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Climate Change Economics: Assessing the Effectiveness of Carbon Pricing mechanism and Green Transition

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Abstract

Climate change is generating an unprecedented calamity for the economy and the environment. To fix it, we need new rules and changes to how things are done. This study looks at how well carbon pricing systems, including carbon taxes and emissions trading systems (ETS), work to include environmental costs and promote growth that is low in carbon. Real-world data shows that well-planned carbon pricing policies can lower greenhouse gas (GHG) emissions a lot without affecting the economy too much (Stiglitz & Stern, 2017; Metcalf, 2019). But there are also issues with political feasibility, fairness in distribution, and policy integration, especially in developing countries. This page also talks about other green transition policies that work well together, such as laws that must be obeyed, subsidies for renewable energy, and frameworks for sustainable finance. To ensure social and economic fairness while meeting decarbonization goals, it is important to use both market-based instruments and regulatory measures (OECD, 2021). The paper also says that working together with other countries, using new technologies, and changing how people act could all help policies operate better. The study looks at a lot of cases from throughout the world and theoretical models to highlight how vital it is to make rules that are flexible, open to everyone, and take a lot of different things into account. The results show that we need to move away from piecemeal solutions and toward comprehensive climate governance that takes into account the needs of the environment, the economy, and social justice.

Keyword: *Climate Economics, Green Transitions, Emissions Trading, Climate Policy, and Sustainable Development.*

Introduction

Climate change is the biggest externality in the world, and it is deeply ingrained in our social and economic systems. We observe more and more heat waves, floods, wildfires, and loss of biodiversity that can't be reversed as human-made greenhouse gas (GHG) emissions keep rising. This is having an effect on the planet we live on (IPCC, 2023; Pachauri & Meyer, 2010). These environmental shocks aren't simply thoughts; they have tangible repercussions on our economies and societies that hurt people a lot. They make it harder to cultivate crops, which puts food security at risk for millions of people and harms farmers' livelihoods (FAO, 2023). New diseases that are sensitive to climate change are appearing, and heat-related illnesses are on the rise. This puts even more strain on healthcare systems that are already stretched thin (WHO, 2021). A lot of damage happens to important infrastructure like roads, bridges, and electrical grids. This makes living harder and costs a lot of money to fix (World Bank, 2023a; Hallegatte et al., 2013).

In this urgent crisis, economists and policymakers from all around the world mainly agree on two primary strategies to accomplish systemic change. The first step is to place a price on carbon. This can be done using carbon taxes or more complex emissions trading systems (ETSs). These technologies strive to get consumers and businesses to adopt cleaner, more sustainable choices by making it evident how much carbon emissions would cost them. This is because they want people and corporations to pay for the damage that pollution causes (Nordhaus, 2017; Aldy & Pizer, 2015; Tietenberg & Lewis, 2018). The second lever has a bigger set of plans to help the economy become more environmentally friendly. These initiatives do more than only help the environment; they also involve smart and adaptable legislation, significant support for emerging clean technologies, and essential protections for social justice. These rules all work together to make it easier to get to net-zero emissions. They make sure that the transition is not only successful, but also fair and socially acceptable, protecting workers and communities that are most at risk (Mazzucato, 2021; Rodrik, 2020; UNFCCC, 2015).

Objective of the Study

We have carefully planned the goals of this study so that we can better comprehend the complex economics of climate change. They will give us information that is both academically sound and tremendously useful for real-world policy concerns and people's lives.

- The main purpose is to make the economic logic and practical specifics of carbon pricing approaches clearer. This requires looking at where they came from, from Pigouvian taxes, which try to solve flaws in the market by putting a cost on outside harms, to the complicated market tools that are ubiquitous

today (Pigou, 1920; Baumol & Oates, 1988). We will closely look at how the carbon price level, the sectors that are covered, the techniques used to distribute allowances in ETSs (such auctioning vs. free allocation), and the ways that prices keep stable all have a huge effect on how businesses and households act.

- Second, this study intends to see how effectively carbon pricing systems perform in the real world. In other words, we need to look closely at statistics from the actual world to evaluate if these pricing schemes have really worked to cut down on greenhouse gas emissions. We will talk about how carbon pricing pushes businesses to come up with new ideas by making them pay for greener ways to make things and more energy-efficient technologies. We will also examine at how these pricing change people's behavior, making them more likely to buy electric cars or make their homes more energy-efficient. We know that the decisions of a lot of people are what make a change work (Goulder & Parry, 2008; Lin & Jia, 2019; Metcalf, 2019).
- A third, equally vital purpose is to delve at how policies that promote the green transition work and what they do. This study will look at how different types of support can make the impacts of a carbon price stronger or weaker. A carbon price is a very potent weapon for deep decarbonization. This means looking at how successfully clean energy subsidies (like feed-in tariffs for renewables), substantial public investments in green research and development (R&D), and specialized industrial policy initiatives (like green procurement and help for emerging clean-tech firms) function.

- Lastly, the study seeks to come up with a full, fair, and politically stable set of rules for dealing with climate change. This goal is based on a thorough assessment of effectiveness and issues. It tries to bring together many ideas into one framework that strikes a balance between social fairness and economic efficiency. This framework will teach you how to best set up carbon pricing and carefully mix it with other policies to fast attain ambitious climate targets while also addressing significant equity issues and securing long-term public support, which is needed for policy success.

Research Gap

There are a lot of studies in the academic and policy worlds about individual climate tools, but there isn't much research on how carbon pricing and green industrial measures work together, especially in countries that aren't part of the Organisation for Economic Co-operation and Development (OECD). There is a lot of research on the theoretical underpinning and direct effects of carbon pricing on the environment (see, for example, Neuhoff et al., 2015). There is also more and more research being done on the technological and economic implications of switching to renewable energy (see, for example, Grubb & Newbery, 2018).

For example, most existing comparative studies only look at a few aspects, such as efficiency or effectiveness, and don't go into detail about important issues like political feasibility, how revenue recycling would actually work, or how social equity works in different situations. There isn't a lot of systematic study that explains why one carbon pricing model might operate well and be accepted by the public in a location like Sweden, where high carbon taxes have been in place for decades with broad support because of how the money is spent (Kåberger & Mårtensson, 2013). On the other side, it can fail spectacularly and be largely rejected by the public in a location like France, where the "Yellow Vests" movement partly arose because many thought the fuel tax hike was unfair (Guivarch & Rogel, 2019). The most essential thing is that most of the research and evaluations of policies on carbon pricing and green transitions that are based in the real world are in developed economies. In an integrated policy context, we still don't know much about the realities of developing countries. These include high levels of energy poverty, strong fiscal constraints, people relying on fossil fuel industries for jobs and money, and being more vulnerable to climate change (UNEP, 2022; World Bank, 2023b).

Review of Literature

The notion of externalities and welfare economics are two of the fundamental theories that make up the intellectual foundation of climate change economics. The concept of Pigouvian taxation came from Arthur Pigou's major work The Economics of Welfare (1920). He suggested that taxing things that have detrimental effects on other people, such pollution, may make people pay for the social costs of those things. This would lead to better resource allocation and better welfare for society as a whole (Pigou, 1920; Mankiw, 2015). Carbon taxes are based on this notion in theory. They are supposed to make the individual who pollutes pay the entire environmental cost of their carbon emissions. Ronald Coase's 1960 book "The Problem of Social Cost" was very important since it looked at property rights and said that private bargaining can work well to deal with externalities if property rights are clearly defined. Coase's work, which is frequently considered as an alternative to Pigouvian taxes, made it evident that unambiguous pricing signals are necessary for efficient resource allocation. This set the stage for market-based solutions like emissions trading schemes (Coase, 1960; Stigler, 1966).The Stern Review on the Economics of Climate Change (2006) makes it extremely evident that we need to take big, aggressive steps to fight climate change right away. The UK government asked for this important report, which used detailed economic modeling to show that the long-term costs of not doing anything about climate change, like severe environmental damage, social dislocation, and economic disruptions, would be much higher than the costs of taking action right away.

A lot of real-world information regarding how well carbon pricing works has swiftly come in, especially from significant international institutions like the Organisation for Economic Co-operation and Development (OECD, 2022), the World Bank (2023a), and the International Monetary Fund (IMF, 2019).

These reports often go into great detail on the money made, the emissions cuts accomplished, and the overall effects on the economy, which helps us learn from different implementations.

Carbon pricing schemes can work and be hard to use in the real world, depending on how they are set up and where they are used:

- The European Union Emissions Trading System (EU ETS) is the biggest and most advanced carbon market in the world. It began in 2005. It covers emissions from over 10,000 power plants, energy-hungry industries, and airlines. It has obviously helped cut emissions by a lot in the industries it covers, by roughly 35% from 2005 to 2020 (European Commission, 2023). But at first, it had too many allowances, which drove carbon prices go down and made it less tempting to invest.
- People mostly think the Carbon Tax in British Columbia, Canada, which started in 2008, is a success story because it doesn't change taxes. Tax cuts give all tax money back to people and companies. This made the program far more palatable to the public and relieved anxieties about how it would affect the economy. Studies have shown that it helps to cut down on fuel use and emissions without harming the economy of the province too much. It has even led to new green technologies and more jobs in clean industries (Murray & Rivers, 2015; Elgie & McClay, 2013).
- The Cap-and-Trade Program in California, which began in 2013, is responsible for about 85% of the state's greenhouse gas emissions. It is also connected to Quebec's cap-and-trade scheme, which makes the carbon market bigger and easier to trade. A lot of money has gone into clean technology and renewable energy because of this, which has helped California accomplish its ambitious climate objectives (California Air Resources Board, 2023; Bushnell & Chen, 2017).
- The National ETS in China, which began in 2021, is now the largest in the world in terms of emissions covered. The electricity industry was the first to do it. It is still in its early stages and has to cope with issues like data quality, compliance monitoring, and bringing together several pilot programs from different regions. But it's a big step toward putting a price on carbon in a big, rising economy (Qi et al., 2019; IEA, 2023a). China's "learning by doing" approach to climate policy centered on the market teaches other developing countries a lot about how to use similar tools.
- These studies indeed show substantial evidence of the direct benefits of carbon pricing, but there is still a big gap. There aren't many studies that look at how carbon pricing fits into bigger plans for green industry, changes in the job market, and difficult social and political limits in a way that is wide enough, especially in developing countries. A lot of the time, the existing literature looks at these policy areas separately, missing the huge potential for strong synergies, but also for unintended trade-offs and the important role of public support and a fair transition in the overall success of the policies (Jacobs, 2013; Victor & Kennel, 2014; O'Neill & Giddens, 2014).

Work at the moment

This study is the first step in a multi-faceted investigation that aims to give a more complete and nuanced picture of climate economic policies. It will look at how they work in the real world, their effects on society, and the human dimensions of transition. It does this by filling in the gaps in existing studies and exploiting the wealth of information that is currently available. This study does the following significant analysis in particular:

- First, this essay takes a detailed look at carbon pricing systems all around the world, focusing on the EU ETS, Canada's federal carbon price plan, and China's new but rising national ETS. This means looking closely at their specific design features (like how allowances are given out, whether there are price collars or stability mechanisms, and how many sectors are covered), the real-world problems that came up during their rollout and operation (like problems with data monitoring, market liquidity, and political resistance), and the results that were seen (like exact emissions reduction trajectories, revenue generation patterns, and their measurable effects on technological innovation and industrial competitiveness). For instance, in the EU context, the research will critically look at how the changes to the ETS after 2013 fixed problems with too much supply in the past and how increased carbon prices over the long run have affected investment in green technologies in heavy sectors (European Commission, 2023).
- Second, there will be a thorough review of the most essential policies that support the green transition. This is more than just looking at direct carbon pricing to see how well important supporting measures work. These include clean energy subsidies (like feed-in tariffs and production tax credits, which are common in Germany and the US), big public investments in green research and development (R&D) (like government grants for breakthroughs in renewable energy), and smart climate-smart infrastructure spending (like grid modernization and electric vehicle charging networks). This section will talk about how these measures speed things up by correcting market problems that aren't just carbon externalities, such as knowledge gaps, coordination problems, and large upfront costs. It will also look at how they assist the economy and society become more sustainable.
- Third, the study will look at a holistic effect evaluation that takes into account more than just cutting emissions. It will also look at how fair the changes are, how innovative they are, and how acceptable they are politically. This key aspect looks at more than just overall emissions; it also looks at how well policy functions as a whole, taking into account the people and society that are involved in long-term climate action. It will look at both the measurable drops in greenhouse gases and the real-world benefits of green innovation, such as more patent applications for clean technology and more private investments in green technologies (Dechezleprêtre et al., 2018). The study will also look at how climate policies

affect certain socioeconomic groups, communities that are already struggling, and certain industries, especially those that use a lot of energy and are open to trade. This includes looking into the possibility of energy poverty or job losses in carbon-intensive industries and closely examining how well compensatory measures or revenue recycling schemes work to lessen these effects and help workers and communities make a fair transition (Carattini et al., 2018; Rausch & Mowers, 2014; UNDP, 2021).

- Finally, this study will end with a list of things that were learnt and some ideas on how to make climate economic policies operate better. By combining a complex comparison analysis and a multi-dimensional effect evaluation, this study will bring together essential lessons acquired from both successful and challenging policy implementations in a number of different worldwide settings. It will show policymakers what mistakes they should avoid and what significant success factors they should copy.

Methods

The study adopts a strong, multi-method qualitative approach that is well-supported by a structured analytical framework and a thorough review of secondary information. This blend is aimed to make sure that there is broad coverage, in-depth analysis, and a nuanced awareness of how economic, social, and political elements all affect climate policy.The main aspect of the method is a detailed Comparative Case Study Analysis of carbon pricing and green transition strategies in five distinct places with different economies and climates. We picked these places very deliberately to represent a wide range of development levels, institutional capacities, and energy profiles. This gave us a lot of information about varied policy environments:

- The European Union (EU) has a well-established and continually developing carbon market (EU ETS) as well as the ambitious "European Green Deal" policy package. The study will look at how the EU ETS works with other green policies, such Germany's Energiewende and Sweden's long-standing high carbon price (European Commission, 2023; Åhman et al., 2017).
- Canada and California in North America show distinct approaches of setting prices for carbon at the national level (Canada's federal carbon pricing with its unique output-based pricing mechanism for industry and direct rebates for families) and at the state level (California). The study will look at how well connected markets (California and Quebec) work and how the political economy of recycling money works in Canada. It will also show us how to work together as a provincial and federal government and how to encourage people to agree with these concepts (Government of Canada, 2024; California Air Resources Board, 2023).
- China: China's national ETS (which started in 2021) and its massive state-led green industrial initiatives (including huge investments in making solar panels and electric automobiles) provide us a unique

glimpse into a centrally controlled, expanding economy. China is the world's greatest polluter and has a rapidly growing economy. The study will look at how its ETS operates through "learning-by-doing" and how its carbon price and industrial subsidies fit together (Qi et al., 2019; IEA, 2023a).

- India's economy is rising quickly, but it has a lot of issues to deal with when it comes to climate change and growth. The study will look at India's new carbon market plans (like the proposed carbon tax and carbon credit trading scheme), its ambitious goals for renewable energy, and the hard task of making sure that everyone has access to energy and that poverty is reduced while also decarbonizing its economy (NITI Aayog, 2023; World Bank, 2023b).
- A Representative Region from the Global South (e.g., Latin America, specifically focusing on Colombia or Chile, or Southeast Asia, e.g., Indonesia): This case study will capture the unique challenges and opportunities related to securing climate finance, ensuring effective just transition mechanisms for vulnerable populations, and addressing the critical need for equitable energy access in diverse developing contexts (UNEP, 2022; IMF, 2020).
- Each case study will carefully look at the historical context of policy development, the specific design features of the policy, how it was implemented, the results that were seen (both quantitative and qualitative), and the larger social, economic, and political factors that have a big effect on how well the policy works and how well it is accepted by the public.

A comprehensive Policy Evaluation Framework based on four interrelated main criteria will methodically guide the examination of each case study and the following cross-case synthesis. This will make sure that we fully understand what makes a policy successful, going beyond only economic measures to incorporate vital human and societal factors:

- **Effectiveness:** Mostly based on how well it cuts down on greenhouse gas (GHG) emissions, which is done by comparing progress to national and international climate targets. This entails looking closely at the numbers on emissions patterns before and after a policy is put in place, utilizing national inventory submissions and global emissions databases (UNFCCC, 2023; IEA, 2023a).
- **Efficiency:** This is based on how well the policy lowers emissions while keeping costs low for businesses (such the cost of buying allowances or paying carbon taxes) and looking at the bigger picture, such as how it affects jobs, growth, and competitiveness. The goal is to meet climate goals with as little effect on the economy as feasible (OECD, 2022; Goulder & Parry, 2008).
- **Equity:** This is based on how policies affect different income groups, such as the poorest households, vulnerable communities (including indigenous populations and rural areas), particular firms (such those that use a lot of carbon and could lose jobs), and regions. This entails thinking about the risk of energy poverty or unfair burdens and carefully looking at how well compensation measures or revenue

recycling schemes work to mitigate these consequences and create a truly equitable transition (IMF, 2019; Rausch & Mowers, 2014; Piketty, 2014).

- **Acceptability:** This was looked at by looking at how politically possible it is, how much support it has from the public and industry, and whether there are good processes in place for involving stakeholders, running effective communication campaigns, and settling disputes. This criterion recognizes that having a lot of social license and trust is necessary for policies to work in the long run (Lockwood, 2017; Saelen & Kallbekken, 2011; Botzen & van den Bergh, 2014).

The study incorporates a lot of good Secondary Data Review that is available to the public. This includes:

- The World Bank, the International Monetary Fund (IMF), the International Energy Agency (IEA), the Intergovernmental Panel on Climate Change (IPCC), and the United Nations Framework Convention on Climate Change (UNFCCC) all have official reports.
- Peer-reviewed academic articles that have been published in top-tier journals on economics, environmental policy, energy, and political science (for example, the Journal of Environmental Economics and Management, Energy Policy, Nature Climate Change, Environmental Science & Policy, and The Lancet Planetary Health)
- The Climate Policy Initiative, BloombergNEF, The Grantham Research Institute on Climate Change and the Environment, and Resources for the Future are examples of well-known independent think tanks and research institutions that focus on climate and energy policy. They produce policy briefs, white papers, and in-depth economic analyses.
- This method builds on past strong studies and combines data from various sources to create a solid empirical base. It also allows for triangulation of data to make it more dependable, all while following high academic norms and methods.

Finally, a structured Analytical Matrix will be made and utilized carefully to systematically map and analyze the complicated ways that carbon pricing techniques and other policies that help the green transition work together in diverse economic scenarios. This matrix will help us critically figure out: Specific instances of how carbon pricing makes green industrial policies work better, including making investments in renewable energy technologies or energy efficiency far more cost-competitive with fossil fuels.

When carbon pricing and green transition policies work together, they can remove non-price impediments to decarbonization, such as repairing broken infrastructure, funding risky but required research and development, or boosting public awareness and acceptance through focused campaigns.

This systematic, methodical approach will make it simpler to examine situations in detail, discover causal pathways and feedback loops in difficult policy contexts, and finally come up with complete, meaningful, and human-centered policy insights.

Other Work Streams That Are Related

This study is ideally located at the crossroads of a number of significant and rapidly developing subfields within climate economics and environmental policy. It fits well in with and aspires to make a real and relevant contribution to a growing corpus of literature:

- Behavioral Economics and Climate Policy is a new field that studies how knowledge of human psychology and decision-making can assist make climate policies more effective than just relying on the idea of rational economic actors (Shiller, 2017). Researchers in this field are interested in how pricing signals, cognitive biases (like present bias and loss aversion), social norms, and psychological factors affect how people and businesses use energy, invest in green technologies, and adopt sustainable practices (Gollier & Tirole, 2015; Thaler & Sunstein, 2008).
- Green Industrial Policy means that the government should take an active and planned role in directing economic activity toward industries and technology that are good for the environment. This is because markets alone might not be able to make the adjustments that need to happen fast and on a large enough scale. In Mission Economy (2021), Mariana Mazzucato and Dani Rodrik (2020), who has written a lot about the subject, argue for proactive, mission-oriented public investments, strategic procurement, and targeted subsidies to encourage innovation and give clean energy and other new green industries a competitive edge, rather than just relying on abstract market mechanisms. This study will closely look at how various decisions on green industrial policy can either significantly support or, in some cases, weaken carbon price. It will look at how these choices determine how quickly and in what direction technology changes and the economy restructures.
- Just Transitions is a new and important field of study that focuses at the social and economic fairness issues that come up when individuals take action to fight climate change. It focuses at how to make decarbonization policies that don't unfairly impact vulnerable populations, workers in carbon-intensive industries (such coal miners and oil and gas workers), and developing countries that have their own challenges (ILO, 2015; UNDP, 2021). The International Labour Organization (ILO) and the United Nations Development Programme (UNDP) are two groups that study how to make the move to a low-carbon economy fair and open to everyone.
- Lastly, recent research on Carbon Border Adjustment Mechanisms (CBAMs) looks at the economic reasons for and complicated impacts of charging more for imports from countries with less rigorous carbon pricing rules. One of these mechanisms has been considered by the European Union (European Parliament, 2023). It wants to stop "carbon leakage," which is when production that uses a lot of carbon moves to nations with weaker climate legislation. It also hopes to get more people around the world to

take action on climate change by making it simpler for businesses in the US to compete when they have to pay a carbon price (Böhringer et al., 2014; Nordhaus, 2015).

Expected Main Outcomes

Based on the first look at the literature, the proposed case studies, and the proposed analytical framework, this study hopes to find a number of important things that will add to the ongoing conversation about climate change economics and policy implementation, with a strong focus on their human and social aspects:

- One of the most important things we hope to learn is that carbon pricing lowers emissions when it is done with clear policy goals, solid rules, transparent revenue recycling, and active participation from all stakeholders. The EU ETS, for instance, has cut emissions in covered sectors after making key improvements that made price signals stronger. This illustrates that a pricing that is well-designed and regularly implemented can influence how businesses respond (European Commission, 2023; Ellerman et al., 2010). Countries like Sweden, who have had high carbon prices for decades, indicate that consistent pricing leads to deep decarbonization across sectors over time (OECD, 2021). But the amount of emissions that are cut down could be very different. The carbon price level, the kinds of emissions that are covered, and, most significantly, the presence of policies that operate well together are all factors that affect this (Aldy, 2016).
- People also think that Emissions Trading Systems (ETSs) work best when they have clear and ambitious caps, well-regulated and liquid markets, and strong monitoring, reporting, and verification (MRV) systems. The EU ETS's Market Stability Reserve, which prohibits prices from falling too low because of too many allowances, is an example of a mechanism that makes them far more useful (Carbon Market Watch, 2022).
- The main purpose of the study is to illustrate that carbon pricing alone is nearly never adequate to move us to a future with net-zero emissions and a lot of decarbonization. It sends important economic signals, but we also need targeted public investment in breakthrough green research and development (R&D), strategic public investment in enabling infrastructure (like smart grids and charging networks), and comprehensive labor reskilling and social support programs. These further measures are needed to fix problems in the market that are more serious than just externalities, such as the dangers of new ideas, problems with the capital market, and mismatched talents. This will help communities who are affected not get left behind and speed up big changes in the economy (Aghion et al., 2016; IEA, 2023b; Rodrik, 2020). For example, a carbon price makes people more likely to buy electric cars, but the government needs to put more money into charging stations so that more people can use them and they are easier for everyone.In the end, the study says that political opposition and deep-seated equity concerns will continue to be major obstacles to the successful implementation and ambitious growth of carbon

pricing, especially in low-income countries and areas where families are most worried about being able to afford energy. The way that revenue recycling mechanisms are set up (for example, giving households direct dividends or "carbon cheques," making targeted investments in public services or green infrastructure, or strategically supporting vulnerable, energy-intensive industries) is very important for reducing negative effects and making the program more acceptable to the public, turning potential opposition into broad societal support (Rausch & Mowers, 2014; Carattini et al., 2018; Wuppertal Institute, 2020).

Suggestions for policies and what will happen as a result

The projected outcomes of this study have substantial policy implications and practical proposals for governments, international organizations, and other interested parties who want to put in place fair, effective, and efficient climate policies as climate change grows worse. These ideas are supposed to be practical, people-centered, and aware of how difficult the link is between economic incentives, social well-being, and political viability.First, it's very necessary to set up and employ progressive carbon pricing systems that are closely linked to solid social safety nets and clear means to recycle the money they make. To persuade people to genuinely accept the program and deal with any negative effects on vulnerable households, the government should focus on methods to provide a lot of the carbon revenue back to citizens. One approach to do this is to give people carbon dividends or one-time payments. The federal system in Canada has proved that both operate by making the benefits plain and genuine (Government of Canada, 2024; Green & Sterner, 2017). Also, temporary exemptions or output-based rebates for energy-intensive, trade-exposed industries (EITEs) like steel, cement, or chemicals manufacturing can stop "carbon leakage" (when production moves to countries with weaker environmental laws) and protect jobs and competitiveness during the transition period (Metcalf & Weisbach, 2012; Cosbey et al., 2019). This proactive technique alters how people think about carbon pricing, turning it from a burden into a chance to properly share wealth and make investments that will pay off in the long run.Second, governments need to make sure that carbon markets and bigger plans for green industries function together in a way that makes sense. People should think of carbon pricing as a simple way to find out how much emissions cost. It needs to be combined with smart industrial policies that promote innovation, make it easier for new green technologies to grow quickly (like making green hydrogen, advanced batteries, and capturing, using, and storing carbon), and build competitive domestic industries that can lead the way in the clean energy transition. Third, it's vitally necessary to establish plans for the Global South that are tailored to each scenario and incorporate everyone. A "one-size-fits-all" approach to carbon pricing or green transitions won't work because low- and middle-income nations have extremely different social and economic situations, energy systems, and development aspirations (UNEP, 2022). These countries need to carefully prepare their climate policies so that they can

cut down on carbon emissions while simultaneously making it easier for people to get energy, eradicating poverty, and making their economy more diverse.

Lastly, we need to work together more on a global scale to stop carbon leakage and encourage fair competition in a world that is becoming less carbon-heavy. It is possible for a country to set its own carbon price, and it can be good for that country. But when it comes to global climate action, coordinated policies are definitely better for the economy, the environment, and politics. International conversations and agreements can help make sure that carbon pricing is the same around the world. This might happen by making "carbon clubs" where people agree on a common effective carbon price, or by making standards for carbon accounting that everyone agrees on. People may be less worried about carbon leakage and not need complicated and perhaps trade-distorting carbon border adjustment processes if they work together (Aldy & Stavins, 2012; Nordhaus, 2015; Carbone et al., 2022).

Conclusion

The most critical concern of our time is climate change. We need a quick, coordinated, and truly game-changing economic response that puts people's health and happiness first. This in-depth study paper makes it very evident that an effective climate economic strategy must carefully balance well-thought-out market-based mechanisms with proactive, well-targeted public policy activities. Changing economic incentives through different types of carbon pricing is a strong and cost-effective strategy to internalize environmental externalities and lower greenhouse gas emissions. However, when it is strategically combined with comprehensive green transition policies that promote technological innovation, build climate-resilient infrastructure, and, most importantly, make sure that everyone has equal access to the benefits and that the public supports them, it works much better and is more socially acceptable.So, figuring out the optimal approach to establish carbon prices or building intricate models of how much it costs to cut emissions isn't the only thing that will affect the future of climate economics. Instead, it's all about understanding and actively working to make green changes happen around the world that are fair, include everyone, and are founded on new ideas. This includes making hard decisions, dealing with political opposition that arises from a sense of unfairness, and making sure that everyone in society can experience the benefits of a low-carbon economy, such as better air, new green jobs, and more energy independence. Policymakers have a wonderful chance to make and follow through on paths to a low-carbon future that are more resilient, fair, and effective. This future should be sustainable, prosperous, and truly human-centered. They may achieve this by learning from the many varied worldwide experiences, both the major successes and the minor failures, and by carefully filling in the gaps in existing research that don't take into account social and political reali

References

1. Acemoglu, D., Aghion, P., Bursztyn, L., & Hemous, D. (2012). The environment and directed technical change. *American Economic Review, 102*(1), 131–166.
2. Aghion, P., Dechezleprêtre, A., Hémous, D., Martin, R., & Van Reenen, J. (2016). *Carbon taxes, green innovation, and energy efficiency* (CEPR Discussion Paper No. DP11354).
3. Åhman, M., Nilsson, L. J., & Karlsson, M. (2017). Political economy of carbon pricing in Sweden. *Energy Policy, 108*, 649–659.
4. Aldy, J. E. (2016). Learning from carbon pricing experience. *Current Opinion in Environmental Sustainability, 19*, 117–124.
5. Aldy, J. E., & Pizer, W. A. (Eds.). (2015). *Post-Kyoto climate governance: Confronting the next set of challenges*. Cambridge University Press.
6. Aldy, J. E., & Stavins, R. N. (2012). The promise and problems of linking emissions trading systems. *Energy Policy, 49*, 298–309.
7. Baumol, W. J., & Oates, W. E. (1988). *The theory of environmental policy* (2nd ed.). Cambridge University Press.
8. Board of Air Resources, California. (2023). *California cap-and-trade program overview*.
9. Botzen, W. J. W., & van den Bergh, J. C. J. M. (2014). Public attitudes toward carbon pricing. *Environmental Innovation and Societal Transitions, 13*, 20–30.
10. Bushnell, J., & Chen, Y. (2017). Allocation and exchange of emissions permits. *Energy Economics, 64*, 499–509.
11. Carbone, J. C., Hufbauer, G. C., & Ryskin, M. (2022). *Carbon border adjustment mechanisms: Trade and political economy issues*. Peterson Institute for International Economics.
12. European Commission. (2023). *The EU emissions trading system (EU ETS).*
13. FAO. (2023). *The state of food security and nutrition in the world.*
14. Hepburn, C. (2018). Carbon pricing: Policy options and lessons. *Oxford Review of Economic Policy, 34*(3), 395–419.
15. Hughes, D. L., & Konisky, D. M. (2017). Environmental justice and public opinion. *Annual Review of Environment and Resources, 42*, 291–311.
16. IEA. (2021). *Emissions trading and carbon markets.*
17. IEA. (2023a). *Emissions trading and carbon markets.*
18. IEA. (2023b). *World energy outlook 2023*.
19. ILO. (2015). *Guidelines for a just transition towards environmentally sustainable economies.*
20. IMF. (2019). *Fiscal policies for implementing the Paris Agreement* (Staff Climate Note No. 2019/01).
21. IMF. (2020). *Climate change policy assessment*.
22. IPCC. (2023). *AR6 synthesis report: Climate change 2023.*
23. IRENA. (2021). *Renewable power generation costs in 2020.*
24. Jacobs, M. (2013). The politics of carbon taxation. *Climatic Change, 118*, 591–600.
25. Kåberger, T., & Mårtensson, A. (2013). The Swedish carbon tax. *Energy Policy, 61*, 804–810.
26. Keep an eye on the carbon market. (2022). *EU ETS reform and climate policy.*
27. Lin, B., & Jia, Z. (2019). Carbon tax policy in China. *Journal of Cleaner Production, 229*, 934–945.
28. Lockwood, M. (2017). Political economy of British Columbia's carbon tax. *Global Environmental Politics, 17*(3), 118–137.
29. Metcalf, G. E. (2019). Economy-wide impacts of carbon pricing. *National Tax Journal, 72*(1), 223–241.
30. Metcalf, G. E., & Weisbach, D. (2012). Carbon taxes in the United States. *Energy Policy*, 41–203.
31. Murray, B., & Rivers, N. (2015). British Columbia carbon tax. *Energy Policy, 86*, 674–681.
32. Neuhoff, K., Devanney, J., & Sartor, O. (2015). *Carbon pricing: Design, experience, and issues*. MIT Press.
33. NITI Aayog. (2023). *India's carbon market: Opportunities and challenges*.

34. Nordhaus, W. D. (2017). Integrated assessment models. In *The New Palgrave Dictionary of Economics* (2nd ed.). Palgrave Macmillan.
35. OECD. (2021). *Effective carbon rates 2021*.
36. OECD. (2022). *Pricing carbon in a time of transition*.
37. Qi, Y., Mao, Y., & Li, H. (2019). Carbon trading in China. *Energy Policy, 132*, 1078–1086.
38. Rausch, S., & Mowers, H. (2014). *Distributional impacts of carbon pricing* (MIT Joint Program Report No. 312).
39. Rodrik, D. (2020). *Green industrial policy* (NBER Working Paper No. 27956).
40. Saelen, H., & Kallbekken, S. (2011). Public acceptance of carbon pricing. *Climate Policy, 11*(6), 1433–1445.
41. Shiller, R. J. (2017). *Narrative economics*. Princeton University Press.
42. Stern, N. (2006). *The economics of climate change: The Stern review*. Cambridge University Press.
43. Stigler, G. J. (1966). *The theory of price* (3rd ed.). Macmillan.
44. Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Penguin Books.
45. Tietenberg, T., & Lewis, L. (2018). *Environmental and natural resource economics* (11th ed.). Routledge.
46. UN. (2022). *Global assessment report on disaster risk reduction*.
47. UNDP. (2021). *Guidelines for a just transition.*
48. UNEP. (2022). *Emissions gap report 2022*.
49. UNFCCC. (2015). *Paris Agreement*.
50. UNFCCC. (2023). *National inventory submissions*.
51. Victor, D. G., & Kennel, C. F. (2014). Climate policy over the long term. *Nature Climate Change, 4*(2), 79–84.
52. WHO. (2021). *Climate change and health*.
53. World Bank. (2023a). *Climate change knowledge portal*.
54. World Bank. (2023b). *State and trends of carbon pricing*.
55. Wuppertal Institute. (2020). *Just transition: Concepts and implementation*