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## UCS Backgrounder

### We Need a Well-Designed Cap-and-Trade Program to Fight Global Warming

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The debate over global warming has finally shifted from whether it is indeed happening (it is) and if human activity is causing it (it is) to what we need to do to avoid the worst consequences of climate change. If we stabilize atmospheric concentrations of global warming emissions at or below 450 parts per million (ppm) of carbon dioxide (CO<sub>2</sub>) equivalent we have a 50 percent chance of preventing the Earth's average temperature from rising 3.6 degrees Fahrenheit (2 degrees Celsius) above pre-industrial levels. Scientific evidence suggests this would avoid some of the worst, irreversible consequences of global warming.

According to a Union of Concerned Scientists (UCS) analysis, even with aggressive action by industrialized and developing countries, the United States would have to cut its emissions by at least 80 percent from 2000 levels by 2050.

This daunting task will require countries to quickly deploy clean energy technologies and develop new low-carbon technologies, using a combination of policies to help spur these activities. Foremost among them is a well-designed cap-and-trade program, which would put a price on carbon emissions that reflects the costs of global warming. This must be coupled with strengthened efficiency standards, incentives, and public investment in clean technologies and infrastructure. A carbon tax—which has attracted some attention recently on Capitol Hill—also could be part of the solution, but it would not guarantee necessary emissions reductions without an emissions cap in place.

#### How a Basic 'Cap-and-Trade' Program Works

Under a cap-and-trade program, the federal government would establish an economy-wide cap on emissions, measured in metric tons of CO<sub>2</sub> equivalent, and tighten that cap over time. It then would issue "emissions allowances" that correspond to a specific number of metric tons of carbon. The total number of allowances would match the cap.

The program would require electric utilities, refineries and other sources of global warming pollution to have an allowance for each ton of their emissions. Polluters would acquire allowances during the initial distribution or by trading for them in an "allowance market." This market would enable polluters that are able to reduce their emissions relatively cheaply to sell allowances to those that are unable to do so, thereby establishing a market price for carbon. The program would create an incentive for polluting facilities to implement the most cost-effective emissions reduction options and, by putting a price on global warming pollution, encourage investments in new low-carbon technologies.

#### Key Elements of a Well-Designed Cap-and-Trade Program

All cap-and-trade programs are not equal. Only a well-designed program would achieve the necessary emissions reductions and protect the environment and the economy. The key elements are:

- **Stringently capping emissions, with firm near-term goals.** As discussed above, the United States must reduce its global warming pollution emissions at least 80 percent below 2000 levels by 2050 to avoid the worst effects of global warming. Delay in taking action would require much

sharper cuts later, making it much more difficult and costly to meet the necessary target. A near-term goal of a 15 percent to 20 percent reduction from current levels by 2020 is essential.

- **Including as many economic sectors as possible.** The cap should cover all major sources of emissions, either directly or indirectly. They include electric utilities, transportation, and energy-intensive industries, which together comprise some 80 percent of U.S. global warming pollution, as well as fossil fuel emissions from the agriculture, commercial and residential sectors.
- **Including all major heat-trapping gas emissions.** Those include carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF<sub>6</sub>). Emissions of different gases could be combined according to their global warming potential using the CO<sub>2</sub>-equivalent method.<sup>1</sup>
- **Auctioning all (or a substantial majority of) allowances** rather than giving them away to emitters. An allowance auction would allow the market to set the price of carbon, and it would be the most efficient and equitable way of distributing allowances. Giving away too many allowances would distort the market and could result in windfall profits for polluters.
- **Using auction revenues for the public good.** The government should invest auction revenues in clean, renewable energy technologies and energy efficiency measures. Revenues also could compensate low-income families, provide transition assistance to workers or economic sectors that are disproportionately disrupted by the program, and help communities adapt to the unavoidable effects of global warming.
- **Excluding loopholes that undermine the integrity of the program.** To be effective, a cap-and-trade program should not include a “safety valve” setting a maximum price for allowances and requiring the government to sell unlimited allowances to polluters once that price is hit. This would undermine the integrity of the emissions cap, and reduce the incentive for investments in clean technology.
- **Including strict criteria for cost-containment mechanisms** such as offsets and borrowing. Offsets would allow regulated polluters to purchase emissions reductions from unregulated sectors or countries that do not have caps, instead of reducing an equivalent amount of their own emissions or buying allowances from other regulated facilities. (For example, a regulated electricity generator could pay an unregulated landfill company to capture its methane emissions and use those emissions reductions to “offset” their own.) Borrowing would allow facilities to emit more global warming pollution if they promise to make sharper emissions cuts later.

Offsets and borrowing could lower the cap-and-trade program’s short-term costs for polluters. However, by postponing emissions reductions from major emitting sectors, they would delay much-needed technological innovation and jeopardize the program’s long-term goals. Any offsets should meet rigorous standards to ensure the activities are permanently removing carbon from the atmosphere beyond what would happen in a business-as-usual scenario. Borrowing should not reach unsustainable levels that threaten the program’s viability.

- **Linking with similar programs.** There are important economic advantages to linking a domestic cap-and-trade regime with those in Europe and other regions that have adopted a stringent emissions cap. Doing so would require the U.S. program’s design to be compatible with these other regimes.

## **Lessons from Existing Cap-and-Trade Programs**

In 2005 the European Union implemented a cap-and-trade program, the EU Emissions Trading System (EU ETS), covering 27 countries. In its first phase, which ends this December, the program covered the electric power and major energy-intensive industrial sectors. The program has been criticized for setting overly generous caps for polluters and giving away most allowances, resulting in huge windfall profits for power generators. The EU is making adjustments for the next phase of the ETS, which extends from 2008 through 2012. A U.S. cap-and-trade program should learn from the EU's experience and implement strong design principles from the outset to avoid these mistakes.

Any federal cap-and-trade system also could borrow from examples here in North America. The Regional Greenhouse Gas Initiative (RGGI), which will begin in January 2009, is a cap-and-trade program designed to reduce emissions from the electric power sector in 10 Northeast and Mid-Atlantic States. California has set a cap of reaching 1990 levels of global warming pollution by 2020, and is moving to implement a suite of policies, including an emissions trading system, to achieve that goal. Meanwhile, six Western states and two Canadian provinces have launched the Western Climate Initiative to develop a regional cap-and-trade regime, and several Midwestern states are proposing similar programs as part of climate change legislation.<sup>2</sup>

At the federal level, the acid rain program provides a good model of a successful cap-and-trade program that has greatly reduced power plant emissions of sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>), the pollutants that cause acid rain and smog.

## **Proposed Cap-and-Trade Programs**

Several bipartisan climate policies in both the House and the Senate have been proposed in the 110<sup>th</sup> Congress. The Safe Climate Act (H.R. 1590) and the Global Warming Pollution Reduction Act (S. 309) would set the most aggressive caps, calling for emissions reductions of 80 percent below 1990 levels by 2050. Both bills would establish additional performance standards for the electric, fuel and transportation sectors, while leaving the details of a cap-and-trade program to the Environmental Protection Agency.

In the Senate, Joseph Lieberman (D-Conn.) and John Warner (R-Va.) introduced a cap-and-trade bill this month, while House Energy and Commerce Committee Chairman John Dingell (D-Mich.) and Rep. Rick Boucher (D-Va.) have issued the first in a series of white papers exploring the principles of a cap-and-trade policy before introducing a bill.

## **Cap and Trade Alone is not Sufficient**

A cap-and-trade program alone would not be sufficient to meet the challenge of climate change. While a cap-and-trade policy would address the failure of the market to account for harm to the climate, it cannot by itself provide sufficient incentives for the technologies and other measures that will be needed to establish a true low-carbon economy. The government must implement parallel policies alongside a cap-and-trade regime to ensure development and deployment of the full range of clean technologies. These policies include requiring utilities to generate a higher percentage of their electricity from renewable energy sources, requiring automakers to increase vehicle fuel economy standards, stronger energy efficiency policies, incentives for investments in low-carbon technologies, and policies encouraging smart growth. Studies have shown that a comprehensive approach including these parallel policies would lower the price for allowances, cut emissions, and save consumers money by lowering their electric and gasoline bills.<sup>3</sup>

## **What about a Carbon Tax?**

A well-designed cap-and-trade program has an important advantage over a carbon tax. The former would require the specific emissions reductions necessary to avoid dangerous climate change, while a carbon tax by itself cannot guarantee any particular level of emissions reductions. Moreover, a cap-and-trade program would more easily dovetail with similar existing and proposed regimes in other

countries and regions. For example, allowing developing countries to sell carbon credits in a cap-and-trade program from tropical deforestation emissions reductions would provide a powerful incentive to address the source of some 20 percent of global warming pollution emissions.

Nevertheless, a carbon tax, like a cap-and-trade program, would use the power of the market to achieve cost-effective emissions reductions, and both would generate revenues that could be used for the public benefit. It may be possible for the two policies to co-exist and complement one another. For example, a cap-and-trade program could cover most economic sectors where emissions can be capped at centralized sources, such as power plants. A carbon tax could provide incentives for emissions reductions in sectors where it is more difficult to establish a cap, such as transportation, where emissions are more dispersed through the stages of fuel production and consumption.

Any effective U.S. climate strategy must cut global warming pollution deeply enough to avoid the worst effects of climate change, which means at least 80 percent below 2000 levels by 2050. Emissions trading and carbon taxes are both tools we can use to achieve these reductions, as are technology standards, incentives, and public investment in clean technology and infrastructure. What's most important is that we move aggressively to address the climate crisis, and that we begin the transition to a low-carbon economy right now.

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The Union of Concerned Scientists is the leading science-based nonprofit organization working for a healthy environment and a safer world. Founded in 1969, UCS is headquartered in Cambridge, Massachusetts, and has offices in Berkeley, California, and Washington, D.C. For more information, go to [www.ucsusa.org](http://www.ucsusa.org).

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<sup>1</sup> Information on the global warming potential values for major greenhouse gases can be found at: <http://www.epa.gov/climatechange/emissions/downloads06/07Annex6.pdf>

<sup>2</sup> See RGGI model rule at [www.rggi.org/](http://www.rggi.org/), the California Global Warming Solutions Act of 2006 (AB 32) at [www.climatechange.ca.gov](http://www.climatechange.ca.gov), Western Climate Initiative at [www.westernclimateinitiative.org/](http://www.westernclimateinitiative.org/), Illinois at [www.epa.state.il.us/air/climatechange/index.html](http://www.epa.state.il.us/air/climatechange/index.html), Minnesota at [www.mnclimatechange.us](http://www.mnclimatechange.us).

<sup>3</sup> Alison Bailie et al, 2003, "Analysis of the Climate Stewardship Act," Tellus Institute, <http://www.tellus.org/energy/publications/McCainLieberman2003.pdf>