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## ***The Social Cost of Carbon***

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- The social cost of carbon (SCC), the estimated price of the damages caused by each additional ton of carbon dioxide (CO<sub>2</sub>) released into the atmosphere, determines the strength of climate legislation; the higher the SCC is set, the more stringent the regulatory standards.
- Current national estimates of the SCC are grossly underestimated due to a reliance on deeply flawed economic models and a disregard of important alternative estimates and ethical issues.
- Ethical considerations such as unmonetized climate impacts and the rate of discounting future impacts cannot be disregarded; nor can the risk of catastrophic climate damages.

### **The Significance of a Social Cost of Carbon**

It is vital to regulate CO<sub>2</sub> emissions to work towards climate stabilization. The more CO<sub>2</sub> in the atmosphere, the hotter the average global temperature. Current trends unaltered imply a rising average temperature by as much as 6°C within this century. Many scientists believe that any warming beyond 2°C would put the world at excessive risk of catastrophic, irreversible consequences. Every ton of CO<sub>2</sub> that we can keep out of the atmosphere slows climate change and reduces the risk of the worst kinds of damage.

But reducing emissions carries a cost. To help determine how aggressively to act in cutting emissions, policymakers weigh preventative costs against the cost of inaction, or of less-aggressive action. The SCC may be the most important number you've never heard of. It asks, how much will each ton of CO<sub>2</sub> that we release into the atmosphere cost us in damages, both today and in the future? If the answer is a big number, then we ought to make great efforts to reduce greenhouse gas emissions. If it is a small number, then the case for reduction is weaker, and only easy or inexpensive changes seem warranted.

### **How to Use a Priced Ton of CO<sub>2</sub>**

All current proposals for climate policy are based on the price of carbon emissions, whether through a carbon tax, market allowances, or through regulation by government agencies.



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- **Carbon tax:** The price per ton of carbon is applied as a tax on fuels. The government collects the taxes and can use the revenue for virtually any purpose, like investment in climate protection.
- **Emission allowance markets:** In a 'cap and trade' scheme, a limited number of carbon allowances are issued, and a secondary market forms to buy and sell the permits. In a 'cap and dividend' system, carbon allowances would be auctioned off, with the revenue returned to the public.
- **Government regulation:** A government agency can set technology bans or impose performance standards such as emissions limits. Such regulations are generally guided by cost-benefit calculations; a policy is approved if its cost per ton of CO<sub>2</sub> eliminated is less than the carbon price and rejected as uneconomical if its per ton cost is more than the carbon price.

### Obama Administration Approach

While no definite SCC has been set so far, an Interagency Working Group has endorsed a 'central' estimate of \$21 per ton of CO<sub>2</sub> in 2010. If widely adopted, this low estimate of the SCC could result in ineffectual regulations that would barely reduce U.S. emissions, if at all.

Their estimates were calculated by collecting a variety of SCC estimates from current climate economics literature and tweaking them for comparability and utilizing only three models, FUND, PAGE, and DICE. All three are problematic: FUND mistakenly predicts a huge reduction in mortality from warming, then values the lives supposedly saved on the basis of their per capita incomes. As a result, it makes the morally offensive assumption that human lives in poor countries are worth less than in rich ones. PAGE has produced a wide range of estimates, the higher of which the working group ignored, and most of its estimates assume that developed nations will adapt to climate change at near-zero cost. DICE assumes on very thin evidence that most people in the world would prefer a warmer climate, and recommends a very slow 'climate policy ramp' as a result.

The resulting underestimated values use unsupported judgments as grounds for ignoring important alternatives like the Stern Review and the Intergovernmental Panel on Climate Change, are overly aggressive in discounting the value of future costs, and ignore the risk of catastrophic climate change. A corrected version of the same calculations would likely result in a higher SCC and more stringent emissions regulations.

### Ethical Issues and Discounting

Some of the serious anticipated damages from climate change, such as loss of endangered species, unique habitats and environments, and human lives and communities cannot be reasonably quantified or monetized regardless of how valuable they really are. Much of the



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literature used to inform the Administration's estimates omits these values entirely, effectively giving them a value of zero. As a result, estimates of the SCC may be too low or logically incomplete.

To estimate the SCC, present and future damages must be combined in one value. This process is called 'discounting'. The farther into the future that costs take place, the less these costs are assumed to matter in today's decision-making. The higher the discount rate, the less future costs are valued in present-day terms. Climate policy is inescapably concerned with mitigation costs incurred today that will have their greatest benefits a century or more into the future. The choice of a discount rate for intergenerational impacts is therefore an ethical judgment. Lower discount rates, decreasing rates over time, and even a zero discount rate can be used to show that our society takes seriously the costs to be suffered by future generations. The Administration's casual estimates and unsupported judgments are used to justify discount rates that are inappropriately high (2.5-5%) for an analysis that spans several generations.

### **Catastrophic Risk and Policy Design**

The Administration's SCC estimates largely omit the risk of catastrophic climate damage. In fact, the treatment of catastrophic risk is one of the most important parts of climate economics; policy is recommended to be directed at reducing the risks of worst-case outcomes, not at balancing the most likely values of costs and benefits. The expected damages are important and costly; the credible worst-case outcomes are disastrously greater. The urgent priority is to protect ourselves against those worst cases, not to fine-tune expenditures to the most likely level of damages.

Policy design should begin with adoption of a safe minimum standard, based on the scientific analysis of potential risks. The economic analysis would then seek to determine the least-cost strategy for meeting that standard. For example the costs of lowering atmospheric CO<sub>2</sub> concentrations to 350 ppm, a level now advocated by a growing number of climate scientists and policy analysts, would be noticeable but manageable<sup>1</sup>. The risk of spending 'too much' on clean energy alternatives pales in comparison with the risk of spending too little and irreversibly destabilizing the earth's climate.

### **Conclusion**

The Administration's low estimate of \$21 per ton of CO<sub>2</sub>, is a function of its choice of a limited range of underlying studies, high discount rates, and insufficient emphasis on the risk of catastrophic climate damage. Better choices at several points in the methodology would have

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<sup>1</sup> Please see our recent report on 'The Economics of 350: The Benefits and Costs of Climate Stabilization' for more information available online at: [http://www.e3network.org/papers/Economics\\_of\\_350.pdf](http://www.e3network.org/papers/Economics_of_350.pdf)



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resulted in a far higher SCC and, as a result, more stringent and expensive but necessary emissions reduction would be considered economical.

To put this price in perspective, consider the United Kingdom, which pioneered the use of SCC estimates for policy purposes, estimates prices ranging from \$41 – \$124 per ton of CO<sub>2</sub>, with a central case of \$83. Since 2009 however, it has abandoned calculation of the SCC altogether, and now bases its carbon price on estimates of mitigation costs to reach its official commitment to reduce CO<sub>2</sub> emissions by 80% by 2050.

An expanded calculation of carbon prices for the United States should at least explore prices in this range, and should be open to considering the full range of implications of the extensive research that is needed to compute a better estimate of the cost of carbon emissions.