CLMATE CHANGE

# Carbon Trading Over Taxes

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Carbon emissions trading ensures not only that targets will be met by a specific date but also fosters international cooperation and development objectives.

As the United States moves inevitably toward climate legislation, discussion has shifted from the science to the policy options for slowing emissions of carbon dioxide ($CO_2$) and other greenhouse gases. Some favor a tax on $CO_2$ emissions—referred to as a C tax (*1*). Others favor government subsidies (*2*). If high enough to alter consumer behavior, a carbon tax would reduce emissions by raising the effective price of carbon-intensive energy relative to carbon-free sources. Subsidies may speed development of specific, targeted low-C technologies.

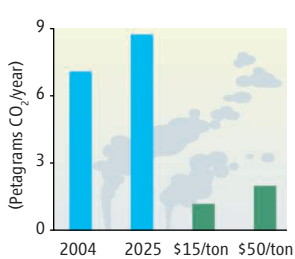
But a market-based system with an economy-wide cap on emissions and trading of emission allowances would do the same, while having distinct advantages (*3*). Most important, a cap-and-trade system, coupled with adequate enforcement, assures that environmental goals actually would be achieved by a certain date. Given the potential for escalating damages and the urgent need to meet specific emission targets (*4*), such certainty is a major advantage. A federal cap-and-trade system could be incorporated into existing emissions trading frameworks and markets, such as the Kyoto Protocol's international market or subnational ones like the Regional Greenhouse Gas Initiative.

Earth's climate is agnostic about the location and type of $CO_2$ emissions and is sensitive only to the total burden of $CO_2$. It makes sense, therefore, to design a climate policy that taps all possible avenues to limit net $CO_2$ emissions. Trading of emissions across all sectors of the economy addresses this by allowing emitters to purchase carbon offsets from businesses that are able to lower their own emissions below their allocation. If trading were incorporated into an international system, U.S. firms and consumers could meet emissions targets at reduced costs by substituting less expensive cuts in, for example, developing countries, for expensive emissions cuts in the United States. Because investment would be funneled to technologies that reduce $CO_2$ emissions at the least cost, the overall expense of the program would be minimized.

Pollution credits exchanged for cash.

Cutting emissions of pollutants is admittedly not as complicated as cutting $CO_2$ emissions, and transaction costs can be a factor. Nevertheless, the United States was able to reduce sulfur oxide emissions ahead of schedule and at 30% of the projected cost using a market-based cap-and-trade system (*5*). Elimination of lead from gasoline and phase-out of ozone-depleting chemicals were also facilitated by emissions trading programs.

Offsetting emissions by storing carbon in soils, forests, and other forms of biomass in the United States has the potential to offset 10 to 20% of U.S. emissions in 2025 at relatively low cost (see chart below and table S1). International opportunities also exist. Deforestation of tropical rainforests is currently estimated to cause more than 7000 million metric tons per year of $CO_2$ emissions, the equivalent of about 25% of worldwide emissions from fossil fuel burning today; in 2025 the percentage is estimated to be about 15% (table S2). Using an international cap-and-trade market to compensate nations for slowing deforestation would bring a significant block of emissions under management, while preserving irreplaceable ecosystems and providing income to developing economies (*6*–*8*).




**Effect of carbon credits.** U.S. greenhouse gas emissions for 2004 and 2025 with business as usual (blue); estimated U.S. land-management offsets in 2025 at $15 and $50 per ton of $CO_2$ (green); 1 petagram = 1 billion tons (table S1).

Ensuring the integrity of such a system will require rigorous monitoring, auditing, and registration. Leakage (e.g., where reduced timber harvest in one location is replaced by increased harvest elsewhere to meet demand for lumber), the credibility of baselines in capped and uncapped systems, and the full climate effects of enhanced biological growth must be addressed (*9*–*10*). However, these problems are manageable (*11*). Frameworks and methodologies for documenting the size and validity of carbon offsets based on land-management practices are available (*12*, *13*). Following such a methodology will not be a trivial exercise. It will involve costs that will affect those hoping to market offsets. But the advantage of a market-based system is that it provides an incentive for innovation—which can translate into inexpensive $CO_2$ emission reductions. Why would we want to exclude any sector of the economy from this competition, let alone one with such large potential?

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