

The Role of Social Justice in Carbon Pricing: A Balance between the Environment and the Economy

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Abstract

This article addresses the role of social justice in carbon pricing as a way to balance the environment and the economy. Carbon pricing is essential to reducing greenhouse gas emissions and stimulating innovations in renewable energy. However, policies must take into account unequal impacts on low-income communities, which often suffer from the repercussions of climate change. Through a fair carbon pricing structure, including revenue

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recycling and progressive pricing strategies, more equitable economic and environmental outcomes can be achieved. The participation of societies in decision-making and the ongoing assessment of the impact of policies is key to ensuring social justice in this context.

Keywords: Social Justice _ Carbon Pricing _ Environmental Balance _ Economic Balance _ Greenhouse Gases _ Climate Change

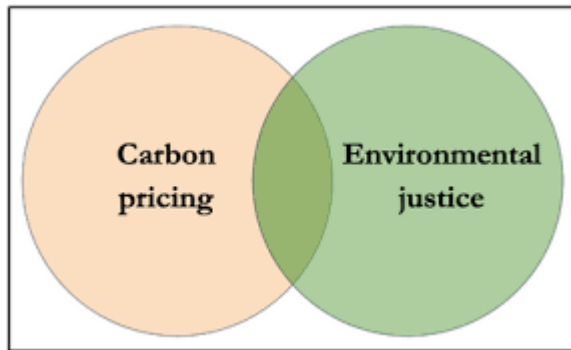
1. Introduction

Much research has been dedicated to examining the political and economic consequences of carbon pricing, particularly with a focus on its progressive or regressive impacts, the so-called distributional issues. Few works, however, have inquired into the procedural dimension of the question. This paper analyzes the distributive effects of environmental fiscal instruments, in connection with their democratic legitimacy or, more concisely, their fairness.

A vibrant literature deems carbon taxation a straightforward policy proposal to mitigate air pollution associated with greenhouse gases, especially in the presence of substantial market power and price distortions typical of the energy sector. However, the political upshot of this tax proposal, especially transposing it into a general tax, is not yet a done deal. Moreover, a hotly debated feature of environmental fiscal systems links to their redistributive effects. The acceptance of a policy proposal will increase if an explicit analysis underscores its impact on communities and individual income ;

Based on this, the following problem statement can be formulated :

How can we design carbon pricing mechanisms that effectively reduce emissions while ensuring equitable benefits and protections for marginalized communities affected by climate change?



<https://www.researchgate.net/figure/Intersection-between-carbon-pricing-and-environmental-justice>

1.1. Background and Rationale

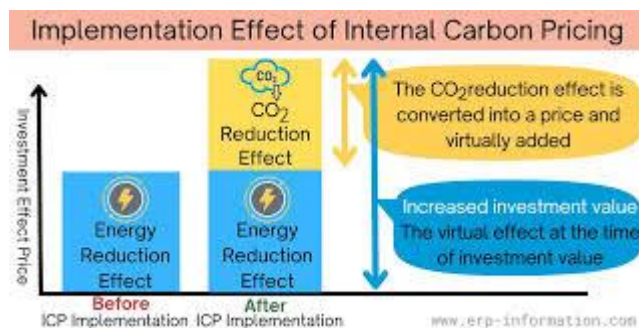
With numerous countries, states, and provinces now having implemented or are in the process of implementing or considering carbon pricing programs, the societal impact of these programs is now at the forefront of ongoing policy discussions. Carbon pricing not only enables incentives for emissions reductions but also implies potential costs for various groups. For instance, carbon pricing may lead to increases in energy, transportation, and industrial process costs, which might be regressive, hurting those with limited resources the most. Impacts may also extend over time scales, possibly affecting adjustments of capital stocks and investments, firms' and government budgets, competitiveness of affected industries, equity stakes for disproportionately affected communities, and more. Although the value of emissions reductions on public health and well-being persists at any carbon price, revenues generated through carbon pricing are typically not directly linked to public health and welfare or spent appropriately to address potential broader distributive consequences. These multifaceted costs of carbon pricing¹, as reflected in the set of distributional and interactional objectives and constraints faced by legislators and

¹ State and Trends of Carbon Pricing 2018 (World Bank, Ecofys & Vivid Economics, 2018).

policymakers, can give rise to complex political economy dynamics that may potentially weaken targeted emissions reduction efforts.

2. Understanding Carbon Pricing

Carbon pricing refers to a cost, either a tax or a trading system, placed on the most prolific greenhouse gas, carbon dioxide. It is expected to help reduce the amount of carbon in the atmosphere by raising the cost of emitting it. There are currently five carbon pricing systems in operation, although the schemes vary in complexity. The EU Emissions Trading System applies to about 11,000 energy-intensive installations and aircraft operators across the EU, the oldest market. The Electric Sector Cap-and-Trade program in nine states in the United States covers about 2,700 entities. The Western Climate Initiative in North America currently includes California and Quebec but will eventually grow to ten jurisdictions, aiming to cover 90% of Canadian emissions. The New Zealand market applies to 75% of the country's emissions, and Switzerland's scheme covers roughly 50% of the country's GHG. Four Canadian provinces have plans in place for a carbon price.



<https://www.erp-information.com/internal-carbon-pricing>

A vital consideration in crafting carbon pricing schemes is to include some sort of social justice measure. Yet, no country has yet created a strategy that is explicitly designed to help the most climate-conflicted citizens by law. Frameworks to support the poor throughout the temperature rise differ. Goals assist in preserving their existing quality of

life until sustainable and affordable options are found. Another further encourages climate-friendly, also known as green, choices and provides long-term economic flexibility. The middle class is likely to bear a disproportionate share of the trade-offs made to help the most vulnerable. Although these goals occasionally appear to be addressing contradictory societal goals, they are complementary. Pricing schemes, both cap-and-trade and carbon taxation, are effective resources for meeting these joint obligations. While implementing carbon pricing, currently only 25 disclosures can boast features that achieve potential social justice co-benefits¹. They also have unexpected effects, many of which depend on how the revenue is used and on industries.

2.1. Types of Carbon Pricing Mechanisms

Carbon pricing is one of the most effective and efficient tools we have to reduce greenhouse gas emissions and mitigate global warming. Economic theory and a wide range of energy and economic models have indicated that setting a price on carbon is key to reducing emissions at the lowest possible global cost. In its simplest form, a carbon price is a fee or tax tied to the amount of emissions generated in industrial processes, and it is imposed at either the production, distribution, or consumption stages within an economy. It also requires consumers and producers of energy to take into account not only the private production and consumption costs but also regulated environmental and social costs. The carbon price serves to internalize these external environmental costs, and the main function of the price on carbon is to correct for the negative externalities from carbon pollution associated with the combustion of fossil fuels, which is a significant driver of climate change.

There are two primary types of carbon pricing mechanisms: the carbon tax and the cap-and-trade system, which enacts an emissions trading scheme. Prior to identifying the

¹Benson, J. E. Massachusetts Bill H.1726. An Act to Promote Green Infrastructure, Reduce Greenhouse Gas Emissions, and Create Jobs (General Court of the Commonwealth of Massachusetts, 2017); <https://malegislature.gov/Bills/190/H1726>

specific types of social justice impacts associated with carbon pricing mechanisms, it is useful to define these instruments. In its most basic form, a carbon tax is a straightforward way for an energy company to minimize pollution sources by paying for the right to emit a specified amount of pollutants. Once the source of pollution costs is internalized, a carbon tax could be designed in several ways. The first parameter of a carbon tax is the amount of the tax itself. If the tax is set at the appropriate level, it will reduce emissions to accommodate the social optimum, whereby the marginal cost of abatement resulting from a decrease in production or an increase in abatement equals the marginal damage of an additional ton of emissions.¹ If a carbon tax is established too low, that will also reduce emissions, of course, but it will not reduce them as much as is socially desirable. If a carbon tax is set too high, that would reduce emissions to a greater extent than the social optimum.

3. Social Justice and Environmental Equity

In the context of climate policy, there is a background assumption that direct regulatory action may be necessary in circumstances when market mechanisms do not work properly or fail to efficiently promote climate mitigation and other environmental interests. This concern about the effectiveness of markets and the ability of environmental problems to be corrected through regulatory action has led to considerable political resistance to market-based solutions, such as tradable emissions permits and carbon taxes indirectly imposed on consumers through their day-to-day choices. There is widespread dissatisfaction with carbon pricing policies as economically regressive without the imposition of compensatory measures to protect low-income and other vulnerable groups from disproportionate adverse burden shifts onto them.

¹ Baranzini, A., Goldemberg, J. & Speck, S. A future for carbon taxes. *Ecol. Econ.* 32, 395–412 (2000).



<https://fastercapital.com/content/Social-Justice--Bridging-the-Gap-with-True-Cost-Economics.html>

Despite widespread agreement about the goal, the means to achieve social justice under a carbon pricing policy are hotly contested. Substantive distributive justice can be largely achieved through the welfare state maximizing efficiency and redistributing compensation rather than attempting to micromanage and equity-proof carbon markets¹. However, climate mitigation has large implications for intergenerational equity. The strength of the welfare state in the medium and longer term depends upon the scale of public debt and future taxes, social security pensions, and welfare entitlements paid during shorter working lives, the generosity of the social security system, and the quality and dependency of care benefits. Climate change is set to impose real constraints on the welfare state through the multiple channels of public debt, public services, social security, employment, social policies, public spending, in-work poverty, child benefits, pensions, and education.

¹ Lucas, K., Walker, G., Eames, M., Fay, H. and Poustie, M. (2004). Environment and Social Justice: rapid research and evidence review. Sustainable Development Research Network, London.

3.1. Concepts and Definitions

The term environmental justice could be interpreted in several different ways. Indeed, until fairly recently, generally only a minority of researchers worked on the subject in any precise way. However, as the titles to seminal research papers demonstrate, there was an association with fairness that can be traced back to classical political philosophy. The demand for cleaner air and water, and for fairer access to environmental benefits and burdens, was politicized by the U.S. civil rights movement. In the aftermath of certain environmental crises, the term environmental justice began to be widely used in movements for racial equality in the U.S. Although the term is American in origin, it soon spread both to other countries and to the international social movements in whose rhetoric it was thereafter employed, for example, as a rallying cry against the environmental consequences of structural adjustment programs and against the polluting of the global commons by comparatively rich countries¹.

This and other such instances of conceptual or physical spillovers led to a definition of environmental justice as the principle that all people and communities, regardless of their racial, economic, or social condition, have the right to maintain the environmental quality necessary to support healthy and productive lives.² This definition implies a collective problem and a normative solution, but one different from what other environmental ethicists describe. Instead of demanding environmental sustainability, it appears that the core normative component of the environmental justice movement is social justice based on a claim for distributive justice in environmental policy.

4. The Intersection of Social Justice and Carbon Pricing

Although national policy discussions will continue to highlight the relative merits of different carbon pricing approaches in Congress, it is becoming evident that regulatory and

¹ Burningham, K. and Thrush, D. (2001) 'Rainforests are a long way from here': The environmental concerns of disadvantaged groups. Joseph Rowntree Foundation, York.

² Drews, S. & van den Bergh, J. C. J. M. What explains public support for climate policies? A review of empirical and experimental studies. *Clim. Policy* 16, 855–876 (2016).

pricing by examining proposals advocating for social justice in carbon pricing. In doing so, we take care to amplify the distinctive features of the U.S. federal system in the context of climate policy, as well as the unique values and egalitarian traditions that have shaped U.S. social policy.

4.1. Challenges and Opportunities

The EU carbon market has provided several interesting signals to the Swiss policymakers, which have been confirmed in interviews. Firstly, it has highlighted the potential to stimulate collaboration on carbon pricing solutions across different target horizons and to build synergies with other policies such as fiscal policy or the development of the local economy. Furthermore, the EU ETS is seen as an active sign of the necessary shift towards a low-carbon economy; the Swiss system would affirm to businesses that emissions reduction is a relevant investment. However, policymakers are well aware that the price signal would have to reach a given level to trigger the investment effect¹. With respect to the Swiss system – if it were to be implemented – the cost-covering reduction of emissions and the necessary depth of the offset link with the EU ETS is therefore still in question.

5. Case Studies and Examples

Now that we have an understanding of what social justice is and how it can be applied within carbon pricing schemes, it is crucial to demonstrate where it has been applied successfully or where it has needed adjustments in exchange for social support. The transparency and movement towards a more uniform understanding of social justice within different carbon pricing schemes can only be progressed by examining how they have been employed so far. This does not only mean listing examples, but understanding why the

¹ Bekun, F. V., A. O. Adekunle, A. D. Gbadebo, A. Alhassan, J. O. Akande, and N. Y. M. Yusoff. 2023. "Sustainable Electricity Consumption in South Africa: The Impacts of Tourism and Economic Growth." *Environmental Science and Pollution Research* 30 (42): 96301-96311. <https://doi.org/10.1007/s11356-023-28856-4>.

schemes are structured a certain way and how they affect social and economic welfare. This paper is not concluding that all carbon pricing schemes are failing; in fact, the importance of case studies is only to highlight the success stories as much as they are for learning opportunities¹. Barring valuable information that can be applied to future carbon pricing schemes is only detrimental to an approaching commons problem.

We will be examining five case studies in how carbon pricing has addressed some aspects of social justice, the implications that resulted, and what aspects would have benefited from different strategies. The primary focus of these case studies rests within the link between carbon pricing and compensation, where the secondary focus is placed on regulation within the carbon pricing schemes. The strategy of an increasing domestic tax, carbon trading, and direct and indirect cost compensation are all facets of correcting the geographic and intergenerational governments². Another reporting piece surrounding the implementation of carbon pricing is Green Budget Reform. Green Budget Reform is a fiscal policy aimed at making the sources of gross domestic product net of environmental services less by taxing environmental emissions and offsetting the gross domestic product with tax reductions.

5.1. Global Perspectives

The public's engagement in carbon pricing policies is a key determinant of their political feasibility and chances for successful implementation. We conducted a survey in Denmark, China, Mexico, and the United States to explore public attitudes about the distribution of costs and benefits among different income groups and preferred objectives for spending carbon pricing revenues. Across these four countries, we found little evidence that citizens demanded strict equality in relative benefits for the burden of costs of carbon

¹ Martin, R., Muûls, M., Laure, L. B. & Wagner, U. J. Industry compensation under relocation risk: a firm-level analysis of the EU emissions trading scheme. *Am. Econ. Rev.* 104, 2482–2508 (2014).

² Bekun, F. V., B. A. Gyamfi, R. O. Bamidele, and E. N. Udemba. 2022. "Tourism-induced Emission in Sub-Saharan Africa: A Panel Study for Oil-Producing and Non-oil-Producing Countries." *Environmental Science and Pollution Research* 29 (27): 41725–41741. <https://doi.org/10.1007/s11356-021-18262>

pricing and, thus, do not uniformly prioritize policy designs that redistribute all carbon revenues back to the people. We also found that the preferred goals for spending carbon pricing revenues varied across countries. Importantly, these public preferences did not always line up with experts' prescriptions for designs that receive widespread public support. The results make clear that the political viability of carbon pricing policies will be influenced by the specific configurations chosen. These insights are of key importance for policymakers who need not only successful implementation of carbon price policies but also the reassurance that they have the public's mandate to do so.

6. Policy Recommendations

There are a number of policy design features that can help carbon pricing be socially just and politically acceptable. The tax should be progressive and should redistribute more revenues to the poor who are hardest hit by an increase in fossil energy prices. To motivate mitigation while protecting the poor, the government might consider using some of the second-best pricing methods. For example, provide tax credits to promote energy conservation, place a floor under carbon prices for sectors where there are genuinely undeveloped control technologies, and subsidize mitigating technologies that are more expensive but are a combination of clean energy and job creation. Also, a modest part of the revenue might be applied to family assistance to partially compensate lower income before household budgets are affected by increased prices.

Politically, wage-based distribution of carbon tax revenues to each worker is likely to be more acceptable than equal per capita rebates based on the estimated cost of the carbon tax incidence. A universal carbon dividend where most of the revenue collected from linear carbon fees is returned to taxpayers on an equal basis will provide the most effective minimum effect and make the carbon price more acceptable to the public if fossil energy prices rise. Indeed, carbon dividends can generate broad popular support for climate change mitigation. With a carbon fee paid by those who are using carbon-based fuels,

differentiated universal dividends will reward all citizens: those least affected by the fee will receive dividends greater than the fees they pay, thus benefiting from reduced emissions; and those who are more affected will have received the same or less in dividends compared to the fees they have to pay, which should prevent negative income.

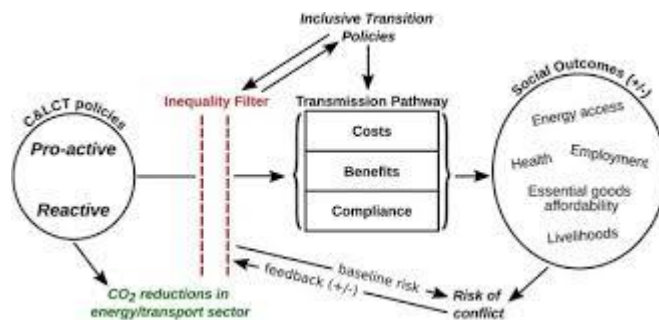
6.1. Incorporating Social Justice Principles

The proportionate dividend model encompasses all four social justice principles and can be developed further in a systematic way. In this chapter, we focus on priority determinants that will guide the design of dividend decisions; three classes of determinants – those that help clarify equity rights, those that help clarify domain principles that make redistribution feasible, and those relevant for fairness – are identified. Although our expressed focus here is on the proportionate dividend earned for the interest that a household may have in the value of reduction resources that are aligned with income, the notion of a medium quadrilateral (MQ) may be implemented with other transfer schemes in more complex settings. This chapter will focus on the proportionate dividend earned within the MQ divisible resource setting. The goal is to illustrate the sequential use of the priority determinants, to seek any generalization produced, and to provide a structural justification for the general principle in terms of observed social practices.

7. Economic Implications of Carbon Pricing

The adoption of carbon taxes and cap-and-trade regulatory approaches was not primarily based on their environmental performance, but on their potential to stimulate top environmental technologies. In addition to their impact, carbon taxes and cap-and-trade regulations also influence the economic performance of the country that has adopted them. This might result in a shift of industrial production from the most developed countries that want to limit air emissions to less strict ones, with negative effects on the recognition of

labor rights and on the social well-being of globalized society¹. It is not by accident that social justice has emerged as one of the most important issues of globalization.



<https://link.springer.com>

It is, however, recognized that macroeconomic impacts are affected by the level and type of use of the revenues deriving from the application of carbon taxes or from the sales of emission allowances. Actually, carbon taxes and cap-and-trade regulations represent two differential types of burden, each addressing revenues that could be differentiated with respect to tax revenues. In view of the commitment to reduce emissions of air pollutants and greenhouse gases, and given the existence of the Emission Trading system, in Italy, a CO2 tax system has been set which, starting from 2010, will introduce, over ten years, a tax on each ton of CO2 emitted by the major Italian final CO2².

Although all these measures have made climate policy one of the most advanced in the world today, and possibly the only example of a well-functioning cap-and-trade system that has achieved effective emission reductions, reduced knowledge of the related regulations at national and international levels has made it necessary to carry out a specific study in the Italian context. For most firms, the directive may represent an additional cost that could be relevant for some of them, as the benefits deriving from the investment in energy efficiency systems not only soothe the fiscal levy, but also translate into lower costs necessary for the production of goods and services. The survey, submitted to the major

¹ Andersson, J J (2019), "Carbon Taxes and CO2 Emissions: Sweden as a Case Study", American Economic Journal: Economic Policy 11(4): 1–30.

² Känzig, D R, (2023), "Climate policy and economic inequality", VoxEU.org, 25 Ju

Italian firms and involving ten main questions, aims to draw a picture of the behavior, expectations, and necessities of firms, with a view to suggesting effective policies of environmental micro-management¹. However, CO2 taxation or allocation of emission allowances are not able to distinguish virtuous companies that have undertaken a path of voluntary improvement in the protection of the environment. Building tools able to reward the best performance of energy efficiency with respect to the acknowledged standard of activity, more feasible in terms of control and market liquidity, including a performance index, is the purpose of a new project that our research group is developing in collaboration with the business world.

7.1. Cost-Benefit Analysis

What can cost-benefit analysis tell us about a policy that makes decisions about future generations and between countries with widely varying costs of abatement and measures impacts by the welfare, not the monetary, consequences of climate change? It can provide, at best, an underpinning for some of the considerations that must be part of a cost-benefit analysis in this setting. Hence, such considerations ought not to be laid at carbon pricing's door unless and until other climate change policies also embrace them. They include the acceptability of sliding-scale abatement targets, global cost-effectiveness of carbon pricing, spatial equity, and some aspects of expenditure-cost trade-offs between abatement and adaptation.

Social justice is also associated with the distribution of the consumption-enhancing benefits derived from carbon pricing. The way in which these benefits should or could be recycled—whether as a uniform levy or as rebates to certain individuals and groups—may depend on income distributions but also depends on individuals' perceptions of the justice and fairness of the recycling mechanisms. Whether any export tax of the surplus revenues of carbon pricing flows to other countries is a social justice issue as well. Social justice also

¹ Konradt, M and B W di Mauro (2021), "Carbon taxation and inflation: Evidence from Europe and Canada", VoxEU.org, 29 Jul.

plays a part in the national and international implementation and governance of carbon pricing; determining equitable per capita emissions rights, managing shocks, and timing the timing of carbon pricing are pertinent examples.

8. Public Perception and Communication Strategies

The influence of public opinion is intricately tied to the feasibility and potentially the eventual political and social outcome of enacting carbon pricing. The acceptance of carbon pricing is influenced by multidimensional factors and framing remains the key aspect to alter the public's attitude. This includes awareness, equality and fairness considerations, clarity of communication of both the concept and potential benefits, trust and transparency on the part of the politicians responsible, demonstration of direct benefits in connection with the more indirect impacts, and the consistency in message reliability from multiple government representatives and the media.

Communication activities aimed at presenting these political decisions as the result of an inclusive participatory process, enhancing distributed responsibility, and democratically deciding about the methods, the use of resources, and the direction of policies that affect both formal and informal institutions are necessary¹. They may also contribute to diminishing the influence, hence the pressure, coming from vested interests against the introduction of carbon pricing. Furthermore, such policies allow specifying the procedures by which rules that reflect choices made by the community as a whole are identified and promulgated. Indeed, to be perceived as fair, these policies need to positively affect those who, for reasons of personal capacities, spatial distribution, or both, are less able to reduce emissions.

8.1. Building Support for Carbon Pricing

Arguments were also made that social justice concerns can limit the design of an optimal carbon pricing policy, leading to an important role for social justice within it.

¹ Konradt, M and B W di Mauro (2021), "Carbon taxation and inflation: Evidence from Europe and Canada", VoxEU.org, 29 Jul.

Social justice concerns have often been the basis for more positive formulation of carbon pricing policies in other research. Justice was identified as a supportive factor for carbon pricing by designing and imposing a social safety net to reduce income disparities. Social justice can provide many benefits in connecting carbon pricing to non-environmental concerns, spurring popular demand that can help build sustainable political support and the benefits including expanding pursuers of the reduction goal, improving technological and policy solutions, increasing the chances for lowering the abatement burden, and enhancing information quality.

Moreover, public support is essential as political economy causes can contribute to weakening carbon pricing policies due to distributive concerns. Introducing social justice provisions into carbon pricing can greatly increase the potential for positive politics, not only by mobilizing and expanding the social groups that explicitly support these policies, but also by providing clearer and broader strategies for defending the policies against political threats. Despite the general principles, after reviewing findings from surveys, experimental studies, and field studies, demand for carbon pricing has been too weak or alternatively has been very elastic with respect to the existence of social justice provisions. There are many factors that may support demand for carbon pricing and they also condition the effectiveness of different framing strategies. First, expectations about the effectiveness of carbon pricing in producing emissions reductions are critical for public support. Recent research evocative of the potential collateral benefits from the deployment of clean technology and its contributions with probability of increasing the effectiveness of carbon pricing in terms of emissions reductions constitutes a reason for optimism with respect to the existence of public demand for carbon pricing, even without a specific emphasis on equity and distributional impacts.

A carbon price is often criticized not only due to its distributive impacts, but also because it is not¹ perceived as effective in promoting real emission reductions. There is also substantial evidence that citizens link domestic emissions reductions with international climate efforts². These are important bases for the empirical estimates which assume all the other factors have been held constant, thereby avoiding the shortcoming of single-interpretation findings. Second, fairness concerns can also be raised to promote the introduction of stronger regulatory alternatives for front-loaded policies, such as physical supply caps, with the result of policies like cap and trade. A specifically designed regulation can alleviate anti-regulatory sentiments and minimize the political resistance to establish emissions reduction mechanisms while maintaining the level of support. Finally, available evidence suggests that fairness concerns are not static. The mainstream public is generally weakly committed to actively pursue egalitarian values; yet during the actual time of decision-making in the collective action dilemmas, those values can be activated, often with the result of weakening demand for collective action to allay climate change. The public does not react to pure self-interest incentives.

9. Technological Innovation and Carbon Reduction

Technological innovation helps in the genesis of new and expanding environmentally friendly emerging technologies. Through learning and discovery processes and organizational change, it enables existing and transitional technologies to become more carbon efficient. Putting a price on the externalities helps to shift the composition of the overall basket of goods and services that we produce and consume, but leaves the sectoral volumes unchanged. Technological innovation helps to achieve the complementary goal by exploiting the potential of sectoral volume changes: they help us to decouple the increase in volume of the goods and services we want or need from the need to reduce the overall

¹ Martin, R, L B D Preux and U J Wagner (2014), "The impact of a carbon tax on manufacturing: Evidence from microdata", *Journal of Public Economics* 117: 1–14.

² Mildemberger, M., Lachapelle, E., Harrison, K. & Stadelmann-Steffen, I. Limited impacts of carbon tax rebate programmes on public support for carbon pricing. *Nat. Clim. Change* 12, 141–147 (2022).

adverse environmental impact associated with the extraction, transformation, distribution, and use of primary resources, ecosystem deterioration, and the waste generated through the use of those same technological artifacts while boosting economic growth.¹ In short, technological innovation should be seen as a tool of economic structural change that contributes to moving the economy into a new 'green equilibrium' while promoting smart, sustained, and inclusive growth. Reaping the full benefit, however, from the environmental and dynamic effects of carbon-pricing schemes can be challenging. Indeed, compared with output price changes, environmental taxes are relatively limited as a signal that helps guide investment choices and the adoption of best available technologies, and signals affect predominantly competitive product markets. Consumer preferences are another important factor driving innovation, especially if the carbon price is not high relative to the cost of adopting new technologies. Finally, whereas carbon prices may lead to generalized incentives that raise the productivity of the economy if they finance public goods, or trigger negative welfare effects if they finance turbulent trends within the economy, such as protectionism and energy security concerns.

Subtopics 9.1 The Schumpeterian Perspective on Firm Reaction 9.2 Environmental Taxation and Technological Change 9.3 Technological Change and Economic Structural Change Long Term Growth and Technological Change to the Service of Social Welfare 9.4 Recursive Dynamics 9.5 Environmental and Technological Micromodeling 9.6 Conclusion on the Role of Technological Innovation

9.1. Renewable Energy Solutions

In the context of social justice, renewable energy solutions hold out the promise of the lowest social costs and the highest degree of environmental equity in alleviating the dominance of fossil-based fuels in delivering electricity services. In an economy's electricity market, social costs are defined as the total direct costs and noxious external

¹ Cheng K (2009) Urbanization, technological innovation and economic growth——An empirical study based on the mediating effect of innovation. Stat Res 26(5):40–46 (in Chinese)

effects, less the health and social protection savings and employment multipliers. To the degree that pressures for poverty exclusion are kept to a minimum, the resulting ranges of lowest social cost or least cost solutions in the economy's electricity market add up to the total market demand. Hence, the least-cost solutions are also the most politically sustainable, highest-utility additions in the range of available environmentally efficient electricity supply solutions.¹ From this perspective, the initial equilibrium share of renewable sources in a country's future electricity mix would equal the end-use consumption share of renewable sources in the country's total primary energy mix. This would also mean that the final share of electricity generated by wind and solar-based renewable sources would have to be about six times the level in the mix.

10. Legal and Regulatory Frameworks

The enhanced guidelines describe the importance of measuring activities that either reduce or increase greenhouse gas emissions in creating a standard protocol for the ex-post baseline application. For a standard protocol, the following criteria are to be added for establishing baselines and monitoring the emission reductions. The calculus must transfer values or shadow prices that estimate the cost of maintaining an eco-friendly activity. These could be prices for carbon sequestration, carbon assimilation, or emission-generating activity. Such prices will lead to the correct distribution of benefits depending on whether the calculation favors activities that reduce emissions or penalizes those that generate emissions. The calculus should identify where such activities take place so that the resulting benefits can be distributed among the source, sink, or reservoir entities equitably and that they receive fair compensation. The first amendment has implications. The amended calculus makes it possible to quantify what equitable compensation means fairly and legitimately. This can be derived from cost allocation. Payments should be based on fairness to ensure that nations, countries, or consolidated regions can assume their

¹ Cheng L, Zhu J, Abraham J, Trenberth K, Fasullo J, Zhang B, Yu F, Wan L, Chen X, Song X (2019) 2018 continues record global ocean warming. *Sci Press* 36:249–252

adaptation and mitigation obligations. They must be able to help each individual and community in both developed and least developed countries.¹ Moreover, the calculus assures that anyone directly or indirectly involved in eco-friendly activities can derive benefits. These principles allow the application of an economic solution reapportioning compensation in order to find a fair value for intangible assets of the private sector.

10.1. International Agreements and Compliance

This chapter has examined the mismatch between the design and nature of the entire carbon pricing agendas, which have concentrated solely on economically optimal policies, with the social justice required for the implementation of carbon pricing. It has looked at some of those who are excluded from participating as a result of these mismatches and examined the consequences for those left behind. It has then explored difficulties presented by additional features of individual policies through the use of a case study of two proposed policies. The chapter concludes that carbon pricing mechanisms and policies will be more consistently sustainable in the context of international agreements if they are designed to include some provisions that can enhance social justice objectives in the structuring of their policies. Only by better balancing the interests of the economic, environmental, and social justice policy communities can such an outcome be achieved.

11. Corporate Social Responsibility

Corporate social responsibility (CSR) emerged as a popular business concept in the second half of the 20th century and has been a priority for corporate managers and investors. It reflects the social commitment and responsibility shown by the owners of a corporation towards different areas relevant to the production system. These responsibilities are expansive and benefit companies for the well-being of their environment, customers, employees, suppliers, and society in general because it indirectly implies the good

¹ Du K, Li P, Yan Z (2019) Do green technology innovations contribute to carbon dioxide emission reduction? Empirical evidence from patent data. *Technol Forecasting Soc Change* 146:297-303

reputation of a company and the loyalty of its clients or suppliers, which leads to business success. As part of the social commitment and responsibilities of investors, they have the ability and willingness to take risks, solve problems, create opportunities, and take generally favorable market positions. This standing has environmental, social, and ethical dimensions. The management of investors' social responsibility is related to the strategies of social actions, which indicate whether a company provides commercial opportunities; they need to dare to undertake it because the benefits of belonging to the organization are related to the high quality of life of the community they serve¹. The implementation of the strategies of business social responsibility is long-term, meaning not only improvements in the company's image but also providing solutions to the social problems of the community. A good community development manual can make a significant contribution to the success and long-term sustainability of a community.



<https://www.researchgate.net/figure/Corporate-Social-Responsibility>

For companies to be linked to society and be ethical, they have to invest in environmental and social projects; they must maximize the ethical benefits of the company's actions and products. In return, society will give the company its support, and consumers will feel positive about buying and using the company's products. Faced with the corrupt practices that many companies have been exposed to, this situation leads to little

¹ Post J., L. Preston, S. Sachs 2002 Managing the Extended Enterprise: The New Stakeholder View. California Management Review 45: 6-28

confidence in the products and poor commercial success. The investor will not place an order in the company or the shareholders. Companies that are part of the socially responsible initiative have an interest in meeting the standards regarding ethics, social values, and the reduction of social and environmental impacts. Corporate social responsibility is considered a reflection of social action and social value, which companies contribute to society. Companies that apply corporate social responsibility policies are more successful in achieving the economic success of the organization while at the same time achieving other social objectives such as the welfare of society, the welfare of workers, and the welfare of suppliers¹.

11.1. Business Strategies for Carbon Neutrality

A company's internal sustainability goals, operations, and processes will define its carbon neutrality goals. After activities are measured and reduced and some emissions are offset, however, most entities will find themselves with some remaining emissions. In these cases, the purchase of carbon allowances under a cap-and-trade program at the corresponding amount of emissions could be used complementarily to offset other reductions and prevent the emission of additional CO₂ from high-emitting sources, such as cement production or oil refining. Electric utilities with high renewable energy goals will likely not be able to simultaneously eliminate their electricity-related emissions to reach 100% carbon neutrality and use offsetting to protect the allowance market². In contrast, a well-publicized transportation company absorbed easy reductions, offset high-emitting sources, and protected the need for additional allowance sales by going carbon neutral.

In the wake of climate change and pressure from various stakeholders to voluntarily reduce emissions, a number of companies have publicly pledged to become net-zero. Throughout this chapter, the analysis has tried not to limit itself to only a few carbon

¹ Ruf B., K. Muralidhar, R. Brown, J. Janney, K. Paul 2001 An Empirical Investigation of the Relationship between Change in Corporate Social Performance and Financial Performance: A Stakeholder Theory Perspective. *Journal of Business Ethics* 32: 143–156

² K. Du et al. Sources of the potential CO₂ emission reduction in China: a nonparametric metafrontier approach *Appl. Energy* (2014)

pricing mechanisms. However, an important section in the text addresses the difficulties of differentiating the quality of different offset credits. These and other challenges that have been examined do not preclude spending variable capital on voluntary offset projects that provide additional quality benefits; however, companies should seek eligible and high-quality offsets when considering becoming carbon neutral, even though using electronic allowances will restrict the benefits of well-validated offset projects. The decision between purchasing allowances and purchasing offsets can be just as important to the ultimate carbon prices in the various markets as the choice between one compliance option or the other.

12. The Role of Non-Governmental Organizations

Non-governmental organizations (NGOs) such as business and environmental organizations also advocate for policies and programs related to climate change, including carbon pricing. Some business organizations argue for the preservation of business competitiveness, while the current economic systems rely on fossil fuel consumption. Otherwise, the business organizations demand that their taxes be lessened or rebated in terms of integrating carbon pricing into the principles of reducing emissions¹. To be a global leader in driving low-carbon investments, environmental organizations demand significantly stringent regulations, and such constraints can generate incentives for private investors, ultimately saving carbon pricing revenues and allocating those amounts to carbon pricing with related carbon abatement objectives. The interests of business organizations sometimes diverge from one another, but a carbon price is encouraged by groups that see a negative impact on the economy or who are otherwise negatively influenced by increasing energy prices.

The structure supports a social justice perspective that affects the economy as the financial burden is distributed between groups and individuals as part of the social contract.

¹ opt,cit p24

By safeguarding against adversities, social justice values can also justify policies, and those who feel the burden are affixed accordingly. For successful implementation of policies, social justice thinking can be applied as the scope of carbon price policy design is valued by the design of the policy¹. Awareness of the role of social justice helps to provide the necessary support needed to enhance public acceptance and address political barriers. Higher degrees of policy acceptance could be granted by a fair approach to carbon price policy design, which could enable economic efficiency and successful mitigation of greenhouse gases.

12.1. Advocacy and Awareness Campaigns

It is important to conduct extensive advocacy to gain public acceptance, build support for, and raise awareness of the equitable design of policies and measures, especially carbon pricing for climate change. This can be achieved through structured information dissemination, awareness campaigns, and broad stakeholder participation. Advocacy efforts should include outreach activities to the mass public to increase the level of understanding of the role of social justice in carbon pricing. Broader awareness is essential because there may be public perception that carbon pricing would reduce purchasing power and living standards.

The taxes collected from carbon pricing should be redistributed effectively and efficiently to reduce negative economic impacts, support low-income households, create green jobs, and ensure rapid decarbonization with affordable low-carbon technologies. The costs of pricing carbon, particularly for the poorest in society, should be taken into account. The equity of a tax should neutralize unjust impacts and protect those who are least able to adapt smoothly to rising prices. The financing of their green transitions is equally important, as these measures will prevent them from being trapped in the vicious cycle of

¹ Clark D: The Project on Death in America: Twenty Years On. End of Life Studies. www.endoflifestudies.academicblogs.co.uk/the-project-on-death-in-america-twenty-years-on 2016. (last accessed September20, 2016)

poverty. With respect to distributional effects, and in particular the design of feedback mechanisms for taxation, mitigation policies could acquire popular support and enhance political acceptance.

13. Ethical Considerations in Environmental Policy

The ethical implications of responding to climate change are inescapable. It is a global challenge, thrust upon us by the actions of the largest global economic powers, that requires the involvement of all the countries in the world to engage in the search for a solution. Severe adverse consequences to the quality of life of many of the poorest and least responsible are already occurring and are expected to enlarge and spread over the globe. Most moral schemas suggest an imperative to take action now to reduce the risk of catastrophic global changes. National and international economic policies can amplify or reduce the influence of moral considerations on the generation and impacts of policies designed to address the challenge of climate change.

Carbon pricing is a precondition for the correction of capitalism to contribute to eliminating or reducing the risk of catastrophic global change. Ethical concerns suggest that the tax instrument is the appropriate pricing method. With it, we treat our nations' activities in response to the climate change charges as minor events. ¹Our penal systems ignore petty theft in a host of ways. We can value sentimental things that are not for sale, such as human lives, with some ease when it comes to considering climate change mitigation policies designed to reduce the future risk of business as usual. The scientific evidence regarding the risks of multiple catastrophic tipping points of significant harm to society is already compelling. Why not have our tax system bear sustainable juridical witness to the ethical considerations raised by this compelling case?

¹ Palliative Care Public Awareness: The Palliative Hub. www.thepalliativehub.com/public-awareness 2017. (last accessed June 3, 2017)

13.1. Fairness and Distributional Justice

The topic of justice and fairness in climate change policies is one that has already received a great deal of attention. Concerns about fairness and social equity regarding climate change measures are of a more general nature and additionally cover the decision-making procedures applied in adopting the policies. No wonder that common but differentiated responsibilities and respective capabilities, the North-South divide, liability, and compensation have mostly been expressed as traditional issues requiring solutions. Despite all these important issues, we argue that the fairness issues in sharing the burden should ideally be addressed in a national context rather than on the international scale. Allocating the burden on the basis of ability to pay or capacity to implement results in leaving the fairness issues aside and concentrating more on a gradual cost-effective transition towards the long-term goal of having a low-carbon society.

Distributional justice, i.e., rights, liberty, opportunity, income, wealth, and the like are fairly important notions in the societal fabric. They also cover the distribution of goods on top of justice. Policymaking in market economies has always collided with redistribution issues in a societal space. There is a continuation in the discussion about social justice in real markets until the end of the last millennium, where the majority of the publications are dated. The more recent publications, specifically in this millennium, mostly address the problem of which type of social welfare functions to apply when evaluating climate change-related policies¹. The tough issue is that some disagree with the very same Pareto-improving schemes as the Kyoto-like protocols.

14. Gender and Social Equity in Climate Action

Gender equity is fundamental to just societies. Equity between women and men has progressed slowly and unevenly in diversified economies, both advanced and developing countries. Gender and social equity are often left behind or not taken into account with

¹ .Speak Up: Speak Up Parlons en. www.advancecareplanning.ca 2017. (last accessed September20, 2016)

ambitious and rapid climate action, including when implementing carbon pricing policies to reduce emissions. This chapter provides mental models of gender and social equity with diverse community-based drawings, highlighting responsive energy markets to ensure just outcomes for vulnerable households. Social justice principles are embedded in other regional and country case studies underpinning gender-responsive climate pricing, focusing on transportation infrastructure and just transition in view of a fossil fuel phase-out plan¹. Analysis results are summarized and suggest that carbon pricing policies are beneficial when considering equity dimensions; a great deal can be done within them to address some of the complementary policies necessary to enhance and create synergies with social equity and public acceptance.



<https://www.mdpi.com>

2. Introduction: Social and Gender Dimensions of Carbon Pricing

Carbon pricing can play a powerful role in the decarbonization of the transport sector, building on the experience from other sectors, including the power sector. In order for carbon pricing to be effective, it is essential to consider the equity impacts. Pricing can affect decision-making processes; it should be carefully designed and implemented to minimize adverse distributional consequences. Mandatory cap and trade or taxation policy options are the main types of carbon pricing instruments that have been applied, including

¹ Maher AC, Lewis KL, Ferrar K, et al. : Are health behavior change interventions that use online social networks effective? A systematic review. J Med Internet Res 2014;16:1–13

base and adjust or carbon tax and rebate. Coastal entrenched documents complement revenue recycling and equity considerations, including the topics of social justice and gender. The report presents results from multiple regional analyses, gender responses, and the economic functioning of transportation analysis and policy responses to the framing of equity concerns within their unique country contexts.

The findings are based on assessments of and experiences with carbon pricing policies carried out in various regions. Each region is characterized by unique socio-economic contexts and levels that include gender analysis. The analysis provides insights into the potential for distributional effects and relevant mechanisms that can shape equity outcomes. The report highlights the connections between transportation carbon pricing research and the ongoing agenda to advance a constructive policy discussion¹. The findings presented in this document are based on cross-policy interactions regarding desirability and design options to ensure carbon pricing parity between men and women. The program of ongoing research and capacity building in social equity and gender response is built on an integrated policy agenda for pricing the up-front capabilities of the region in their policy discussions by linking local transportation reflection processes and broader policy objectives in the context of individual actions related to climate, including political economy.

14.1. Intersectional Approaches

Tax systems that are complementary to carbon pricing schemes have become a major discussion point in the policy literature. These discussions tend to focus on one of two main aspects of the issues of tax and cap-and-trade reforms, either the environmental objectives or the broad economic and fiscal policy objectives. There has been a limited assessment of social justice in conjunction with environmental justice, both at the theoretical and

¹ Grilli R, Freemantle N, Minozzi S, et al. : Mass media interventions: Effects on health services utilisation. Cochrane Database Syst Rev 2002:CD000389

empirical level. In the justice context, the body of questions regarding the distributive effects of tax and cap-and-trade reforms on different income groups and demographic characteristics is not well developed. Intersectionality holds that the unification and cross-application of this field with the study of environmental justice have enormous potential for both. In the past, it was the strength of environmental justice that made scholars of gender, race, and class relations hesitant to incorporate into their analyses a greater understanding of toxic and other hazards. Simultaneously, gender, racial, and class analyses have always engendered an approximate concern for the natural environment, especially as it relates to economic exploitation¹. Those who lead studies of marginalized communities mostly maintain that because the three aforementioned groups are defined by being interconnected, opposition to the oppression faced by some groups is difficult when focused solely on racism, sexism, classism, and heterosexism.

15. Educational Initiatives and Capacity Building

Those countries and subnational jurisdictions that have chosen to implement carbon pricing policies have an obligation to help industry, workers, and communities affected during the transition to a low-carbon economy, ensure that the benefits are equitably distributed, and assist those who will struggle with rising energy or transportation costs to participate in that new economy. Business, workers, and environmental organizations must also be part of the policymaking process. The strength of a jurisdiction's carbon pricing policy requires businesses and envisions such programs as interventions that

¹ Granger D, Vandelanotte C, Duncan MJ, et al. : Is preference for mHealth intervention delivery platform associated with delivery platform familiarity? BMC Public Health 2016;16:1–7

Successful Capacity Building Initiatives



<https://fastercapital.com/topics/capacity-building-and-technical-assistance.html>

will not only advance each jurisdiction's goals and obligations to reduce emissions but also enhance global progress. They have also set policies to apply a portion of the revenue derived from these differing efforts to assist in the transition for those affected, to promote clean energy and transportation solutions, and to lessen the impact on consumers.

Many low-income families spend a higher portion of their incomes on energy than their higher-income neighbors. Such inequality raises issues of social justice and equity. In addition, consumer groups are often very vocal about any increased costs for electricity, heat, or transportation imposed by carbon pricing policies. In both the United States and Canada, a number of provinces and states that have committed to pricing carbon in some way have placated consumer advocates with provisions that will direct some of the revenue from pricing to households. This case considers several such programs and their implications. It also discusses the progress made under such programs and the lessons that can be drawn from initial experiences as new programs are developed and as older programs are reviewed and adjusted. Finally, it provides suggestions for the development and implementation of such programs based on the existing and anticipated experience.

15.1. Empowering Communities

This section is closely related to the broader discussion of equitable policy design. Indeed, the unique administrative, governance, and spatial features of different jurisdictions are important in constructing well-functioning cap-and-trade systems. Successful

negotiation of programs and facilities that benefit and distribute value to communities can improve the politics of climate policy. Overcoming potential rifts between environmental and business interests in the workforce and public more generally is important if climate programs are to function peacefully. Environmental justice elements could help conjure the needed legitimacy of systems functioning as intended. In the case of Canada, this would imply federal systems inferring value directly from public lands in favor of community-based land trusts or local agencies.

How one tackles empowering communities through cap-and-trade systems is complex and somewhat perplexing. The argument here is simple: one seeks to empower communities through earnest negotiations culminating in workable agreements benefiting all concerned and, in return, building on such negotiations to develop environmental markets. Theories of ideology associated with environmental programs are generally not effective. While in no way favored by community-based strategies, impact fees to restore ecosystems to their natural state could be constructed to fund environmental markets. They could ensure greater equity across environmental jurisdictional and property boundaries. Simply put, implementation cost assessment through cap intent favored by the often proposed baseline credit system requires a fairly restrictive interpretation of the five elements featuring accounting and system boundaries and environmental services. Measurements that cannot be defensible under present state or federal systems, including those of Canada, and their natural resource accounting could eliminate activities potentially authorized by the science-based policy¹.

16. Measuring Impact and Effectiveness

As a subnational government in the United States, California has taken on a very ambitious policy to address the intersection of climate and social justice. From inception,

¹ Akiyama M, Hirai K, Takebayashi T, et al. : The effects of community-wide dissemination of information on perceptions of palliative care, knowledge about opioids, and sense of security among cancer patients, their families, and the general public. *Support Care Cancer* 2016;24:347-356

California's AB32 legislation has included a complementary regulatory cap rule with a highly inclusive set of carbon pricing mechanisms. Cap-and-trade has evolved to be an important tool for compliance with AB32. California's linkage with Quebec in 2013 extended its cap-and-trade to a linked cap-and-trade system. The California Assembly allocated 25% of its cap-and-trade auction proceeds to disadvantaged communities, and over \$1 billion has been distributed to such neighborhoods from 2013 to 2016.

To measure the impact, we use the synthetic control method. The state of California is compared to a synthetic control group that is a weighted average of the performance of all other states, with weights chosen to match California's pre-program emissions. The weights may vary by California's regions. To measure the effectiveness, we use a difference-in-difference approach. We compare the effect of the policy in qualifying ZIP codes with eligible income levels, called the treatment group, with those that didn't qualify, called the control group.

16.1. Metrics and Evaluation Methods

For a nation-state to go to the effort to put a carbon pricing scheme in place, the public needs to be assured that a host of potential positive impacts will occur as a result. Environmental, economic, and social justice benefits must be achieved prior to a populace engaging in a higher carbon pricing tax that results in significant mass personal disutility. The current arithmetical and statistical basis to evaluate the economic, environmental, and social justice balances that current and potential carbon pricing methodologies deliver is limited. Without the ability to clearly describe what has worked and to identify alternatives that could or should be explored, public support for and further development of carbon pricing will continue to be of limited acceptance. To enable a richer discussion, comparisons with existing methods of defining tax rates and benefits in areas analogous to carbon pricing are necessary¹. This paper seeks to provide a first step in thinking about

¹ Molina EH, Flores SL: WA29 "we are all one" compassionate cities "a global community joined for care." *BMJ Support Palliat Care* 2015;5(Suppl 1):A9

these alternative methods to balance the environment with the economy while considering and addressing social justice.

17. Future Trends and Emerging Issues

The expected long-term trend is a worldwide growth in the importance of sustainability, being driven by the best practices of the world's companies, influenced by their corporate values and economic interests. Some other emerging issues that are expected to have important implications for future research on carbon pricing include the following: issues relating to the interaction of carbon costs with other policy and general economic factors; issues relating to energy prices and carbon constraints; the allocation of uncertainty in this political economy setting, and the implications of doubt concerning the models and other economics that underpin the case for urgent action on climate change; increasing international coordination toward incorporating ideas of good governance into domestic economic policies; and pursuing globally consistent post-2012 or non-Kyoto regional policy arrangements.

In the context of policies for mitigating climate change, where the scientific consensus is that significant reductions in the use of fossil fuels are required to contain future levels of atmospheric carbon dioxide, one approach that is favored, among others, is the internalization of the costs of future carbon emissions¹. This involves an agreeable way for pricing carbon emissions as a means of reducing consumption of energy associated with carbon emissions and leads to capping future emissions at a level consistent with meeting the reduction targets established under international agreements.

¹ Mills J, Rosenberg JP, McInerney F: Building community capacity for end of life: An investigation of community capacity and its implications for health-promoting palliative care in the Australian Capital Territory. *Crit Public Health* 2015;25:218–23

17.1. Innovations in Climate Finance

Any successful policy framework to address climate change will require substantial increased investments in the global transition to a climate-resilient economy. Here are some of the proposed innovations in climate finance.



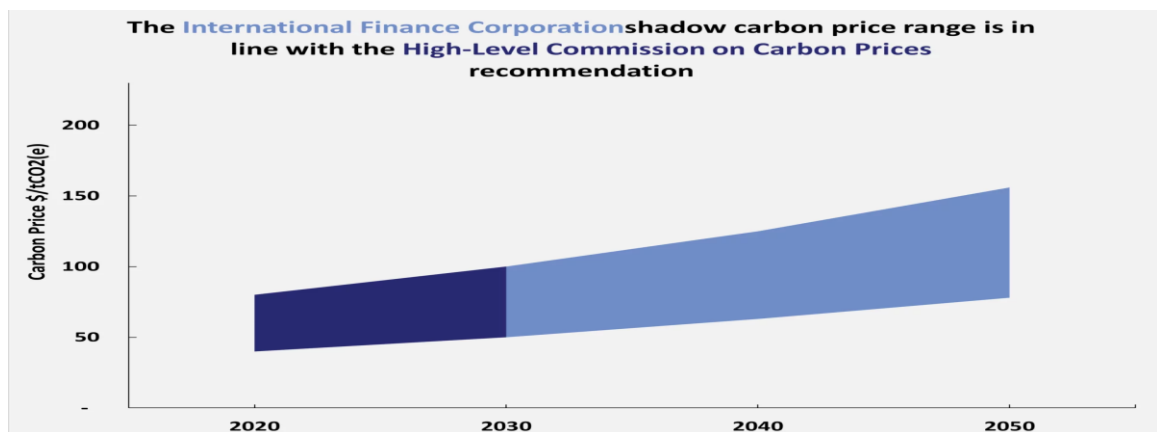
<https://medium.com/@writerj/innovations-in-climate-finance>

Bond issues for funding the redevelopment of climate-friendly infrastructures. The belief is that there is pent-up demand among listless pension funds. The bonds would be backed by revenue generated by the infrastructure project. New funding for repairing and rebuilding climate-friendly infrastructure will gain urgency as more climate-related disasters occur and will at the same time necessitate improved climate resiliency in the rebuilding process.

Proposed Carbon Green Development Mechanism. The concept of a carbon green development mechanism to subtract emissions embedded in trade. This would offset the additional costs that would be borne by those countries that adopted truly effective climate policies and that, as a consequence, possibly incurred some trade disadvantages in the process. The mechanism would be a reward for cutting carbon through a refund of a small

part of the tax revenues raised in the importing country¹. The distribution of this fund would emphasize hard-hit poorer countries and producers likely to be vulnerable.

Proposed Principles for a Control Mechanism Applicable to Imports from the Carbon Leakage to Third Countries. During the first phase of the system, the majority of the price signal was estimated to be covered in overcoming the free allocation of allowances because of carbon leakage, mainly in the power sector. The major influence of the price shift on the electricity system has moved debate on free allowances beyond those industries exposed to international competition to the power sector, and pointed to an aberration that allows generators to pass on costs supposedly incurred more than reasonably as free allowances to their customers. This question is also indirectly asked by hitherto subdued voices in favor of a tax-based system framed within a uniform replacement carbon price across all sectors aiming to minimize windfall effects. In that case, whether the carbon price is produced directly through a system or indirectly as a floor through a tax, the question remains on how to deal with imports of electricity as the single market attracts competition by reason of carbon leakage.



<https://www.e3g.org/bank-metrics/shadow-carbon-pricing-ifc/>

¹ Dempers C, Gott M: Which public health approach to palliative care? An integrative literature review. Prog Palliat Care 2016:1-1

18. Conclusion

The elegance and simplicity of a carbon price are lost if it fails to achieve its primary goal. It must achieve a meaningful reduction in emissions, not just raise revenues. Social justice is a key component of the conditions necessary for the acceptance of carbon pricing policies. The need is particularly critical in the United States, which has rejected an array of existing policies and lacks key regulations that would provide assurances about the effectiveness of carbon pricing. To address the negative economic impacts of a carbon price, a portion of the funds can be rebated to consumers. The difficulties of crafting such rebates suggest that two readily available alternative options are more attractive. A policy that provides a larger percentage of emissions permits to low-income households than they would have to spend on energy can reduce their energy costs and make the policy overall income-progressive. A significant geographic distribution helps politically, while spending the penalty revenue in areas more affected seems appropriate for justice. Three other options are more politically feasible. Targeting supplementary assistance to citizens who need more aid while phasing out existing energy subsidies would be a coherent policy combination. Similarly, to minimize costs and improve the overall effectiveness of the policy, using penalty funds to support other policy instruments can make it income-redistributive for the economy. The most effective way to address the issue happens to combine the best elements from both perspectives, as the best policy is also an effective

way to maximize the political viability of a carbon price. In the near term, relying solely on such policies might be the best way to move forward with pricing carbon.

18.1. Key Findings and Recommendations

Key Findings: 1. A key issue in the implementation of carbon pricing systems, both carbon tax and cap-and-trade, is the adjustment burden placed on poor and vulnerable households and businesses. 2. A legal obligation to deliver social justice can shape the design of carbon pricing legislation and policy so that it ensures fairness and strongly contributes to climate change mitigation. 3. It is important to design carbon pricing policy with a focus on the balance between environmental and social justice objectives. This ensures the development of policy that is not only relevant in the country in which it is applied but also contributes to an increase in the transparency, legitimacy, accountability, and feasibility of the international mitigation effort to limit total carbon emissions.

Recommendations: 1. A framework that sets out the MRV of the climate change impacts of the carbon pricing system is needed prior to the introduction of carbon pricing legislation and policy. There is a need for strong and clear climate justice language in the design of carbon pollution pricing policy to ensure that the policy delivers fair and equitable outcomes and that it can be expected to reduce poverty and inequality in the long term. 2. The legislative provisions and policy design, the development process, the structure, and the objectives of carbon tax rates are designed to reflect the characteristics of a carbon tax that places a significant price signal on carbon release into the atmosphere while ensuring that distributions of rebates are structured to achieve greater social justice. A detailed MRV of climate impacts with a focus on the costs that carbon pollution places on the economic well-being and social welfare of residents at different income levels should be established to confirm that the carbon policy measure continues to achieve carbon pollution reductions and other climate change objectives.

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