EXECUTIVE SUMMARY

PUTTING A PRICE ON CARBON: EVALUATING A CARBON PRICE AND COMPLEMENTARY POLICIES FOR A 1.5°C WORLD

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EXECUTIVE SUMMARY

Highlights

- The increasing effects of climate change highlight the need to rapidly transform the global economy to achieve the Paris Agreement goals and limit global warming this century to well below 2°C, while aiming for 1.5°C.
- Deeply decarbonizing the U.S. energy system by 2050 will require rapidly increasing energy efficiency, decarbonizing electricity supply, and electrifying energy end uses, including buildings, transportation, and industry.
- A carbon price is needed to incorporate climate change costs into economic decision-making to significantly reduce U.S. greenhouse gas emissions, particularly in the electricity sector; however, a price is not a silver bullet for addressing climate change.
- Policies and programs that address externalities other than the cost of climate change and that provide incentives to develop and deploy long lead time mitigation options are needed in addition to a price on carbon so that deep emission reductions can be achieved in the longer term.
- Measures are needed to bend the cost curve and remove the market barriers that hinder long-term emission reductions. Such measures should be evaluated based on their ability to minimize the cost of achieving long-term emission targets rather than on their cost in achieving near-term emission reductions.

Introduction

Climate science increasingly shows the need for rapid transformation to a low-carbon economy. The recent Intergovernmental Panel on Climate Change (IPCC) special report, *Global Warming of 1.5°C* (IPCC 2018), shows the difference in expected impacts between warming limited to 1.5°C and warming limited to 2°C. This has helped shift the focus on achieving the more ambitious side of the Paris Agreement’s goal of “keeping warming well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius.” The IPCC report also highlights the rapid action needed to reduce global emissions to keep 2°C warming within reach, with even faster action required for 1.5°C pathways.

As the climate debate in the United States begins to rekindle, understanding the potential and the limits of carbon pricing is crucial. Carbon pricing is a necessary but not sufficient approach to achieve long-term climate goals in an economically efficient manner. A carbon price is necessary to embed climate change costs into economic decision-making while providing clear incentives for the development and deployment of low-carbon technologies and shifts in operations to reduce carbon emissions. In some cases, a carbon price may result in greater emission reductions than suggested by the modeling. Complementary measures will be necessary, however, for those market barriers and sector characteristics not addressed by a carbon price that could limit the adoption of mitigation measures.
In evaluating what is the most economically efficient approach to address climate change, policy makers should keep in mind the long-term nature of the climate issue. Most proposals for a carbon price gradually increase in stringency, either with an increase in tax or a decline in the cap in a cap-and-trade program. This approach operates on the underlying assumption that the most economically efficient approach is to work sequentially from the least expensive emission reduction opportunities to the most expensive until the emissions target is met. If this approach is implemented by taking into consideration only current and near-term costs and emission reductions, it may miss opportunities to take actions that can lead to cost reductions in the longer term and make it easier to meet long-term targets.

Meeting the goals of the Paris Agreement calls for complementary policies that will contribute to changing cost curves to ensure the prospect for and relevant cost reduction of further rounds of emission reductions in 10 or 20 years. Such policies may not be the least expensive in terms of emission reductions achieved in the next 5 or 10 years.

This paper also compares what recent empirical evidence and modeling efforts tell us about the effectiveness of a carbon price in reducing emissions and shifting to low-carbon technologies with what deep decarbonization studies state regarding the pathways for meeting climate goals. This comparison better illustrates why a carbon price is necessary but is not sufficient to shift the United States and the world to a low-carbon future.

Carbon Pricing and Deep Transformation

The recent IPCC special report, Global Warming of 1.5°C (IPCC 2018), shows the need for rapid transformation of the global economy to meet Paris Agreement climate goals. Recent deep decarbonization studies focused on the United States show various technological pathways to achieve this, although the policy levers in those studies are not always clear.

A carbon price is an essential tool to proceed onto a pathway that is consistent with 1.5°C. Economic literature claims a carbon price is the most efficient approach to reduce emissions. Most economists also recognize that other policies are essential. For example, they recommend spurring research and development in low-carbon technologies or addressing market barriers or sectoral characteristics, such as high up-front costs or a mismatch between who pays for equipment and who pays for operating costs (principal/agent problem). Among the policies that can complement the direct effects of the carbon price are regulations, standards, infrastructure investments, research and development spending, and incentive programs. These may be a continuation, expansion, or extension of existing policies or new ones that are designed for specific market barriers or sectors. Carbon pricing also provides an important source of revenue for some complementary policies.

Evaluating emission reduction options based on whether they are the least-cost approach—if viewed through a too simplistic, short-term lens—may fail to adequately consider the need for rapid and sustained emission reductions to minimize the effects of climate change. Studies of the types of transformation to meet long-term climate goals offer an overview of the temporal path that the low-carbon economic shift needs to follow to meet cumulative emission targets.

The transportation sector provides one clear example of the need to invest in currently higher-cost or price-insensitive emission reduction options, such as electric vehicles and charging infrastructure, to ensure that options are available for deep reductions in the future. While abatement options in other sectors today may be less expensive in achieving emission reductions, if the tools to decarbonize the transportation sector and other hard-to-abate sectors are not put in place soon, it will become more expensive to achieve deep reductions in the decades ahead. A carbon price alone is unlikely to provide sufficient incentives for deployment of these options.
Recent deep decarbonization studies to understand the types of near-term changes needed to transform the economy, consistent with 1.5°C- and 2°C-degree pathways, and how carbon price emission pathways measure against those.

As discussions about different carbon tax proposals are re-energized in the United States, a key question in the debate is whether other regulations and policies should be preempted. This issue brief aims to inform all sides in the debate about the ways in which additional policies and programs should supplement a carbon price to achieve deep decarbonization, consistent with the Paris Agreement. It does not take the next step, however, to identify specific existing policies and programs that either should be kept in place or new ones that should be implemented.

While this paper focuses on the United States, the underlying issues broadly apply globally. Applying a price on carbon helps reflect the costs of climate change in everyday economic decision-making, thus shifting economic incentives toward low-carbon technologies and goods. Other market failures and the importance of developing emission reduction options for sectors that are harder to address, however, imply that a price is not a silver bullet. The specifics of what types of complementary policies are necessary and appropriate will differ from country to country. The framework discussed in this paper, however, provides a useful guide to think through the issues and plan a research agenda that will build the necessary evidence base to guide decision-makers.
Conclusions

A carbon price is a necessary and effective tool for reducing emissions, particularly in the electric sector.

A carbon price helps embed the external costs of climate change throughout the economy, thus providing incentives for shifting to existing lower-carbon options as well as for the development and deployment of new low-carbon technologies, processes, and business models. The extent of these shifts may be difficult to capture in economic models, so a carbon price may have broader and deeper effects than the modeling demonstrates. At the same time, a carbon price will not address all market barriers, thus calling for some complementary policies to meet long-term emission targets.

A gradually increasing carbon price is built on the logic of seeking the least expensive way, today, to reduce emissions, with more expensive options becoming cost effective as the price increases over time. This approach fails to fully account for the need to develop emission reduction options in harder-to-abate sectors, such as transportation and industry, which may be aided by pursuing some abatement options while they remain relatively expensive.

Government policies can play a role in changing cost curves and ensure the prospect of a further round of emission reductions in 10 or 20 years. Furthermore, not all of these policies will be the least expensive in terms of emission reductions achieved in the next 5 or 10 years.

Policies and programs to complement a carbon price should be designed for an uncertain future, and evaluated on their potential to contribute to minimizing the costs of achieving long-term emission targets and not only on their near-term cost effectiveness. These policies should incorporate mechanisms to evaluate effectiveness over time, and to enable the adjustment or abandonment of policies that do not deliver results.

The full issue brief is available online at www.wri.org/publication/evaluating-carbon-price.
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ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

Our Challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth’s resources at rates that are not sustainable, endangering economies and people’s lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our Approach

COUNT IT
We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT
We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT
We don’t think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people’s lives and sustain a healthy environment.