RESOURCES *for the* FUTURE

Comments on Key Considerations for United States Climate Policy

Submitted to the Committee on Energy and Commerce

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RESOURCES *for the* FUTURE

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President & CEO

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Committee on Energy and Commerce, Democratic Staff
2125 Rayburn House Office Building
Washington, DC 20515

Dear Members of the Committee on Energy and Commerce:

On behalf of Resources for the Future (RFF), I am pleased to share the attached information related to your recent request for input on key considerations for US climate policy.

Our long-standing history of working on federal climate policy issues makes us uniquely qualified to provide expert insight on both the economic and environmental considerations of such policy decisions. As you may know, RFF's mission is to improve environmental, energy, and natural resource decisions through impartial economic research and policy engagement. As an independent, nonprofit research institution, RFF is committed to being the most widely trusted source of research insights and policy solutions leading to a healthy environment and a thriving economy.

Our input is organized into two main sections. The first outlines criteria for evaluating climate policy options, while the second discusses specific policy strategies to address to reduce emissions. This information represents the contributions of nearly a dozen researchers but should not be considered an institutional or consensus view. While RFF researchers are encouraged to offer their expertise to inform policy decisions, the views expressed here are those of the individual authors and may differ from those of other RFF experts, its officers, or its directors. Furthermore, RFF does not take positions on specific legislative proposals.

We chose largely to focus on areas where RFF has considerable and recent bodies of research expertise. While we have attempted to provide a robust set of thoughts and resources to the Committee, we recognize our limitations in covering the full spectrum of climate policy considerations in a limited timeframe.

Finally, we would welcome the opportunity to speak in more detail with the Committee members about any of the ideas, issues, or publications included in this input. If you have any questions or would like additional information, please contact RFF Fellow Kevin Rennert at **rennert@rff.org**.

Sincerely,

Richard Newell

Thank you for the opportunity to contribute to the conversation around climate policy development in the United States. This response to the House Energy & Commerce Committee's request for information is organized into two main sections: the first outlines criteria for evaluating climate policy options, while the second discusses a number of specific policy strategies to reduce emissions and contribute to meeting Committee members' stated goal of reducing emissions to net-zero in the US economy by 2050.

Criteria for Evaluating Climate Policy Alternatives

The criteria for evaluating climate policy choices are economic, political, and human. While the list below does not address every possible criterion a policymaker might want to consider, it is useful to keep in mind these crucial measures:

The level and pace of emissions reductions is at the heart of climate policy design, given the primary rationale of reducing US greenhouse gas emissions.

The cost of the policy is important not only for the strength of the economy, but also because achieving reductions at less cost can allow for more ambitious policies.

Increasingly, and for good reason, concerns about **equity and environmental justice** assume a central place in climate policy conversations. Disadvantaged communities are most vulnerable to the potential costs of policy and to the effects of a changing climate. Many in these communities feel they have not enjoyed the benefits or environmental improvements that have accrued elsewhere. Fortunately, there are important opportunities for joint reductions in greenhouse gases and conventional air pollutants.

Economic modeling can help project who bears the cost of various policy options across populations and sectors, providing decisionmakers with critical information to help mitigate these distributional impacts. A focus on equity also includes planning for a just transition for workers affected by a transforming, decarbonizing energy system.

A number of **international concerns** should also be kept in mind when designing climate policy. First, maintaining or even improving international competitiveness is crucial. Second, domestic policy can be designed to leverage actions in other nations, which is critical in the face of a global challenge like climate change.

Technological innovation is a crucial policy outcome, not only to reduce US emissions but also to support reductions internationally. In an ideal world, US companies can benefit strongly in world markets from domestic policy actions taken to reduce carbon emissions.

Finally, it is valuable to consider lessons from previously enacted, large-scale environmental policies, as RFF Senior Fellow Dallas Burtraw, along with co-editor Ann Carlson (UCLA) and a range of contributing authors, recently did in their book ***Lessons from the Clean Air Act***. Their primary finding was the importance of building both **durability and adaptability** into policy design, to help ensure that future policies can withstand changing economic circumstances and political winds.

Policy Approaches and Considerations

As an independent, non-partisan, non-advocacy organization, RFF does not take institutional positions on specific policies to pursue. That being said, our researchers have a wealth of experience in climate policy options available to consider at the federal level. A number of those are described below.

Economy-Wide Policy Strategies

Economy-wide policy strategies are favored from an economic perspective because they have the potential to be cost effective. RFF's research focus on economy-wide policies has been on carbon pricing, in the forms of either a carbon tax or cap and trade, and we focus our comments on these approaches in this document.

Carbon Pricing

Economists often favor policy solutions that introduce a direct price on carbon emissions, which escalates over time. A price on carbon changes the relative cost of fuels by making fuels that have relatively greater emissions relatively more expensive.

A carbon price is viewed favorably because:

- It percolates through the entire economy, providing an incentive for all decision makers in the economy to look for ways to reduce emissions, for example, by improving the boiler in a factory or buying a more efficient air conditioner at home.
- It provides firms with the flexibility to make decisions that make sense based on their own information.
- Existing product markets can seamlessly incorporate changes in relative prices of goods and services.

For a further, high-level overview of carbon pricing, please see RFF's **Carbon Pricing 101** explainer.

RFF has also developed an interactive, exploratory "carbon pricing calculator," based upon output from RFF's economy-wide modeling, that allows users to compare the environmental and economic impacts of both current legislative proposals that place a price on carbon and a custom user-specified carbon tax path. Users can see the impacts of each policy on annual emissions, annual revenues, cumulative emissions, consumer prices, gross domestic product, and the distribution of impacts across income groups. The tool includes the projected impacts of the following policies:

- The American Opportunity Carbon Fee Act (Whitehouse-Schatz, 2019 version)
- The Climate Action Rebate Act (Coons-Feinstein)
- The Energy Innovation and Carbon Dividend Act (Deutch et al.)
- The Healthy Climate and Family Security Act (Van Hollen-Beyer)
- The MARKET CHOICE Act (Curbelo)
- The Stemming Warming and Augmenting Pay Act (Rooney)
- The Raise Wages, Cut Carbon Act (Lipinski).

The carbon pricing calculator (originally published as the E3 Carbon Tax Calculator) can be found at **www.rff.org/cpc**; an updated version of the calculator will be launched on September 20 at the same URL.

Carbon taxes and cap-and-trade programs primarily differ by the type of certainty they provide. Carbon taxes provide price certainty, as entities subject to the tax know how much they'll have to pay per ton emitted—but simply setting a tax rate doesn't guarantee any particular level of emissions reductions. Cap-and-trade programs, on the other hand, set a cap on emissions and therefore provide quantity certainty—but price fluctuations under the trading market structure can provide a less solid basis for business planning decisions. Hybrid systems, however, can be used to reduce price or emissions uncertainty. Under cap-and-trade programs, price floors, ceilings, and steps have been **proposed** and **utilized** to prevent prices from being "too low" or "too high." Carbon taxes can also be **designed** to automatically adjust if actual emissions miss some predetermined emissions path.

Carbon Tax

A carbon tax is perhaps the most straightforward way to introduce a price on carbon, and setting the price path is an important component of carbon tax policy design. There is significant economic evidence that a carbon price will affect short-run behavior and long-run investments and will reduce emissions.

RFF has developed extensive modeling and other analytic tools for evaluating the effects of a carbon tax. These tools allow for the assessment of the effects of carbon tax policies across a number of key metrics, including annual emissions, annual revenues, cumulative emissions, consumer prices, economic growth, and the distribution of economic impacts. RFF researchers have used these tools directly to inform policymakers in carbon tax policy design and provide publicly accessible research that:

- Analyzes a number of policy proposals including the **2015**, **2017**, and **2019** versions of the American Opportunity Carbon Fee Act (Whitehouse-Schatz); the **MARKET CHOICE Act** (Curbelo); and the Climate Leadership Council **Carbon Dividends Plan**.
- Assesses the level of tax required to meet the **US obligation under the Paris Agreement**.
- Evaluates the **distributional effects** of various approaches to carbon taxes and recycling the generated revenues.
- Assesses the **effects of a carbon tax on employment**.

An additional consideration in the implementation of a carbon tax is the level of uncertainty in emissions reductions resulting from a given price path of a carbon tax. RFF researchers have recently described in detail how a **carbon tax might adjust automatically** to achieve an emissions target.

Cap and Trade

An alternate way to introduce a carbon price is through cap and trade, such as was implemented in the successful acid rain sulfur dioxide program. A carbon price is embodied in a trading program as the price of a tradable emissions allowance. Under cap and trade, the emissions goal is identified by the cap, but, in the absence of other policy constraints, the carbon price is set by the market as it adjusts to meet the annual limit on emissions.

To date, cap and trade has been the dominant approach to putting a price on carbon in the United States and abroad. For example, in the United States, eleven states have enacted a carbon cap for all or some portion of their economies. This has allowed for considerable experience and evolution of the policy mechanism. Lessons learned from these experiences as well as further considerations for policy design are highlighted in the following resources:

- **This Resources magazine article** and **this article** from the *Review of Environmental Economics and Policy* provide historical context for cap-and-trade programs, including specific policy design and implementation lessons and some political considerations that affect cap-and-trade policy design. It also provides guidance to assist with implementation of future policies and notes on the implications for climate change policy.

- One of the longest running carbon cap-and-trade programs in the United States is the Regional Greenhouse Gas Initiative (RGGI). This **Resources article**, written on the occasion of RGGI's 10th anniversary, describes some of the more innovative features, including auctioning of allowances and the use of cost containment mechanisms.
- Cap and trade programs have moved away from free allocation of emissions allowances because of concern that windfall profits could result when firms receive allowances for free that have substantial economic value in the market. However, in some cases the introduction of an auction for allowances is politically or economically difficult to achieve. RFF's work described a consignment auction approach that was used in the sulfur dioxide trading program and elsewhere, in which allowances are conditionally allocated, but they must be sold in auction with revenue coming back to the original recipients. This design adds considerable transparency and stronger incentives for efficient outcomes. The approach suggested was adopted by Virginia, and an RFF **article** described how this could work.
- Recently, in response to cost considerations, cap and trade programs have begun to adjust the size of their emissions caps. For example, RFF researchers worked with RGGI states to develop an "**emissions containment reserve**" (ECR) that would provide several important benefits to help improve the functioning of the market for emissions allowances. The ECR has **now been adopted**.
- Markets are increasingly watching government policy to inform their investment plans. This fact alters the relative strengths of alternative policy approaches, like cap and trade versus carbon taxes. Cap and trade policies have a feature that carbon taxes don't, which under certain conditions can encourage more cost-effective emissions reductions. Under a cap, the market price of permits reflects traders' expectations about future policy changes, such as tightening the cap as was done recently in Europe. Market participants then closely watch for potential changes in the cap when determining their emission reductions, whereas under a carbon tax, this determination is simply driven by the statutory tax rate. Current and former RFF researchers have explored these concepts in this **article**.

Uses of Revenues Generated under Carbon Pricing Proposals

Carbon pricing proposals are also often touted for the revenue they generate that can be used for other purposes. Though they impose their price on carbon in distinct ways, a carbon tax and cap and trade both convey a value on emissions that is evident in tax revenue or cap and trade allowance value. Past modeling along with analysis of recent US federal proposals has shown that such value can total more than **$1 trillion over a decade**. How such value is allocated provides a substantial opportunity in policy design and largely determines distributional outcomes.

At a high level, there are three main types of proposals:

- Imposing a tax swap; for example, using carbon pricing revenue to reduce other corporate or payroll taxes.
- Rebating dividends back to households.
- Spending on programs to accelerate emissions reductions or adapt to a changing climate ("green investment" strategies).

RFF and other organizations have conducted **research** on the trade-offs related to various tax swaps, as well as with lump-sum rebates back to households across various income quintiles. In comparison, at the current time there is not the same depth of research on the efficiency and effectiveness of proposed green investment strategies. Given that, in a number of policy proposals, such investment strategies are put forward as critical elements for achieving target emissions reductions, understanding more about their utility moving forward will be vital for informing the design of such policies.

Assessing the Benefits of Action to Reduce Greenhouse Gases

In the development of climate legislation, an important policy tool to evaluate the benefits of action to reduce emissions is the social cost of carbon: an estimate, in dollars, of the economic damages that would result from emitting one additional ton of greenhouse gases into the atmosphere. Economic theory additionally suggests that optimal carbon policy would price each GHG at its estimated social cost of carbon.

RFF researchers, as part of **RFF's Social Cost of Carbon Initiative**, are leading a team of distinguished economists and scientists to improve the science behind estimates of the social cost of carbon through a process that ensures the highest levels of scientific quality and transparency and builds the scientific foundation for future estimates.

In addition to the bottom-up calculation of the SCC based on evaluating projected damages across multiple economic sectors, there are also numerous studies in the literature which project damages from future climate change by evaluating the effects of historical fluctuations in climate on GDP. This **paper** improves our understanding of the uncertainty around estimates of the impacts of climate change on GDP.

International Trade and Competitiveness Considerations

A key policy consideration in any potential climate legislation is the potential effects on trade and competitive positioning of US firms. From the standpoint of building support for such legislation, unions, communities, and companies of energy-intensive trade-exposed (EITE) industries are likely

to oppose climate legislation that does not accommodate their concerns with regard to international trade and competitiveness for both imports and exports. In addition, major developing nations will react to US greenhouse gas legislation that they regard as imposing arbitrary restrictions on international trade with consequences for trade immediately and for climate and trade negotiations.

RFF research has explored the potential for a border adjustment to be implemented as a part of a carbon tax that will address competitiveness concerns while also maintaining compliance with World Trade Organization (WTO) requirements.

Key insights from such research include the following:

- WTO acceptable export rebates/import charges for EITE products can be created if there is upstream tax on greenhouse gases, but not with cap-and-trade or other regulatory approaches.
- In a cap-and-trade program, the competitiveness of domestic businesses can be **addressed** through output-based free allocation of emissions allowances.
- Essential greenhouse gas emission data and information on products produced in the United States at factories is available and can be used to determine export rebates based on carbon content, greenhouse gas emissions at factory site, and greenhouse gas emissions for purchased energy-intensive raw materials like electricity.
- For nations that export to the United States, import charges can be determined in a similar fashion, based on regulatory guidelines to measure and report GHG emissions in many nations or, absent approved regulatory guidelines, based on available, industry-endorsed voluntary guidelines that exist in most EITE sectors.
- To be compatible with US WTO obligations, border adjustment for imported products cannot give credit to EITE firms for the price or "effective price" paid for their domestic greenhouse gas policies.

Further details are contained in the following RFF publications:

- **Framework Proposal for a US Upstream Greenhouse Gas Tax with WTO-Compliant Border Adjustments**
- **A Compendium: WTO-Compatible Methodologies to Determine Export Rebates and Import Charges for Products of Energy-Intensive, Trade-Exposed Industries, if There Is an Upstream Tax on Greenhouse Gases**
- **Solution to a Vexing Climate Policy Problem: WTO-Compliant Border Adjustments**

Price Responsiveness and the Shale Boom

An additional consideration for any type of carbon pricing proposal is that, at the moment, US oil and gas production is more sensitive to price changes due to the shale boom. This suggests that carbon pricing could have bigger impacts on US oil and gas production now, compared to what previous studies have calculated using data and estimates that pre-date the shale boom.

Related resources:

- **The Unconventional Oil Supply Boom: Aggregate Price Response from Microdata**: An analysis of the price responsiveness of US conventional and unconventional oil supply across three key stages of oil production: drilling, completion, and production.
- **Trophy Hunting versus Manufacturing Energy: The Price Responsiveness of Shale Gas**: An analysis of the relative price responsiveness of unconventional versus conventional natural gas extraction and of three key stages of gas production: drilling wells, completing wells, and producing natural gas from the completed wells.

Sectoral Climate Policies

In contrast to an economy-wide approach, other climate policy options would address emissions from a given sector of the economy, such as the electricity sector, transportation sector, buildings, industry, etc. From an economic perspective, sectoral approaches are often considered less efficient than carbon pricing. However, such policies may be especially useful to promote technological innovation and may be necessary, for example, if a politically achievable carbon price is not sufficient to promote changes in the transportation or industrial sectors.

RFF research has considered a number of sectoral policies and the price effects of key enabling technologies for a transition to zero emissions within a given sector.

Power Sector

- When pricing carbon directly is not possible, an alternative approach that makes use of economic incentives and can be designed to be clean technology neutral is a tradeable clean energy standard. This **issue brief** describes how clean energy standards work and this **issue brief** provides projected effects of the federal *Clean Energy Standard Act of 2019*, introduced by Sen. Tina Smith and Rep. Ben Ray Luján.
- **Modeling** by several groups of researchers outside and inside RFF indicates that emissions pricing in the power sector would produce very large net benefits (i.e. benefits greatly exceed the costs), largely attributable to significant benefits to health from reductions in SO_2

and NO_x emissions. In addition, the net benefits of replacing coal generation with gas generation as a result of less expensive gas or as a result of a CO_2 emission price or cap are significant even when accounting for the increased estimates of the leakage rate of methane from wells and pipelines suggested by recent literature.

- The research literature features differing views on the role of storage in reducing emissions. In this **paper**, RFF researchers find that although storage can reduce the costs of reducing power sector emissions to zero, in the medium term storage could increase emissions. Using a stylized model, the effect of storage costs on emissions is shown to depend on the supply responsiveness of both fossil and renewable generators.
- Reforms to the transmission planning and siting processes to enable nationwide and cross-border planning based on minimizing the cost of decarbonization would provide significant benefit in decarbonizing the power sector. Cross-border aspects of such transmission planning are discussed in this **report**.

Transportation Sector

Decarbonizing the transportation sector is particularly complex from a policy standpoint, and absent major policy changes, RFF research has shown that vehicle miles traveled are **likely to continue increasing** in the short/medium term. A number of policies have been put in place to try to reduce emissions from the transportation sector, including tightened fuel efficiency standards, zero- or partial-zero emissions vehicles mandates, subsidies for more fuel-efficient vehicles, and more. RFF research has highlighted a number of important considerations that bear upon policy design in this area:

- Federal fuel economy/GHG standards **may be regressive**, at least in the short term.
- Tightening fuel economy/GHG standards reduces demand for new vehicles, **raising the costs** of meeting the standards.
- There is **little evidence** on the economically efficient level of subsidy for plug-in vehicles. There are complex interactions among state and federal vehicle policies, making it difficult to effectively promote plug-in vehicles.

Industrial Sector

RFF experts are currently building a research program to further explore and evaluate viable and cost-effective solutions for reducing both process and electricity consumption-related emissions from industrial sources. To date, RFF's **research** in this area has focused on opportunities to reduce emissions in the industrial sector by promoting carbon capture storage and utilization (CCUS) in the existing tax code through section 45Q.

Agriculture and Forestry

Agricultural lands and forests have enormous potential for climate mitigation through biological carbon capture and sequestration as well as **sustainable biomass energy development**, which can have economic, societal and ecological co-benefits. Policy options to reduce emissions from forestry include:

- Support for active forest management on public and private lands that incentivizes reducing emissions (i.e., reduce large scale wildfires) and encouraging forest growth and restoration.
- Through USDA conservation programs, provide incentives for farmers to use carbon sequestration practices (e.g. cover crop rotations) as well as other practices that improve soil health and reduce nitrous oxide emissions. For further background, see this **article**.

RFF experts are currently building a research program to further evaluate and explore these areas and the broader role of agriculture and forest lands to contribute to climate change policy solutions.

Considerations for Overlapping Economy-Wide and Sector-Specific Policies

In practice, carbon pricing policies such as cap and trade, domestically and abroad, almost always coexist with other policies to encourage clean energy investment. RFF research has explored policy interactions between such policy tools.

- Allowing for emissions caps to **adjust automatically** in response to changes in market prices can preserve the integrity of other policies that lead to emissions reductions.
- This **analysis of the NY carbon pricing policy** illustrates how one jurisdiction's decision to impose a higher price on carbon emissions within the electricity sector interacts with price responsive emissions supply, in the form of the RGGI Emissions containment reserve, to yield CO_2 emissions reductions within NY State and beyond.
- Results from **this article** as well as **this one** suggest that the optimal set of policies for reducing emissions is a combination of policies that includes emission pricing and funding of research and development.
- Tax incentives have commonly been used alongside other policies to reduce emissions to promote particular technology solutions. Care must be taken in the design of such incentives to ensure that they are delivering the intended or expected level of reductions. This **study** provides a case study of the "refined coal" tax credit, now being claimed at $1 billion annually, which was intended to reduce conventional air pollutants, but instead is failing to achieve its goals and actually hindering reductions in CO_2 emissions by increasing coal use by power plants.

Conclusion

We include two closing observations about how to make progress. First, policy outcomes are certain to involve a portfolio of these options and to involve measures at the federal, state and local level. This policy mix may be desirable for various reasons, such as to promote innovation, achieve ancillary benefits for example from improved air quality, or to achieve distributional outcomes. It is important that policies be designed in anticipation of overlapping influence to maximize the effectiveness of the entire portfolio.

Though the greenhouse gas emissions reduction goals identified by Committee leaders are ambitious, so too were the targets under the Clean Air Act in 1970, which addressed multiple pollutants across the economy and for which technologies to achieve emissions reductions did not exist at the time. The achievements under the Clean Air Act were monumental. As noted above, a recent book sponsored by the American Academy of Arts and Sciences **identified crucial features** that enabled the Clean Air Act to be durable, adaptable and flexible in achieving its goals. A key element of that success was the unusually formalized role of process in achieving scientific and citizen engagement. We can expect such attention to process to be important in addressing the ongoing and evolving challenges of climate change.