



### Effective Market-Based Solution for Controlling Emissions?

#### Watch List

- The institution of a cap-and-trade system to control greenhouse gas emissions is part of the Obama Administration's proposed budget.
- The administration desires to auction off all of the allowances; effectively raising \$650 billion in government funds.
- Of those funds, \$15 billion would be invested to develop technologies like wind and solar power, advanced biofuels, clean coal, and more efficient cars and trucks built in the United States.
- Senate opposition to auctioning off allowances could mean a change to the administration's plans.
- The House Energy and Commerce Committee expects to approve an energy and cap-and-trade bill by Memorial Day 2009.

#### Related Sustainability Watch Reports

- Carbon Emissions
- Carbon Offsets
- Carbon Capture & Sequestration
- Carbon Tax
- Carbon Trading

#### Key Takeaways

- Cap-and-trade systems are gaining more visibility since President Obama's proposed budget allocations for controlling greenhouse gas emissions.
- A 1995 United States cap-and-trade system to control sulfur dioxide (SO<sub>2</sub>) emissions, a cause of acid rain, has been successful.
- Cap-and-trade systems are market-based instruments.
- Key elements of a cap-and-trade system include: The emissions goal (the cap); the permits which allow an organization to pollute (allowances); and the ability to buy and sell allowances (trading).
- A cap-and-trade system allows regulatory bodies to set and control the level of aggregate emissions; emissions cannot exceed the cap set by the regulatory body.
- Allowances may be auctioned or given away for free by the government.
- Compared to pollutions taxes, cap-and-trade systems are advantageous because they impose a direct limit on emissions.
- Cap-and-trade systems work best with pollutants that are produced by relatively few sources whose emissions can be accurately measured, such as oil refineries, iron and steel plants, etc.



## Executive Summary

Emissions caps and tradable pollution permits are the methods by which cap-and-trade systems allow regulators to govern emissions levels. Caps serve as the limit of all emissions. The tradable nature of allowances means that market forces determine their distribution in a way that is most efficient in meeting the overall cap.

Two basic assumptions underlie every cap-and-trade system:

- Emissions below a certain quantity do not cause undue harm to the environment.
- A market in pollution allowances is the most cost-effective means of reducing pollution to the pre-determined level.

Cap-and-trade programs work best with pollutants that are produced by relatively few sources whose emissions can be accurately measured. If the cost of measuring and accounting for emissions is greater than the market price of the allowances, then the program is worthless.

In the United States, a cap-and-trade system has been used successfully since 1995 to reduce sulfur dioxide (SO<sub>2</sub>) emissions, a cause of acid rain. Experience with using cap-and-trade systems to control greenhouse gases is more limited. Two examples of greenhouse gas cap-and-trade systems currently in operation are the European Union Emission Trading Scheme and the Northeast states' Regional Greenhouse Gas Initiative.



Coal Powered Plant and Wind Turbine Getty 2007



### Business Options & Best Practices

Worldwide consideration and discussion regarding the reduction of greenhouse gases has led to increased mention of cap-and-trade systems.

#### What is a Cap-and-Trade System?

A cap-and-trade system is reliant upon an overall emissions goal. This goal is called the cap. The cap serves as a limit for the total aggregate emissions and does not provide individual limits for specific firms or sources. Typically, emissions caps follow a slow/stop/reverse pattern. The emissions are first slowed, then stopped, and then emissions are reduced to an end-point. An example of a cap is when the Northeast states agreed in 2005 to stabilize CO<sub>2</sub> emissions from the region's power plants at 2005 levels by 2015, and then reduce them by 10 percent in 2018.

Once a cap is established, an initial allocation of permits is made to organizations that pollute. These permits are called allowances. The total number of allowances that are issued is limited by the cap that has been set. A cap-and-trade system allows regulatory bodies to set and control the level of aggregate emissions; emissions cannot exceed the cap set by the regulatory body. If polluters can reduce their emissions below their permitted amount, then they can sell some of their unneeded allowances to other organizations that pollute more than is permitted them. This process of buying and selling allowances is called trading.

The tradable nature of allowances means that market forces determine their distribution in a way that is most efficient in meeting the overall cap. Each ton of emissions generated by a firm corresponds to an allowance which is acquired and then relinquished upon use. To offset allowance costs (and emission levels), a firm will therefore institute those reductions which are less costly than the allowance mar-

ket price. Further, because emission allowances can be traded among organizations, a market is created which supports the trading of allowances at their highest valued use; in effect covering those emissions that are most costly to reduce. Conversely, in this market, the least costly emission reductions are those that are taken to meet the cap.

In the United States, a cap-and-trade system has been used successfully to reduce sulfur dioxide (SO<sub>2</sub>) emissions, a cause of acid rain. In 1995, this system was established under the 1990 Clean Air Act Amendments. According to the US Environmental Protection Agency, in 2005 this cap-and-trade program had reduced SO<sub>2</sub> emissions by more than 5.5 million tons from 1990 levels, or roughly 35% of total emissions in the power sector. Although the program will cost about \$3 billion per year by 2010, the environmental and health benefits will total more than \$100 billion according to the EPA.

#### Design Considerations for a Cap-and-Trade System

The effectiveness of a cap-and-trade system relies on several different design considerations. These include how allowances are distributed, how the cap is set, whether the program is designed to be "upstream" or "downstream," and whether safety valves are included.

- **Distribution of Allowances.** Initial allocation of allowances makes a big difference in terms of equity and the cost of reducing emissions. The allocation process also tends to be politically charged. The government can utilize two main avenues for distributing allowances: As free handouts or through an auction. Allowances that are distributed for free are determined by a firm's past activity (such as output, emissions, or fuel input). In an auction system, firms bid to purchase allowances. Auction systems, in which all organizations bid for allowances, are consid-



ered to be more efficient. Auctions allow new and existing firms to compete for allowances on an even footing, avoid the risk of windfall profits, and generate revenue that can be used to address economic or policy concerns.

- Setting the cap. In a cap-and-trade system, if the cap is set too low (i.e., fewer emissions are allowed), then the cost of meeting emissions reductions will rise rapidly. Carbon allowances will become more valuable on the market and high prices will cause economic pain. In contrast, if the cap is set too high (i.e., more emissions are permitted), problems also occur. In this case, the desired emissions reductions will not be met.
- “Upstream” vs. “downstream” programs. The discussion of upstream vs. downstream programs concerns to whom allowances are distributed. Upstream greenhouse gas cap-and-trade systems distribute allowances to importers or producers of fossil fuels. Downstream systems, on the other hand, distribute allowances to emitters. An upstream cap is considered to be more efficient, since there are fewer producers than there are emitters. While emitters such as electric utilities represent a manageable number of organizations, all end users of energy, like automobile drivers, are emitters of greenhouse gases. Clearly, a downstream approach which includes these emitters makes monitoring more complex and inefficient.
- Safety valves and cap-and-trade systems. In cap-and-trade systems, safety valves are additional allowances that are released by the government at a specified safety valve price. Safety valve allowances are only issued when the costs of carbon allowances exceed a certain amount. A safety valve sets a ceiling on emissions prices.

### Advantages & Disadvantages of Cap-and-Trade Systems

Naturally, cap-and-trade systems are not a perfect tool for reducing harmful emissions. These programs have both advantages and disadvantages.

#### Some of the advantages of cap-and-trade systems include the following:

- They impose a direct limit on emissions.
- Unlike pollution taxes, cap-and-trade systems create winners (those who reduce emissions cheaply or play the markets well), not losers (those who pay taxes).
- Environmental performance and cost effectiveness are unlikely to be affected by political forces.
- Cap-and-trade systems have been successfully adopted and implemented in the United States over the past two decades.

#### Some of the disadvantages of cap-and-trade systems include the following considerations:

- These programs work best with pollutants that are produced by relatively few sources whose emissions can be accurately measured. Examples include coal plants, oil refineries, and similar facilities.
- A cap-and-trade system only works if emissions can be measured accurately and cheaply. If the cost of measuring and accounting for the emissions is greater than the market price of the allowances, then the program will be worthless.
- Some feel that the levels at which caps are established are wholly arbitrary. In addition, a “baseline year” must be picked against which emissions are measured. Politicians and lobbyists may haggle over these elements of a cap-and-trade system.



- From a philosophical point of view, cap-and-trade systems appear to confer a “right” to pollute and enable emitters to buy their way out of polluting.

### Cap-and-Trade Systems vs. Carbon Taxes

Both cap-and-trade systems and pollution taxes are market-based instruments. A carbon tax is considered to be a pollution tax. Cap-and-trade systems impose quantity restrictions on emissions, while pollution taxes impose cost restrictions.

Pollution taxes require regulators to decide on the level of the tax, the pollutant to be taxed, and the measurement standard for emissions. They tend to be less complex to implement than cap-and-trade systems. However, pollution taxes are not politically popular.

## Regulatory Environment

### Existing Cap-and-Trade Systems for Greenhouse Gases

Cap-and-trade systems have been proven to be effective at controlling conventional air pollutants, specifically sulfur dioxide. However, these systems have a more limited history as a means of reducing carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions. Two examples of cap-and-trade systems for greenhouse gases are the European Union Emissions Trading Scheme and the Regional Greenhouse Gas Initiative.

- European Union (EU) Emission Trading Scheme (ETS). The EU ETS is a cap-and-trade system at the heart of the EU’s goals to cut greenhouse gas emissions 20% from their 1990 levels by 2020. The EU ETS currently covers power stations, combustion plants, oil refineries, coke ovens, iron and steel plants and factories making cement, glass, lime, bricks, ceramics, pulp, paper and board. Phase 1 (2005 – 2007) was

judged unsuccessful as verified emission data was late in coming and led to an overallocation of carbon permits, which sent the carbon price plummeting. The EU believes that with correctly verified data, real emission reductions can be achieved in Phase 2 (2008 – 2012) because national caps can be set appropriately. The allocation should cap emissions at an average of 6.5% below 2005 levels and covers 10,000 installations responsible for 40% of the EU’s CO<sub>2</sub> emissions.

- Regional Greenhouse Gas Initiative (RGGI). RGGI was formed in 2005 by ten Northeast and Mid-Atlantic states. Participants are: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. In addition, the District of Columbia, Pennsylvania, the Eastern Canadian provinces, and New Brunswick are observers in the process. The participating states have agreed to a regional cap-and-trade program initially covering CO<sub>2</sub> emissions from fossil fuel-burning power plants. RGGI’s goal is to cap GHG emissions by 2009 and to reduce them by 10 percent by 2012. In the future, RGGI may be extended to include other sources and greenhouse gases (GHGs). Rather than distributing allowances to the regulated emitters for free, the participating states have decided to auction nearly the entire annual regional emissions budget of 188 million emission allowances (an allowance is equal to one ton of CO<sub>2</sub>). The initial auction was held in September 2008 and a second was held in December 2008.

### The Obama Administration & a Greenhouse Gas Cap-and-Trade System

The Obama Administration’s proposed budget includes the institution of a cap-and-trade system in the United States for controlling greenhouse gas emissions. The budget plan includes an auction of



the emission allowances which would result in \$650 billion in government funds.

During his February 24, 2009 speech to a joint session of Congress, President Obama pushed for a mandatory cap on greenhouse gas emissions. He suggested that \$15 billion of government revenue from the allowances sold to companies for compliance with the cap-and-trade system would be invested to develop technologies like wind power and solar power, advanced biofuels, clean coal, and more efficient cars and trucks built in the United States.

Business lobbies and many Republicans have found issue with the cap-and-trade program, saying that the plan is a large and permanent tax on oil, electricity, and manufactured goods, that will be passed on to consumers. Opponents to the program in Congress are concerned over whether a cap-and-trade system would have enough oversight to manage billions of dollars in government revenue. As such, it is expected that the final version of the Senate's cap-and-trade legislation will not utilize an auction to distribute funds. Of interest is the fact that the Senate desires to focus on an energy bill prior to touching on climate legislation whereas the House of Representatives desires to approve an energy and cap-and-trade bill before Memorial Day.

## Related Entities

### Governmental Organizations

- [European Union Emission Trading Scheme](#)
- [Regional Greenhouse Gas Initiative](#)
- [U.S. Environmental Protection Agency](#)

## Acronyms

- CO<sub>2</sub>** – Carbon Dioxide
- ETS** – Emission Trading Scheme
- EU** – European Union
- GHGs** – Greenhouse Gases
- SO<sub>2</sub>** – Sulfur Dioxide
- RGGI** – Regional Greenhouse Gas Initiative

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