Curbing Greenhouse Gas Emissions — Two Approaches

Facing the growing evidence that burning fossil fuels is contributing significantly to global climate change, U.S. policymakers are beginning to evaluate strategies for reducing greenhouse gas emissions, especially carbon dioxide (CO_2). They have two general approaches to consider. *

Cap-and-trade

With a cap-and-trade system for CO_2, policymakers set a limit on the quantity of CO_2 that can be emitted in a given period. The total emissions allowed under this cap are divided into permits (e.g., one ton of CO_2), representing the right to emit that amount. The permits are then allocated to the sources covered by the program (e.g., power plants). At the end of the compliance period, each source must report all emissions and surrender an equivalent number of permits.

Since the number of permits is limited, they have financial value. Companies able to reduce their emissions at low cost can sell the permits they don't need to companies for whom the cost of reducing emissions is high. Each company has the flexibility to choose how to meet its emissions target, but market incentives encourage them to develop new, cleaner technologies. Over time, the cap is lowered to achieve more aggressive emissions-reduction targets.

Carbon tax

A carbon tax is imposed on fossil fuel suppliers at a rate that reflects the amount of carbon that will be emitted when the fuel is combusted. The tax is included in the price of the coal, oil and natural gas supplied to wholesale users and ultimately is passed on to consumers in the price of electricity, gasoline and other energy-intensive products. By raising the price of carbon-based energy, the tax creates incentives to reduce energy use, stimulates demand for more energy-efficient products, and promotes a shift to cleaner fuels and renewable energy.

Emissions certainty

The strength of the **cap-and-trade** approach is that it sets firm limits on emissions. The cap is set at a level designed to achieve a desired environmental outcome (e.g., a reduction of CO_2 emissions to 80 percent of 1990 levels by 2050).

A **carbon tax** allows the quantity of emissions to fluctuate as the demand for energy rises or falls. Allowing emissions to vary from year to year gives firms the flexibility to abate less and pay more in taxes when abatement costs are unusually high (and vice-versa when abatement costs are low). In order to achieve climatic goals, the tax rate can be adjusted over time to attain greater emissions reductions.

Price predictability

The advantage of a **carbon tax** is that it fixes the price of carbon emissions. It creates a permanent incentive to reduce emissions, thereby encouraging investment in alternative fuels and energy-efficient technologies that have high up-front costs.

Under a **cap-and-trade** system, the price of emissions permits may vary considerably from year to year. An especially cold winter, for example, could increase the demand for energy and cause a spike in the price of permits. This volatility could weaken incentives to invest in cleaner technologies.

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* Both approaches can be designed to cover all greenhouse gases. For purposes of this paper, the two systems are discussed in the context of limiting emissions of carbon dioxide.

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To address this volatility, most cap-and-trade proposals include cost-control mechanisms, some of which would allow the level of emissions to exceed the cap.

- Safety valve—establishes a ceiling on the price of permits. If the price reaches this level, the government can sell additional permits at this price to the capped entities.
- Circuit breaker—freezes a gradually declining emissions cap if the permit price rises above a predetermined level.
- Banking—allows companies to save unused allowances for future years.
- Borrowing—allows companies to borrow permits from future years and pay them back, with interest, later.
- Offsets—allow companies to cover some of their emissions by purchasing credits created by carbon mitigation projects (e.g., tree planting) from sources outside the cap-and-trade system.

Environmental effectiveness

The impact of a **cap-and-trade** system depends on a number of factors. How stringent is the emissions target? How will baseline emissions be measured and a corresponding and appropriate number of emissions permits be determined and distributed? Will the cap be applied economy-wide or only to certain sectors (e.g., power plants and large industrial facilities)? What types of cost-control measures are included?

The impact of a **carbon tax** depends in large part on whether the tax rate is set high enough to create real market incentives to develop and adopt climate-friendly technologies. Although a carbon tax does not establish a firm limit on emissions, it applies economy-wide and provides a continual incentive for companies to make carbon-saving investments. The tax rate can be increased over time to provide stronger incentives to reduce emissions.

Equity

Under many **cap-and-trade** proposals, a substantial portion of the emissions permits are to be distributed free to the capped entities. Research indicates that only a modest portion of the permit value is needed to offset the costs of the cap; the remainder is then passed along in increased prices to consumers. This would disproportionately affect lower-income households because they tend to spend a larger fraction of their income than do higher-income households and because energy products make up a bigger share of their spending..

A **carbon tax** directly raises substantial revenues. These could be used in part to fund "progressive" tax-shifting policies that would reduce the burden of higher energy costs on lower-income groups.

Simplicity and transparency

A **cap-and-trade** system requires new institutions (e.g., a system to allocate permits, markets where firms can buy and sell permits, a means of monitoring emissions and trades). Auctioning the permits rather than distributing them free could help promote simplicity and transparency.

A **carbon tax** can be levied and collected through existing institutions with experience in enforcing compliance. It is simpler and less expensive to administer and enforce than a cap-and-trade system. Its underlying premise—the price of energy should include environmental costs associated with its production—is transparent and readily understood.

A more comprehensive discussion of this subject can be found on the author's website at revelle.net/lakeside/lakeside.new/CandT-CarbonTax.pdf.