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A Brief Comparison of Two Climate Change Mitigation Approaches: Cap-and-Trade and Carbon Tax (or Fee)

Almost all climate scientists agree that greenhouse gas (GHG) emission increases have contributed to observed climate change and that continued increases in GHG emissions will contribute to future climate change. Although a variety of efforts seeking to reduce GHG emissions are currently underway on the international level and in individual states or regional partnerships, federal policymakers and stakeholders have different viewpoints over what to do—if anything—about GHG emissions, future climate change, and related impacts.

For policymakers considering actions to reduce GHG emissions, various policy options are available. Over the last 15 years, many of the legislative proposals have involved market-based approaches, such as a GHG emissions cap-and-trade system or a carbon tax or emissions fee. These particular approaches may be considered in the 117th Congress and are discussed below. The information below provides an overview of two approaches while briefly addressing their similarities and differences.

What Is a Cap-and-Trade System?

A cap-and-trade system is a policy tool that creates a cap on GHG emissions from selected emission sources while providing the sources with flexibility—on-site reduction or emissions trading—when complying with the emissions cap. The cap could apply to the primary GHG emitted by human activity, carbon dioxide (CO_2), or it could apply to multiple GHGs, such as methane, nitrous oxide, or fluorinated gases. Covered sources in prior legislative proposals have included major emitting sectors (such as power plants and specific industries), fuel producers and/or processors (such as coal mines or petroleum refineries), or some combination of both.

An emissions cap is partitioned into emission allowances (or permits). Typically, in a GHG cap-and-trade system, an emission allowance represents the authority to emit one metric ton of CO_2-equivalent—a measure that accounts for different GHG global warming potentials.

Policymakers may decide to (1) sell the emission allowances through periodic auctions, which would generate a new federal revenue stream; (2) distribute allowances to covered sources at no cost (based on, for example, previous years' emissions); or (3) use some combination of these strategies. Given that emission allowances have a market value, the distribution of emission allowances would likely be a source of significant debate during a cap-and-trade program's development, as discussed below.

At the end of each established compliance period (a calendar year or multiple years), covered sources submit emission allowances to an implementing agency to cover the number of tons emitted during the period. Generally, if a source did not provide enough allowances to cover its emissions, the source would be subject to penalties.

Under an emissions cap, covered sources would have a financial incentive to make reductions beyond what is required, because they could (1) sell unused emission allowances to entities that face higher costs to reduce their facility emissions, (2) reduce the number of emission allowances they need to purchase, or (3) bank emission allowances—if allowed—to use in a future compliance period.

A cap-and-trade system would create an emissions trading market. Depending on program design details, emission allowance trading could involve not only sources directly subject to an emissions cap but also a range of brokers and intermediaries. The federal government oversees existing emissions trading programs (sulfur dioxide and nitrogen oxides) and would likely oversee a GHG program.

What Is a Carbon Tax (Emissions Fee)?

A carbon tax or emissions fee is a policy tool that provides a financial incentive to reduce GHG emissions by attaching a price to GHG emissions (CO_2 emissions or multiple GHGs) or their emission inputs, namely fossil fuels. The choice of terminology between a tax or fee may have procedural consequences, particularly in terms of congressional committee jurisdiction, which could potentially influence the policy's design. As many policymakers, stakeholders, and academic journals use the term *carbon tax*, this is the default term in this document.

A central policy choice when establishing a price on GHG emissions is the rate of the carbon tax (measured in dollars per ton of emissions). Several factors could be considered when setting the rate. For example, Congress could set the rate at a level or pathway—based on modeling estimates—that would achieve a specific GHG emissions target. Congress may also consider whether the tax rate should increase over time and, if so, by how much.

A carbon tax would generate a new revenue stream. The magnitude of the revenues would depend on the scope and rate of the tax, the responsiveness of covered entities in reducing their potential emissions, and multiple other market factors. A 2018 Congressional Budget Office study estimated that a $25/metric ton tax on energy-related and other GHG emissions would yield approximately $100 billion each year during the first 10 years of the program.

The distribution of this new revenue stream would likely be a source of significant debate, as discussed below.

Similarities Between Approaches

Cap-and-trade and carbon tax instruments are market-based approaches that may be used to reduce GHG emissions. In many ways, a cap-and-trade program and carbon tax would produce similar effects. Both would place a market price on GHG emissions (directly or indirectly), and both would increase the relative market price of more carbon-intensive energy sources, particularly coal, which generate greater emissions per unit of energy. This result could lead to the displacement of these sources with lower carbon-intensive sources, including renewables; spur innovation in emission reduction technologies; and stimulate actions that may decrease emissions, such as efficiency improvements.

Distribution of Allowance Value and Tax Revenue

When designing either program, policymakers would likely face challenging decisions regarding the distribution of the new emission allowance value (which includes both auction revenues and distribution of no-cost allowances) or tax revenues. Policymakers could apply the allowance value or tax revenue to support a range of policy objectives but would encounter trade-offs among objectives. The central trade-offs include minimizing economy-wide costs (often measured in terms of gross domestic product); lessening the costs borne by specific groups, particularly low-income households and displaced workers or communities; and supporting a range of specific policy objectives, which may or may not be related to climate change.

Economic Impacts

A primary concern with either approach regards their potential for economy-wide impacts and disproportionate effects on particular demographic groups and specific industries. The degree of these potential effects would depend on multiple factors, including the scope of the program and the use of allowance value or tax revenues.

Policymakers may have different perspectives on whether estimated economy-wide costs—often measured in terms of U.S. gross domestic product—are significant. In addition, some would argue that these costs be compared with the climate benefits achieved from the program as well as the estimated costs of taking no action. Estimates of climate-related benefits and costs often contain considerable uncertainty and have generated debate in recent years.

Either approach may yield disproportionate impacts on certain demographic groups, particularly lower-income households, which spend a greater proportion of their income on energy needs. Congress could address these impacts by distributing some of the allowance value or tax revenues back to households in some fashion.

While some domestic industries may thrive, a price on GHG emissions could create a competitive disadvantage for other industries, particularly emission-intensive, trade-exposed industries. Policymakers could address some of the potential concerns, for example, by including a border adjustment mechanism and allocation of no-cost emission allowances or tax rebates to selected industries.

Coverage Decisions

Under either approach, policymakers would face a similar debate regarding scope and applicability. For example, questions such as which emission sources should be subject to the program or which GHG emissions to include would be raised with either approach. Policymakers may consider multiple factors when debating these issues, including environmental effectiveness, economic efficiency, costs, measurement, available technology, and administrative concerns.

Role of Emission Offsets

Many existing cap-and-trade programs allow for the use of emission offsets as a compliance option. In a carbon tax program, policymakers could allow for tax credits for offset-type projects. An offset is a measurable reduction, avoidance, or sequestration of GHG emissions from a source not covered by an emission reduction program. Economic analyses have found that offset treatment could have a substantial impact on overall program cost, because these projects can often reduce emissions at a lower cost than many typically covered sources. However, in existing cap-and-trade programs, offsets have generated some controversy and raised concerns, including the credibility of emission reductions from particular offset projects and environmental justice issues more generally.

Price Control Versus Quantity Control

A primary difference between a cap-and-trade system and a carbon tax program is that the former provides emissions certainty, while the latter provides price certainty. In one sense, preference for a price (carbon tax) or a quantity limit (emissions cap) depends on one's preference for uncertainty—either uncertain emissions or uncertain program costs. Policymakers can include multiple design elements, such as a price safety valve or auction reserve price, with a cap-and-trade program that may blur the distinction between price and quantity control. Similarly, a carbon tax program could include a mechanism by which policymakers could alter the tax rate if they determine that emission reductions are not proceeding at a desirable pace.

Concluding Observations

Discussions of cap-and-trade and carbon tax approaches often center on their potential advantages in terms of emissions uncertainty and price uncertainty, respectively. The degree to which one approach has an advantage in a particular context, such as transparency or administration, would depend on the designs of the programs being assessed. In many cases, these differences may be addressed with specific design elements.

Although recent attention has largely focused on market-based mechanisms, policymakers can address emissions with other policy tools, including performance-based regulations, which currently apply to motor vehicle emissions, or promotion of mitigation technologies, such as carbon capture and sequestration. These tools could support market-based programs or function independently.

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