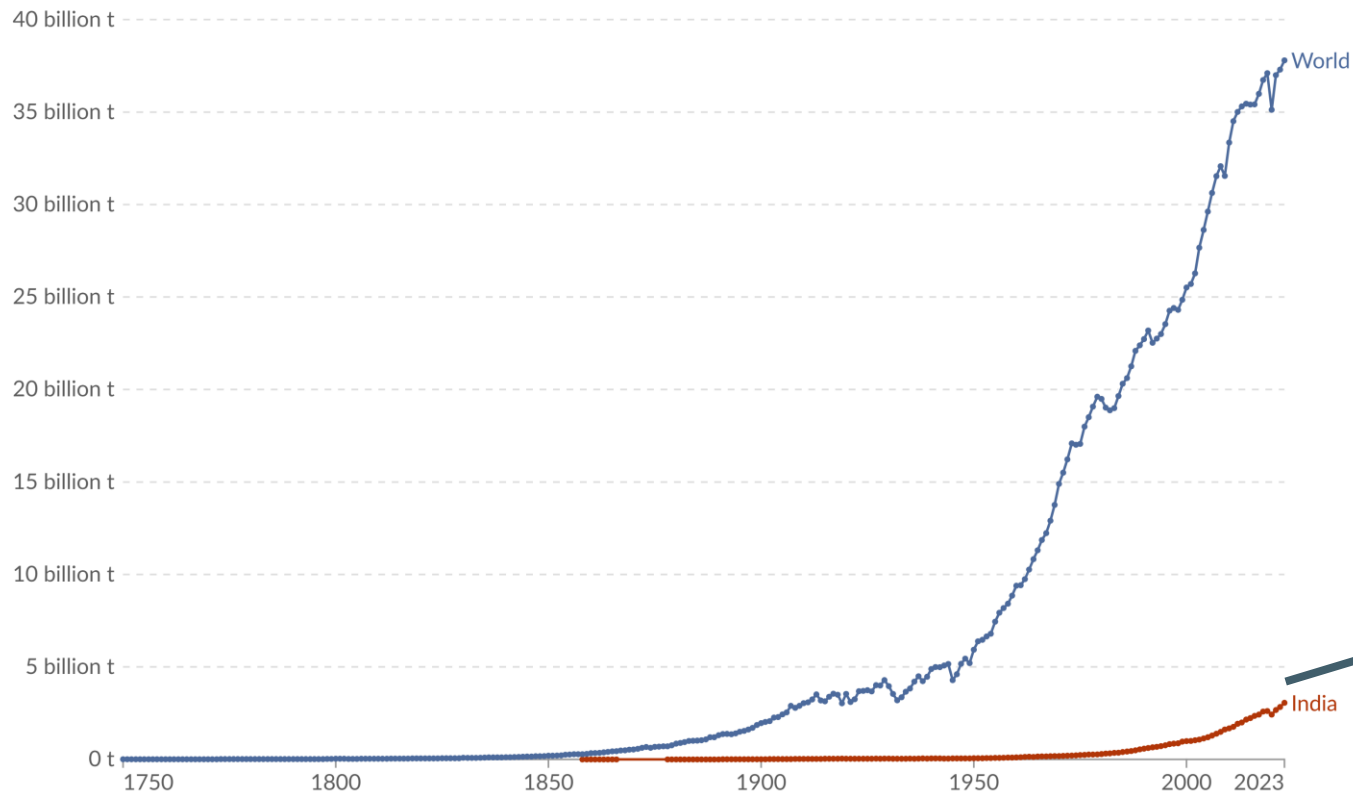




Annual CO₂ emissions

Our World
in Data

Carbon dioxide (CO₂) emissions from fossil fuels and industry. Land-use change is not included.



**3.06
bt**

Data source: Global Carbon Budget (2024)

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Indian Situation: Current Landscape

India's climate policy must balance **growth** and **sustainability**, while learning from global practices like the USA's use of SCC.

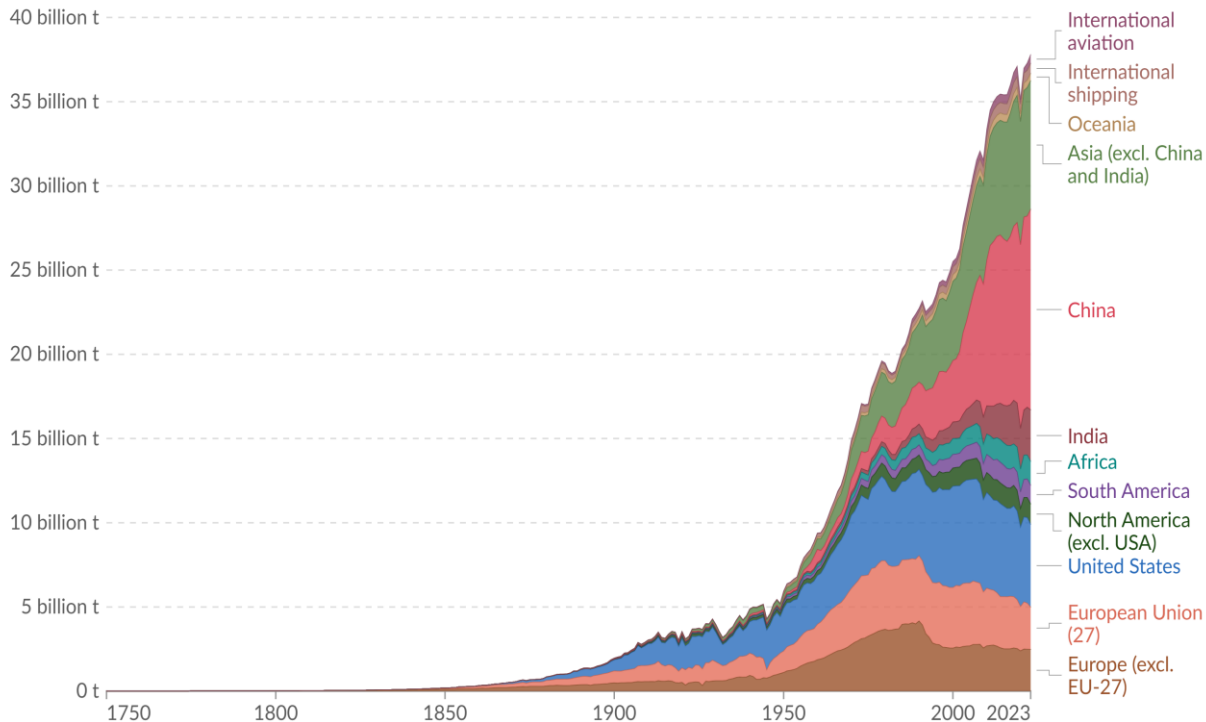
- ❑ **Emissions Profile** : India is the 3rd largest emitter, but per capita emissions remain far below USA levels
- ❑ **Development Priorities**: Growth, poverty reduction, and energy access complicate climate policy.
- ❑ **Energy Dependence**: Heavy reliance on coal for electricity generation.
- ❑ **International Standing**: Using SCC strengthens India's role in global climate negotiations.



Annual CO₂ emissions by world region

Our World
in Data

Emissions from fossil fuels and industry are included, but not land-use change emissions. International aviation and shipping are included as separate entities, as they are not included in any country's emissions.



Data source: Global Carbon Budget (2024)

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CO₂ Emissions, Annual in the World (2023)

Source: eia.gov • [Show metadata](#)

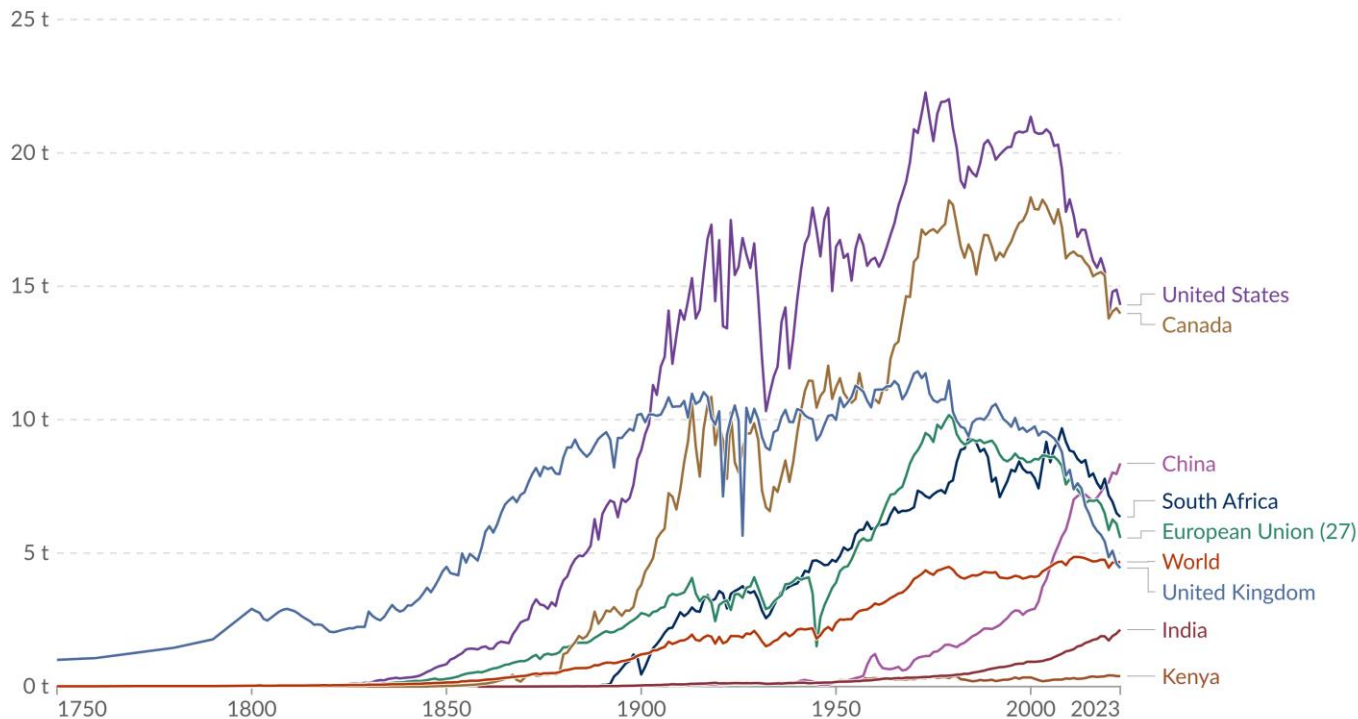
1.	China	12.2K MMt CO ₂	2023
2.	United States of America	4.8K MMt CO ₂	2023
3.	India	2.82K MMt CO ₂	2023
4.	Russia	1.84K MMt CO ₂	2023
5.	Japan	960 MMt CO ₂	2023
...			
213.	Réunion	0 MMt CO ₂	2023
214.	Martinique	0 MMt CO ₂	2023
215.	Northern Mariana Islands	0 MMt CO ₂	2023
216.	French Guiana	0 MMt CO ₂	2023
217.	Guadeloupe	0 MMt CO ₂	2023





CO₂ emissions per capita

Carbon dioxide (CO₂) emissions from burning fossil fuels and industrial processes. This includes emissions from transport, electricity generation, and heating, but not land-use change.



Data source: Global Carbon Budget (2024); Population based on various sources (2024)

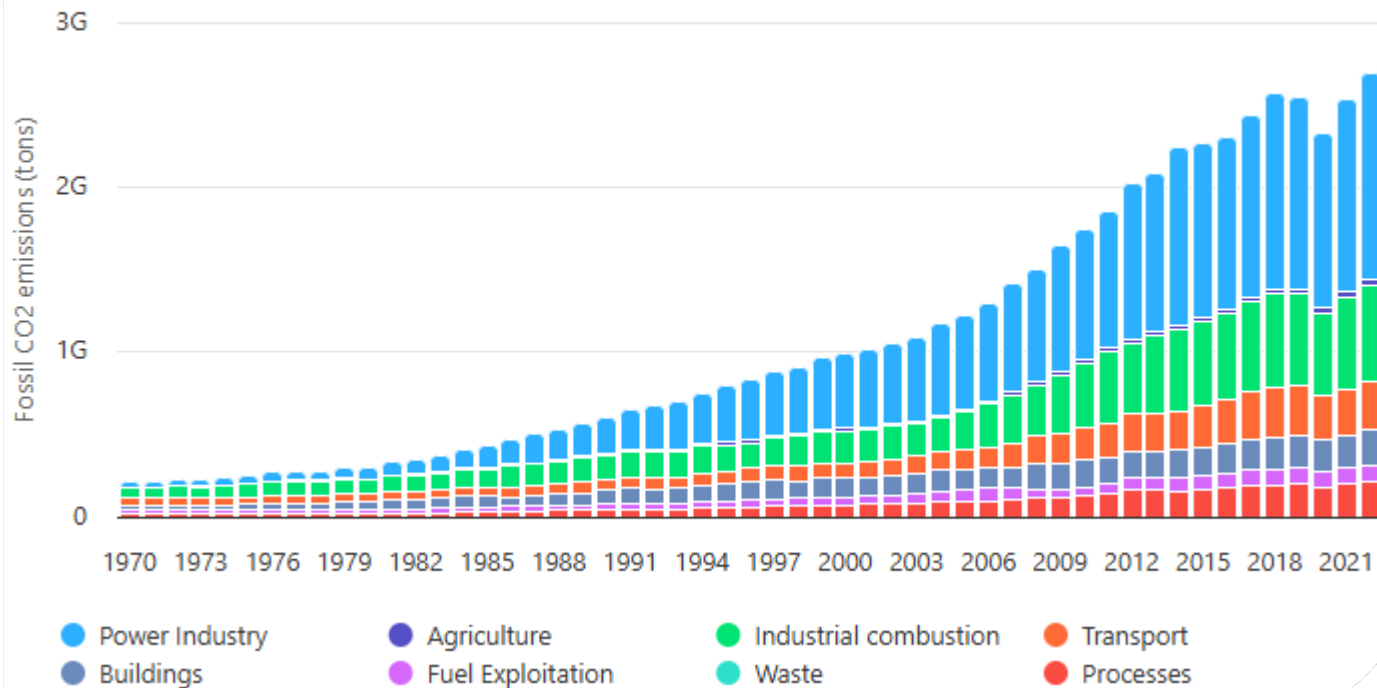
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Energy Dependence: Heavy reliance on coal for electricity generation.

India CO2 emissions by Year and Sector (tons)



Estimate by National Bureau of Economic Research (NBER),
United States (US) for India–

US\$80-130/tCO₂



Estimate as seen in Economic Survey 2016–17

US\$2.9/tCO₂

2015 estimate.
No data available after that.





Implementing SCC in India

The Social Cost of Carbon (SCC) can provide India with a structured tool to guide investments and regulations in line with climate goals.

- ❑ **Policy Appraisal** – Integrate SCC into cost–benefit analysis of infrastructure, energy, and transport projects.
- ❑ **Carbon Pricing** – Use SCC as a reference for taxation and industry benchmarks.
- ❑ **Targeted Incentives** – Apply SCC to guide subsidies for renewables and efficiency, with periodic revisions.





Limits : Using SCC as a Guide

Transplanting the SCC framework into India overlooks critical differences in context, economy, and development needs.

- ❑ **Economic Constraints** – Lower per capita income and fiscal limits make US-level SCC difficult to apply.
- ❑ **Coal & Energy Poverty** – Strict SCC-based policies could undermine affordability and access
- ❑ **Long-Term Lag** – Benefits take years to emerge, and a uniform SCC overlooks state-level disparities



Should SCC Analysis Replace Mitigation Cost Analysis?





Mitigation Cost Analysis

Calculates expenses of cutting emissions, showing efficient pathways to targets but not assessing overall economic justification.

Emission
Reduction
Benefits



Efficient
Emission
Reduction

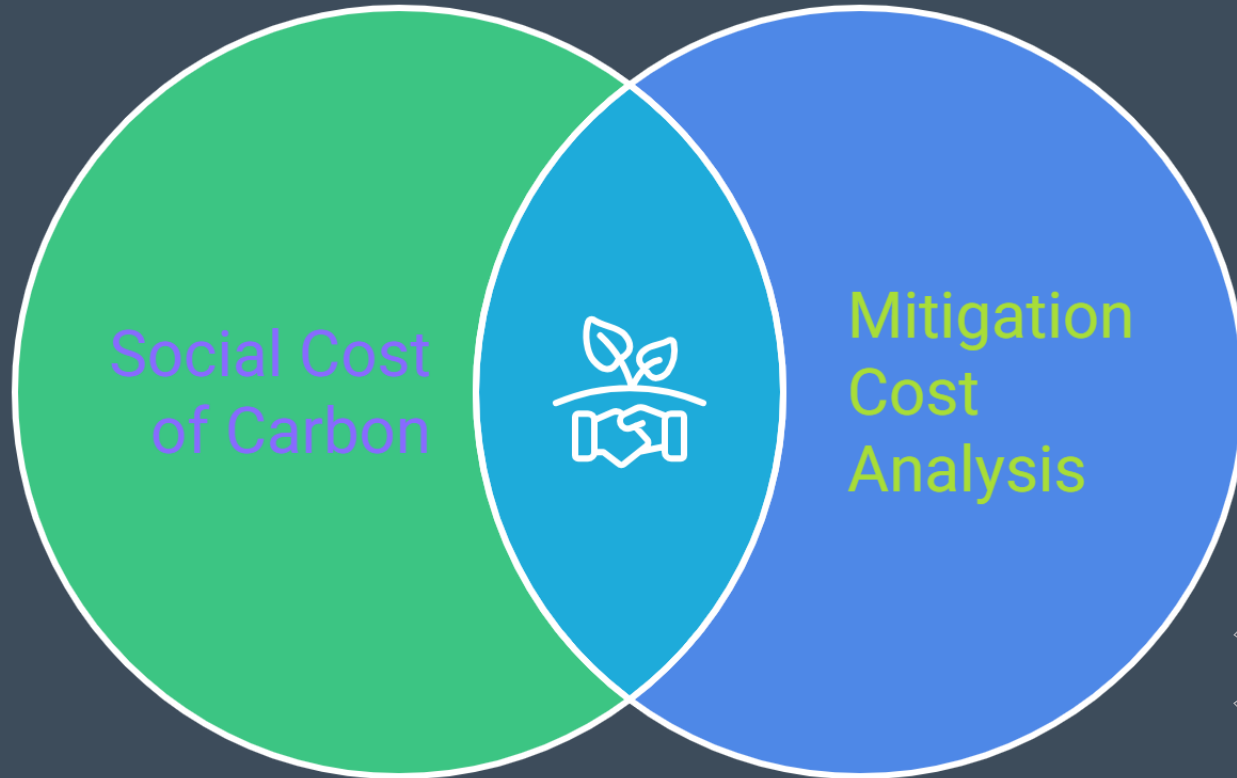
Social Cost of Carbon

Mitigation Cost
Analysis





No, they are complementary, not interchangeable.





Should SCC Analysis Replace Mitigation Cost Analysis?

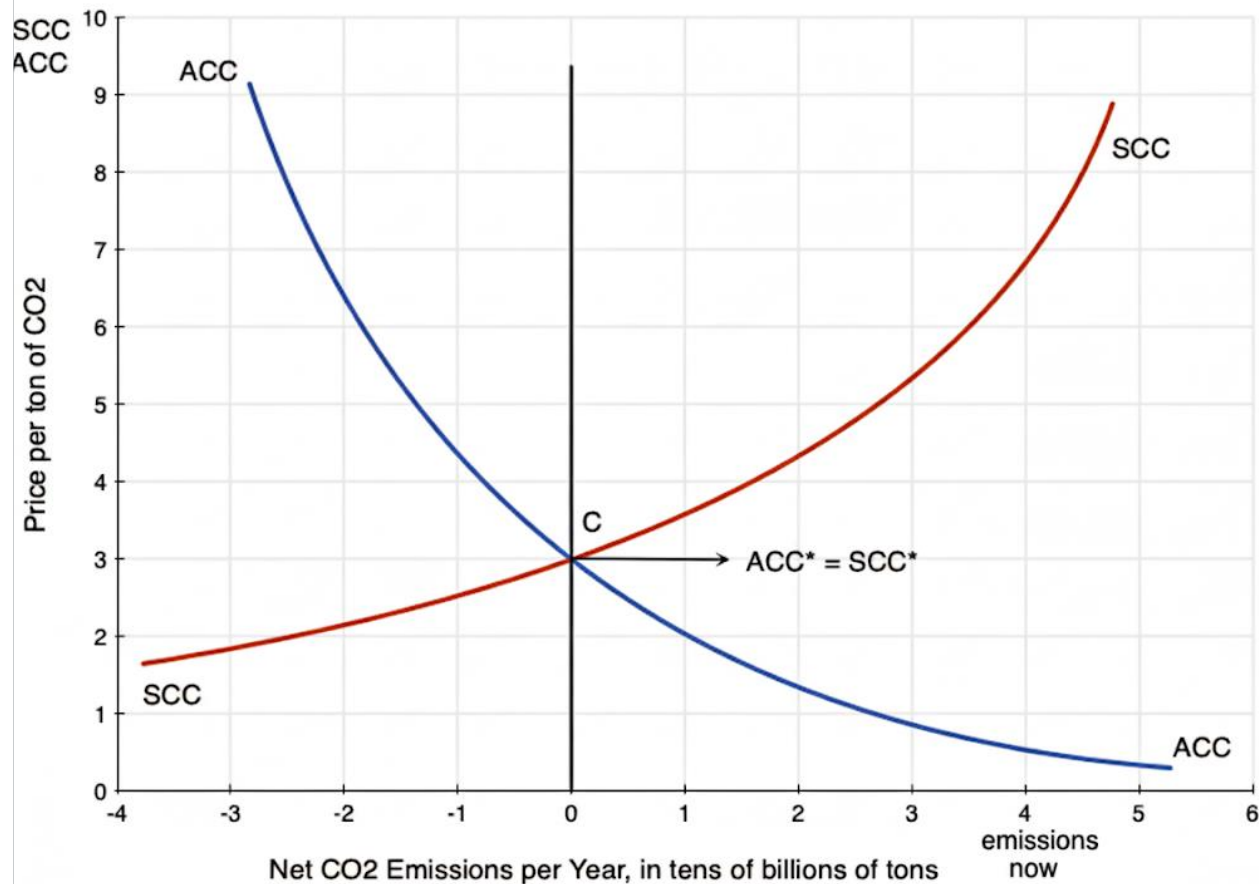
SCC and mitigation cost analysis are complementary, not interchangeable. SCC captures the *benefit side* by valuing avoided damages from emissions cuts, while mitigation cost analysis shows the *cost side*, identifying efficient reduction pathways.

Together, they form a complete cost–benefit framework, ensuring climate policies are both effective and worthwhile.





The Social Cost of Carbon (SCC) vs. the Abatement Cost of Carbon (ACC)





References

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7. <https://www.epa.gov/>
8. <https://ourworldindata.org/emissions-by-sector>
9. <https://www.indiabudget.gov.in/economicsurvey/>



Thank You

Any Questions?

