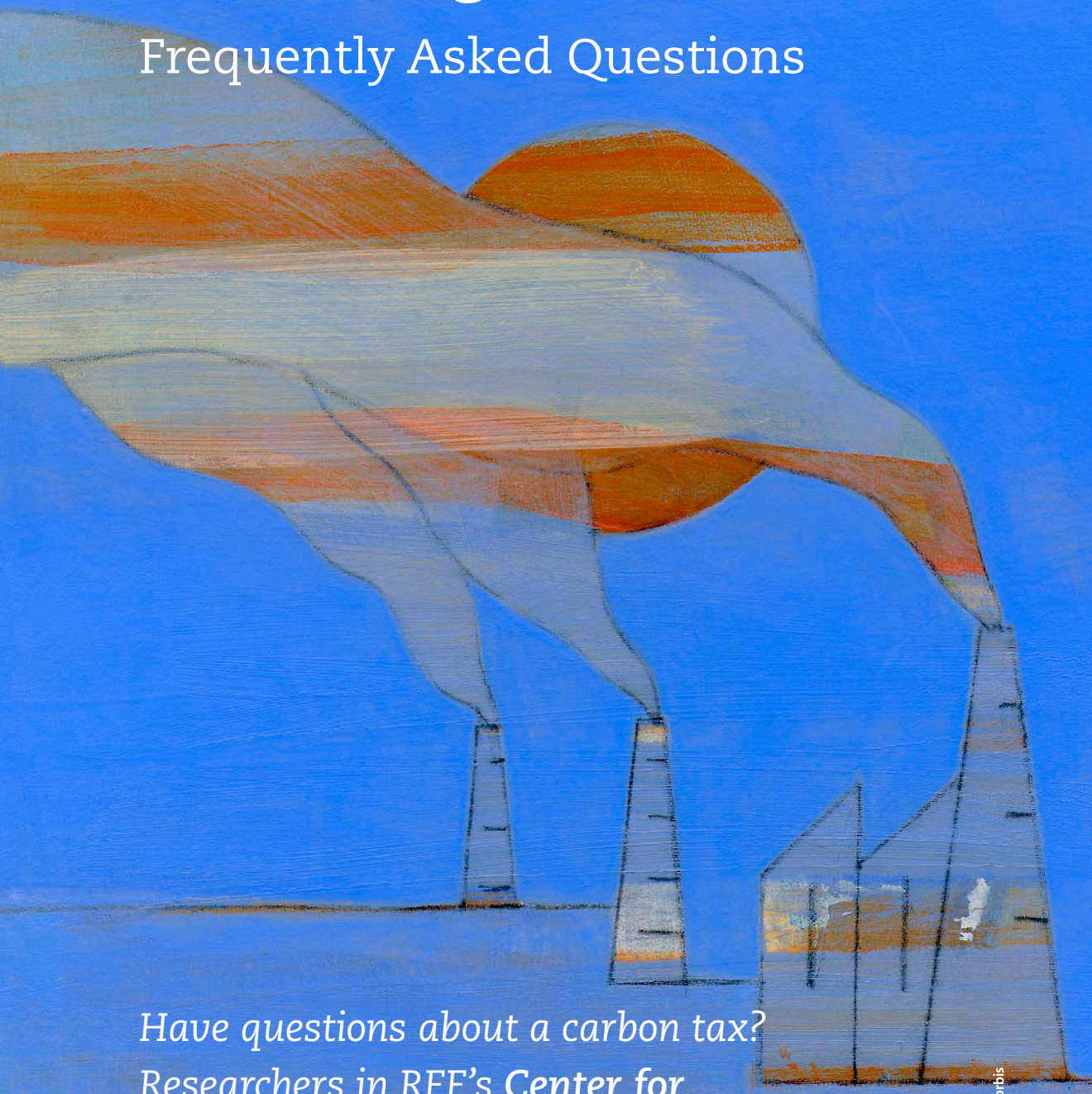
Considering a US Carbon Tax

Frequently Asked Questions



Have questions about a carbon tax? Researchers in RFF's ***Center for Climate and Electricity Policy*** *have the answers.*

For the past several decades, experts at RFF have helped decisionmakers understand climate policy challenges and assess the costs and benefits of possible solutions. This history gives RFF researchers a unique perspective in being able to objectively and comparatively assess the effectiveness of these policies.

As part of that body of work, RFF researchers have compiled a collection of frequently asked questions about the important design elements and potential economic impacts of a carbon tax policy. The questions in this excerpt address some of the foundational issues raised in extensive dialogues with policymakers, industry stakeholders, and academic experts. The answers reflect the latest findings of ongoing research at RFF to analyze options for US climate policy.

What Is a Carbon Tax?

A carbon tax is a tax imposed on releases of carbon dioxide (CO_2), which is emitted largely through the combustion of fossil fuels used in electricity production; industrial, commercial, and residential heating; and transportation.

A carbon tax may be a tax per ton of carbon or, more commonly, per ton of CO_2. A $1 tax per ton of CO_2 is equal to a $3.7 tax per ton of carbon because carbon constitutes roughly 3/11 of the weight of CO_2. Because CO_2 is usually the substance of interest rather than carbon itself, the usual meaning of a "carbon tax" is a tax on CO_2.

The most common proposal for a carbon tax calls for the tax to start low and rise over time. There are many options for how this tax would be applied, all of which have different impacts (on overall cost, effectiveness of raising revenue and reducing CO_2, and so on) depending on what is taxed, where the tax is implemented, and how the revenue is used.

How Might a Carbon Tax Affect the Economy?

Various perspectives have been offered about how a carbon tax could affect the economy, and in-depth analysis on this topic is currently under way at RFF. Experts generally agree that how the tax is designed and how revenues are used will be the largest determinants of the effects of the tax on the economy.

A carbon tax would increase the cost of fossil fuels, encouraging companies to switch to currently more expensive (albeit cleaner) fuels and leading households and companies to reduce energy use. These factors could make the economy less dependent on fossil fuels and thus less vulnerable to energy price shocks.

Although a carbon tax could slow the growth of industries that emit large amounts of CO_2, the tax could also boost other industries, particularly clean energy. A carbon tax could slightly reduce economy-wide employment due to lower demand for workers in carbon-intensive industries and weakened incentives for labor force participation (because the tax would lead to higher prices, reducing workers' buying power).

A carbon tax could lead to overall economic growth in the United States if the tax revenues are used efficiently, such as by cutting other taxes or reducing the deficit. The amount of revenue raised depends on the level of the tax, how broadly it is applied, and other factors. Most experts suggest a tax of around $25 per ton of CO_2, which would raise approximately $125 billion annually.

Reducing personal and corporate income taxes would promote growth because these taxes distort employment, savings, and investment. The $125 billion in annual revenues from a $25 per ton carbon tax could allow federal personal income tax

reductions of about 15 percent or corporate income tax reductions of about 70 percent, if all carbon tax revenues were used to replace current tax revenues. Alternatively, the federal deficit could be reduced by approximately $1.25 trillion over 10 years—about the same reduction that the 2011 Joint Select Committee on Deficit Reduction would have had to agree on to avoid mandatory spending cuts. Other ways that the revenue could be used to promote growth include funding essential infrastructure, basic research, or investments in human capital. Any of these uses—tax cuts, deficit reduction, or productive government spending—could promote growth.

However, if revenue is not recycled in an efficient way, the annual costs of a $25 per ton carbon tax would be substantially higher and could approach $50 billion, or about $90 per ton of CO_2 reduced.

Could Higher Energy Prices Hurt US Competitiveness?

A carbon tax could raise costs for industries that consume large amounts of energy, but some sectors are better positioned to recover the cost increases than others. In sectors that are both energy-intensive and exposed to international trade, such as metals and chemicals, product prices are driven by international market forces. Such industries could be disproportionately burdened if a carbon tax affects their operations but not those of their international competitors.

Effects on industry's production and employment depend on a number of factors, including the carbon intensity of producers, the degree to which they can pass costs to consumers, their ability to substitute with less carbon-intensive energy, the strength of competition from imports, and consumers' ability to substitute other, less carbon-intensive alternatives.

Various policy options may help offset these impacts. For example, because these industries tend to be capital-intensive, lowering capital taxes or enhancing depreciation allowances could reduce their costs. However, these measures are not usually well targeted. Another option is to reduce the burden of the carbon tax in these sectors. The challenge is to do so in a way that does not undo the incentives for reducing carbon intensity or seem to offer direct subsidies that violate World Trade Organization obligations.

Another option is to give firms a tax rebate based on their output. Per-output emissions above a sector-specific baseline would generate a tax liability, and emissions below the baseline would generate a refund. This would preserve most incentives for emissions reductions while reducing the overall tax burden. It makes the tax more complex, however, possibly creating opportunities for tax avoidance, rent seeking, or protectionism. This approach must be carefully designed, and preferential treatment must be phased out as trade partners undertake their own climate regulations.

How Might a US Carbon Tax Affect Global Carbon Emissions?

The primary environmental objective of a tax on carbon is to set a price that reflects the "real" costs such emissions impose—accounting for the damages that are expected to arise from global warming, including effects on agricultural productivity and human health, coastal inundation, and other changes. Experts suggest that of all the policy options, a carbon tax will produce the most efficient carbon reductions throughout the economy—whether from electricity production or transportation—because as a uniform price on CO_2 emissions, the tax is the same regardless of the source of the emissions.

Because the United States emits significantly more CO_2 than most other countries, reducing US emissions can contribute to reducing total global emissions. However, imposing a carbon tax or other policy to reduce emissions in one country can lead to increased emissions elsewhere—a phenomenon known as carbon leakage. This occurs for a variety of reasons. First, production of some carbon-intensive goods is likely to move abroad to avoid the tax. Second, reduced US demand for fossil fuels would result in lower global prices for those fuels, making them more attractive in unregulated countries. Research finds that, on average, a 10 percent reduction in carbon emissions in the United States would be partially offset by a 1 to 3 percent increase elsewhere.

How Might a Carbon Tax Affect Energy Prices?

A carbon tax would increase energy prices—the amount of increase would depend on the size of the tax and the extent to which it is passed forward to consumers. For example, research shows that a tax of $25 per ton of CO_2 could add about 21 cents per gallon to the price of gasoline and about 25 cents per gallon to the price of diesel fuel. The price of natural gas could increase by about $1 per thousand cubic feet, the price of coal by about $40 per short ton, and the price of electricity by about 1.2 cents per kilowatt-hour.

Changes in energy prices would vary by region, depending on the source of electric power (and its carbon content) used in the region. Regions of the country that consume relatively greater amounts of fossil fuels, and coal in particular, could feel a greater price increase from the introduction of a tax on carbon. However, other regions of the country could bear much of the change in cost because electricity generated and goods manufactured with fossil fuels are transported to consumers across great distances.

Most experts suggest a tax of around $25 per ton of CO_2, which would raise approximately $125 billion annually. A carbon tax could lead to overall economic growth if these revenues are used efficiently.

In general, a carbon tax would tend to raise prices for everyone, but less so for those currently facing the highest prices. The West Coast and Northeast currently face some of the highest electricity prices in the country, largely because they have already made investments that have reduced the carbon emissions of their electricity production. In these regions, the price effect of a carbon tax would be modest and consumers would continue to pay the highest prices nationwide. The Midwest and Southeast stand to face the highest electricity price increases under a carbon tax, though these regions would still continue to pay the lowest electricity prices in the country.

How Might a Carbon Tax Rate Be Set?

There are several approaches that Congress might consider when setting a carbon tax rate: using the real cost of emissions, setting a price designed to achieve a revenue goal, or setting a price to achieve an emissions target.

The most common approach discussed

by experts is to set a tax equal to the real cost of emissions, basing the price on the global environmental damages from emissions, or the "social cost of carbon." The social cost of carbon is the discounted monetary value of future climate change damages due to additional CO_2 emissions (for example, the costs of adverse agricultural effects, protecting against rising sea levels, health impacts, species loss, risks of extreme warming scenarios, and so on).

For example, a recent US federal interagency assessment recommended a value of $25 per ton for 2015 (in 2010$) with the tax rate rising at a rate of about 2 to 3 percent per year in real terms (roughly reflecting growth in world output potentially affected by climate change). Research shows that a tax of $25 per ton of CO_2 would reduce emissions by roughly 10 percent per year (based on projections that energy-related CO_2 emissions would be about 5.5 to 5.8 billion tons annually for the next decade). Experts recommend that once in place, a carbon tax would need to be flexible so it can be updated in response to future learning about climate change.

Alternatively, there has been discussion about designing a carbon tax to achieve a revenue goal, in which case the rate would depend on fuel prices (for example, the price of natural gas relative to coal).

Some suggest setting a carbon tax to achieve an emissions reduction target. For example, a recent study by researchers at RFF and the National Energy Policy Institute suggests that a carbon tax reaching about $30 per ton of CO_2 by 2020 would be needed to reduce domestic, energy-related CO_2 emissions by approximately 10 percent. To achieve this, the tax should rise at approximately the risk-free rate of interest (near zero right now, but roughly 5 percent in the long run) to balance the value in today's terms of making adjustments in the future.

A carbon tax will produce the most efficient carbon reductions throughout the economy of all the policy options—whether from electricity production or transportation—because the tax is the same regardless of the source of the emissions.

How Might a Carbon Tax Be Implemented?

Various approaches could be examined when implementing a carbon tax. For example, one approach is to implement the tax "upstream"—that is, as an extension of existing fuel taxes already applied to petroleum refineries, coal mines, and natural gas operators. Such a tax would affect approximately 2,000 companies. Alternatively, the tax could combine taxes on transportation and home heating fuels with a downstream charge on power plants and major industrial facilities. However, this could increase administrative costs (as it would cover about 13,000 companies), would be less comprehensive (as small-scale emitters are likely too costly to include), and could possibly lead to greater pressure for exempting certain industries.

Congress may face several challenges in designing the tax. For example:

» Taxing only a limited share of carbon emissions—from a specific sector or only large sources of emissions—could significantly lower revenue. A $25 per ton CO_2 tax could raise less than $40 billion per year if applied only to the electricity sector, compared to $125 billion per year if applied to all emissions.

FURTHER READING

What Is a Carbon Tax?

» RFF Discussion Paper 11-46: The Promise and Problems of Pricing Carbon: Theory and Experience

How Might a Carbon Tax Affect the Economy?

» RFF Discussion Paper 12-27: Carbon Pricing with Output-Based Subsidies: Impact on US Industries over Multiple Time Frames

» RFF Discussion Paper 11-02: Moving US Climate Policy Forward: Are Carbon Taxes the Only Good Alternative?

» RFF Discussion Paper 03-46: Fiscal Interactions and the Case for Carbon Taxes over Grandfathered Carbon Permits

Could Higher Energy Prices Hurt US Competitiveness?

» RFF Discussion Paper 10-47: The Impact on US Industries of Carbon Prices with Output-Based Rebates over Multiple Time Frames

» RFF Discussion Paper 09-12: Combining Rebates with Carbon Taxes: Optimal Strategies for Coping with Emissions Leakage and Tax Interactions

» RFF Discussion Paper 08-37: Impact of Carbon Price Policies on US Industry

» Congressional Testimony, March 18, 2009: Competitiveness and Climate Policy: Avoiding Leakage of Jobs and Emissions

How Might a US Carbon Tax Affect Global Carbon Emissions?

» RFF Discussion Paper 10-47: The Impact on US Industries of Carbon Prices with Output-Based Rebates over Multiple Time Frames

How Might a Carbon Tax Affect Energy Prices?

» RFF Issue Brief 12-03: The Variability of Potential Revenue from a Tax on Carbon

» *Resources* 176: Is a Carbon Tax the Only Good Climate Policy? Options to Cut CO_2 Emissions

How Might a Carbon Tax Rate Be Set?

» RFF Discussion Paper 11-02: Moving US Climate Policy Forward: Are Carbon Taxes the Only Good Alternative?

» RFF Discussion Paper 08-26: A Tax-Based Approach to Slowing Global Climate Change

How Might a Carbon Tax Be Implemented?

» RFF Issue Brief 09-05: Should the Obama Administration Implement a CO_2 Tax?

» Exempting some sectors or categories of emissions sources may create perverse economic incentives that lower tax revenue while increasing greenhouse gas emissions. A carbon tax targeting the electricity sector but exempting manufacturing could result in an increase in on-site power generation at manufacturing plants.

» Increases in the tax rate would not necessarily lead to proportional increases in revenues. A higher tax creates incentives to use lower-carbon alternatives, reducing emissions and reducing carbon tax revenue. ●

Read the carbon tax FAQs in their entirety at http://www.rff.org/carbontax. The following experts have contributed their research to answer the FAQs: Joe Aldy, Tim Brennan, Dallas Burtraw, Jared Carbone, Carolyn Fischer, Ray Kopp, Molly Macauley, Richard Morgenstern, Daniel Morris, Karen Palmer, Anthony Paul, Nathan Richardson, and Roberton Williams. The answers reflect their individual research and informed opinions; however, they do not necessarily reflect the views of RFF as an organization.