Pathways to Stringent Carbon Pricing:

Configurations of Political Economy Conditions and Revenue Recycling Strategies

By

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Declaration

I, the undersigned, Dániel Muth, candidate for the degree of Doctor of Philosophy at Central European University's Doctoral School of Political Science, Public Policy and International Relations, declare herewith that the present dissertation is exclusively my own work, based on my research and includes only such external information as is properly credited in notes and in the bibliography. I declare that no unidentified or illegitimate use was made of the work of others, and no part of the dissertation infringes on any person's or institution's copyright. I also declare that no part of the dissertation has been submitted in this form to any other institution of higher education for an academic degree.

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Dedicated to my Grandparents and Children

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CEU is a special place to do a PhD. The university's institutional DNA fosters critical thinking, motivating all students to examine their own assumptions, engage in thought-provoking discussions, and reflect on the most profound questions of our time. This process inspires contributions from both students and faculty in their pursuit of answers and solutions. I am honored to be part of a community that strives for academic excellence and stands for the very values to which I am deeply committed. As a PhD candidate, I was allowed, by CEU, to develop my project at my own pace, and given the flexibility to take care of and spend precious time with my children, as well as to take part in various academic projects throughout these four years. All of these things greatly enriched my professional and personal development.

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Abstract

The landmark Paris Agreement was set forth in 2015 to keep global warming, with its dangerous consequences, well below two degrees. In order to achieve this strenuous target, greenhouse gas emissions need to be reduced drastically, on a global scale. There is general agreement among economists and climate policy practitioners that carbon pricing should play a central role in tackling climate change effectively. However, prevailing price levels, in most jurisdictions that have adopted carbon pricing policies, are considered too low to accelerate decarbonization or drive emissions down drastically. The difference between our current prices and the prices aspired to by the scientific community in order to keep the changing climate at a safe and tolerable level, produces the *carbon price gap*. This gap is largely caused by political economy constraints, especially the policies' negative distributional impact, which results in fierce resistance from the public and businesses to carbon pricing in general. In turn, this creates a political stalemate and keeps the carbon price levels too low, inhibiting these climate policies from exerting the positive environmental outcome they, in theory, are designed to deliver.

My claim is that this political impasse can be overcome, or successfully mitigated, by correctly and wisely utilizing a unique benefit from this climate policy – the proceeds it earns, in a process known as *revenue recycling*. Through various mechanisms, such as compensating adversely affected groups, and 'green' coalition-building financed by different revenue-recycling schemes, persistent political economy constraints can be alleviated to make carbon pricing politically more appealing to various socioeconomic groups. Enhanced acceptance, ultimately, can enable the implementation of more stringent policies. However, as countries differ in their socioeconomic environments, revenue recycling needs to adequately address the local political economy situation and hurdles. For this reason, a cross-case analysis is necessary to examine which revenue recycling strategies are effective in alleviating political economy constraints in various environments. These assumptions are then tested empirically through a multi-method research design.

The Introduction, Chapter 1, presents the context of the research, the main inquiry the dissertation aims to address, as well as the scientific and societal relevance of the project. Chapter 2 introduces carbon pricing theory, and puts forth the argument that a holistic approach, combining different strands of literature, including insights from classic political economy, and the recently-emerged field of ecological economics and political ecology, is better suited to assess climate policy effectiveness than neoclassical economic accounts. The delineated

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Theoretical Framework in Chapter 3 takes the novel approach of analyzing carbon pricing stringency through constellations of structural political economy conditions and various revenue recycling measures. Chapter 4 details the research design and applied methodologies to fulfill the research objectives. It demonstrates why fuzzy-set Qualitative Comparative Analysis (QCA) is an ideal method for the developed intersectional model. Additionally, this fourth chapter explains how the subsequent process tracing case study helps corroborate and refine the inferences based on QCA. The empirical chapters begin with Chapter 5, presenting the comparison of thirty national-level carbon pricing mechanisms. This is followed by an in-depth case study on the Irish carbon tax reform (Chapter 6), investigating how revenue recycling is causally linked to stringent policy outcome. The dissertation ends with Chapter 7, setting forth numerous, ready-to-implement policy directions, derived from both QCA analyses and case studies, as well as suggestions for future research.

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Data Availability Statement

The data that support the findings of this dissertation are available in figshare at https://figshare.com/s/318dfb108e8a24ee2b1c.

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Acronyms

°C = Celsius degree

CBDR = common but differentiated responsibilities

CCAC = Climate Change Advisory Council

CDM = Clean Development Mechanism

CI = Chambers Ireland

CO2 = carbon-dioxide

COP = Conference of Parties

CPLC = Carbon Pricing Leadership Coalition

CPM = carbon pricing mechanism

DCC = Dublin Chamber of Commerce

DICE = Dynamic Integrated Climate–Economy

DOF = Department of Finance

DPER = Department of Public Expenditure and Reform

EC = European Commission

ECP = emissions-weighted carbon price

EE = ecological economics

EII = energy intensive industries

ENGO = environmental non-governmental organization

EPA = Environmental Protection Agency

ERCS = emission-reduction-credit systems

ESA = enhanced standard analysis

ESRI = Economic and Social Research Institute

ETS = emissions trading system

EU ETS = European Union Emissions Trading System

FF = Fianna Fáil

FG = Fine Gael

fs/QCA = fuzzy-set Qualitative Comparative Analysis

GDP = Gross Domestic Product

GHG = greenhouse gases

GOI = Government of Ireland

GWP = Global Warming Potential

HCO = high compensation

HDE = high decarbonization efforts

HED = high economic development

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HS = high stringency

HSO = high social objectives

ICAP = International Carbon Action Partnership

ICTU = Irish Congress of Trade Unions

IEA = International Energy Agency

ILO = International Labour Organization

IMF = International Monetary Fund

IPCC = Intergovernmental Panel on Climate Change

IS = initial solution

JI = Joint Implementation LFD = low fossil fuel dependence

LII = low income inequality

mT = metric ton

NDC = Nationally Determined Contributions

NERI = Nevin Economic Research Institute

OECD = Organisation for Economic Co-operation and Development

PA = Paris Agreement

PBP = People Before Profit

PE = political economy

PEC = political ecology

PMR = Partnership for Market Readiness

R+D = research and development

RC = robust core

RGGI = Regional Greenhouse Gas Initiative

RT = robustness test

SF = Sinn Féin

SMMR = set-theoretic multi-method research

TD = Teachta Dála

TS = test set

TSG = Tax Strategy Group

UN = United Nations

UNDP = United Nations Development Programme

UNEP = United Nations Environment Programme

UNFCCC = United Nations Framework Convention on Climate Change

USD = United States Dollar

WRPD = World Risk Poll Data

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Chapter 1: Introduction[1]

Scientists tirelessly sound the alarm about the frightening future to which mankind is headed as a direct result of climate change (IPCC, 2023). To successfully cope with the massive climate challenge ahead, implementation of stringent emissions reduction measures must be understood as a global priority. Although there is a growing recognition of the problem, public support for such measures is limited and tends to diminish as the goals become more ambitious (e.g., Beiser-McGrath and Bernauer, 2019; Sommer, Mattauch and Pahle, 2022). The public's reluctance to embrace strict measures stems mainly from economic and political considerations (Bergquist et al., 2022; Carattini, Carvalho and Fankhauser, 2018). This dissertation is not to offer yet another unheeded warning, but to discuss a part of the solution, an important tool that must be better understood and more skillfully wielded.

This project answers the call of scholars and institutions to emphasize overcoming political economy hurdles in climate policies, to increase their environmental effectiveness (IMF, 2019; Jenkins, 2019; Klenert et al., 2018; Rabe, 2018; World Bank, 2017). My research focuses on carbon pricing mechanisms (CPMs), which have recently emerged as a key choice in climate policy, and have already been implemented in numerous jurisdictions and proliferated across the globe (World Bank, 2022). Carbon pricing theory suggests that crucially needed amendments to current production practices and consumption patterns could be enforced by imposing a fee on emissions. In the long term, the implementation of these changes could pave the way for decarbonized economies by incentivizing investments in low carbon technologies (Aldy & Stavins, 2012). However, carbon prices vary significantly across jurisdictions, and it is generally agreed that current prices of existing schemes fall below the level needed to spur technological advancements and keep the rise of global warming under two degrees, the number set forth in the Paris Agreement (World Bank, 2017). This mismatch between economic theory and political reality produces the *carbon price gap* (OECD, 2018).

A growing body of literature suggests that this gap can be attributed to persistent political economy hurdles (e.g., Dolphin, Pollitt & Newbery, 2020; Ervine, 2018; Jenkins & Karplus, 2017). Indeed, the (re)distribution impact of stringent carbon pricing policies can be substantial, a fact which ignites fierce opposition from energy-intensive industries, whose assets and market

[1] This chapter includes sections from the paper 'Pathways to stringent carbon pricing: Configurations of political economy conditions and revenue recycling strategies. A comparison of thirty national level policies', published in Ecological Economics, Volume 214 (2023), available at https://doi.org/10.1016/j.ecolecon.2023.107995.

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value are tied to the maintenance of favorable regulatory conditions, and whose leverage for redeployment of production capacities is very limited. Opposition will also come from households unwilling or unable to pay the perceived high cost of mitigating climate change (Jenkins, 2014). This unwillingness can significantly reduce the political space for adopting and perpetuating ambitious climate policies. However, these forces of resistance cannot explain the varying price levels across countries, nor can they answer the question, 'How did some countries successfully overcome these barriers and implement more stringent carbon pricing policies than other countries?'

My theoretical premise is that by changing the incentive structure around carbon pricing policies, by compensating negatively affected social groups (industries with high asset-specific, and low-income households), and by strengthening the political coalitions of direct beneficiaries (abatement technology firms, insurance companies, etc.), the political outcome of these policies can be altered, and more stringent policies implemented (Acemoglu & Robinson, 2013). Specifically, using the revenue generated by carbon pricing, a process also known as *revenue recycling*, can improve the public perception of a policy's fairness and environmental effectiveness. Revenue recycling can be accomplished through different compensatory mechanisms and decarbonization efforts, which, in the right combinations, might be the key to enhancing the political acceptability of these schemes (Carattini, Carvalho and Fankhauser, 2018). Ultimately, this would enable the adoption of stringent carbon pricing implementation. Following this line of reasoning, varying price levels might be explained by the ability of countries to put the distribution effects in the forefront of their policy design considerations, minimizing the negative and exploiting the positive distributional impacts. Nevertheless, contextual differences (e.g. dependence on fossil fuels in energy mix) and macro factors (such as economic development) play a role, because they require the prescription of disparate incentives, thus these two sets of factors will be jointly analyzed. These assumptions will be tested through cross-case analysis of existing national-level CPMs, employing the method of Qualitative Comparative Analysis (QCA), followed by an in-depth case study into the causal mechanisms linking revenue recycling measures to stringent policy outcome. All of which leads to my main research question:

How can we explain the varying levels of carbon prices of existing national-level carbon pricing mechanisms?

By assessing which constellation of structural conditions and revenue recycling measures produces more stringent CPMs in various contexts, we can identify key political intervention

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points. This can serve as essential information for policymakers, pointing out how these schemes can be designed to fulfill their environmental purposes and facilitate the emergence of a sustainable energy regime in a world where carbon pricing is ascendant.

1.1. Theory and Brief History of Carbon Pricing

Carbon pricing has long been lauded by environmental economists and major financial institutions for its potential to reduce greenhouse gas emissions in a cost-effective fashion (e.g., Aldy and Stavins, 2012; Boyce, 2018; IMF & OECD, 2021). Compared to command-and-control measures, such as environmental performance-based (e.g., vehicle emissions) and technology-based (flue gas control in coal power plants) standards, carbon pricing schemes can be implemented across every sector of the economy, including power generation, industries, and households, where, ideally, prices are set to reflect the social costs of emissions, and leave the decisions as to how to reduce carbon pollution up to the market participants. This can be achieved directly by reducing production output or energy consumption, or by nurturing new, low-carbon technologies. Therefore, by imposing a fee on emissions, the government is incentivizing economic agents to desist from polluting activities, which results in what is called a *static price effect*, and to invest in cleaner energy sources and low-carbon production capacities, which leads to a *dynamic price effect* (Aldy and Stavins, 2012). There are two major carbon pricing policies that explicitly price emissions: carbon taxes, and emissions trading system (ETS). Carbon tax is a form of pollution-tax levied on the carbon content of products and services. Carbon taxes typically cover different fuel types (e.g., coal, oil, or natural gas). Taxes can be charged 'upstream,' meaning at the place of extraction; or upon entering the domestic market, 'midstream' (electricity generators and distributors); or, it can be charged 'downstream,' in services and end-products (Aldy, 2017). In emissions trading systems, the maximum level of emissions is determined in a given jurisdiction, and reduced in each compliance period, thus safeguarding the environmental effectiveness of the scheme; and a market is created in order to trade with pollution permits auctioned or given freely to participants.

The emergence of emissions trading systems was fostered by the development of emission reduction regulation to improve air quality, and by the creation of the United States Environmental Protection Agency in 1970. The flexibility provided by these schemes was more appealing to private firms than alternative solutions, such as command and control regulation. These factors encouraged the gradual introduction of emissions pricing instruments (Coelho,

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2015). The first cap-and-trade scheme of the National Sulfur Dioxide Program in the US was introduced in 1990 to control acid rain by reducing urban smog. The perceived environmental effectiveness of the system, and the dominant neoliberal discourse at that time, facilitated the implementation of subsequent trading mechanisms (Lohmann, 2006). The policy received attention on an international stage at the Kyoto Protocol climate meetings, where the US lobbied for the inclusion of global emissions trading in the treaty as a credible tool to fight climate change. The proposal met with fierce opposition because developing countries feared the policy would not incentivize emissions reduction efforts in wealthy countries, thus could perpetuate economic imbalances. EU countries shared this concern, and, in addition, preferred command and control climate measures. However, the policy, as a flexible mechanism[2] to meet emissions targets, was included in the agreement in order to convince the U.S. to commit to the Protocol (Bryant, 2019), which the US eventually signed, but did not ratify (Byrd-Hagel Resolution). Nevertheless, the Agreement paved the way for policy experiments (e.g., EU emission trading system), implementation (Australia), and policy diffusion (Chinese pilot systems) (Skovgaard, Ferrari & Knaggård, 2019; Paterson et al., 2014).

The first groups to have adopted carbon taxes consisted mainly of European countries (notably, Nordic countries) (Skovgaard, Ferrari & Knaggård, 2019). Andersen (2019) examined the puzzle of why 'small' (in terms of their share of global GHG emissions) European countries exposed to international competition adopted carbon taxes. By carrying out detailed case studies, the author found that the main driver was their consensus-based (neo-corporatist) style of policy-making. This method enabled the introduction the carbon tax as part of a broader fiscal package, deemed necessary, as nearly 2/3 of these small countries experienced a financial crisis before policy adoption. After early experiments with the policy, the development of global carbon tax adoption followed a relatively linear path, which began with its implementation in developed countries (e.g., Switzerland in 2008, Japan in 2012, France in 2014), driven mainly by the increase in 'green votes' and rising public concern about climate change, multiplied by other local political economy factors, such as the fiscal deficit in Ireland caused by the Great Recession (Skovgaard, Ferrari, Knaggård, 2019). Since 2014, numerous developing countries have adopted carbon taxes, such as those in Latin-America (Mexico in 2014, Chile and Colombia in 2017) and South Africa (2019) (World Bank, 2021).

[2] Two flexibility mechanisms were introduced: the Clean Development Mechanism (CDM), and Joint Implementation (JI). CDM is discussed in greater detail in the following chapter.

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The most striking development, which has been unfolding since the historic Paris Agreement in 2015, is the spread of carbon pricing as a dominant policy instrument in the transnational policy-making arena, albeit comprising a great diversity of design elements between older systems and newer initiatives (Bose et al., 2019). This divergence can primarily be explained by jurisdictions' unique responses to domestic and local political challenges, such as the power of interest groups and the policy objectives of the jurisdiction, for instance reducing energy import dependence (Gulbrandsen et al., 2019). Interestingly, in terms of economic environment and political systems, we now observe a great diversity of countries and sub-national polities adopting CPMs, challenging prevailing views that CPM deployment is reserved for countries with advanced economies and strong democratic institutions (e.g., Dolphin, Pollitt and Newbery, 2020; Klenert et al., 2018). Canadian provinces, Chile, South-Africa and Kazakhstan are all among the newcomers to the group of countries adopting carbon pricing. Notably, China, in terms of covered GHGs, introduced the world's biggest national emission trading system in 2021.

Thisted and Thisted (2019) argue that the underlying mechanism behind this increased popularity is that the policy has entered into a more mature phase, during which there is no need to showcase policy success to convince policymakers about the merits of the solution, as the evidence (though subject to many narratives) is already abundant. Moreover, the scheme's apparent flexibility, economic advantages, potential to generate added profits for powerful stakeholders (such as carbon traders and investment banks), and its alignment with market-favored policies earned substantial attention from intergovernmental institutions, policymakers, and corporations around the globe (Paterson, 2012; Lane & Newell, 2016; Paterson et al., 2014). This increased attention is demonstrated by the numerous influential players who seized upon the landmark climate negotiation in Paris to actively promote CPMs, a measure that has since become a 'global norm,' to which countries are increasingly expected to conform (Thisted and Thisted, 2019). These narratives are underpinned by unanimous support from major international organizations; OECD, World Bank and IMF all promote CPMs. As a result, the Paris Accord served as a major impetus in pressuring countries to develop and achieve ambitions plans through the adoption of carbon pricing, thereby also encouraging widespread imitation.

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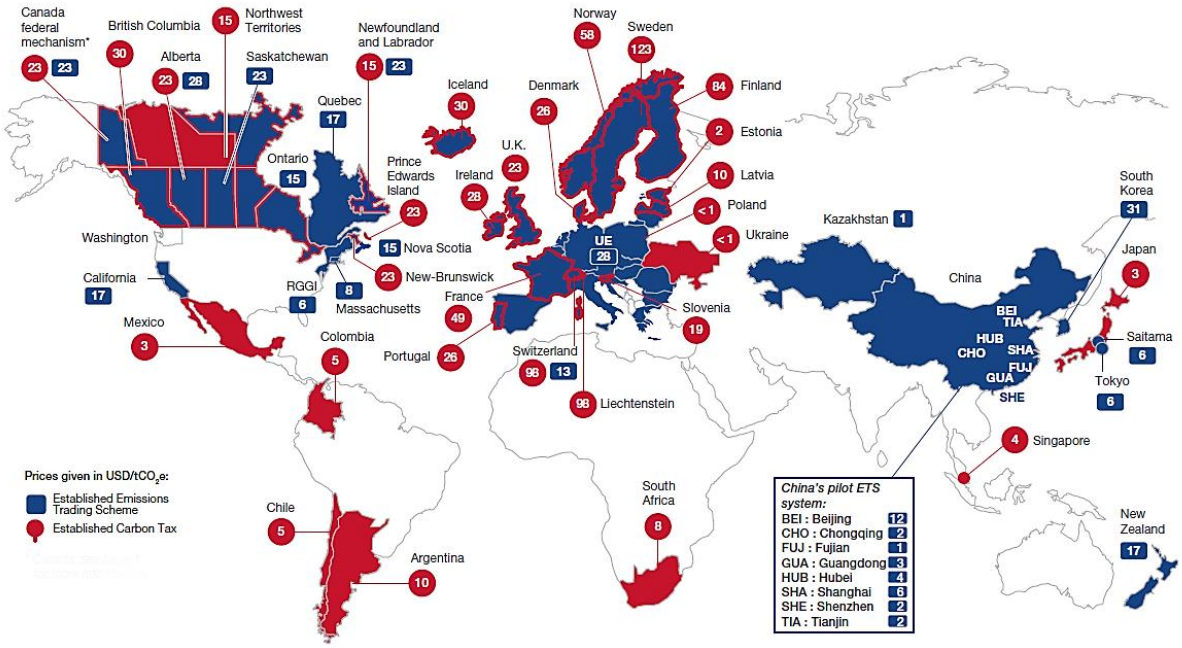
1.2. Problem Statement

1.2.1. The Question of Stringency – the Carbon Price Gap

The Paris Agreement, in which 195 countries expressed their joint commitment to fight against climate change and establish ambitious targets for keeping global warming below two degrees, has been hailed as a landmark in the history of international climate change regime (United Nations, 2020). In the perception of global communities, the Agreement reinforced the validity of carbon pricing as a key climate change mitigation tool (Article 6) for the purpose of reaching ambitious temperature targets. When we assess the global policy developments of carbon pricing, one crucial aspect should be directly addressed: what is the price level at which carbon pricing is effective?

Major institutions, such as World Bank (2017), OECD (2018), and IMF (2019), agree that a minimum price of approximately 40 dollars per one ton of CO_2 would be needed to be consistent with Paris Agreement temperature targets. They base their assessment on available evidence from multiple sources, such as analyzing domestic decarbonization roadmaps and integrated assessment models, ascertaining emissions development scenarios of different policy instruments and climate objectives. However, in practice, most schemes have a much lower price, as shown on the map below. This creates a carbon price gap, a difference between the price levels needed to keep global warming below 2 degrees—what is considered a safe and tolerable level of climatic change—and the stringency level of the currently implemented schemes (Boyce, 2018; OECD, 2018). What we also see is that the price levels vary significantly across countries and regions. This gap and these price-differences motivated me to research why some countries are more successful than others are in enforcing ambitious carbon pricing and to examine ways we can bridge the carbon price gap.

1. Figure - CPMs implemented around the world with price levels.



Note: reprinted from the Institute for Climate Economics (2020, p.4)

Price level is the most important component of carbon pricing, as it is the primary determinant of the environmental outcome of the policy. The higher the emissions prices are, the more incentive actors have to refrain from polluting activities and to invest in low-carbon technologies or change behavior. In this context, higher carbon prices induce a more rapid shift towards decarbonization. However, as Dolphin, Pollitt and Newbery (2020) show effectively, simply looking at the price level as a measurement of stringency is insufficient for numerous reasons. Economic sectors and fossil fuel types included in the policy (called '*coverage'* in the literature) are of nearly equal importance as the price level. This is the case, because the wider the coverage of the policy, the less distortion (among fuel types and sectors) develops in the economy and more sectors are compelled to engage in decarbonization efforts. One way of overcoming this challenge is to integrate the price level and coverage, in order to assess and compare CPM's stringency more objectively, an approach the OECD and other scholars propose (OECD, 2018; Dolphin, Pollitt & Newbery, 2020). A detailed discussion on how stringency—my key focus in this research—is understood and operationalized is provided in subsequent chapters on the proposed Theoretical Framework (Chapter 3, section 'Analytical Framework: Revenue Recycling Strategies in Different Political Economy Environments'), and Research Design (Chapter 4, section 'Measurement and Calibration').

1.2.2. Carbon Pricing: A Policy Paradox?

The 1997 Kyoto Protocol put carbon pricing on the front line to combat climate change, supported by prominent environmental economists, who praise the ability of CPMs to achieve emission reductions cost-effectively (Paterson et al., 2014). Since then, carbon markets and fossil fuel taxes have been implemented from local to supranational levels and have proliferated across the globe (World Bank, 2020). Nonetheless, real world experiences with the instruments pose questions about CPMs' environmental integrity and effectiveness, and hence, have drawn criticism from both academics and civil society (Bryant, 2019). The most often mentioned market imperfections and design element flaws include: (1) depressed and volatile price levels derived from political interventions and economic fluctuations, which undermine the environmental effectiveness of schemes and hinder investment in clean energy (Gilbertson & Reyes, 2009); (2) CPM schemes do not spur low carbon technologies (Patt & Lilliestam, 2018), but only switch to fuels with a lower carbon content (Ellerman, Convery & De Perthuis, 2010); (3) The complexity of emissions trading systems, which can render public, democratic control very difficult (Bryant, 2016a). Another problem with these types of policies is that they potentially perpetuate and widen existing economic inequalities among participants (Bryant, 2016b; Böhm & Dabhi, 2009).[3] These persistent challenges revolving around carbon pricing make the international community's strong commitment to this instrument in climate negotiations puzzling; hence Bryant (2019, p.1) calls this a 'Paradox in Paris.'

Undoubtedly, these problems have detrimental effects on policy efficacy. However, critical assessments cannot overlook the increasing number of positive cases in various jurisdictions, implementing environmentally stringent and socially more equitable carbon pricing policies (Klenert et al., 2018; Raymond, 2019). This demonstrates that effectiveness can be enhanced by improving on design elements and mitigating political economy hurdles (Rabe, 2018). Perhaps the most important of all developments is that carbon pricing has been able to drive emissions down despite its consistently low prices. Best, Burke and Jotzo (2020), in their large N study analyzing 142 countries over two decades, find evidence that jurisdictions deploying CPMs have an annual emissions growth rate of 2% lower than jurisdictions without. A positive correlation between emissions reduction and CPM deployment can be also drawn in single case

[3] There is also a vast amount of critical literature on issues associated with the operation of international carbon markets such as the speculation on tradable pollution permits, implementing dubious emissions reduction projects in developing countries, together with appalling human rights abuses, or taking advantage of inconsistent emissions accounting methods (e.g., Böhm & Dabhi., 2009; Solomon & Heiman, 2010, for more theoretical accounts, see: Lohmann, 2012; Böhm, Misoczky, & Moog, 2012). However, it is not discussed here in detail, as the focus of dissertation is on national-level policies.

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studies (see for example Andersson, 2019 synthetic control study in Sweden). Furthermore, it should be acknowledged that carbon pricing schemes are relatively new policies which are, therefore, in a constant state of evolution (Kaupa, 2019). In this respect, the EU ETS is a telling example, as its design elements have changed considerably since its inception. For instance, the system design removed a chunk of surplus allowances to stabilize price levels, and restricted the usage of international offset credits. However, certain structural challenges, such as the practice of providing free allowances to energy-intensive industries remain resistant to change (Bryant, 2019).

Additional factors working towards increased stringency have also been developing since the Paris Agreement. Firstly, jurisdictions may have a profusion of incentives to adopt carbon pricing despite facing collective action problems, or an absence of (binding) multilateral agreement. The introduction of carbon pricing mechanisms boosts governments' revenues, and accruing funds can be invested in climate-resilient public infrastructure or other positive projects, such as reducing tax-system distortions (Edenhofer et al., 2015, Jakob et al., 2016). Internalizing the social costs of climate change related externalities also produces various co-benefits (Parry, Veung, & Heine 2015). For instance, adding a levy on carbon improves air quality, which, in turn, has a direct economic and social impact in the form of reduced health care costs and, for example, improves cognitive performance in children (Pujol, Sunyer and Macía, 2016). Moreover, there is a link between carbon pricing and innovations in low carbon technologies in many jurisdictions, and fruitful policy interactions between CPMs and renewable energies deployments are not unknown (Hu, Cheng, & Qiu, 2020; Lim and Prakash, 2023). In addition, carbon pricing implementation fosters the spillover of available climate change mitigation technologies, thus helping to disseminate current best practices, which also reduces abatement costs (Dolphin and Pollitt, 2018). Lastly, promising developments have appeared on the horizon, as evidence and crucial information gather, indicating that carbon pricing introduction does not necessarily imply substantial costs for industries (Thisted and Thisted, 2019). Further, the anticipated problem of industries being forced to relocate due to the increasing price tag of ambitious climate policies (*carbon leakage*) has not been detected[4] (Bose, Bridges and DeFrancia, 2019). This kind of data can help governments to better assess the likely societal and political costs of the abatement policy, increasing the likelihood of adopting more ambitious environmental policies.

[4] Though this might be explained by the historically low carbon prices rendering outsourcing of production capacities financially unreasonable.

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In summary, whether carbon pricing will deliver on the promises of societal change and economic decarbonization, through incentivizing energy transitions towards cleaner sources, and amending production and consumption patterns—is yet to be seen. However, carbon pricing will definitely stay at the heart of international climate change regime in the Post-Paris era. Understanding the political dynamics behind the evolution of CPMs will shed light on the necessary conditions to foster more ambitious climate change mitigation-schemes.

1.3. Preview: Theoretical Framework

The theoretical point of departure of my analysis is that there are possible ways around the multiple political economy constraints that hamper carbon pricing mechanisms (CPMs). These limitations cripple policies and render them unable to achieve their full potential or the emissions path scenario envisaged by the Paris Agreement. Domestic and international climate change mitigation efforts show various paralyzing symptoms of collective action problems and principal-agent failures (Jenkins, 2019; Ostrom, 2010). Crucially, the (re)distribution impact of stringent carbon pricing policies can be substantial, a fact which ignites fierce opposition from energy-intensive industries whose assets and market value are tied to the maintenance of favorable regulatory conditions, and whose leverage in redeploying production capacities is very limited (Jenkins 2014). Firms that participate in international trade may find it increasingly challenging to remain cost competitive, both in domestic and international markets, where they must compete with firms selling goods with potentially higher, but unpriced, carbon content (Aldy and Pizer 2015; Steinebach, Fernández-i-Marín and Aschenbrenner, 2021). In a similar vein, environmentally effective carbon pricing entails considerable reductions in private welfare in the short term for households, due to the price increase of commodities. Since low-income households spend disproportionately more on energy and basic goods, carbon pricing effects tend to be regressive, and therefore contribute to increasing inequality and energy poverty in a society (Ohlendorf et al. 2021; Wang et al. 2016). Numerous studies show that this regressive effect is perceived as highly unfair by the public, which translates into a lower level of political acceptability and a higher level of opposition (Maestre-Andrés, Drews and van den Bergh, 2019). Lastly, public opposition to high costs is conjoined with a general skepticism about the environmental effectiveness of carbon pricing due to the inelastic demand for basic goods (e.g., motor and heating fuels) and the unaffordability of low carbon alternatives. This further erodes support for policy implementation (Carattini, Carvalho and Fankhauser, 2018).

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Essentially, identification of the conditions under which political considerations and economic principles may clash is crucial when policymakers are assessing various policy proposals to achieve greater welfare and avoid potential unintended consequences[5] (Acemoglu & Robertson, 2013). Regarding carbon pricing, the main challenge is how to eradicate climate change (representing market failure in terms of these policies), which hinges on maintaining a durable/lasting political equilibrium. Political equilibrium is broadly defined here as balance between political feasibility and the production of public good[6] under the prevalent political economy conditions, which encompass primarily the distributional impact of policies and the relative power of affected social groups (Acemoglu & Robertson, 2013). Theoretically, creating economic rents reaped by groups, who are in a position to push low-carbon energy transition (e.g., abatement firms) and compensation for other groups, such as covering the increased cost of living for low-income households, can help support an emerging equilibrium, making stringent policy innovation and reform politically feasible. Indeed, the fact that some CPMs have produced relatively high price levels (surpassing the level needed to achieve the Paris Agreement or even higher) (World Bank, 2020), without serious political backlash, would suggest that persistent political economy hurdles and other barriers (cognitive, organizational, etc.) can be overcome, or at least successfully managed. Recent works on the political economy of carbon pricing mechanisms also indicate that carefully crafted policy designs, which directly address the (re)distribution impact might be essential to producing environmentally more effective and socially more equitable policies (CPLC, 2020; Klenert et al., 2018). Therefore, I focus on distribution impact as the key facet in determining the outcome of a policy change, while exploring ways in which the political economy dynamics of these impacts can be altered (Jenkins, 2019).

Specifically, I focus on possible solution/answer to these negative distributional effects: the strategic use of revenue, which may be the key to unlatching the political gridlock of carbon pricing adoption and implementation, assuming that greater political support results in higher price levels (Beiser-McGrath and Bernauer, 2019; Maestre-Andrés, Drews and van den Bergh, 2019).

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[5] In carbon pricing, the first phase of the European emissions trading system provides a telling example. Here, the EU grandfathered (provided freely to avoid political resistance) excess pollution permits for European electricity generators which could be sold on the carbon market generating a huge 'windfall profit' for utility companies, caused exactly the opposite effect of that intended (Gilbertson & Reyes, 2009).

[6] In this case, safe climate through stringent carbon pricing. For a detailed discussion, see: Collective Action Problem below.

Carbon pricing is unique among other climate policies in that it generates substantial revenue for states. There are myriad paths to spending this revenue in economically, environmentally, and socially productive ways (Partnership for Market Readiness - PMR, 2019; Steenkamp 2021). For example, lowering tax rates on employment, financing infrastructure projects (e.g., digitalization or high-speed railway) and reducing national debt, all enhance the macro-economic performance and competitiveness of a country, and offset some of the negative consequences of mitigation policies. This argument is put forth in different strands of the 'double dividend' literature (see e.g., Goulder 1995; Jakob et al. 2016).

Carbon revenue can also be used to multiply the positive ecological effects of a policy by financing the deployment of renewables, weatherization of buildings, or investing in the development of low-carbon technologies, thus accelerating the decarbonization efforts of a jurisdiction. Furthermore, the revenue can be put towards greater equity in publicly valued domains (e.g., education), and the elimination of rampant climate injustices and social inequality by providing targeted assistance to marginalized groups (low-income households, minorities, elderly, women) (e.g., PMR 2021a).

As can be seen, carbon pricing revenue can be effectively utilized towards various policy objectives. Crucially, revenue recycling also holds the potential to boost carbon pricing policy towards greater stringency by increasing its political acceptability. Different revenue recycling measures can be implemented that can result in progressive distributional outcomes, better environmental performance of the policies, and positive effects on people's wellbeing, all of which changes public perception on policy fairness and effectiveness (Beiser-McGrath and Bernauer 2019; Konc et al. 2022). This modified public perception can foster political acceptability, thus leading to the successful implementation of higher carbon prices (Maestre-Andrés, Drews and van den Bergh, 2019; Bergquist et al. 2022). One revenue recycling measure that can push policy towards higher stringency is compensating negatively affected social groups, thus eliminating the regressive effects of carbon pricing. Such compensation can positively alter public perception on a policy's fairness. In addition, providing assistance to companies to help them bear the increased tax costs, and making low carbon technologies more accessible to them, helps to stabilize or even increase their competitiveness, and dilute resistance.

Furthermore, using carbon pricing proceeds towards climate friendly projects, such as energy efficiency programs or deployment of renewable energy, may foster increased public acceptability through two channels. First, by providing local, tangible benefits through green

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spending, public perception about the environmental effectiveness of a policy can be changed or reaffirmed. Second, spending carbon revenue on climate action directly benefits and mobilizes clean energy (or 'sunrise') sectors such as renewables, energy storage and battery, or green hydrogen. The economically growing coalition of direct beneficiaries can provide increased political support for the reform and implementation of ambitious climate policy (Meckling et al. 2015).

The last measure addresses what I call 'social objectives,' and it refers to spending on policy objectives the public regards highly. For instance, if the public is concerned about high debt rate, a low level of education and a lack of other public services, spending carbon revenue specifically on these problems can increase public acceptance (Bergquist, Mildenberger and Stokes, 2020, 1; Drews et al., 2022; PMR, 2019; Steenkamp, 2021). All these processes and measures theoretically push policies towards a new political equilibrium where implementation of more stringent policy is feasible, which in turn raises more revenue to be redistributed and invested.

However, as the socioeconomic environment of countries differ significantly, the use of revenue should also accommodate different social objectives. For example, the public may accept higher prices in countries that are more vulnerable to climate change if the revenue is spent on adaptation. Alternately, in a socially polarized country where more people are exposed to energy poverty, compensation for poor households will be necessary to avoid equity issues, while in wealthier and more egalitarian jurisdictions, this is less of a concern, so other constraints should be addressed (Andersson and Atkinson, 2020). When there are more people at, or close to, their subsistence level of consumption, equity concerns become more pressing, highlighting the need for effective redistribution to counteract the negative price impacts of stringent carbon taxes and emissions trading systems (Konc et al., 2022). To make this point more concrete, experimental research shows that a tax rebate scheme in the US that refunds carbon revenue to all families equally was found to significantly increase carbon tax acceptability. However, a similarly proposed scheme in Sweden had negative effects on public support (Kaplowitz and McCright, 2015 and Jagers, Martinsson and Matti, 2018 as cited in Maestre-Andrés, Drews and van den Bergh, 2019; also see Douenne and Fabre 2022 for a discussion on the French context). The merits of examining and comparing revenue recycling in different environments is further supported by results from other surveys and experiments suggesting that public preferences for revenue use options might be context-specific (Beiser-McGrath and Bernauer, 2019; Carattini, Carvalho and Fankhauser, 2018; Dabla-Norris et al.,

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2023). That is why cross-case analysis is crucial to ascertaining under what structural conditions revenue recycling can support stringent carbon pricing, and which constellation of differing revenue-use schemes is effective in different environments.

Therefore, I offer a novel theoretical framework which identifies and detects different constellations of structural political economy conditions and revenue recycling measures to explain carbon pricing stringency applied to all national level carbon pricing mechanisms in the world.

1.4. Scientific Relevance of the Research

This study contributes to the current literature in several ways, both with my QCA analysis and subsequent case study research. To my knowledge, this is the first study that systematically analyzes how different constellations of structural political economy factors and revenue recycling strategies can explain carbon pricing stringency. In fact, only a few scholars have attempted to empirically test factors shaping the architecture of carbon pricing policies under binding political economy constraints. There is a growing chorus demanding greater attention be paid to the political economic dynamics around carbon pricing mechanisms (e.g., Carbon Pricing Leadership Coalition, 2020; Jenkins & Karplus, 2017; Klenert et al., 2018). For instance, Cambridge Energy Group scholars (Dolphin, Pollitt & Newbery, 2020; p. 475) assess that: "However substantial the discussion of political economy factors in environmental policy formulation has been, relatively less attention has been paid to the political feasibility of carbon pricing policies and, equivalently, to the variables that influence their implementation and strength." In addition to the scarcity of empirical works, the majority of available studies employ the method of single case study, focusing on one particular sector or geography, a limitation which reduces the external validity of these studies (e.g., see the meta-analysis from Carattini, Carvalho and Fankhauser, 2018). Given the above, my immediate research goal is to contribute to the scant body of empirical data and existing political economy literature on carbon pricing mechanisms. This will be accomplished by providing empirical evidence concerning the role that one key design element, revenue recycling, plays in maximizing environmental effectiveness and political acceptability of these policies in constrained environments.

The literature analyzing the relationship between revenue recycling and the political acceptability of carbon pricing represents an emerging field (Carattini, Carvalho and Fankhauser, 2018). The studies available on carbon pricing's distributional impact, its

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perceived fairness, and the potential of revenue recycling to enhance carbon tax acceptability are problematic for various reasons. For instance, they focus on Western countries and employ surveys or experiments (Maestre-Andrés, Drews and van den Bergh, 2019). Firstly, surveys and experiments may not give a realistic picture of how carbon pricing is received by the public in practice. People might change their attitude towards the policy when they materially suffer the effects of higher carbon prices (e.g., higher energy bills). This case is clearly demonstrated by the Canadian example, where carbon dividends did not increase tolerance for carbon pricing, despite surveys indicating they would bolster support (Jenkins, Stokes and Wagner, 2020; but also see my discussion below on the Irish case study). Also, it must be noted that studies examining the political acceptance of carbon pricing disproportionately focus on carbon taxes (Raymond, 2019). Although it is understandable, as imposed costs are more transparent in the case of taxes, current ETSs cover more GHGs globally, and the distribution potential, that chiefly determines political tolerance, is as significant as that for carbon taxes (World Bank, 2021). For these reasons, they require equal consideration from policy makers and academics.

My research uses a cross-case analysis of all national-level policies (both carbon taxes and ETSs), incorporating different revenue recycling options and newly established carbon pricing mechanisms from emerging economies as well as those in the West, thus addressing these pressing limitations in current literature. Furthermore, as Carattini, Carvalho and Fankhauser (2018, p. 12) argue: future studies on revenue-recycling should "tackle more complex policy designs and realistic situations" such as hybrid strategies of revenue use, to overcome the shortcomings of surveys and experiments. Similarly, Carl and Fedor (2016, p. 60-61) assert that there "now exists enough global experience to begin useful comparative analysis among carbon-revenue systems and offer empirical insights beyond general conceptual models," which can enhance the external validity of research findings. To accomplish this research objective, a unique dataset of all countries' revenue recycling systems was created which served as the basis for my comparative research.

As discussed above, contextual differences between countries matter, as they theoretically require the prescription of disparate revenue recycling strategies. By using QCA I can capture this diverse set of combinations. Equally important is the capability of QCA to detect hybrid revenue recycling strategies. Theoretically, the more people or social groups who benefit from revenue recycling, the more political support can be garnered (Klenert et al. 2018). Therefore, one of the main theoretical contributions this research makes is a comprehensive examination of hybrid uses of revenue in all currently implemented national carbon pricing mechanisms.

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Using this information, we can explore this promising, and presumably more viable, political strategy to secure public support for increasing carbon prices.

This research offers a unique, intersectional theoretical framework for examining and elucidating how policy elements affecting distributional outcomes of carbon pricing interact with the political economy environments in which they are developed and implemented. It presumes that different local contexts require tailored policy measures to overcome local political economy constraints. The dissertation provides empirical evidence supporting this relationship and the associated hypotheses, confirming the suitability of the developed theoretical approach. Thus, this research surpasses previous empirical research that solely examines the link between macro conditions (e.g., fossil fuel dependence) and carbon pricing policy stringency. It provides crucial insights into a group of countries where the structural conditions, discussed by Levi, Flachsland & Jakob (2020), Dolphin, Pollitt, and Newbery (2020) and others, are either absent or less pronounced, yet stringent policy outcomes are still achieved. The main finding of the analysis is that a combination of social compensation and spending on climate action is the most effective strategy to implement high carbon prices. Additionally, the analysis reveals that countries implementing compensatory mechanisms alongside their policies achieve higher carbon prices compared to countries with similar structural conditions that do not employ such mechanisms. These findings have direct policy implications, since they indicate that ramping up climate ambitions should be conjoined with adequate social support mechanisms.

The second empirical chapter is a process tracing case study on the Irish carbon tax reform. The main objective of this qualitative investigation is to strengthen and refine the QCA-based inferences by confirming the causal mechanisms linking revenue recycling measures to stringent policy outcome through enhanced political acceptability. In this case study, I analyze the relationship between various revenue recycling measures, such as different social cushioning transfers, and ecological projects, as well as their effect on the political acceptability of carbon tax. Although the literature is abundant with results of such surveys and experiments, empirical investigations, and thus our understanding of how public acceptability manifests on a more abstract political level, is very limited. The literature addresses significant gaps in understanding the political dimensions of carbon tax, including the motives behind policy adoption (Rabbia, 2023; Skovgaard, Ferrari & Knaggård, 2019), and the relevance of political systems in either facilitating or hindering the placement and implementation of these policies on the public agenda (Andersen, 2019). However less attention has been paid to the role of party

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politics, and especially revenue recycling, despite its appealing theoretical effects—which have also been supported empirically in the 'laboratory' environment—in affecting real-world political outcomes of carbon tax implementation or reform (for notable exceptions, see Crowley, 2017; Harrison, 2012; 2013). This is important, as Mildenberger et al. (2022) effectively shows, by examining the effect of existing revenue recycling measures on public support in Switzerland and Canada, that surveys may not be an accurate representation of public opinion on carbon tax. It has been noted that the attitudes of citizens towards real-world policies may be far more negative than indicated in the surveys (also see for similar assessments from the US and France: Anderson et al. 2019; Douenne and Fabre 2022).

Therefore, a key objective of this qualitative case study research is to trace the causal mechanisms that explain how revenue recycling may enhance political acceptability by examining how the public's policy preferences are perceived, interpreted, and acted upon by political elites. This research also seeks to investigate how interactions between the government and actors involved in the formal decision-making process, such as political parties, interest groups representing workers, business interests, environmental and poverty concerns, as well as media, contribute to determining the political acceptability of carbon tax. By doing that, I add important insights to the burgeoning field of party politics in climate change, and the political economy of carbon pricing adaptation (Jenkins, 2019; Little, 2020). Another crucial contribution of this undertaking is the detailed comparison, from the perspective of political acceptability, of two alternative social compensations models, the fee and dividend approach (also called carbon dividend), and the integration of targeted social cushioning and climate spending (hypothecation). While the argument for carbon dividends has been presented in various strands of literature and policy circles (see e.g., Boyce, 2019; Nystrom and Luckow, 2014), emphasizing positive distributional outcomes and macroeconomic effects, there is a lack of scholarly assessment on how it is perceived politically by the government, major interest groups, and different socioeconomic segments.

In sum, the greatest contribution of this research is to provide empirical findings to support hypotheses derived from the theoretical intersections of structural political economy conditions and revenue recycling alternatives. This information could be crucial to ease the political impasses thwarting the implementation of stringent carbon pricing mechanisms. The result is a comprehensive explanation of carbon price differences from a fresh perspective.

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1.5. Social Relevance of the Research

The diffusion of carbon pricing to all regions of the world has recently accelerated and is on its way to break forth as a dominant policy instrument in climate change mitigation (Thisted and Thisted, 2019). Current schemes account for approximately 23% of global GHGs (World Bank, 2023), and according to Nationally Determined Contributions (NDCs),[7] 96 countries are considering implementing some type of CPMs to meet their individual pledges, and thus complying with the Paris Agreement. That is an enormous number, accounting for almost 60% of global GHG (World Bank, 2019). Hence, we anticipate seeing the number of CPMs mushrooming in the next couple of years. Therefore, reaching global climate objectives could very much depend on the performance of carbon pricing policies in the future, among other crucial climate action measures. To increase the chances of successfully coping with this unprecedented challenge, the ambitions of current and future schemes should be raised considerably. My research takes a step towards this goal by focusing on the promising new domain of distributional impact in the political economy of carbon pricing. Jenkins (2019, p. 2) argues that: "Attention to how clever policy choices can affect distributional outcomes and alter the political economy of climate policy may hold the key to accelerating the as-yet inadequate pace of carbon reductions," and that (2014, p. 472), "Further research is necessary, however, to determine how far these measures can increase tolerance for carbon prices." The key question is not anymore whether current pricing policies are operating effectively, as even the fiercest proponents admit that most schemes produce prices too low to effect the changes attributed to these policies (Klenert et al, 2018; World Bank, 2020). Rather, the question is whether carbon pricing can be calibrated in such a way as to overcome the challenges to more ambitious climate policies. Some positive cases point towards this direction; my research aspires to offer additional data and support for these findings. From my perspective, even if critical scholars and environmental NGOs are correct in their assessment that carbon pricing is ineffective in unlocking the rapid changes desperately needed for transitions to zero-carbon economies, the dominant discourse and the flexibility of such schemes, and their appeal to many powerful sectors, indicates that carbon pricing solutions are here to stay. Thus, I am confident that contributing to the moral and academic discussion on the use of CPMs, with a goal towards greater environmental integrity and social fairness, is a worthy pursuit.

[7] NDCs were introduced by the Paris Agreement and are national plans submitted to the United Nations on how to reduce their greenhouse gases emissions and comply with their decarbonization pledges.

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The obtained empirical findings of this research have direct policy implications as detailed in the Conclusion chapter. For instance, a key finding of QCA analysis is that applying a hybrid use of revenue, combining compensatory-and-climate-action measures, enables the implementation of stringent carbon pricing, even in countries with constrained political economy environments (high income inequality and/or increased dependence on fossil fuels in energy consumption). Analysis on how to ramp up climate ambition in constrained environments is particularly important and needed, since this situation applies to a majority of countries in the world today. The analysis also reveals that lack of compensation renders the introduction of ambitious carbon pricing implausible, even in some highly developed countries. With these results, I provide substantial empirical evidence to support theoretical claims about the relationship between enhanced carbon price level and effective redistributional policy choices which may serve as important information to policy makers about how these mechanisms should be designed to make them environmentally effective, socially tolerable and politically acceptable. Crucially, it appears that ensuring social protection and preservation of domestic companies' competitiveness during energy transition is a prerequisite for implementing ambitious climate policies.

1.6. Preview: Research Design and Methods

1.6.1. Research Design – Explanatory Sequential Design

In order to secure the robustness and quality of the research, my dissertation employs an explanatory sequential design in which the qualitative phase builds directly on the results of the quantitative section. By definition: "The explanatory design is a mixed methods design, in which the researcher begins by conducting a quantitative phase and follows up on specific results with a second phase […]. The second, qualitative phase is implemented for the purposes of explaining the initial results in more depth, and it is due to this focus on explaining results that is reflected in the design name" (Creswell & Clark, 2011, p. 82). My approach makes use of an interactive model, meaning the two methods are combined before the conclusion of the study. By using this construction, my intention is to offer the reader a greater understanding of how certain processes can lead to a specific policy outcome. As such, the quantitative part can show the relationship between the conditions identified in the theoretical framework; and the qualitative analysis will demonstrate a deeper understanding of causal mechanisms. Furthermore, applying multi-method analysis may yield complementary benefits and thus significantly enhance the quality of the research. Most importantly, this approach will paint a

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more complete picture of the social phenomenon under investigation. As shown earlier, the distribution impact of carbon pricing policies is currently an under-researched field, begging for expansion in depth and range of inquiry. Lastly, using this dual approach guarantees greater validity, because the qualitative examination of one case accomplishes an in-depth analysis while the cross-case analysis ensures external validity (Creswell & Clark, 2011).

1.6.2. Applied Methods

Qualitative Comparative Analysis

The quantitative phase will rely on fuzzy-set/Qualitative Comparative Analysis (fs/QCA). QCA helps us understand social phenomena in terms of set relation and causal complexity, acknowledging that there can be multiple, non-exclusive pathways to the same social outcome (Schneider & Wagemann, 2012). FS/QCA seems a suitable method for this research project as the stringency of CPMs is presumably contingent on intersecting conditions based on the assumption that revenue recycling needs to respond effectively to local political economy challenges to enable higher carbon prices. Diverging policy design architectures, and the diversity of jurisdictions implementing CPMs, make a good case for QCA application. Furthermore, the number of identified cases (30) are well considered by QCA's enhanced abilities to handle medium N dataset. This method relies heavily on raw quantitative data but is simultaneously able to perform a qualitative process by analyzing context (Ragin, 2008). To accomplish the quantitative part, I use publicly available, secondary data on policy elements; coverage and price history for the structural conditions, gathered by prominent institutions (e.g., World Bank, 2021; Institute for Climate Economics, 2020); and I create a unique dataset on countries' revenue recycling systems.

Process Tracing in Case Study

The rationale behind combining QCA and process tracing in case studies is to explore how the sufficient and necessary conditions identified during the QCA analysis are related to the defined outcome (the phenomenon under investigation) (Schneider & Rohlfing, 2013). As we are interested in how stringent carbon pricing policies might be introduced and perpetuated, a CPM that surpasses the 'Paris' climate benchmark ('more stringent CPM') can be chosen for further inquiry, in accordance with the 'positive outcome principle' (Schneider & Rohlfing, 2013, p. 569). However, the analytical strategy a researcher might employ, one which is empirically worth pursuing, is determined by the QCA results, such as causal heterogeneity and coverage. Theoretically, a promising path for my research is to select a typical case to test hypotheses on causality. In addition to investigating the causal mechanisms, case study research provides the

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opportunity to examine the exact process by which a carbon pricing policy is implemented and perpetuated amid turbulent political procedures. The empirical material is based on secondary data derived from multiple sources, including studies, interest groups' position papers, proposals, government reports, etc. Moreover, semi-structured interviews (Tansey, 2007) with key-stakeholders and experts provide supplemental information about the decision-making processes, events, and issues that affect the policy outcome and implementations of the CPM under study. In this research, I conduct sixteen interviews. To analyze the gathered data and assess hypothesized causal mechanisms, the process-tracing method is applied (George and Bennett, 2005).

1.7. Structure of the Dissertation

The dissertation is structured in seven chapters. The introduction above presents the research puzzle I address in my inquiry and gives an overview of the theoretical argument explaining carbon price development across the world, as well as the research design employed to accomplish the research objectives. The second chapter provides succinct but crucial background information about my project and situates the research in relevant political economy literature. It provides information about the climate crisis and introduces different policy measures to tackle the problem, giving special attention to carbon pricing mechanisms and their theoretical underpinnings, such as the need for a Pigouvian fee and the Coase theorem. The discussion offers an overview of the historical development of these environmental policies and argues that a more holistic approach, which combines classic political economy theories with insights from ecological economics, is more suitable to explain climate policy stringency than a more reductionist environmental economics account. After setting the scene, the Theoretical Framework (Chapter 3) presents the main political economy forces shaping international and domestic climate policy development, both in climate destructive and climate friendly ways. Afterwards, the intersectional model is introduced, explicating the main political economy conditions and revenue recycling measures, and how their combinations theoretically affect carbon pricing stringency. The fourth chapter presents the research design and employed methodologies, including the case selection and operationalization of variables (called ‘calibration’ in QCA). Chapter five is the first of two empirical chapters, presenting the QCA results and corresponding discussion on them. Crucially, it demonstrates that hybrid use of revenue enables the implementation of stringent carbon pricing even in a constrained political economy environment and shows that compensation is a critical measure for policy success. The chapter ends with set-theoretic multi-method research (SMMR) which is a formalized case

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selection mechanism for process tracing, based on QCA inferences derived from sufficiency statements. The selected case to investigate the causal relationship between revenue recycling and policy stringency is the Irish carbon tax reform. The process tracing case study is presented in Chapter six. The dissertation ends with the Conclusion, where I take stock of main empirical findings of my research and formulate policy recommendations based on results. I also discuss the limitations of research and outline further, promising avenues for future inquiries.

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Chapter 2: Literature Review and Background of the Research

This chapter addresses various aspects of the research project. It aims to present the background of my research, review relevant literature on the main theories about climate change mitigation policies, and take stock of empirical works concerning the political, social and economic factors of effective carbon pricing policies. My review applies a 'funneling approach,' meaning that it begins with a comprehensive overview of the examined issue (climate change and various mitigation policies) and sequentially narrows down to examining the appropriate theoretical settings of this research. The chapter begins with a succinct assessment of the science behind and effects of climate change, one of the greatest threats facing mankind. Following that, I detail possible policy responses to the current crisis and shed light on why carbon pricing is believed to be the most cost-efficient policy to cut greenhouse gas (GHG) emissions and mitigate climate change. In this research, I analyze carbon taxes and emissions trading systems (ETS) together, as they both generate sustainable transitions by imposing a fee on emissions. I present the theoretical foundations of these policies, along with my critique of the neo-classical, economic approaches to policy effectiveness. I also discuss why I believe a more holistic approach, which combines classical political economy with key insights into ecological economics and political ecology is the most suited to examining climate policy effectiveness. The argument is taken forward and explained in greater detail in the Theoretical Framework chapter.

2.1. The Science and Effects of Climate Change

There is a growing body of evidence detailing the catastrophic future to which mankind is heading as a direct result of increasing greenhouse gas (GHG) concentration in our atmosphere. Greenhouse gases play an essential role in achieving the fragile energy balance (incoming energy from sunlight and outgoing energy to space) in the planet's atmosphere and providing ideal conditions for human life. Roughly 30 % of the sunlight is reflected back to space, while 70% is absorbed by the Earth's surface. However, as increasing GHGs trap more infrared light in our atmosphere, thus not releasing it back into space, surface and lower-level atmospheres are heating up, causing comprehensive alterations in the Earth system. Cumulative emissions of carbon-dioxide (CO_2) or other greenhouse gases, such as methane, are approximately proportional to the degree of global warming, although significant uncertainties exist concerning projections (Hsiang and Kopp, 2018).

The Earth has experienced waves of enormous alterations in the atmosphere, lands and oceans over time. However, the problem we face now is that current alterations in our ecosystems,

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induced by carbon cycle changes unprecedented in their sheer scale and pace, endanger our very survival as a species. Anthropogenic activities have already caused roughly 1 degree Celsius (°C) global warming above pre-industrial levels, and its impact can already be felt across the globe' (IPCC, 2018). The effects include temperature increases and precipitation and humidity changes, causing droughts and floods and rising sea-levels, imperiling coastal cities and low-lying areas.[8] As well, we see ocean acidification contributing to coral bleach endangering marine ecosystems, on which millions of species rely. Climate change has other, more immediate impacts on our lives, such as increased mortality displacement during heat waves. However, significant uncertainties exist around climate models' projections, due to our limited understanding of how different elements in the complex Earth system would interact exactly in a rapidly changing environment, and whether these changes in the subsystems, at certain point, ('tipping point') will induce an irreversible, domino-effect on our planet (Hsiang and Kopp, 2018). This is the realm of Earth system's non-linear processes, interactions and feedback effects that can create conditions rendering the planet inhospitable to human societies by amplifying global warming effects (Steffen et al., 2018). For instance, more rapid warming in the higher altitude regions of the Earth contributes to thawing permafrost (frozen soil for thousands of years) in the Northern hemisphere, which releases methane. This region "contains twice as much carbon as there is currently in the atmosphere" (Schuur et al., 2015, p. 171). Similarly, the collapse of the Amazon rainforest, and shift towards becoming savannah, due to deforestation and decline in rainfall, would entail the loss of one of the most important carbon sinks in the world (Cooper, Willcock and Dearing, 2020). Melting ice sheets, which reduce Earth's ability to reflect sunlight back into space, and ocean acidification, which has nearly reached its maximum carbon absorption capacity, are both equally worrying feedback mechanisms. The climate trajectories, driven by these unprecedented changes, delineate a future, in which abrupt geophysical events impose critical socio-economic and political challenges on our societies, some of which will almost certainly prove unmanageable for mankind. For example, a sudden shift in conditions for agriculture, such as no access to fresh water and alterations in the hydroclimate, could trigger mass migration and social collapse (Steffen et al., 2018). The table below details some of the above-mentioned effects ranging from deterred health conditions to significant crop loss.

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[8] For example, Kiribati, a small-island nation has already bought lands from its 'neighbor' country, Fiji, possibly to relocate its population.

1. Table - Some of the effects of climate change in different climate scenarios.

	1,5 °C	2 °C	4 °C
Global population exposed to water scarcity	+271 M	+388 M	
Suitability of drylands for malaria transmission	+19%	+27%	
Average crop yield of maize by 2100	-6%	-9%	
Mortality displacement due to heat wave in France	+0,8%	+1,5%	+5,7%
Annual hot nights in Greater Horn of Africa	65 days	107 days	170 days

Source: CarbonBrief (2021) compilation which is based on 70 peer-reviewed climate studies.

2.2. International Climate Change Regime

The problem of global warming slowly creeped into the public agenda in the 1980s. The international legal regime on climate change, namely the United Nations Framework Convention on Climate Change (UNFCCC) was created in 1992 at the Earth Summit in Rio, and, from the very beginning, it aimed at stabilizing greenhouse gas emission in the atmosphere to prevent dangerous changes in our climate system. At the time of Rio, the expectations were high due to a successful environmental regime on ozone layer protection (the Montreal protocol in the 1980s), and the optimism for enhanced international cooperation after the fall of the Soviet bloc. The Rio Convention did not set binding emissions limits; it just provided a framework within which countries can advance further agreements. Importantly, the states meet annually to make decisions and resolutions at the Conference of Parties (COP). In subsequent COPs, however, a legally binding, comprehensive emissions reduction, also known as a "top-down" approach, has not been achieved. This represents a considerable failure of the international community to reach a consensus on emissions trajectories for both developed and developing countries, and to enforce compliance. The Kyoto Conference (1997) was close to a breakthrough, as developed countries (so-called Annex I countries) committed to a binding reduction of emissions, but eventually the US backtracked, by signing the Kyoto Protocol, but

not ratifying it in the US Senate, seriously weakening the forged agreement.[9] Taking a new tact, the convention applied a bottom-up approach, relying on non-binding pledges made by countries to fight against climate change. This idea came up in Copenhagen (2009) and was then formalized and further developed in Paris, in 2015 (Kaupa, 2019a).

The Paris Agreement, which was hailed as a diplomatic success, set the ambitious target to keep global warming below 2 °C, with the aspirational target of 1.5 °C (United Nations, 2020). However, it should be clear by now that even a 1.5 °C warming could have devastating, irreversible effects on all aspects of our life on earth. These effects encompass national security, food supply, economic prosperity, social mobility, and essential ecosystem services, such as access to drinking water (IPCC, 2018). The warmer our climate gets in upcoming decades, the more resources will be needed to deal with increasing climate-related risks. Inaction will become increasingly costly, exacerbated by the increasing necessity for adaptation in the future, reduced flexibility for response, and a more firmly established ('lock-in') carbon-emitting infrastructure (Stern, 2007; 2008). The problem with the current international climate change regime is that it relies on emissions reduction pledges of individual countries (embodied in the so-called Nationally Determined Contributions - NDC) (UNFCCC, 2020). If we aggregate all NDCs, the result would be a 2.6°C hike in global temperatures. Even more concerning is, as it stands now, we are on track for a warming of over 3°C by 2060 (Ritchie and Roser, 2017), which would entail catastrophic consequences. This difference between the Paris climate target and countries' individual commitments is what the United Nations Environment Programme calls the "emissions gap" (UNEP, 2020). In order to reach the Paris Agreement targets, the bulk of the available fossil fuel reserves should be left underground and a drastic annual emissions reduction of 7.6 % between 2020 and 2030 would be needed (McGlade and Ekins, 2015; UNEP, 2019). According to IPCC's (2023) latest assessment report, if the annual global emissions between 2020 and 2030 remains at the same level as 2019, we will be close to depleting the remaining carbon budget. The carbon budget is the cumulative CO_2 allowed in the atmosphere if we are to limit global warming to 1.5°C. The different scenarios are depicted in Figure 2.

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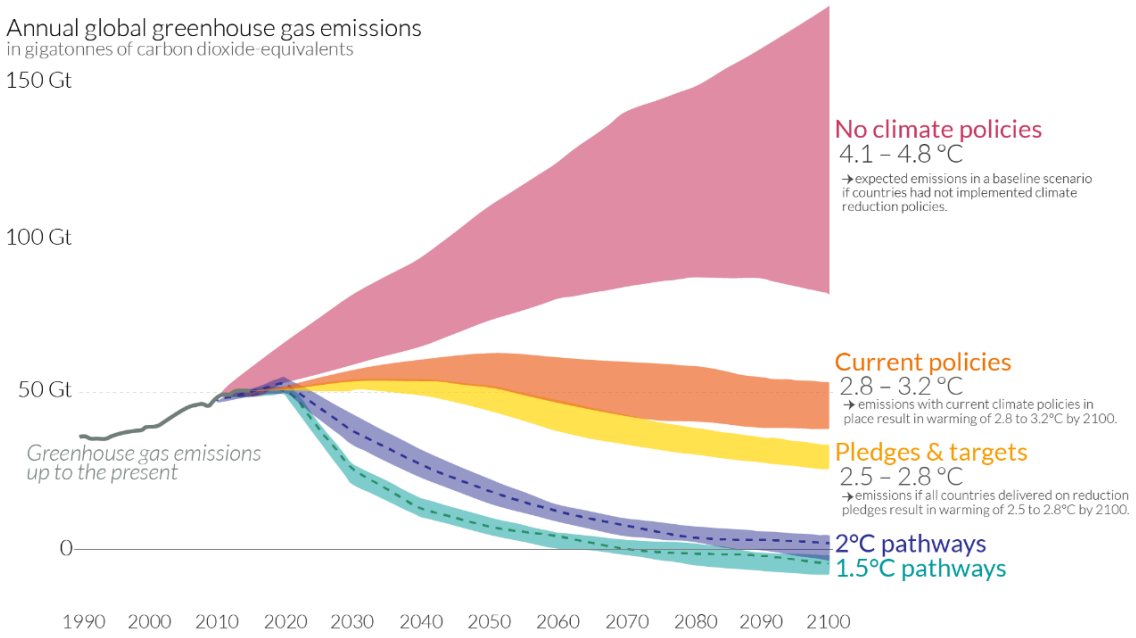
[9] Nevertheless, the Kyoto Protocol was a notable treaty, because the first international carbon pricing mechanisms, the Clean Development Mechanism and Joint Implementation, were introduced. For more information, please see the Introduction and the Pricing Instruments sections below.

2. Figure - Climate scenarios in different levels of policy developments.



Source: Reprinted from the website of 'OurWorldInData.org'. Source and author: Ritchie and Roser (2017).

Note: Shading covers uncertainties in climate scenario modeling.

2.3. Possible Policy Responses to the Climate Change Challenge

Stabilization of the Earth system requires large-scale, coordinated, comprehensive and integrated steps in all aspects of social life. This encompasses technical advancements, such as developing low-carbon technologies, environmental initiatives to strengthen carbon sinks, economic measures for financing the transition, as well as political strategies to overcome coordination problems and competition concerns (Steffen et al., 2018). When we assess climate policies, an important distinction has to be made between climate change mitigation efforts specifically designed to reduce greenhouse gas emissions, for instance, implementing low-carbon technologies, and climate change adaptation policies (IPCC, 2018). An example of the latter would entail an adjustment to the changing climate, such as building a seawall to protect inhabited urban areas.[10] In this research project I am only concerned with the former type, reducing emissions.

Possible policy responses to climate change mitigation can be broadly categorized into two groups. These are pricing and non-pricing interventions (Stiglitz, 2019). Others use different labels, such as traditional *command and control regulation,* and *pricing instruments* (Aldy and

[10] Some policies that are related to mitigation such as infrastructure building (developing electricity grid systems or high-speed rails) cannot be clearly categorized into these groups. My discussion focuses on explicit mitigation policies.

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Stavins, 2012), or market and non-market technological interventions (Stern, 2007), but the distinction is clear.[11] From a neoclassical, economic point of view, the most cost-efficient intervention is carbon pricing, as the market will determine the cheapest pathways for emissions reduction. However, as we live in a world with many imperfections (e.g., information asymmetry, knowledge spillover), supplementary policies are often needed (Bataille et al., 2018; Burtraw, Keyes & Zetterberg, 2018; Stern, 2008). This point is notable, because the implementation of carbon pricing is politically the costliest policy option in the climate change policy repertoire as we will discuss later[12] (Furceri, Ganslmeier and Ostry, 2021; Tvinnereim and Mehling, 2018).

2.3.1. Command and Control Policy Instruments

Traditional approaches include information policies (e.g., education and green nudges to change behavior towards sustainability); financing (issuing green bonds, providing low-interest loans to be spent on energy efficiency, supporting research and development programs on low carbon technologies, etc.) and regulation (Stern, 2007). Command and control measures aiming at reducing emissions and protecting the environment can be technology- or performance-based standards. According to Aldy and Stavins' definition (2012, p. 154): "Technology-based standards typically require the use of specified equipment, processes, or procedures," while "Performance-based standards are more flexible than technology-based standards, specifying allowable levels of pollutant emissions or allowable emission rates, but leaving the specific methods of achieving those levels up to regulated entities." Examples for technology-based standards are the requirement for using certain types of energy-efficient motors, or banning particular kinds of GHGs in heating/cooling systems such as chlorofluorocarbons. Limits on maximum levels of CO_2 emissions from combustion, meaning how much pollution a vehicle can emit every 100 km, is a widely used performance-based tool. The problem with the traditional regulatory approach in climate change mitigation is that there are numerous sources of emissions in the economy. This requires regulators to constantly look for the best available technology and standards in the market for many, diverse sets of economic sectors. Furthermore, after adopting the prescribed technology or processes, little incentive is left for private companies to engage in further reduction efforts (Aldy and Stavins, 2012).

[11] There are instruments such as tax breaks and subsidies which cannot be straightforwardly categorized. They are often referred to in the literature as implicit carbon pricing instruments.
[12] This is mainly caused by high visibility of prices to voters. A detailed discussion follows in the Theoretical Framework, including other reasons, and options to mitigate political economy hurdles around CPM adoption.

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2.3.2. Pricing Instruments

In theory, carbon pricing instruments place the onus of nurturing low-carbon technologies and developing more efficient processes best-suited to their production practices upon the market participants. By setting a carbon price, market participants build the price signal into their cost structure, thereby internalizing the social costs of emissions. That adjustment reflects or compensates for the cost of the marginal damage created by these emissions. If the marginal benefits of the reduction equal the marginal costs, efficiency is achieved. This can be accomplished by introducing a carbon price that equals the monetized damages from emissions. There are several alternative ways of putting a price on carbon. Each will be discussed in turn.

Carbon Taxes

In my research, I deal with carbon pricing initiatives that put a price tag directly on greenhouse gas emissions (so called 'explicit carbon pricing policies'). Two instruments fall into this category: carbon taxes and emissions trading systems (ETS/carbon markets). Carbon tax is a form of pollution-tax levied on the carbon content of products and services. It can be charged 'upstream,' meaning at the place of extraction (e.g., coal mines), or upon entering the domestic market; 'midstream' (electricity generators/distributors); or, the last possibility is, 'downstream,' which means in services and end-products (PMR, 2017). The key challenge of carbon tax is defining the scope of the tax, called *coverage* in the literature. Carbon taxes typically cover different fuel types (e.g., coal, oil, natural gas), but can also target direct emissions, as those created by particular sectors or economic activities (PMR, 2017). For example, the Indian tax targets coal extraction exclusively, the dirtiest fossil fuel, whilst British Columbia in Canada taxes 23 different fuels and gasses. Chile takes a different approach by targeting large boilers regardless of the fuel type. Similarly, South-Africa targets a range of economic sectors (from refineries, fugitive emissions to industrial facilities), covering approximately 75% of the country's GHG emissions. Defining the scope requires the consideration of many factors. Such factors include policy interactions, price elasticity and cost pass-through capabilities in the covered sectors, as well as the administration's capacity to monitor and verify emissions, among others, all of which determine the policy outcome. Crucially, political considerations such as assessing carbon tax's effects on coal-dependent regions, or incentivizing the use of natural gas as a bridge fuel and excluding it from taxation, play a definitive role in final policy design (PMR, 2017).

The second key consideration is the price level of the tax (Aldy, 2017). There are four distinct approaches to determining the tax rate (PMR, 2017 p. 89). The first is the alignment with the

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social cost of carbon, which is the rate of the internalization of the full social costs of emissions (crop damages, public health issues, etc.), guided by efficiency considerations (McKitrick, 2016). The second approach targets the abatement objective of the jurisdiction. Here the tax rate should be in line with the jurisdiction's emissions reduction plans, though due to modeling and forecasting challenges, defining the precise tax rate to accomplish the desired abetment might be challenging. The third approach sets the tax rate that would generate a particular, given amount of revenues (public finance approach). Lastly, jurisdictions may introduce carbon tax and calibrate the rate to stay competitive on the regional market and compliant with international norms. This latter approach is referred to as *benchmarking*. However, price setting is often not a single act but a process requiring continuous adjustment. For instance, price adjustment may be required after a period of insufficient emissions reduction performance, or when new information on the estimation of social costs becomes available. Nevertheless, considering the fairly low level of carbon prices across jurisdictions, it is safe to say that price level is overwhelmingly determined by political consideration. Gradual price increase from a relatively low level may help to water down political opposition during implementation. In a similar vein, a low rate can also prevent *carbon leakage* and mitigate the negative distributional impact. Carbon leakage refers to the outsourcing of production capacities to countries where environmental and climate regulations are lax, thereby offering a cheaper environment for production (Böhringer, Rosendahl and Storrøsten, 2017). The third key consideration is how revenues are spent on different social objectives, such as reducing distortions in the tax system or financing low-carbon projects. Alternately, revenues can be channeled to the general budget without legal earmarking. The following table shows some key design elements in various jurisdictions.

2. Table - Scope, point of regulation and prices in various jurisdictions.

Country	Sectors, fuel types and share of GHGs in the economy (coverage)	Point of compliance	Price level (US$/tCO2e)
Colombia	Liquid and gaseous fossil fuels (combustion and heating oil (24%)	Sellers and importers of the fuels (upstream and midstream)	5
Iceland	Liquid and gaseous fossil fuels (55%)	Producers and importers of the fossil fuels (upstream)	35
Japan	All fossil fuels (75%)	Producers of the fossil fuels (upstream)	3
South-Africa	All sectors involving	Upstream (fuel refiners),	9

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	fossil fuel combustion, industrial processes, product use, and fugitive emissions (75%)	midstream (electricity generators), and downstream (industrial facilities)	

Source: World Bank (2021), South-Africa: PMR (2017, p. 77).

Emissions Trading Systems

Emissions trading system (cap-and-trade, carbon market) is a quantity-based instrument, meaning that the maximum level of emissions (the cap) is determined by a given jurisdiction and reduced in each compliance period.[13] If the cap is set stringently,[14] the environmental effectiveness of the scheme is safeguarded. The cap can be set to comply with international (e.g., the Paris Agreement) or domestic emissions reduction plans, but alternative considerations (marginal costs to equal marginal benefits) may also be applied, as in case of carbon taxes (Aldy, 2017). After setting the cap, the allowances (emissions reduction rights) are allocated to market participants.

Two major allocation methods exist. Participants can either buy their allowances at auctions to cover their emissions, or get them freely. Free allocation militates against the polluters pay principle and the internalization of the social costs of emissions, but its usage prevents carbon leakage and helps keep political opposition to carbon pricing adoption at bay. Participants can receive their free allowances based on their historical emissions (so called *grandfathering*), or up to a benchmark level. *Benchmark* sets a desired level of emissions by calculating the carbon content of products using the most advanced technology in a given economic sector. For instance, the European Union Emissions Trading System (EU ETS) has shifted from grandfathering to benchmarking as a more robust incentive to implement low carbon production practices. This change is motivated by the larger emissions gap observed in the inefficient installations under the grandfathering allocation method (Directorate-General for Climate Action, 2015). The most efficient allocation method is undoubtedly auctioning, as it prevents distortions caused by sectoral differences and incentivizes instant emissions reduction, however its implementation is challenging as it raises mitigation costs considerably, especially compared

[13] Not all emissions trading systems have a cap. For instance, market participants in New Zealand could emit without limit until they possessed a sufficient number of international offsets, although the country later introduced a cap. The Chinese national ETS uses benchmarking as main allocation method and there is no cap (World Bank, 2021).

[14] For detailed discussion of what stringency entails, please see the discussion in the Theoretical Framework. In general, the cap is considered stringent if market participants need to invest considerably in low carbon technologies and change their behavior to comply with the emissions target.

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to costs in countries with lenient climate and environmental regulations. A stringent cap when combined with full auctioning results in high environmental effectiveness, and high carbon prices in the market. However, it also brings about high economic and political costs in the short to medium term. A modest cap, coupled with free allocation results in limited environmental effectiveness, depressed carbon prices, and a slower transition to sustainability. On the other hand, it involves lower political costs too. Any other combination, between these two ends of the spectrum, generates outcomes accordingly (Aldy and Stavins, 2012; PMR, 2021b). Figure 2 below depicts different approaches to key design elements in ETSs across the world.

3. Table - Comparison of key design elements across different ETS regimes.

Reprinted from ICAP (2021, p. 30) Note: RGGI stands for Regional Greenhouse Gas Initiative, a U.S. regional cap and trade system.

Two other key design elements add to the complexity of ETS operation and environmental effectiveness (PMR, 2021b). The first is access to international emissions reduction credits (see my discussion below), and the other is *banking of allowances*. Banking gives market participants the opportunity to buy allowances, which can be surrendered (at a higher rate) in later compliance periods. If a participant anticipates a future carbon price increase, it might

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purchase excess allowances now to fulfill future obligations at a lower cost. Other policy elements, such as emissions monitoring and verification, or establishing a bureaucratic agency for market oversight and system management, as well as the establishment of a robust compliance regime to install penalties and enforcement procedures are correspondingly important. However, these are not directly relevant to my project, so I do not discuss them in detail (for a comparative analysis of main systems' design elements, see: Narassimhan et al., 2018).

When the main design elements are implemented, trading with allowances can begin, which yields a price on emissions based on demand-supply dynamics (Ji, Hu and Tang, 2018). The power plants and other installations enrolled in the policy can sell surplus allowances or buy more allowances on the market, if necessary to cover their share of GHG emissions. In this way, participants are incentivized to upgrade their technology and use cleaner energy sources, as this becomes a profitable investment to reduce emissions and sell allowances. To offset the harm, polluters must pay for the environmental damage and social costs of emissions (Aldy & Stavins, 2012). Carbon markets dominantly cover energy-intensive economic sectors (e.g., cement, steel, waste management) and power generators. One unit of tradable pollution permit (allowance) generally represents one metric ton of CO_2 (mT/CO_2), or the equivalent amount of greenhouse gas calculated by Global Warming Potential[15] (IPCC, 2007).

A comparison between carbon tax and emissions trading

The most important similarity, and thus the main reason to jointly analyze these two instruments for the purposes of this research, is that both carbon taxes and emissions trading systems hold the promise to correct market failure by making economic actors pay for fossil fuel production and consumption (Aldy et al. 2010). By putting a direct price tag on emissions and enforcing a shift of the responsibility and burden from the public onto the polluters, these instruments facilitate clean energy deployment and the spillover of low-carbon innovation. Furthermore, both instruments leave the decision to market participants about the best way to comply with emissions reduction targets and develop mitigation solutions suitable for the technological environment of the sectors in which the agent operates. Additionally, contrary to technology-and-performance-based standards, both instruments generate substantial revenue for the state that can be used strategically to incentivize further emissions reduction or be spent on key socio-economic objectives. Empirically, these instruments interact in many ways, since some

[15] GWP shows how much a certain chemical substance contributes to global warming over a given period, relative to CO_2 as a reference gas.

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countries use both instruments to price emissions, despite their overlapping emissions scopes, as seen in Finland, and employ policies that resemble policy characteristics of both instruments (e.g., German ETS with fixed price allowances). As Dominioni and Faure (2022) also effectively demonstrate, there is a general trend towards greater similarity in the price stabilizing properties of carbon taxes and cap-and-trade systems, resulting in similar economic and environmental effects. A detailed discussion about the rationale behind analyzing ETSs and carbon taxes at the same time in this project is provided under the section of 4.3.1. Cases (distilled version available in Muth, 2023).

Theoretically, both carbon taxes and ETS drive changes by the same overall principle, but remarkable differences exist (Aldy and Stavins, 2012; PMR, 2017; PMR, 2021b). The most important difference is that ETS provides certainty about the maximum emissions in the economy by determining the overall cap, whilst carbon tax cannot guarantee that the emissions target, if there is one, will necessarily be met. In essence, for carbon tax, one sets the price, and the quantity is then determined by the market; in emission trading, one sets the quantity, and the market determines the price. However, it should be noted that by calibrating the tax rate during periodic reviews, the carbon levy can be aligned with the emissions reduction plans by lowering or increasing rates. In a similar vein, the cap in an ETS can be proven to be unambitious if it fails to incentivize investments in low carbon technologies, prompting its adjustment in response to policy learning. Alternatively, a *safety valve* (maximum carbon cost) and a price floor can be introduced to stabilize prices and send a clear signal about the need for transition, while shielding companies from price shocks (Aldy and Stavins, 2012). Therefore, due to the flexibility of these mechanisms (primarily ETS, but also taxes), the effects can be similar.

Notably, carbon taxes are easier to implement and administer (especially upstream charges), because, in most countries, the infrastructure to collect fuel excise taxes and import tariffs is already in place, while ETS implementation requires the establishment of a central agency responsible for market infrastructure, entailing auction venues, developing a strong IT security environment, robust carbon accounting rules, etc. This agency would also oversee decision-making on various aspects of trade that are subject to state capacity considerations, political contestation and special interests (PMR, 2021b). Furthermore, carbon taxes are more predictable, due to lack of price fluctuations caused by economic downturns, thus sending a

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clear signal to companies to shift from dirty fuels.[16] In contrast, ETS is subject to price fluctuations that might discourage low carbon technology investment and research and development efforts (PMR, 2021b). The predictability of carbon tax also supports budget planning by central governments (and government at all levels where carbon taxes are effective), and therefore supports the compensation mechanisms and green initiatives financed by the revenues that might be key for continuous public support and uninterrupted sustainability transition (see next chapter). Given the complexity of ETSs, carbon taxes are more transparent and more easily understood by the public, rendering higher democratic accountability (Carbon Tax Center, 2021). However, transparency can also work against implementation considering the general resistance from the public towards new taxes.[17] ETSs provide more flexibility to market participants. As a closing remark, I would note that adopting one type of carbon pricing instrument does not exclude the implementation of the other CPMs, as demonstrated by countries, such as Finland and Ireland, where both carbon taxes and ETSs are used. The above-mentioned flexibility in design choices provides ample opportunity for the implementation of hybrid schemes. One contribution of this dissertation is to analyze both single mechanisms and hybrid carbon pricing regimes for all countries that implement them.

Other carbon pricing mechanisms

Further pricing instruments include emission-reduction-credit systems (ERCS) and clean energy standards (Aldy and Stavins, 2012). One of the most well-known examples of ERCS is the Clean Development Mechanism, established by the Kyoto Protocol. Under this system, developed countries (Annex 1) have the opportunity to fulfil their domestic emissions reduction targets by purchasing certified reduction permits from developing countries (non-Annex 1). Certified reduction permits constitute zero-or-low-carbon projects, such as the production of biofuel or the construction of solar power plants. The rationale behind such a scheme is that, from the perspective of global warming, it makes no difference where in the world emissions reduction is achieved. Such schemes provide the flexibility and opportunity to reduce emissions relatively inexpensively. Article 6.4 of the Paris Agreement also provides countries with the possibility of meeting emissions reduction pledges by trading reduction credits internationally (United Nations, 2020). However, it is a highly contentious issue, due to previous, unfavorable

[16] Due to an inelastic demand for energy and certain basic goods (e.g., motor and heating fuels) the revenue can be relatively easily forecast from a budget perspective. Price elasticity is discussed in greater detail in the Theoretical Framework and the case study, demonstrating how price inelasticity can cause public skepticism as to the emissions reduction potential of carbon pricing.

[17] However, some research suggests that by using the word 'levy' or 'climate contribution' instead of tax, acceptability can be slightly improved (Baranzini and Carattini, 2017 as cited and discussed in Klenert et al., 2018).

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(some might say disastrous) experiences with CDM (see Böhm and Dabhi, 2009 for detailed case studies), as well as perpetuated conflicts around key design elements (for an overview of what is at stake and how such scheme might work, see: (Harrisson, 2020)).

Clean energy standards are a combination of cap-and-trade systems and technology-based regulations (Aldy and Stavins, 2012). The objective of this standard is to incentivize the implementation of a certain technologies by allowing companies that implement favorable, low-carbon technologies to sell credits to companies that fail to adopt new standards. For instance, if a renewable energy target (e.g., electricity generated through renewables) is in place in a jurisdiction, an electricity generator can sell its surplus allowances, earned by exceeding its target (e.g. 20% is the target, and the company generates 24% of its electricity from solar power, then allowances equivalent to the excess 4% can be sold on the market) to firms that lag behind.

2.3.3. Which Policy Response Shall Be Taken?

At the macro level, projections of the costs of sustainable transition, often expressed by aggregated GDP loss or increase of abatements costs, vary greatly, ranging from 1 and 6% by 2050. These variations depend on factors such as the desired emissions level and development of low-carbon energy and technology (Tol, 2009; Climate Policy Info Hub, 2021; IPCC, 2018). There are two crucial considerations that should be kept in mind in relation to mitigation costs. First, inaction will be increasingly costly to societies (Burke, Hsiang and Miguel, 2015) as the impacts of climate change can lead to economic and social destruction. The sooner we begin cutting emissions, and the greater the reductions we realize in the next decade, the fewer financial and social resources will be needed for adaptation. Preemptive action is significantly cheaper than future adaptation (Stern, 2007). Secondly, we need to invest considerably in low carbon technologies to reduce costs for transitions.

The cost implications of a policy option (abatement cost), combined with the likely emissions reduction capacity (abatement potential), determine which policy instrument or measure is taken by regulators. The costs of mitigation vary a great deal according to policy options, but typically encompass expenses related to emissions monitoring and verification, technology implementation, the operating government agencies, and the required equipment and expertise. Gillingham and Stock (2018) conducted an analysis of static costs, which refer to the cost implications of a given policy instrument in current terms and abatement potential of various climate policies. Their analysis provides a comprehensive overview of available mitigation solutions, as illustrated by next figure, which has been borrowed from McKinsey (2017).

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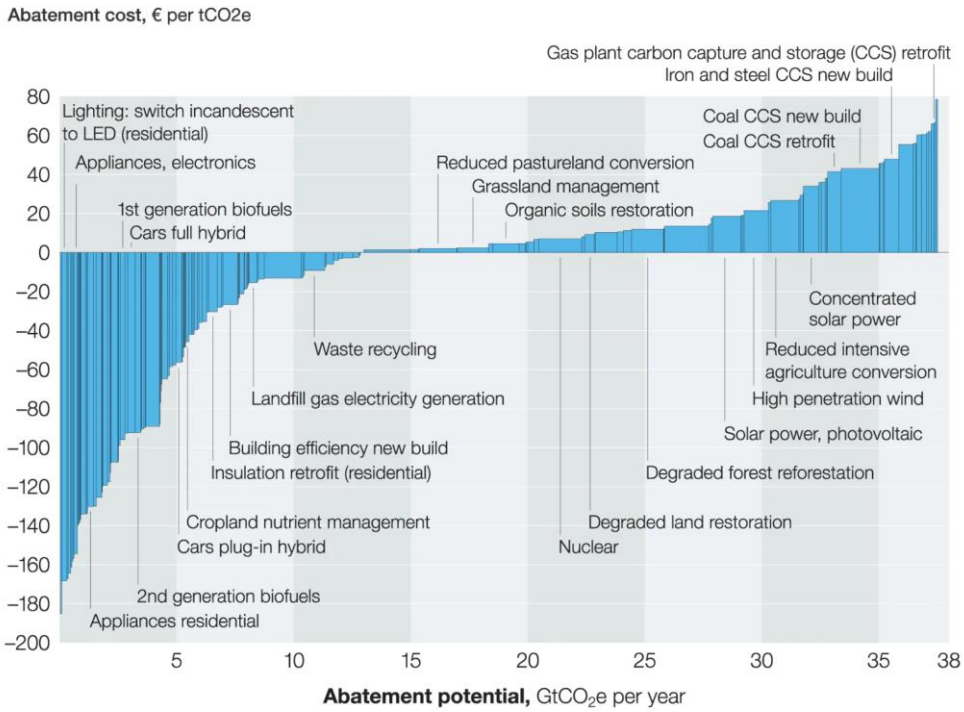
3. Figure - McKinsey's marginal abatement cost curve v2.1.



Source: McKinsey (2017)

Without going into great detail about the different policy options, two important remarks should be made. First, the price implications of various abatement technologies show what instruments will prove to be profitable investments after introducing a certain level of carbon price, and how much reduction can be realized by implementing these instruments. It might be surprising to see some mitigation policies with unexpectedly low carbon prices, but there are serious institutional behavioral and economic failures explaining why these policies are not adopted at scale, even when they are cheaper than more polluting, traditional alternatives. Cost transparency, myopia, multiple, conflicting objectives of the instruments, and special interests are just some of these factors (for a discussion see: Stiglitz and Rosengard, 2015, chapter 6 and Gillingham and Stock, 2018).

Second, the figures show static costs. However, as climate change is a long-term issue, we should be equally concerned with how these costs change over time due to *economies of scale*, consumer choices and learning, institutional behavior, and increased spending on research and development, which are captured by dynamic costs (Gillingham and Stock, 2018). For instance, the prices for solar photovoltaic systems and battery technology have dropped dramatically in a relatively short period of time, whilst nuclear power has remained costly over time.

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2.4. Ecological Sustainability: Competing Narratives

In the previous section, I discussed the causes and effects of climate change and possible policy responses to tackle the crisis, focusing on carbon pricing, which is theoretically the most cost-effective solution to address excessive GHG emissions. Although, in theory, carbon pricing modifies carbon-consuming behavior by imposing a fee on emissions, the underlying theoretical foundation for emissions trading systems differs remarkably from those of carbon taxes. In the following sections, I will discuss the two strands of thought, each having a crucial effect on the development of environmental economics and the public policy approach to climate change. Since more recent approaches have taken a more holistic view to climate policy development and effectiveness, both the Pigouvian approach and the Coase Theorem are challenged. This is crucial, because the scientific assessment of a policy's effectiveness is determined by the extent to which it achieves its primary objective, environmental sustainability. I argue that stringency can only be understood from an encompassing perspective that takes into account the greater socioeconomic environment in which carbon pricing policy is embedded.

2.4.1. Brief Semantic Analysis

The concept of carbon pricing originated with Arthur Cecil Pigou (1932) and Ronald Coase (1960). Pigou introduced the concept of externality. An externality is the cost or benefit that is not borne by the parties (buyer-seller or trading agents) who are directly involved in the economic exchange, and is external to market or decision-making processes. An example of a negative externality, discussed by Pigou in his work, is the smoking chimneys of factories in residential places, which harms the well-being of local citizens by affecting their health, increasing their need for artificial light, and, thus, imposing additional expense. An externality can also be expressed as the difference between the private, marginal costs (the price buyers pay for additional goods or services) and social marginal costs (the price representing the entire societal cost or the social effects of production). Due to the fact that businesses are self-interested, strive for profit maximization, and are concerned only with private costs, the social net product and private net product tend to diverge, thus resulting in reduced welfare for the society. This shortfall leaves room for government intervention. In the climate change analogy, externality is the product of greenhouse gas emitters who do not pay the costs for emissions (Nordhaus, 2019). In theory, if GHG emitters were forced to pay the full costs of production,

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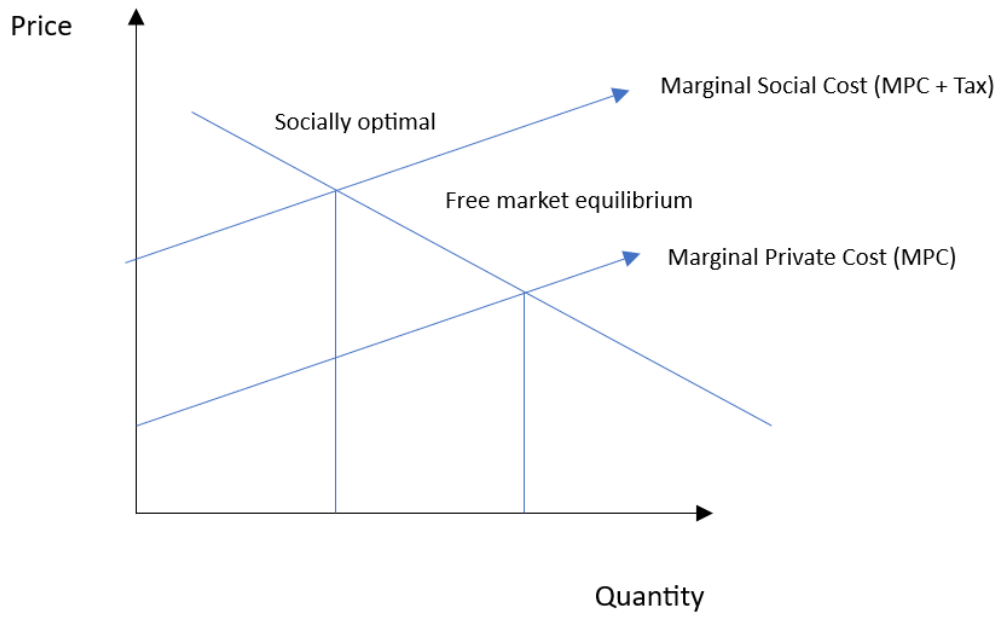
for example in form of carbon tax, it would pave the way for socially efficient production and consumption, as demonstrated in the following graph.

4. Figure - Pigouvian correction.



Source: own formatting

Coase (1960) criticizes Pigou's views on welfare and takes a different approach to social costs, or damages. According to him, government intervention might be unnecessary, as it may prohibit the realization of enhanced economic output by restricting certain activities. He argued that in an economy that is free from transactional costs (such as lack of coordination efforts, information asymmetries, contractual obligations or monitoring costs), and with properly allocated property rights to individuals, firms, and other entities, there is significant room for bargaining between parties. Bargaining can ultimately lead to the maximization of production value, and thus economically optimum levels of pollution (externality). From a climate policy perspective, the operation of emissions trading systems is based on Coase Theorem, as the efficient level for the carbon price is theoretically developed by trading property rights (pollution permits) among participants.

2.4.2. Critique of the Pigouvian Approach and Coase Theorem

The main problem with the Pigou's view is that it requires a precise assessment of the social damages (externality) and benefits. Gauging the optimal level of price (tax rate) and monetizing social benefits and costs is an exceedingly challenging task requiring serious moral considerations. These include how we are *discounting the future,* and estimating the effects of

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social and environmental damages that may come (which involves comparing present consumption to future consumption, and predicting the opportunities of future generations) (Pindyck, 2013). One example is the disagreement between two highly prominent climate economists, Nicholas Stern and William Nordhaus, over the desirable rate for future discounting: Nordhaus (1992; 2007; 2018) takes the long-term interest rate for capital for discounting (3%) in his Dynamic Integrated Climate–Economy (DICE) model, while Stern (2007) argues that the discount rate should be close to zero, because future generation's welfare is equally important. This fundamental disagreement results in very different outcomes about 'optimal' abatement efforts.[18] In addition to discounting the future, defining the benefits and costs of climate change is highly problematic, since global warming affects countries and social classes very differently[19], not to mention we have only limited knowledge of the complex functioning of the Earth system (e.g., what happens if we cross one or more climate tipping points?). This simplistic approach can be detected by many economic studies and climate models (as in most *integrated assessment models*), most prominently, in the calculations made by William Nordhaus's (2019), on the economically optimal level of global warming. He implied that a 3.5°C global temperature rise would be optimal by 2100, ignoring the fact that our scientific understanding is very limited as to how eco-services, essential for maintaining human life, might perform in such a warm world. There is also the fact that the *precautionary principle* teaches us to avoid possibly-catastrophic climatic change, and that the poor segments of the society and countries of the world may well be hit hardest as climate change effects vary greatly by region (Gowdy and Erickson, 2005; IPCC, 2018; Pindyck, 2013; Spash, 2007).

2.4.3. Theoretical Settings for the Political Economy of Carbon Pricing

While the Pigouvian tradition and Coase Theorem are based on distinct theoretical foundations, both approaches emphasize the importance of efficiency (social and market), as the primary objective of neoclassical economics' studies. As we asserted earlier, Pigou takes a more comprehensive approach by taking normative considerations into account in his economic

[18] It should, however, be noted that current research suggests that providing more accurate input to the model (energy balance, climate damage updates) may reconcile policy implications drawn from the model and UN climate targets (Hänsel et al., 2020).

[19] Also, if we act on Coase's arguments, the outcome of a bargaining process between a polluting factory and a richer, or poorer, neighborhood respectively, would be very different, as the latter have more limited economic opportunity, thus likely would accept higher emissions. Therefore, the poorer people would suffer more (experiencing worsening health effects, and also material damages). Coase does not seem to be concerned with questions of equity and fairness. Unfortunately, we see plenty of examples of such injustice, as socially marginalized groups are, indeed, more likely to live near highly polluted places than richer segments of the society (Boyce and Pastor, 2013; Schlosberg and Collins, 2014). For an example of a detailed explanation on global climate justice, see Ciplet, Roberts and Khan, 2015.

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analysis, but his views and approach are later reduced to finding economically optimal levels of pollution and the use of eco-services in the field of environmental economics (Coelho, 2015).

Newly emerging approaches attempt to overcome this simplified view (economy-environment-externalities) of environmental economics. Most notably, ecological economics (EE) and political ecology (PEC) take a broader, more holistic approach to the relationship between economy and nature (see Harris and Roach, 2017; Martinez-Alier and Muradian, 2015; Liverman, 2015; Van den Bergh, 2000; for a historical overview of how ecological questions have developed from an economic point of view, see: Costanza et al., 2014). Ecological economics is an interdisciplinary approach that examines the multifaceted relationship between economic and ecological systems. This field understands the economic and social spheres as embedded in a broader ecosystem, and, as such, they are inseparable and evolve interdependently. Essentially, political ecology analyzes and understands environmental changes from the point of social structures, engaging deeply with historical developments and power relations in society. The questions of how resources are appropriated, valued, used and distributed, and what effects these have on social arrangements (production, wealth and power or environmental burden) are central to political ecology inquiry. These two approaches have wide overlap as they have informed and shaped one another considerably over time. Compared to neoclassical accounts of economics that assume infinite natural resources (or at least an efficiency of extraction that can constantly be enhanced), and treat environmental resources solely as physical inputs to production and sites for their waste disposal, EE and PEC interpret nature as an integral and interdependent part of the social system. Therefore, environmental considerations (e.g., resource limits) are at the center of these co-evolutionary perspectives. For various factors such as consumer choices (e.g., car ownership), institutions (such as fossil fuel industries, wealth distribution and emissions rights) and knowledge (pertaining to fossil fuel extraction technologies and limits) have all co-evolved around our historical dependence on fossil hydrocarbons (Costanza et al., 2014, Martínez-Alier and Muradian, 2015; Malm, 2013; Mitchell, 2011).

I argue that this multifaceted approach is more suitable for examining climate-related challenges. By emphasizing the truth of finite resources on Earth, dependence of the economic system on nature, and the sociopolitical dynamics governing societies' response to climate change, the exclusive focus on optimal allocation of resources shifts to sustainability, which may produce remarkably different outcomes from an ecological point of view. This difference is clearly demonstrated by the gap between what climate models call 'economically optimal

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levels,' and what climate science suggests is tolerable for human existence,[20] especially if the precautionary principle is taken seriously.[21] As a result, while some theories aim to determine the economically optimal level of emissions reduction (meaning the extent to which emissions should be reduced, if at all), more critical accounts focus on understanding the root causes of climate change, addressing the limits to growth (scale), and determining the strategies for achieving emissions reduction (Bryant, 2019; Paterson and P-Laberge, 2018). Furthermore, traditional environmental and resource management approaches do not take other important factors into account that are crucial to analyzing climate change mitigation efforts, such as the institutional context of developing countries, or the need for a longer time horizon of analysis (van den Bergh, 2000). A summary of the main differences between classical environment economics and ecological economics is seen below.

4. Table - Key differences in traditional resource economics and ecological economics.

Aspect	Environmental Economics	Ecological Economics
Value determination	Economic value assessed by people's willingness to pay. Value neutral, expressed in monetary terms.	Pluralistic. Nature has inherent values.
Policy goal	Efficiency and growth	Sustainability. Mainly ecological resilience but also social stability, equity and well-being.
Approach to analysis	Focus on costs-benefits, externality, and utility. High abstraction.	Systemic, multidimensional. Integrated cause-effects models.
Uncertainty	Expressed as risks.	Precautionary principle. Emphasis on coevolution of subsystems (ecological, economic, and social).
Academic approach	Monodisciplinary	Transdisciplinary
Role of government	Minimized. Priority should be given to market and private institutions.	Key role in creating the institutional environment for sustainability.
Acceptance of market-based solutions.	Yes, advocating fiercely.	Critical. Market-based solutions may mitigate micro-level failures but cannot solve structural (macro) problems.

[20] It should be noted, however, that the two approaches tend to diverge (Ropke, 2005 and a demonstration in climate economics model: Hänsel et al. (2020)

[21] The precautionary principle, which is key in ecological economics, teaches us that if there is uncertainty/lack of scientific knowledge of the possible harmful consequences of our intervention in the environment (e.g., global warming above 1.5 C) preventive and proportionate actions should be taken to avoid irreversible harm.

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Other significant views	Technological optimism Resources are 'limitless' but at least can be extracted more efficiently over time.	Deliberate technological pessimism. Natural resources are scarce.

Table compiled from the comparative tables of Harris and Roach (2013, p. 13); Van den Bergh (2000, p. 16); Gowdy and Erickson (2005, p. 213) and Costanza et al. (2014, p. 58-59).

These emerging views inform my approach to carbon pricing in two fundamental ways. Most importantly, they confirm my resolution to assess policy effectiveness by prioritizing ecological sustainability over efficiency considerations. The diverging views on what the policy objectives of CPMs should accomplish (economic efficiency vs. environmental effectiveness) have important implications. Above all, the desirable price level to which carbon pricing should aspire, called *stringency*, is starkly different in these two approaches.[22] One strives for a price level that is in line with the scientific community's recommendations to keep global warming well below two degrees, considered to be a socially tolerable and scientifically more certain outcome (Boyce, 2018; IPCC, 2018). In contrast, carbon pricing guided by efficiency fundamentals aims for a price that reflects the 'social cost of carbon' (cost of emissions born by the society as externality) (Boyce, 2018). However, as explained, gauging the level of social costs is highly challenging and problematic for numerous reasons (Pindyck, 2013). The unknown probability and magnitude of future climate disasters; scientific uncertainty of climatic responses to a much warmer world; ethical considerations of discounting the future are just some of these issues (for a detailed discussion and comparison of the two 'camps', see: Boyce, 2018). Following an emissions trajectory entirely guided by efficiency considerations may well contribute to the unfolding of a scientifically uncertain, possibly destructive, ecological outcome to climate change.

Secondly, these approaches highlight the urgency of paying special attention to the political conditions and social relations that are woven into the fabric of climate policies, such as institutional configuration, energy profile and power relations. Relevant to my analysis, neoclassical accounts treat the functioning of carbon pricing mechanisms as neutral microcosms, separated from the sociopolitical environment in which they are embedded (Ervine, 2018; Bryant, 2019). Political economy scholars see climate policies as fundamental political constructs shaped by forceful dynamics specific to local development and particular historical contexts (Paterson & P-Laberge, 2018; Paterson, 2020; 2021).

[22] I discuss this problem in great detail under the section of Outcome Measurement in the Theoretical Framework.

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Regarding the universal market approach, low prices, plaguing the currently implemented global CPMs, are a direct result of governments' excessive intervention into the market processes with such procedures as *backloading*,[23] and allowing overlapping climate policies to function simultaneously. This results in depressed carbon prices and efficiency distortions. Thus, liberating the market from political considerations, and releasing the invisible hand guiding market interactions, will produce the lowest abatement costs and greatest economic benefits. Political economy scholars assert that the political and economic considerations cannot be separated. The dynamics of market price are artificially mediated by the emissions cap set by policymakers (because the cap determines the available pollution permits – on the supply side), which is, inevitably, the result of an arbitrary political decision (Ervine, 2018). In a similar vein, the decisions on which fossil fuel types and economic sectors are be covered by the carbon pricing policies will be profoundly determined by political considerations. For instance, phasing out coal, which is the most polluting fossil fuel (releasing both harmful substances and greenhouse gas), from the energy mix, would be a major step towards social efficiency, generating mounting benefits for society, such as cleaner air and better health prospects. Nevertheless, coal dependent regions can successfully block pricing initiatives or fight for exemptions. They do this by mobilizing power over local politics, as coal mining and power generation are relatively labor-intensive processes, employing a great number of constituencies. Other considerations such as ensuring the availability of cheap, stable energy, and providing vital contributions to local budgets could be equally important factors in policy deliberations.

After all, one may still argue that it seems contradictory to analyze carbon pricing instruments as primary tools for climate change mitigation. A number of ecological economics and political ecology scholars are quite skeptical about how far we can get implementing market-based instruments to solve a problem that was largely created by market forces. However, I argue that no climate policy, market-based or not, can be free from political considerations in the current socioeconomic framework. For example, renewables deployment and bioethanol production are similarly affected and weakened by various political economy hurdles (e.g., Haas, 2019; Morales and López, 2017). The main problem lies not with the instruments per se, but the challenging socioeconomic environment in which these policies are formulated and implemented. Some problematic features of carbon pricing may be seen as unique in the climate

[23] Backloading entails the decision on how to handle (e.g., to withdraw), huge numbers of surplus allowances, caused by, for example, economic downturns, floating in the market, keeping carbon prices constantly low.

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policy portfolio, such as fetishizing ecological costs, but the fundamental political economy dynamics shaping climate policies apply universally (see the Theoretical Framework for detailed discussion). Considering the woefully inadequate level of global effort to mitigate climate change, it would be naïve to assume that other climate policies could deliver the scale of emissions reduction needed to keep global warming under control without challenging the dominant socioeconomic status quo. Carbon pricing promises to contribute to the solution in a cost-effective manner through the reduction in consumption of fossil fuels and the encouragement of profitable low-carbon investments. As will be clearly demonstrated in the following chapter, there are mounting political economy constraints that hamper these policies (and other climate policies) from realizing their full potential, but these constraints can be successfully mitigated by conscious policy design choices. I argue that, it is a more constructive intellectual strategy to consider carbon pricing as a tool in our collective effort to fight climate change, than to reject it outright. If we engage with its politics and find out whether it can satisfactorily explain cases with stringent policy outcome, and analyze how persistent political economy hurdles might be overcome to support more ambitious climate policies, I deem to be of great value both scientifically and socially.

To sum up, weighing the disagreements between environmental economics and ecological economics in some key areas, it is not surprising that political economy (PE) scholars who embrace the importance of ecological sustainability, criticize economic efficiency-driven studies on numerous fronts. Notably, the imperative of efficiency in a policy objective should be an important facet of policy deliberations, but it is immensely simplistic in many regards when applied to the field of climate change mitigation. Classic conceptions about environmental economics cannot explain the realities of climate change and policy, nor take crucial ethical and political considerations into account, such as distributional impact. Of course, these two approaches are not mutually exclusive, as efficiency is an indispensable factor for policy-making and evaluation, and hybrid approaches are highly possible.[24] Some of the differences have also been presented here, to underscore the importance of more encompassing approaches to climate policy analysis.[25] Nevertheless, given the multifaceted challenges posed by climate change, priority in this paper shall be given to approaches that are better equipped to explain climate policies' environmental effectiveness and allow the construction of a holistic,

[24] Indeed, slow divergence can be detected in literature (Røpke, 2005)

[25] Neither shall we forget that ecological economics and political ecology are 'broad churches' and comparison is difficult with a much narrower, neoclassical approach. Nevertheless, at the level of policy analysis and evaluation, the differences are stark (Gowdy and Erickson, 2005).

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pluralistic framework of analysis, where ecological considerations, shaped by current socioeconomic structures, are the central locus for scientific inquiry. Therefore, my theoretical approach will be built upon ecological economics and political ecology insights, and will concurrently incorporate concepts from traditional political economy which is presented in the next chapter.

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Chapter 3: Theoretical Framework[26]

As demonstrated in the previous chapter, holistic approaches which integrate insights from political economy and ecological economics literature offer a powerful explanation for climate policy effectiveness and political dynamics governing state response to global warming. This chapter provides a deeper analysis of the political economy conditions shaping climate policies, and carbon pricing specifically. I present and discuss the systemic forces which drive increasing greenhouse gas emissions and the political dynamics of international climate negotiations. Furthermore, I analyze domestic structural political economy constraints that paralyze effective climate change mitigation efforts. However, as climate change has been accelerating, and thus the perception of the problem has altered, significant counter forces have emerged that can help overcome/mitigate these political economy constraints and thus support enhanced stringency of climate policies. This more abstract level discussion sets the analytical framework for the proposed intersectional model which analyzes carbon pricing stringency through the constellations of structural political economy conditions and policy design elements affecting the distribution outcome of policy.

The chapter structure is as follows. First, I discuss the main political economy challenges countries face when developing climate policies. By acknowledging the emergence of factors that militate against climate inertia and ignorance, I am discussing the powerful counter forces pushing states to address and deal with climate change. Here, special focus will be paid to unilateral incentive structures to implement and adopt carbon pricing instruments that overcome collective action challenges. The discussion on structural political economy conditions will be followed by a presentation of the main actors and their preferences in climate change mitigation, thereby delineating the power constellations among these actors engaged in the political bargaining process shaping climate policy outcome. After setting the scene, my claim unfolds as to why the distributional impact is ultimately the decisive factor in climate policy stringency. The core of my rationale is that the strategic use of carbon pricing revenue holds the promise to change current political equilibrium via mechanisms of compensation and coalition building strategies.

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[26] This chapter includes sections from the paper 'Pathways to stringent carbon pricing: Configurations of political economy conditions and revenue recycling strategies. A comparison of thirty national level policies', published in Ecological Economics, Volume 214 (2023), available at https://doi.org/10.1016/j.ecolecon.2023.107995.

3.1. Political Economy Conditions of Climate Action

Climate change is undoubtedly the most pressing environmental externality of our time, affecting literally all spheres of social life. To understand why it is utterly challenging to take meaningful collective action on preventing the exacerbation of the climate crisis and to facilitate sustainable transformation in the economy, I draw on political economy accounts to explain the conditions influencing states' response in an increasingly warmer world. I use the word 'constraint'[27] "to describe social, political and institutional contexts that appear to actively hinder climate policy progress" (Lamb and Minx, 2020, p. 2). However, such an explanation would be incomplete, as is the case in much of the literature, without comprehending the factors that mobilize states to take earnest efforts to combat climate change. Otherwise, we would not be able to understand why some states are more proactive domestically and push for more ambitious climate change mitigation efforts on the international stage. Therefore, key factors will be presented that mitigate persistent political economy hurdles and slowly erode the current architecture of institutional inertia around climate policies.

3.1.1. Collective Action Problem

Elinor Ostrom (2010, p. 551) defines collective action as "settings where decisions about costly actions are made independently but outcomes jointly affect everyone involved. If independent decision makers seek only short-term material benefits, they do not achieve feasible outcomes that yield higher returns for all who are involved regardless of whether they make costly contributions. Participants posited as maximizing short-term material benefits and making independent choices are not predicted to achieve this outcome".

This definition succinctly explains international climate deliberation. The main challenge to effective, collective climate change mitigation originates with the accessibility to and consumption of *safe climate*. Our climate is a global 'public good' which has two key characteristics (Stiglitz and Rosengard, 2015; Ostrom, and Ostrom, 1977). The first is *non-excludability*, meaning that no one can be excluded from enjoying this 'good.' The second is *non-rivalry*, meaning that it does not cost anything to extend the number of recipients of the good. These non-excludable, non-rival goods, which are being free and readily available tend to be over-consumed and under-produced (Schwartz, 2017). This is the phenomenon Hardin (1968) referred to when he wrote about "tragedy of the commons," also referred to in the

[27] It is important to emphasize that the terms of political economy "constraints," "hurdles" and "challenges" will mean the same and are used synonymously in this research.

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literature as 'common resource problems' (Stiglitz and Rosengard, 2015). The dilemma is that actors pursuing self-interest overgraze common pasture, thus leading to overconsumption (excessive grazing) which is hurting the group's long-term interests and creating social efficiency distortions.[28] This depletion could be prevented by converting the common resource (the land) into exclusive private poverty so the owner would act responsibly by taking long-term interests into account. This solution, however, raises notable issues such as equity, as others would be excluded, or enablement of monopoly business practices (Stigliz and Rosengard, 2015 based on Coase, 1960). Alternately, access to the pasture can be regulated by the government by imposing various rules such as individual quotas. The application of these concepts to climate change is straightforward where countries (and individuals) are self-interested actors dumping greenhouse gases into their own atmosphere, creating eventual social disaster. Since the cost of taking action (mitigation) is perceived to be high, especially in the short run, countries and individuals rush to pollute the atmosphere and benefit themselves by, for example, modernizing their infrastructure and enhancing their comfort, until the entire available carbon budget (limit of safe climate) has been used. The possible antidote to this is to *collectively* constrain polluting activities.

Climate change thus represents a massive collective action problem. As Mancur Olson (1965) argues in his seminal work, if a group that should come into an agreement on a specific issue is relatively large and there is no effective enforcing mechanism to keep its actions in line with its commitments, the group's objective will most likely not be realized. In the climate change analogy, a consensus is generally missing - on the scale of the problem and what solutions should be employed to tackle the problem - which is a prerequisite for successful deliberation (Harris, 2007). The huge number of actors involved in climate negotiations (both domestically and internationally) increases the coordination (transactional) costs dramatically. Ostrom (2010) also asserts that without an external agency to impose regulation and enforce compliant behavior through penalization or other means, no party will reduce emissions.

As climate change affects world regions differently, hence distributing costs and benefits unevenly, the incentives to deal with the problems differ by country as well (Cole, 2008). The complexity of the problem, which encompasses all economic sectors, requires the concerted effort of numerous groups, a situation that ensures coordination efforts will be increasingly difficult and inevitably lead to scaled-down ambitions. This is the case because the higher the

[28] See my discussion on Pigou's view in the previous chapter.

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number of participants in any deliberation, the more likely that the outcome will reflect on the lowest common denominator. Furthermore, the uncertainty of how climate change unfolds - the disparate values, interests and priorities of countries - also give rise to different perceptions of the problem, differing possible solutions, and different ideas about the demarcation line in the trade-off between economic development and mitigation efforts (Esty and Moffa, 2012). Incentives to free ride on other countries' efforts further exacerbate these problems (see below).

Game theories are thus well situated to explain the political impasse of international climate change negotiations (Dixit, Skeath and Reiley, 2015). From this perspective, climate change is understood as a classic *prisoners' dilemma*, where some countries have a powerful incentive to attempt to free ride on other countries' efforts as demonstrated in Table 5, even though a coordinated response would entail low costs (but more than inaction) and leave every party better off. Therefore, studies that use game-theory to explain the possible outcomes and prospects for more effective institutional configurations of the international climate change regime, come to quite pessimistic conclusions (see e.g., Barrett, 2007).

5. Table - Prisoners' dilemma.

		Country A	
		Reduce emissions	No reduction
Country B	Reduce emissions	-1;-1	-5;
	No reduction	0;-5	-10;-10

Source: based on Dixit, Skeath and Reiley (2015, p. 402). Payoffs (outcomes for each combination) represent changes in GDP. Illustrative purposes: Coordinated action would cost 1% of GDP, free riding would cost 5 % for the country that reduces emissions while collective inaction costs 10 % of GDP. As the dominant strategy of both countries (the move that produces better results no matter what strategy the country chose to take) would be to keep emitting greenhouse gases, occurring Nash-equilibrium is socially inefficient (Frank, 2014, Chapter 13).

3.1.2. North-South Division

As we can see from this brief discussion, the political impasse at the international stage of climate negotiations has largely been caused by the conflict on how the burden of transition should be shared among nations (Ciplet, Roberts and Khan, 2015). The most enduring rupture lies between developed and developing countries. Developing nations have been arguing that developed countries are historically responsible for the world's current climate problem because they have been dumping carbon into the atmosphere since the Industrial Revolution and have used up the lion's share of available carbon budget for their development. Therefore, developed countries should drastically reduce their emissions and let the developing world use the remaining carbon budget to catch up economically and enhance the welfare of their citizens. And in any case, developing countries lack the necessary financial and technical resources to

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tackle the consequences of a warming planet. The problem is further exacerbated by the fact that a changing climate will hit poorer regions of the world the harder (IPCC, 2018). An attempt by the international community to resolve this political impasse between developed and developing countries engendered the introduction of the *common but differentiated responsibilities* (CBDR) principle at Rio Earth Summit in 1992. CBDR acknowledges the ecological connectedness of all states and the common responsibility for a healthy planet, thus requiring all countries to make steps towards climate change mitigation, while it mandates advanced economies to undertake more ambitious measures to reflect their historical emissions record and enhanced capacities to cope with the consequences of a warming planet (Rajamani, 2000). However, throughout the history of international climate negotiations, developed countries have been reluctant to take responsibility as this could make them accountable for inaction and deteriorate their competitiveness (and thus global dominance).

If the benefits of climate action exceeded short- and medium-term costs for wealthy, big emitters such as the US, the collective action problem could be more easily overcome. However, as costs for early movers are perceived as being high and these countries have more resources to shield them from some of the worst consequences of climate change by investing in adaptation, developed countries are more interested in delayed response and offloading the costs to vulnerable countries that cannot exert significant influence on the international stage because they are politically impotent, impoverished countries (Ciplet, Roberts and Khan, 2015). Another solution would be if developed countries provided transfers to developing countries in order to convince them to participate in the collective reduction efforts, however the conditions and politics around such transfers would undoubtedly remain contentious[29] (Harris, 2007).

Nevertheless, exactly the same difference in effects and above-mentioned factors, such as disparate values and priorities, are the reason why the concepts about the developed-developing nexus are overly simplified. For instance, the EU countries (especially Germany and Nordic countries) are considerably more ambitious in their commitment and action than the US or Australia (Burck et al., 2020). In a similar vein, we can see a variation in approaches to climate change among developing nations according to vulnerability,[30] availability of cleaner energy

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[29] Quite understandably due to colonial histories and detrimental fiscal and monetary policies enforced upon developing countries by Bretton Woods institutions.

[30] Small-state islands, which will soon vanish due to sea level rise, demanding urgent action, while developing countries that rely on industrialization to develop their economy and citizens' well-being are hesitant to take action.

sources or climate diplomacy as foreign policy, all calling for a more nuanced view in analyzing factors affecting domestic mitigation goals and policy stringency.

3.1.3. Lack of Enforcement

The current architecture of the international climate regime lacks a robust enforcing mechanism to make sure the temperature targets are going to be met in the future. Therefore, there are no legal tools to punish non-compliance to the Paris Agreement, as opposed to, for instance, the Montreal Protocol where possible trade sanctions have been introduced (Harris, 2007). This patchy institutional configuration gives rise to opportunities for free-riding. It implies that economic actors attempt to enjoy the benefits of a safe climate without contributing to supply the public good. Countries wait for others to sacrifice financially and socially to reduce emissions, all the while they are keeping up or increasing their own emission levels. As each party acts in this spirit, no action is taken, therefore, the socially worst-case scenario is realized. If a party decides to act against these odds, it can find itself at a competitive disadvantage economically, without mitigating the overall problem significantly (Esty and Moffa, 2012).

3.1.4. Distributional Challenges. Low Willingness to Pay, Principal Agent Problems, and the Uniqueness of Climate Change Mitigation

Aside from the international factors that create an environment where forging favorable solutions is particularly difficult, climate change mitigation raises considerable domestic political economy obstacles. As with the case of every policy, there are winners and losers when climate policy is adopted. Adverse distributional effects of these policies are often seen as major obstacles to implementing and sustaining meaningful climate change mitigation efforts (Maestre-Andrés, Drews and van den Bergh, 2019; Wang et al., 2016). The carbon pricing problem differs considerably from other climate policies with respect to the greater distributional power of costs and benefits (Aldy and Stavins, 2012). Particularly, since poor households spend disproportionately more on satisfying basic needs such as heating and electricity, they are affected more negatively by the rising prices of energy and goods. That is why carbon pricing effects tend to be regressive[31] (Wang et al., 2016). Ambitious carbon pricing may affect wages for low-income earners who are more likely to be employed in manufacturing and extraction sectors (Haug, Eden and de Oca, 2018). However, income level is not the sole

[31] The situation in developing countries is more ambiguous, because poor households do not necessarily possess cars or have access to public utility (natural gas for heating, access to electricity and affordability issues) that are found in low-income households in developed countries (Dorband et al., 2019; Finon, 2019).

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nexus where the distributional effects at household levels can be analyzed. For instance, we may see important variations by looking at differences among rural-urban populations, as the former tend to spend more on energy-intensive goods due to lack of substitutes (e.g., insufficient public transport, lack of natural gas infrastructure). Size of the household, regional disparities (especially in coal-dependent regions), differing impacts on genders are all important facets on distributional impact in a jurisdiction (PMR, 2021a; Wang et al., 2016). Of particular note, in countries where (energy) poverty is a rampant issue, ambitious carbon pricing can further exacerbate vulnerable populations' welfare situations, challenging the accomplishment of Sustainable Development Goals and success of domestic poverty reduction efforts (Finon, 2019; Haug, Eden and de Oca, 2018; Vogt-Schilb et al., 2019).

Furthermore, energy-intensive industries face higher costs and more intense pressure in international competition from domestic emissions pricing that may have pernicious macroeconomic effects. In the short run, carbon pricing increases input prices (energy essentially) so corporate profit gets squeezed. Even if firms are able to pass costs on to consumers in these cases, demand is likely to reduce due to higher selling prices. Depending on the complexity of CPM (especially point of regulation), compliance and administrative costs can be burdening, especially for small and medium sized enterprises. Lastly, businesses that are exposed to international trade can find it increasingly challenging to stay cost competitive both in domestic and international markets where they need to compete with companies selling goods with higher, but unpriced carbon content. This raises the issue of potential carbon leakage, in which case firms relocate their production capacities to a country where environmental regulation is lax, which is a major concern for policy makers[32] (Haug, Eden and de Oca, 2018).

Other social and economic groups are affected by carbon pricing in various ways depending on numerous factors such as consumption patterns, business opportunities in an emerging low-carbon economy, or availability of alternative energy sources. However, the overarching situation is that all these groups are willing to pay only a fraction of the social costs of GHG emissions. This low *willingness to pay* is inherently related to the distributional impact, which renders effective carbon pricing impotent (Jenkins, 2014). The distributional consequences of carbon pricing, as a transparent, cost-increasing form of climate policy, typically faces strong

[32] It should be noted, however, that empirical evidence cannot confirm that carbon leakage occurred in countries where carbon pricing has been adopted (Bose, Bridges and DeFrancia, 2019; PMR, 2015, p. 24), but this may be caused by low carbon prices.

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political opposition from the public and industries[33] than other mitigation policies, thus significantly constraining the political space for implementing and sustaining CPMs (Dechezleprêtre et al., 2022; Fairbrother, 2022; Krosnick and MacInnis, 2013).

It is essential to understand the reasons for the low willingness to pay, and why the distributional impact of climate change mitigation is more accentuated and differs significantly from other policy sectors. The distributional impact of policy reform always poses challenges for political acceptability regardless of the policy sectors. However, the costs and benefits of such innovation are more transparent in traditional policy sectors such as education and health care (and even in environmental policies) than in climate change mitigation. Climate change is a phenomenon distinct in nature in multiple ways from traditional policy sectors, and thus creates a unique set of circumstances for the policies to address (Fiorino, 2019).

The main reason for this uniqueness is that the causes and effects of climate change are spatially and temporally separated. A coal fired power plant in Poland that has been operating for 25 years has contributed to bushfires in Australia, to unprecedented droughts in Africa, and to more intense typhoons in Asia throughout its operation. This discontinuity of geographic location distorts the social perception of the problem. Ambitious climate policy is further weakened by various *principal agent problems*, imposing other challenges (Jensen and Meckling, 1976). For instance, in the current institutional configuration states are committing to reduce emissions on the international stage while they leave the bulk of the necessary actions to domestic actors (like industrial installations to develop low carbon technology or citizens buying more responsibly). Even if a country sets an ambitious emissions reduction target and devotes resources to climate action, local actors may have different incentives. Furthermore, climate change produces an intergenerational conflict, as the costs of transition are born by current generations sacrificing some of their own immediate, potential development and welfare, whilst the benefits of a safe climate will largely be enjoyed by future generations.[34] As Furceri, Ganslmeier and Ostry (2021, p. 6-7) point out: "short-term adjustments costs for the economy from CCPs [climate change policies] are significant, while significant benefits materialize only in the very long run. What constrains the political will even further is that the benefits of CCPs are not directly observable because they materialize in the absence of environmental damage."

[33] Examples are abundant. E.g.: "Gilets Jaunes" protests in France (2018), failed fuel subsidy reform in Nigeria (2012), repealed carbon pricing scheme in Australia (2014) (Maestre-Andrés, Drews and van den Bergh, 2019, p. 1187; Ohlendorf et al., 2020).

[34] Or, this can be phrased as: current generations reaping the benefits of a safe climate and leaving a too-warm planet to future generations.

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Climate change mitigation differs in other important aspects too. Firstly, climate change is irreversible. History shows us that people can live in dreadful circumstances (e.g., crippling poverty) for centuries. However, how humankind might cope with, or even continue to reproduce itself, under extremely adverse conditions, in a world where essential ecological services might disappear altogether, is anything but certain. Secondly, despite the growing sense of urgency in response to this irreversibility, action is hindered by the fact that global warming transcends national borders, evading democratic control and abrogating accountability. Thirdly, uncertainties around climate modeling, the slow evolution and intangibility of the crisis (we cannot 'see' and 'smell' climate change), occurrences of weather anomalies, and different hypotheses as to how decarbonized economic systems would perform, all add to this complexity. Lastly, the slowly evolving problem of climate change inhibits us seeing the crisis in its totality, which is further complicated by people's reluctance to sacrifice what they have for future gains, as we cling ever harder to our current endowments ('loss aversion'), even at the price of forgoing better options (Bazerman, 2006).

As a result, these uncertainties give rise to numerous cognitive biases (for instance, positive illusion, omission bias or exaggerated technological optimism) and disparate approaches taken by different groups. These might include challenging scientific positions or taking a more cautious approach to climate change mitigation, which could hinder decision-makers from being proactive (Bazerman, 2006; Michaelowa, 1998). These differences and above discussed distributional impact have tangible effects on carbon pricing and any other climate policy. Among all, the most crucial aggravating factor is the reluctance of citizens and firms to pay for the high costs of climate change. Of course, not all of these variables can be factored into my analysis, but they point out the distinct and particularly challenging nature of this policy field, rendering this analysis all the more important.

3.1.5. Rent-seeking Behavior

The last political economy hurdle is *rent-seeking* which refers to the deliberate attempts of actors to change public policy (or keep the profitable status quo) to benefit their own interests (Kruger, 1974; Congleton, 2019). 'Rents' are generally understood as excessive gain or profit realized through government transfers. These transfers encompass a variety of forms such as concessions, tax breaks, subsidies, higher entry costs for new market participants, or enabling

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monopolistic price-setting in the market through *cartelization.*[35] The reason why political actors create and let rents to be extracted by private actors is to benefit themselves along the way. Traditionally, rents are created or redistributed to private actors in order to receive something valuable in exchange. These values can take forms such as campaign contributions, political support from powerful groups such as trade associations, jobs to voters, but also illicit money to public officials. Generally, rent-seeking is highly negative from a social point of view, as it creates deadweight loss (as rents and financial resources spent on lobby for rent creation are not used productively) and deteriorates trust in institutions, among initiating other negative developments (occurring social costs first discussed by Tullock, 1967). Rent seeking happens in all countries, as it is generally highly rewarding for private actors to fight for and collect rents (unless the lobbying costs exceed achievable rent). As well, public officials may have very different incentives from the public that elected them, such as staying in power, gathering more wealth or creating opportunities for their future career (Hillman and Van Long, 2019, Holcombe, 2016). But to what extent such behavior can escalate, harming economic efficiency and damaging social strata, depends on local circumstances, such as the level of corruption and institutional checks and balances in place (Congleton, 2019; Congleton, 2019a). Indeed, there is a strong relationship between quality of institutions, level of corruption and climate policy stringency (Klenert et al., 2018; Levi, Flachsland & Jakob, 2020; Rafaty, 2018).

The field of climate (in)action is abundant with examples of rent creation, extraction and seeking. Generous subsidies to fossil fuel companies, public infrastructure development benefiting oil and natural gas companies, unpaid social costs of emissions, privatizing public utilities where competition is non-existent — are all examples. Launching the carbon market is itself a rent creation act that can benefit carbon traders, investment banks, project developers and, if the policy is poorly designed, big polluters as well (Coelho, 2009). The question of why and how fossil fuel interests can so successfully influence policies and thus extract created rents is examined in the Actors section.

3.2. Counterbalancing Conditions

3.2.1. International Environment in Motion

Due to the free riding problem of climate negotiations (prisoners' dilemma), it is common to explain the apparent failure to develop an effective emission reduction regime from a game-

[35] Independent market actors engaged in market distortionary, profit-maximization practices that limit competition (e.g., collude to fix high prices).

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theoretic perspective. However, it should be noted that climate negotiation is not a one-time show, but a series of subsequent deliberations where parties can change strategies to work towards greater cooperation[36] (Liebreich, 2007). For instance, some countries that feel historic responsibility for inducing climate change or see a competitive advantage in green investments may go forward without a commitment from other countries. The EU's Green Deal as an overarching strategy for boosting economic growth and the Chinese investments in the renewables sectors are prominent examples. This shows unconditional efforts which build moral ground to nudge (or using soft power instruments) other parties to follow suit. 'Reiteration' is another strategy that worked well for the Montreal Protocol where possible trade sanctions were introduced to enforce compliance. The recent plans of the EU to introduce a carbon border adjustment mechanism (a tariff paid based on the carbon content of imported products) is similar. Here, even the possibility of implementing such a measure sends a clear signal to other parties that the rules of the game have changed. Furthermore, climate diplomacy as an increasingly important tool to expand power globally does not work without unilateral commitments. This partly explains California's pioneering role in the US, the behavioral change of South-Africa on decarbonization matters, and China's stance on sustainability issues (Atteridge, 2011; Ciplet, Roberts and Khan, 2015; Cullenward, 2017). But most importantly, as climate change accelerates, the impacts have become more tangible, a situation which is gradually eliminating the 'dilemma' of free riding.

Therefore, it is important to emphasize that the political economy hurdles are losing ground over time. As climate change becomes more visible in numerous ways, such as disappearing seasons in continental Europe, more frequent and intense hurricanes, heat waves and deadly wildfires, the benefits of addressing it also become more apparent and tangible. As the perception of the problem changes, so do the politics around it (Ciplet, Roberts and Khan, 2015). The wave of environmental protest led by Greta Thunberg that swept across the globe in 2019 showed that awareness of the problem reached new heights and can now mobilize masses.

While the architecture of the Paris Agreement of 2015 is patchy, especially because of not including any sanction mechanism and relying primarily on efforts by individual players, it still provided a normative framework to keep governments and corporations accountable for their (in)action on climate change. Now, there is reference to the Agreement from investment houses,

[36] Thus, it is better to see it as repeated games.

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asset managers,[37] central banks requiring financial institutions to report on climate risks and multinationals pledging to cut GHG emissions dramatically (Bolton et al., 2020). The new wave of carbon pricing implementation across the world can also partly be attributed to the Paris Agreement (Thisted and Thisted, 2019). There is no doubt, we are still far from the emissions reduction needed to keep global warming under a 'safe' and tolerable level (IPCC, 2018) and commitments from states and big corporations are too often stuck at the level of rhetoric (Black et al., 2021).[38] Nevertheless, the pressure is clearly increasing on key actors to deliver on Paris promises demonstrated by the net zero pledges from leading emitters such as the US, China and the EU.

Collective action theory alone also cannot explain why some individuals, cities or countries go forward with ambitious climate policies, even without an external agency imposing regulation and penalizing non-compliance (Ostrom, 2010). Indeed, Ostrom (1990) has demonstrated in her studies how creative solutions and principles to these organizational problems, such as democratic decision-making, ethical considerations and gradual sanctioning, mitigate collective action problem and can create the sustainable use of resources in a common property governance (Dietz, Ostrom and Stern, 2003; Ostrom and Williamson, 2009). However, climate change represents a problem of much greater scale than the environmental challenges discussed by Ostrom. Beyond the well-known structural conditions, such as, climate awareness and vulnerability,[39] working in favor of enhanced climate ambition, my claim is that this inconsistency can be at least partially addressed through, unilateral incentives that parties can use to achieve stringent climate policies. At an individual or household level, examples of such incentives are better insulation of homes, carpooling and other energy-saving practices through which significant costs can be cut. At the city-level, we see preparation for climate change effects in anticipation of preventing exorbitant spending in the future. The following section details these incentives occurring at a national level, paying special attention to benefits generated by carbon pricing.

[37] For instance, see the Net Zero Asset Managers initiative: https://www.netzeroassetmanagers.org/.

[38] There are related concerns such as 'carbon washing' (In and Schumacher, 2021 based on the concept of 'greenwashing') and dubious offset permits floating in even well-regulated carbon markets like in California (Badgley et al., 2021) that give false impression on climate progress.

[39] These are: higher income level; low share of fossil fuels (especially coal) in electricity generation; enhanced institutional capacity; lower level of corruption, higher level of education and social trust and political regime type (Best and Zhang, 2020, Dolphin, Pollitt and Newbery, 2020; Lamb and Minx, 2020; Levi, Flachsland & Jakob, 2020), though some of these factors are deeply intertwined (Lamb and Minx, 2020).

3.2.2. Unilateral Incentives of Carbon Pricing

There has been a long discussion on how to overcome the global collective action problem of preventing dangerous climate change, but much less attention has been paid to the potential co-benefits of climate policies that serve national interests very well (Parry, Veung and Heine, 2015). Indeed, there are powerful unilateral incentives for using carbon pricing to enhance the welfare of citizens and improve the economic performance of countries. The deeper the knowledge we accrue on the causes and effects of climate change, the better assessments we can make on how the problem is linked to economic performance, current social calamities, and various forms of environmental degradation (Ürge-Vorsatz et al., 2014). Carbon pricing can go beyond mitigation, yielding benefits that are more immediate, localized and tangible for decision-makers, citizens and economic actors, thus can help to overcome paralyzing political economy hurdles (PMR, 2021c). These co-benefits (also called ancillary benefits in the literature) can be categorized into three groups: economic, environmental, and social benefits. The different categories will be analyzed separately below, with the tacit acknowledgement that they are all intertwined.

As we discussed above, due to numerous reasons, such as intergenerational problems and free riding incentives, the social costs of emissions are not paid by polluters and consumers. Since future costs and benefits are not properly assessed and prioritized by these actors, present actions are inadequate. However, if we consider externalities other than emissions, mainly increased mortality rate and public health care costs due to air pollution or the economic costs of road accidents and wasted time in traffic congestion, the aggregated present benefits of climate policy can easily surpass all occurring costs (Nemet, Holloway and Meier, 2010; Parry, Veung and Heine, 2015). This observation has two essential implications. First, it suggests that countries should not necessarily wait for others to implement stringent carbon pricing policies. Secondly, theoretically it suggests that there is more support or incentive for mitigating the political hurdles of carbon pricing.

The economic case

A significant benefit of carbon pricing adoption is that it raises substantial revenue for states. This is in contrast to other climate policies such as regulation, performance standards or even *feebates*[40] that tend to be revenue-neutral. Crucially, as environmental pollution and emissions

[40] In a *feebate* system, buying vehicles with high carbon consumption (petrol and diesel cars) is discouraged by imposing a fee on these transactions, while purchasing vehicles with low emissions (electric, hybrid) is encouraged by providing rebate to consumers.

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are not priced (or underpriced) from an economic efficiency point of view, this form of tax will not be distorting, in contrast to labor and corporate taxes. A price level of $35 per ton on emissions would generate revenue between 1-2 % of GDP[41] in most jurisdictions (Parry, 2019, p. 19). Crucially, carbon revenue utilization provides present, tangible benefits to citizens and private actors. There are myriad paths to spending this revenue in economically efficient and productive ways. Lowering tax rates on employment, corporate earnings or essential goods, not only reduces deadweight loss but offsets some of the negative consequences of mitigation policy. Carbon revenues can also be employed to finance infrastructure projects (e.g. digitalization or high-speed railway) and reduce national debt, all enhancing the macro-economic performance and competitiveness of a country (Jakob et al., 2016). Therefore, carbon pricing increases efficiency in two ways. First, by internalizing the social costs of emissions and potentially again (in a second way), by spending accrued revenues on the elimination of other forms of economic distortions (argued in the so called 'double dividend' literature, Edenhofer et al., 2015). Consequently, carbon pricing generates revenues that provide means for investment in the natural, human and physical infrastructure without introducing further distortions in the economy. The most efficient way to spend revenues effectively is naturally determined: by local circumstances such as the rate for distortionary taxes; by the level of national public debt; or by the general state of the investment environment.

Ian Parry (2019, p.18 based on IMF, 2019) calculates that if the main emitters adopted a carbon price level of $35 (China and India) and $70 (Canada and the US), it would cost two percent of their consumption by 2030. However, if 1/3 of carbon revenue was used to compensate bottom 40 percent of the population for the increasing energy and product prices and the rest to invest productively in the economy (tax reductions and public investments), then the bottom 40 percent of households would be better off in all countries and the burden on higher-income households would be negligible. Vogt-Schilb et al. (2019) came to the same conclusion, with comparable rates of revenue to be redistributed, in their analysis of 16 Latin American and Caribbean countries.

Environmental benefits

The main environmental co-benefit of carbon pricing is improved air-quality.[42] Carbon pricing targets primarily emissions reduction, but fossil fuel combustion creates dangerous air

[41] Of course, it depends on local circumstances such as the carbon intensity of the economy.

[42] Improvement in water quality, soil health (through reduced soil acidification and deforestation) are also significant co-benefits and directly impacted by carbon pricing, but, for demonstration purposes, I only discuss air-quality in more detail.

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pollutants such as particulate matter and sulfur dioxide while emitting GHGs (Boyce and Pastor, 2013)[43]. These hazardous air pollutants have a detrimental public health and economic impact. Poor air quality contributes to increased mortality rate, respiratory illnesses, and worsening health conditions, all causing reduced economic activity and increased costs in health care. According to the World Health Organization (2021), air pollution was a major cause for deaths from lung cancer (29%), heart disease, stroke (25%) and respiratory infection (24%) globally in 2016. The European Environment Agency (2019, p. 6) estimates that about 420,000 premature deaths could be attributed to air pollution in Europe alone. Air pollution is an acute problem all over the world and it is not confined to developing countries - though undoubtedly a more pressing issue there because solid-firing heating and electricity generation is ubiquitous. Although, calculating the costs and benefits of air quality is very challenging, as it is in all fields of environmental policy,[44] there is an emerging consensus that carbon prices would nevertheless be considered a worthwhile expense because the domestic benefits of even a high carbon rate (rising to 70 USD by 2030) would still surpass costs in most countries (IMF, 2019, p. 29-30; Nemet, Holloway and Meier, 2010). These estimations take into account the costs of road accidents and traffic congestion[45], since calamities related to transportation[46] would subsequently be reduced by carbon pricing, if we can assume that people would use more public, or sustainable, forms of transport (electric vehicles, carpooling, etc.).

The environmental integrity and effectiveness of a carbon pricing scheme could be further strengthened if the revenues they generate were employed to finance other green efforts. These efforts may include renewable energy deployment or large-scale energy efficiency programs (e.g. public buildings insulation or heat pump installations in households). The objective of economic efficiency and environmental gains can be conjoined in cases where revenue is spent on initiatives that address other market failures related to climate change (e.g., knowledge spillover). An example for such an initiative is the tax-break or credits to businesses to invest in R&D of low carbon technologies such as green hydrogen and geothermal energy. A similarly productive way of using revenue is to provide targeted assistance to hard-to-abate sectors such as steelmaking and cement production by taking over the costs risks of developing new

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[43] Countries may have better incentives to reduce or eliminate local pollutants than the global pollutant of CO_2 because they can reap direct benefits from it.
[44] E.g., how can the benefit of stable energy supply be quantified?
[45] Of course, there might be uncertainties around these calculations. For instance, congestion may not be reduced if individuals simply switch from traditional to electronic vehicles instead of using public transport and alternative modes of transportation (e.g., bicycles). In this case, air pollution from burning tires, releasing significant amount of toxic pollutants, would not be decreased.
[46] Consider other important factors such as property damages, injury costs.

technologies or reorganizing inefficient coal-firing power plants by retrofitting or converting them into natural gas-firing plants.

Social welfare enhancement

Apart from preserving environmental integrity, countries generally pursue important social objectives such as poverty reduction or better health prospects for the benefit of their citizens. Issues such as increasing inequality - which can lead to various social calamities such as democratic backsliding, higher suicide rate, and lack of social cohesion - recently received particular attention in academia and policy circles (e.g., Wilkinson and Pickett, 2020) Various forms of inequality and injustice are apparent in climate change and environmental issues as well. For example, it is well-documented that marginalized groups (low-income households, racial and ethnic minorities, elderly) are more concentrated around main pollution sources such as factories, refineries, power plants and congested roads (see e.g., Hajat, Hsia and O'Neill, 2015 on global comparison or Boyce and Pastor, 2013, p. 803 on the US). Climate injustices include the fact that climate change effects take the heaviest toll on the poorest, most vulnerable segments of society, those who least contributed to the problem and have the fewest resources to deal with the dire consequences (Ciplet, Roberts and Khan, 2015, p.5-6). Deforestation and land loss endanger the lives and culture of traditional societies built around local ecosystems. Therefore, policies that successfully reduce fossil fuel combustion and prevent the release of greenhouse gases from intentional, anthropogenic processes also generate significant concentrated health and material benefits to these vulnerable communities, which in turn successfully mitigate social inequality.

Here again, the positive effects of carbon pricing can be enhanced by using revenues for particular social objectives. For instance, they could be spent on financing large-scale energy efficiency measures (e.g., insulation), energy bill assistance and a renewables deployment program for poor households, as in the case of California cap-and-trade program where environmental justice is a core principle for carbon pricing. Alternately, states could spend more on education, women empowerment, peace-building missions (Colombia) or on other developmental objectives (PMR, 2019; PMR, 2021a).

Besides all of these direct environmental, economic and social benefits, carbon pricing could help achieve other crucial social objectives (see Figure 5). These include reducing energy import dependence; mitigating environmental problems that are hard to detect, like leakage from oil tanks (Parry, Veung and Heine, 2015); increasing energy access in rural areas; heightening efficiency in the economy, which liberates resources; and initiating a green

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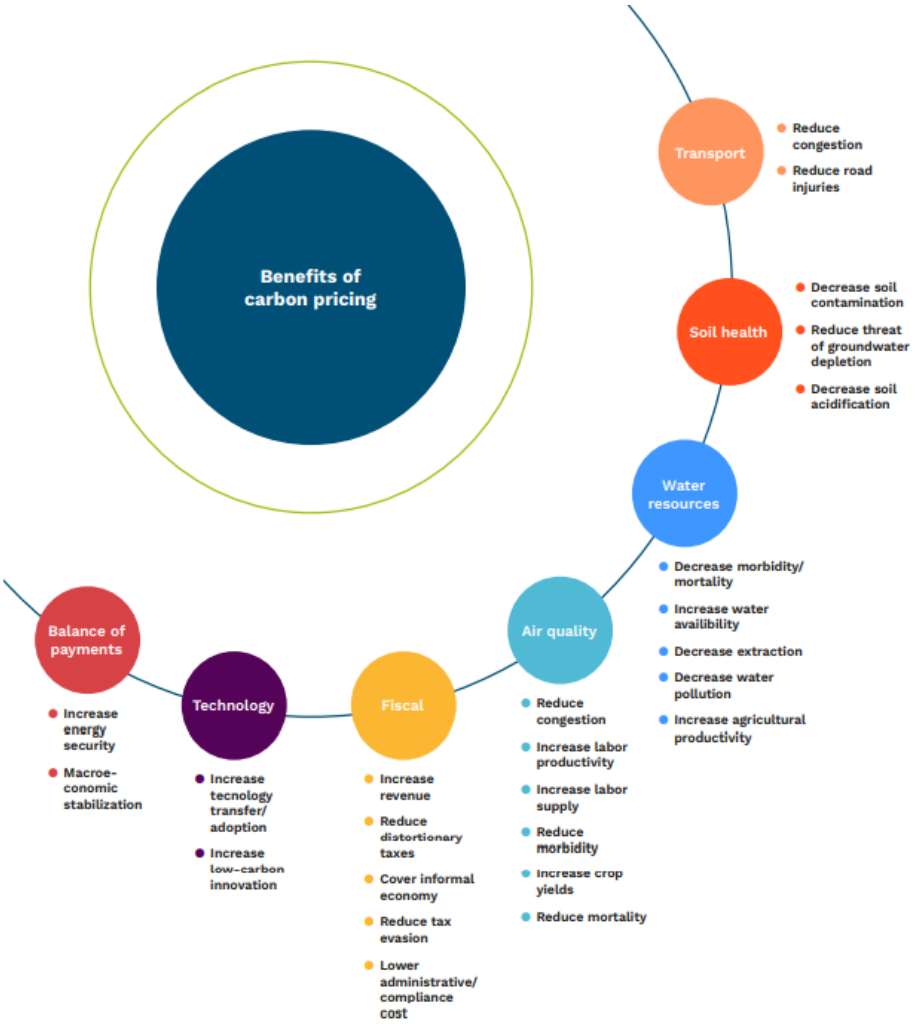
economic transition with low-carbon technological innovations. The above are all possible, positive effects of carbon pricing implementation. Even if these factors are hard to quantify economically, they provide strong incentives to states to implement carbon pricing that help to realize numerous objectives simultaneously.

5. Figure - Overview of co-benefits of carbon pricing.



Note: reprinted from PMR (2021c, p.9).

As an important concluding remark, it must be emphasized that revenue recycling is necessary to achieve higher economic efficiency and improve welfare. Without revenue recycling, carbon pricing effects are, in most cases, regressive and may put heavy burdens on both social groups and economic actors, especially in developing countries. As Wang et al. (2016, p. 1128) rightly point out: "regardless of a country's development status, the design of the carbon tax with respect to how the tax is implemented and how its revenue is recycled could effectively weaken or eliminate its initial regressive or progressive effect in either developed or developing countries." Furthermore, after adding the value of air-quality co-benefit and lump-sum transfers

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to households to the equation of economic cost-benefit analysis, Boyce (2020) demonstrated that most households would receive positive net benefits. In consequence, he (p. 29) argued that: "If climate policy addresses these distributional issues in an egalitarian fashion […] the outcome can be positive net benefits for the majority of people in the present generation. These health and income benefits can attenuate or eliminate the ostensible tradeoff in climate policy between present and future welfare. In turn, this could help to overcome one of the greatest political obstacles to taking effective steps to safeguard the world's climate." These thoughts encompass the main argument of this thesis. The exact mechanisms of how revenue recycling can enhance political acceptance by effectively addressing local political economy conditions is further discussed below.

Unilateral incentives to implement carbon pricing will likely not be sufficient to keep dangerous global warming under 2 °C as set forth by the Paris Agreement (Edenhofer et at., 2015), but they clearly demonstrate that local and direct co-benefits of climate action exceed economic costs presently.

To sum up, carbon pricing provides substantial local and immediate co-benefits to societies. Enhanced economic and resource efficiency, macroeconomic performance, accelerated green transition, reduced health care costs and improved social conditions (health and equity) are all welcome policy effects over and above mitigation. The welfare gains realized can be further increased and maximized by investing the carbon revenues, that are generated in an economically non-distortionary way, into the real-economy, environmental projects and social objectives. The question remains, however, whether these revenue recycling opportunities and schemes can enhance the political acceptability of carbon pricing and can support the implementation of more stringent policies and if so, under what structural conditions.

3.3. Main Actors

Actors that are involved in climate policy deliberations do not represent homogenous groups. Far from that. Some states are remarkably ambitious in climate change mitigation despite very limited financial resources (e.g., Morocco), while other wealthy nations are lagging behind (e.g., Australia) (Burck et al., 2020). Some fossil fuel companies invest in renewables and other sources that can generate profits during and after energy transitions, while others still insist on exploiting traditional hydrocarbons and pooling resources in order to impede climate action. In a similar vein, some environmental non-governmental organizations (ENGOs) deploy anti-capitalist rhetoric, whilst others are more ready to engage in reformist discussions about, for

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instance, employing market-based instruments. Lastly, citizens may have very different opinions as to the gravity of the climate crisis and how to deal with it. These diverging opinions are particularly evident in the US, where there is a huge difference in climate change perception between Republican and Democratic voters (14% as compared to 65% respectively, worry about climate change[47]) (McCright, Xiao and Dunlap, 2014). In other regions such as in the EU, citizens are more united in this respect. However, despite these differences, some overarching features about climate change apply to these different social groups. In the following sections, I shed light on the interests, preferences and relative power of the key participants in climate action. My intention is to provide a nuanced overview to better understand the motivations behind the measures shaping climate policy outcome. For example, I try to demonstrate how the nation states are compelled to take steps towards decarbonization, yet how these same efforts may collide with domestic interests. Since the empirical chapters are conducted at the macro-level (see next chapter), the focus is on the overarching or aggregate interests of these groups, which are strengthened or weakened according to the structural conditions discussed in the following subchapter. For instance, a higher level of fossil fuel dependence in a country presumably affords domestic fossil fuel producers and distributors more political influence in the national economy. Or, since material considerations often prevail over environmental concerns, it is assumed that the public becomes more receptive to stringent climate policy, when the policy does not thwart their financial interests.

3.3.1. States

Whilst we can see an increasing activity at local and regional levels to deal with climate change[48] (Bulkeley et al., 2019; Di Gregorio et al., 2019), the main political actors in climate change mitigation are still national governments acting on behalf of states.[49] The main reason for this is that the policymaking power and resources to manage occurring socio-economic challenges, in the wake of sustainability transitions, are concentrated at a state-level (bureaucracy, mandate to sign international agreements, etc.). Furthermore, central governments have a distinct role in coordinating the actions of numerous social groups and economic players, which is essential for effective climate change mitigation efforts. Crucially, consent among major economic and political actors to endorse policy reform is forged via state institutions. Similarly, allocating significant resources to nurture new technologies and boost

[47] Brenan, 2021 (Gallup poll).
[48] Transnational network of municipalities, regional commitments, etc.
[49] In this framework, the state is abstract whose power is exercised by governments (agency).

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innovation by increased spending on research and by development (R+D),[50] and by changing the economic track of a country, can hardly be imagined without the political commitment and fiscal capacities of national governments. Escalation of the climate crisis with more frequent, possibly more devastating, ecological disasters also calls for an increasing role of the state.

In this research, I take a pluralistic definition of state. In my understanding, states' main role is to perpetuate current social and economic order, which reflects the preferences and relative power of social groups within states. This study employs a rather programmatic definition of power: "Power is […] an actor's ability to achieve or at least to affect a certain outcome" (Marquardt, 2017, p. 169). Generally, tackling climate change is perceived by voters to be costly and to hurt powerful incumbent interests, thus progress on climate change mitigation has been limited. This can explain why the transition to sustainability has been curtailed successfully by entrenched fossil fuel interests that provide the lifeblood for national economies (see below). However, the power of social groups competing within states is in constant flux conditioned by domestic struggles,[51] shifts in dominant ideology, and international developments (Gramsci, 2007). This contingency implies that policy outcomes can change. Mass environmental protests; the emerging concept of a 'green economy' which provides the ideological underpinnings and institutional 'glue' for accumulation by decarbonization; the Paris Agreement or domestic legal verdicts enforcing states to address climate change more seriously, are all just some of these factors. Thus, state action is relational, dynamic and contingent upon numerous forces (Johnstone and Newell, 2018).

What is particularly relevant to climate change is that state intervention at a certain point (which is actually more of a process than a static point, unless a huge crisis hits), is inevitable to perpetuating the stable operation of the economy and social order. This transitional situation implies intense conflicts, because states need to maintain the functioning of a carbon economy as this currently provides the necessary conditions (e.g., employment, taxes, order) for their power and legitimacy (Baker, Newell and Phillips, 2014). However, states' medium- and long-term survival will be prominently determined by the response they give to climate change. The transition requires nurturing new sites for accumulation centered on sustainability, sites that benefit powerful social groups to safeguard the continuation of order and secure a successful transition (Newell and Paterson, 2010). Paterson and P-Laberge (2018, p.4.) summarize this

[50] Low spending of corporations on zero carbon technologies is a sign of another market failure, thus government intervention is necessary.
[51] Countermovement in Polanyian (1944) term. For an application of the concept to carbon markets, see: Bumpus and Liverman, 2008.

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challenge as follows: "to identify the sectors, products, services that are key to keeping growth going while decarbonizing the economy, and the policy and political processes by which those processes might be favored." Overall, this creates a situation where states constantly need to balance between competing interests and exogenous forces (sustainability). This entanglement is captured by Putnam's (1988) concept of "two-level games," expressing the need to reconcile the international pressure for mitigation at the UN climate change negotiations and the domestic economic and political realities entailing coalition-building (Agrawala and Andresen, 2001; Keohane and Oppenheimer, 2016).

The creation of carbon markets depicts this balancing act very accurately (Lane and Newell, 2016). It is perceived to be a response to climate change, thus a deliberate effort to move towards a carbon-free economy. In order to secure political support, carbon markets provide business opportunity ('accumulation by decarbonization') to the sector that has become the most powerful during neoliberalism and accelerated globalism: finance (Bumpus and Liverman 2008, p. 148; Paterson, 2012). However, the power of fossil fuel firms has not waned, so their opposition has to be watered down by different means such as exemptions or giving out excessive free permits for emissions, which might result in huge windfall profits for the most polluting sectors. These processes can be elegantly captured by the three-pillar political economy framework developed by Hall (1997): interests (fossil fuel vs. economic sectors threatened by climate change and pro-environment social groups); institutions (decarbonization as the emerging new regime of accumulation) and ideas (superiority of market-based policy instruments).

After all, climate change compels states to follow a sustainability agenda, at least to some extent. In addition to the substantial benefits climate policy can produce for states (see previous section), there are other macroeconomic factors that make states interested in pushing the sustainability agenda further. For example, it is estimated that job losses in the fossil fuel sectors will be offset by employment gains in emerging low-carbon sectors such as renewable energy and energy efficiency (ILO, 2012). The overall competitiveness of the workforce and quality of employment will be enhanced as well because these jobs require higher skills and provide safer working conditions as compared to decaying carbon sectors (UNFCCC, 2016; Haug, Eden and Montes de Oca, 2018). Thus, states may see great potential and benefit in an accelerated transition. Indeed, even before climate change had become a major issue, some countries managed to overcome incumbents' resistance and mobilize resources to drive sustainability change. Brazil's expansion of bioethanol production in the 1970s, Denmark's investments in

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wind energy as core of its innovation policy and energy security, and the German 'Energiewende' (energy transition) are examples (Cherp, Jewell and Goldthau, 2011; Arregui et al., 2020). This demonstrates that states are deeply embedded in the socioeconomic environment but nevertheless enjoy some degree of autonomy to pursue their own agendas.

Therefore, states can be considered as semi-autonomous actors that attempt to guide policies in favor of their own objectives, that are, theoretically, increasingly sustainability-driven, influenced by international environment and local political economy conditions (their voters' stance on environmental matters, the power of incumbent fossil fuel firms, etc.).

3.3.2. Fossil Fuel Companies and Energy Intensive Industries

Any meaningful climate action thwarts the interests of firms that extract, process and sell hydrocarbons, because their valuation gets depreciated, and their assets stranded (infrastructure) in a rapid, clean energy transition scenario. Similarly, the business model of energy intensive industries such as steel, cement or paper, which rely on cheap fossil fuel is challenged in a warmer world. Therefore, it is not surprising that their fierce opposition to climate policies and successful blocking of green initiatives are well documented in the literature (e.g., Brulle, 2018; Jenkins, 2014; Markussen and Svendsen, 2005 and countless media outlets investigations such as Meyer, 2020). Less attention has been paid to the reason why they have been able to *capture states* and slow down energy transition. Firstly, the fossil fuel industry is highly concentrated, thus they can overcome any collective action problem more easily because coordination among the members is easier and they share a strong common interest. The concentrated power of the fossil fuel industry exceeds that of pro-environmental groups, who find it more difficult to form, having interests that are more dispersed and less focused, reflecting the varied and widespread benefits of a safe climate. Furthermore, free-riding opportunity is rampant within large conglomerates of participants (Olson, 1965; Jenkins, 2019). One of the consequences of this power imbalance caused by cost-benefit asymmetry is that these small groups, especially if they are endowed with abundant resources, can more successfully shape public policies. This results in "concentrated benefits" for them and "diffused costs" for society to pay (Olson, 1965 as cited in Heckelman, 2019, p. 17; for a succinct overview, see: Nowlin, Gupta and Ripberger, 2020). This largely explains why these companies can exert substantial influence at international, national and local levels too (see e.g., Ciplet, Roberts and Khan, 2015, Chapter 6).

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Secondly, as energy is indispensable for functioning modern economies, the energy sector has grown to be one of the most powerful sectors, both politically and financially. This provides them with ammunition to lobby for favorable regulations and make no recompense for the social costs of their emissions or environmental degradation. Thirdly, a stable energy supply is critical for national economies, and using traditional energy sources on existing infrastructure are still cheaper than deployment of cleaner alternatives,[52] thus they frame energy transition as a significant risk rather than an opportunity to reduce import dependence, or other beneficial changes (Haas, 2019). In most countries, energy transition requires substantial investment into the grid system to integrate renewables and produce energy for industrial processes (heating) (International Energy Agency (IEA), 2020). From a budgetary perspective, defined by the short cycle of electoral competitions, strong political will would be needed to prioritize energy transition above more acute and pressing issues such as infrastructure development or poverty alleviation. These factors play into the hands of the industry.

Also, as energy plays a critical role in security and socioeconomic life, and energy-intensive industries tend to employ large numbers of people, fossil fuel firms have direct and frequent contacts with decision makers to ensure alignment in key policy developments. They sit in policy committees and regularly contact senior officials running powerful ministries such as trade (Newell and Paterson, 1998). This is crucial because, as lobbying theories suggest, the outcome of any policy deliberation largely depends on resources (financial, technical and information) and access to decision-makers and fossil fuel companies possess both (e.g., Coen, 1997; Dür, 2008, 2008a; Hall and Deardorff, 2006). Direct access enables inside lobbying, which is more effective than alternative strategies. Since in most countries clean energy still has a minor share in the energy mix, there is unequal power distribution among these actors. Considering all of the above, and the factors that fall under rent-seeking behavior, we can understand how political and economic power is translated into favorable regulation (Stigler, 1971). The picture is further complicated by considering that states can also have a direct interest in the energy business via ownership or lending to market actors, thus defending the energy sector interests also protects its own investments (for a discussion on how state building and energy infrastructure is intertwined, see: Szabo and Fabok, 2020).

After all, it is not surprising that fossil fuel interests fiercely oppose any climate policy, and given their crucial role in functioning modern economies, they are successfully impeding

[52] Nevertheless, renewable energy sources are now cheaper in most countries than fossil fuels (e.g., University of Oxford, 2023)

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effective state response to climate change. The polluters' lobby will try to avoid paying for the costs of climate change (Michaelowa, 1998). Even if pressure is growing and their operation is getting squeezed, which could happen following the adoption of certain measures, they attempt to minimize their costs by fighting for exemptions, voluntary schemes or grandfathered allocation of pollution permits (Meckling, 2015). Even though some fossil fuel energy companies have begun to invest in renewables to keep business profitable in the course of accelerating energy transitions, their efforts — for example propagating natural gas as bridge fuel and buying into renewable business' boards to control operation (insider tactic) — still largely concentrates on slowing down this transformation (for a Gramscian perspective to energy transition and a demonstration of different strategies applied by utility companies in the EU in this transitional period, see: Haas, 2019). In their power to shape discourse and reframe the problem, they create an insoluble conflict, a dichotomy between economic performance and climate, which threatens labor and state.[53] Relativization of the climate crisis, spreading dubious information about the magnitude of the problem and costs for workers are all informational weapons employed by big emitters to create a social environment where the regulatory status quo can be perpetuated. When these attempts are seen under increasing public scrutiny, creative solutions follow. The creation of pro-business climate organizations (some denying climate change, some pushing hard for market-based solutions) and the practice of *greenwashing* fit well into this development (category) (Coelho, 2009).

3.3.3. Abatement Lobby and Environmental Non-governmental Organizations (ENGOs) – Green Platform

Firms that sell low carbon technologies and equipment such photovoltaic cell manufacturers, wind energy, and green hydrogen producers are the beneficiaries of any meaningful climate policy. Therefore, they attempt to influence policy that points towards more ambitious climate change mitigation efforts so they can substantially benefit from created economic rents. Especially, because of their undeveloped market positions, they need state support for nurturing their industry.

Insurance companies deserve distinct attention as the only powerful group that already has sufficient resources to tip climate policy deliberations in favor of increased stringency. Since climate change threatens the profitability of their business model (more frequent payouts requiring uncompetitive premiums), a safe climate is essential to their continued operation.

[53] Carbon leakage as prominent example.

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Their position is climate-pro, and they take part in numerous international alliances that push for decarbonization (Newell and Paterson, 1998; Paterson, 2012). However, it should be mentioned that insurers have significant investments in the oil and natural gas sectors, making their position ambivalent, at least in the short-term perspective.

ENGOs put pressure on national governments and international actors to address climate change. As their financial resources are far more limited than fossil fuel companies, they tend to join forces with other ENGOs to pool resources. They primarily focus on one particular aspect of climate change mitigation (e.g., fighting for a legally binding temperature target or stopping free allocation of pollution permits to industries) rather than frittering away their resources between the many different, highly technical design elements of climate policy. Although their resources can hardly be compared to fossil fuel firms, their participation in decision-making is seen as essential to implement (more ambitious) climate policies (Fankhauser, Gennaioli and Collins, 2015).

3.3.4. Citizens

A recent survey by the United Nations Development Programme (UNDP) and University of Oxford (2021) has found that citizens all over the world are deeply concerned about climate change. There is also a strong relationship between public belief and awareness about climate change and higher carbon prices (Best and Zhang, 2020; Levi, Flachsland & Jakob, 2020). However, citizens do not comprise a homogenous group. Notably, class differences are important. Climate and environmental policies tend to have regressive effects because low-income households spend disproportionately more on energy and basic needs[54] (Wang et al., 2016). Poorer segments of the societies are also more likely to work in resource extraction and manufacturing sectors that are more exposed to devaluation in a low-carbon economy, while the middle class is more shielded as they mainly work in higher-value-added sectors where decarbonization is less of a concern. Therefore, understanding the different impacts of climate change on various social groups is crucial to formulate climate policies that militate against growing inequality and other forms of injustice, otherwise the burning discontent will erupt in wake of the socioeconomic transformation induced by climate crisis (Jenkins, Sovacool, Błachowicz and Lauer, 2020).

[54] Geographical differences are significant as well (Jenkins, 2019). For instance, regions vary by the carbon intensity of electricity generation or availability of natural gas to heat homes. However, geographical perspective will not be examined since this study's level of analysis is at country-level.

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Environmental concern of citizens also depends on socioeconomic factors such as income level, level of education, generation and gender (e.g., Hines, Hungerford and Tomera, 1987; Lee et al., 2015). All this calls for an analysis that takes into account the distributional impact of policy and the assessment of the preferences of the different social groups taking part in the political bargaining process. Nevertheless, regardless of the diverging impact of climate change on different socioeconomic groups and of the factors affecting their level of environmental concern, we can expect that the escalating climate crisis will have a mobilizing effect on all social groups. The major climate strikes taking place in 2019 and subsequent general elections demonstrate that the issue can now mobilize masses around the world and help environmentally conscious parties gain increasing political power. The median voters also got greener over time (Adams et al., 2006; Ezrow et al., 2011). In the initial phase of the empirical research, where the unit of analysis is country-level policy, citizens are considered as aggregates, such as the public's collective perception of climate risk and income inequality. In subsequent process-tracing case studies, we will capture the articulation of diverging views among citizens by examining the positions taken by interest groups and political parties, in the context of carbon tax reform.

3.4. Political Economy of Carbon Pricing Stringency

The political economy of climate policy development is a burgeoning field of study. It encompasses fields such as alternative economic theories (e.g., degrowth) or greening institutionalism analyzing how politics and policies are shaped and also how they affect sustainable transition (for a literature review, see: Lamb and Minx, 2020; Paterson and P-Laberge, 2018). In the following section, I specifically focus on the political economy of carbon pricing stringency since previous empirical findings suggest that the political dynamics around carbon pricing is more challenging than around other climate policies (e.g., Dechezleprêtre et al., 2022; Jenkins, 2014; Krosnick and MacInnis, 2013). The main reason for the muted public support for carbon pricing, as compared to other mitigation policies, is that the cost of this type of policy is more apparent to consumers and businesses, and the public is more skeptical about the emissions reduction capacity of these policies. The costs associated with green subsidies (increasing taxes and/or lowering spending in other policy domains) are less easily understood by the public (Fairbrother, 2022).

Differences between carbon pricing and other types of climate policy in terms of political economy dynamics have been detected by empirical works. For instance, Bättig and Bernauer

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(2009) find democracy to be associated with greater mitigation policies. Democracies are theoretically better equipped to deal with climate change as they are more open than autocracies for international cooperation; there are more institutional venues and opportunities to express concern about ecological degradation and the level of institutional development is higher (Fiorino, 2019). In contrast, the study from Levi, Flachsland and Jakob (2020) tests democratic regimes as potential explanatory variables on carbon pricing stringency, but they find that political regime type is not a significant factor. Moreover, whilst Karapin (2016) argues that proportional voting system has a positive effect on climate change mitigation stringency, since it increases the probability of smaller environmentally-minded, left-wing parties with strong climate agenda being represented in the parliament, Levi, Flachsland, & Jakob (2020) finds the effect insignificant, close to zero, in the case of carbon pricing.

Generally, political economy theories suggest that the political feasibility and gravity of a certain policy innovation or reform is contingent upon the broader socio-economic environment in which the process unfolds. Feasibility is also affected by the political processes and institutional settings where the contestation among actors occurs, and by the appropriate selection of policy design elements (Karapin, 2016 as cited in Levi, Flachsland & Jakob, 2020). The policy design level, thanks to the efficiency studies, is a relatively well-researched area (from a general political economy perspective see: Aldy, 2017). However, the biggest obstacle for carbon pricing is not choosing the suitable technical design for the policy, as there is a general consensus on the most effective architectural choices. These would include: 'upstream' charging for reduced administration costs; introduction of a price floor to stabilize price level, prohibition of the use of excessive international offsets to safeguard environmental integrity; and wider coverage of economic sectors and fuel types to avoid distortions (World Bank & OECD, 2015). The greater conundrum is how to translate these policy components from universities and think tanks into the political arena (Rabe, 2018). Empirical studies about structural political economy conditions are also catching up slowly. In the following table, I provide an overview of the most important empirical political economy works, listed in chronological order.

6. Table - Overview of the literature on the political economy of carbon pricing policies.[55]

Author	Year	Research focus	Methodology	Main findings

[55] This list is by no means all-inclusive. I aimed to include studies that pioneered the field, had a cross-case approach comparable to mine, and that showed the most relevant policy reports.

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Del Rio and Labandeira	2009	Sketching a theoretical political economy framework (path dependence and public choice) and testing it	Qualitative case study of Spain	Significance of distribution effect on implementation.
Jenkins	2014	Implications of political economy factors on environmental efficacy and economic efficiency	Qualitative case study of the U.S.	● Sub-optimal operation due to lobbying efforts and citizens low willingness to pay for climate change. ● Opportunity created for a mix of second-best policies.
World Bank - High-Level Commission on Carbon Prices	2017	Exploring explicit carbon pricing options and levels	Mixed methods	Price level of US$40–80/tCO2 by 2020 required to achieve Paris temperature. Importance of supplementary policies + non-climate benefits, and political economy considerations for implementation.
Jenkins and Karplus	2017	Combining CO_2 price with strategic use of revenues to analyse whether it would relieve political constraints on carbon pricing policies	Stylized partial-equilibrium model of the energy sector	"Using revenues to subsidize additional abatement or offset private surplus loss improves total welfare" and help achieve socially optimal carbon price level (p. 56)
Ervine	2018	Critically assessing the political economy of low carbon prices	Mixed methods	Reasons for low carbon prices: market overallocation, usage of international offsets, all caused structurally by specific local (fossil fuel based) power relations.
Maestre-Andrés, Drews and van den Bergh	2019	Analyzing public perception on fairness of carbon pricing and how this influences political acceptability + examining whether revenue use can enhance acceptability.	Literature Review	● Perception of fairness (distributional impact) directly affects political acceptability. ● Spending revenue on environmental projects is the most preferred option and compensating

				vulnerable groups comes second.
Best and Zhang	2020	Social, political and economic factors influencing carbon pricing stringency	Between estimator for panel data	• Stock of domestic credit • GDP per capita • Level of corruption • Coal reserves • Climate change awareness are important factors explaining stringency.
Dolphin, Pollitt & Newbery	2020	The political economy of effective carbon price. Analysing regulatory capture, political institutions, and macro determinants such as GDP per capita.	Panel data analysis	Political economy factors that have dominant influence on stringency: • CO2 emission/ capita • Share of electricity produced from coal and gas.
Levi, Flachsland and Jakob	2020	Exploring the political economy determinants of carbon prices.	Tobit regression model	• Crucial importance of good governance (regulatory capacity, low corruption) and public belief about climate change.

The number of comparative empirical studies analyzing the political processes producing particular policy outcomes is significantly more limited. Some argue that the main reason for the scarcity of this type of research is that policy makers believed that CPMs were so appealing in theory that eventually they would overcome political resistance (Rabe, 2018). However, this did not happen in a uniform way, which has recently caused a shift in attention to the dynamics of political processes. For example, Gulbrandsen et al. (2019) analyzed the reasons as to why policy diffusion has not led to a convergence of international carbon markets despite strong drivers such as lower transaction costs and market pressures. In their comprehensive study, they came to the conclusion that divergence has been primarily caused by countries' deliberate acts to accommodate carbon pricing to local politics (see also Skovgaard, Ferrari and Knaggård, 2019 for similar assessment about the importance of local context). The level of national politics is the realm of contestation; policy interactions; sequencing; and key political decisions of policy design elements about, for example, the distribution impacts of the policy, all of these

profoundly influence the implementation and stringency of any carbon pricing policies (Maestre-Andrés, Drews and van den Bergh, 2019).

In my analytical framework, I bring these two sets of factors, structural political economy conditions and policy design elements affecting distributional outcome of policy together to explain variation in carbon prices across the world, based on the supposition that if policy design choices effectively mitigate the political economy constraints posed by structural conditions, more stringent carbon pricing can be implemented. Indeed, the fact that some carbon pricing mechanisms have produced relatively high price levels without serious political backlash, would suggest that persistent political economy hurdles can be overcome, or at least successfully managed. Recent works in the literature also indicate that carefully crafted policy designs, which directly address the (re)distribution impact, might be the key to producing environmentally more effective and socially more equitable policies (CPLC, 2020; Klenert et al., 2018). Therefore, I focus on distribution impact as the key facet likely determining the outcome of a policy change, while bearing in mind that through political economy dynamics these impacts can be altered (Jenkins, 2019). The argument is laid out in the next section.

3.4.1. Analytical Framework: Revenue Recycling Strategies in Different Political Economy Environments

This dissertation offers a novel theoretical framework to analyze carbon pricing stringency through the constellation of political economy conditions and revenue recycling measures based on the supposition that higher carbon prices can be implemented if revenue recycling measures respond effectively to local political economy constraints. As discussed above in great length, there are significant political economy constraints that hinder the implementation of ambitious carbon pricing policies. The main ramification of these constraints is that prevailing price levels in most jurisdictions that have adopted carbon pricing are considered to be too low to accelerate decarbonization and drive emissions down drastically. Crucially, the (re)distribution impact of stringent carbon pricing policies can be substantial, a fact which ignites fierce opposition from energy-intensive industries whose assets and market value are tied to the maintenance of favorable regulatory conditions, and whose leverage in redeploying production capacities is very limited (Jenkins 2014). Companies that are exposed to international trade may find it increasingly challenging to remain cost competitive, both in domestic and international markets, where they must compete with firms selling goods with potentially higher, but unpriced carbon content (Aldy and Pizer 2015). In a similar vein, environmentally effective

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carbon pricing entails considerable reductions in private welfare in the short term for households due to the price increase of commodities. Since low-income households spend disproportionately more on energy and basic goods, carbon pricing effects tend to be regressive, and therefore contribute to increasing inequality and energy poverty in a society (Ohlendorf et al. 2021; Wang et al. 2016). Numerous studies show that this regressive effect is perceived as highly unfair by the public, which translates into a lower level of political acceptability and a higher level of opposition (for meta-analysis, see: Maestre-Andrés, Drews and van den Bergh, 2019). Lastly, public opposition to high costs is conjoined with a general skepticism about the environmental effectiveness of carbon pricing due to the inelastic demand for basic goods (e.g., motor and heating fuels) and affordability issues with low carbon alternatives. This further erodes support for policy implementation (Carattini, Carvalho and Fankhauser, 2018; Dominioni and Heine, 2019).

After all, the main challenge is how to address negative distributional issues effectively to enable politically the adoption of stringent carbon pricing. The theoretical premise of this dissertation suggests that modifying the incentive structure around carbon pricing policies can enhance their political feasibility and lead to higher carbon prices. This can be achieved by compensating negatively affected social groups, providing immediate local (green) benefits to the public, and bolstering the political coalitions of direct beneficiaries.

For a short recap, carbon pricing is unique among other climate policies in generating substantial revenue for states. The way this revenue is spent by the government is called *revenue recycling* (Beiser-McGrath and Bernauer, 2019, p. 1.). In general, revenues can be spent for specific purposes that are legally stipulated (*earmarking*) or can be dedicated at a higher political level to be spent on public preferences (*hypothecation*) or can simply enrich the general budget (Marten and Van Dender, 2019). For example, in the EU Emissions Trading System, it is required from member states to spend at least 50 percent of revenue from auctioning allowances on climate-related initiatives.

There are myriad paths to spending this revenue in economically, environmentally, and socially productive ways (PMR, 2019; Steenkamp, 2021; and see above). As an example, lowering tax rates on employment, financing infrastructure projects (e.g., digitalization or high-speed railway) and reducing national debt, all enhance the macro-economic performance and competitiveness of a country and offset some of the negative consequences of mitigation policies (an argument put forth in different strands of the ‘double dividend’ literature, see e.g., Goulder 1995; Jakob et al. 2016).

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Carbon revenue can also be used to multiply the positive ecological effects of the policy by financing the deployment of renewables, weatherization of buildings, or investing in the development of low-carbon technologies, thus accelerating the decarbonization efforts of a jurisdiction. Furthermore, the revenue can be put towards greater equity in publicly valued domains (e.g., education) and the elimination of rampant climate injustices and social inequality by providing targeted assistance to marginalized groups (low-income households, minorities, elderly, women) (e.g., PMR 2021a).

As can be seen, carbon pricing revenue can be effectively utilized towards various policy objectives. Crucially, revenue recycling also holds the potential to boost carbon pricing policy towards greater stringency by increasing its political acceptability. Different revenue recycling measures can be implemented that can result in progressive distributional outcomes, better environmental performance of policy, and positive effects on people's wellbeing, all of which changes public perception on policy fairness and effectiveness (Beiser-McGrath and Bernauer, 2019; Konc et al., 2022). This modified public perception can foster political acceptability, thus leading to the successful implementation of stringent carbon prices (Bergquist et al. 2022; Maestre-Andrés, Drews and van den Bergh, 2019). However, one of the limitations of the current literature is that it mainly focuses on citizens' perception and neglects private firms, despite the fact that climate policy outcome is influenced by the interests of businesses working through different channels (e.g., competitiveness, aggregate interests of workers) as much as that of the public's interest (Lamb and Minx, 2020). Therefore, revenue recycling options that may make carbon pricing more palatable for private firms should also be researched when examining the nexus between revenue use and stringent policy outcome.

As countries differ significantly from one another in their political economy environments, their use of revenue should also respond to individual local constraints and accommodate differing social objectives. For example, the public may accept higher prices in countries that are more vulnerable to climate change, if the revenue is spent on adaptation. Alternately, in a socially polarized country where more people are exposed to energy poverty, compensation for poor households will be necessary to avoid equity issues, while in wealthier and more egalitarian jurisdictions, this is less of a concern, and other constraints can be addressed (Andersson and Atkinson, 2020). To make this point more concrete, experimental research shows that a tax rebate scheme in the US that refunds carbon revenue to all families equally was found to significantly increase carbon tax acceptability. However, a similarly proposed scheme in Sweden had negative effects on public support (Kaplowitz and McCright, 2015 and Jagers,

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Martinsson and Matti, 2018 as cited in Maestre-Andrés, Drews and van den Bergh, 2019; also see Douenne and Fabre 2022 for a discussion on the French context). The merits of examining and comparing revenue recycling in different environments is further supported by results from other surveys and experiments that suggest that public preferences for revenue use options might be context-specific (Beiser-McGrath and Bernauer, 2019; Carattini, Carvalho and Fankhauser, 2018; Dabla-Norris et al., 2023). That is why cross-case analysis is crucial for determining the structural conditions, which may manifest as local constraints, under which revenue recycling can support stringent carbon pricing. This process helps identify the constellation of revenue schemes that will be effective in various environments.

Outcome - Stringency

As detailed in the previous chapter, environmental outcome should be assessed from an ecological effectiveness point of view, rather than efficiency. For a short recap, neoclassical economics endorses efficiency which is calculated as the maximal net value achieved by emissions, minus the social costs they impose on society. However, the calculation for the benefits and costs of climate change is an utterly difficult task and it raises both technical challenges and normative considerations. For instance, the IPCC (2018) states that the scientific knowledge on the economic costs associated with increased global warming is limited due to climate modeling uncertainties, and to not knowing how ecological systems might respond to climate shocks, this can undermine the theoretical and empirical foundation for such calculations (Boyce, 2018). In contrast, proponents for 'safety criterion' reflecting ecological sustainability, which is also embodied in the Paris Agreement, argue that climate targets should be held to what is considered a safe, tolerable level of warming (Boyce, 2018). Of course, what we consider 'safe' is also subject to debate, but climate scientists argue that even the 2 °C of global warming could alter our ecosystems in such a way that would make parts of the planet uninhabitable and put infrastructures under great stress (IPCC, 2018). Consequently, this research will adhere to safety criterion, especially because it uses the Paris Agreement as a framework for assessing countries' carbon pricing policies against the global temperate target set by the Agreement, as well as the emissions reductions pledged by ratifying countries (the operationalization of stringency is presented in the next chapter).

Similarly, to assessing environmental outcome, effective spending of carbon revenues can be assessed from two different angles: efficiency and sustainability. As I have shown previously, pricing emissions (even if the price is very low) is a step towards social efficiency regardless of whether revenues are being legally earmarked for specific uses or simply channeled to the

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general budget. If, for example, the revenues are used to lower taxes on labor income, which are inevitably distortionary (assuming that the tax rate is proportional and higher than optimal), even more efficiency gains could be realized (Edenhofer et al., 2015). However, studying the exact efficiency of a certain type of revenue use can be very challenging in some cases. For instance, part of the Colombian carbon tax revenue is spent on peace-building efforts in the country (PMR, 2019). Monetizing peace in a war-torn country is objectively difficult and incalculable in isolation from other expenditures.

But even more importantly, priority should be given to examining revenue use from a sustainability perspective (stringency). That being said, the precondition for implementing more stringent policies lies in ameliorating the political gridlock around carbon pricing (Beiser-McGrath and Bernauer, 2019; Konc et al., 2022; Sommer, Mattauch and Pahle, 2022). Therefore, political feasibility and environmental effectiveness are deeply intertwined with the latter condition being contingent on the former. Consequently, the key question of the inquiry should be, what type of revenue use enhances the political acceptability of carbon pricing. Some economists would argue that earmarking revenues for specific use is highly inefficient due to possible mismatches between spending needs and the amount of carbon revenue raised (for a discussion, see: Carattini, Carvalho and Fankhauser, 2018). I argue that this potential deficit should not guide the decisions of policymakers because efficiency does not necessarily translate into enhanced political acceptability. From this perspective, for example, the policy choice of tax neutrality is certainly more efficient, but if direct cash transfers to low-income households renders increased acceptability, then it will produce higher prices. Eventually, this policy solution should expedite implementation of environmentally more effective mechanisms that also generate more revenue, which can then be spent effectively, and so on. In sum, when policymakers face possible trade-offs between efficiency and equity, priority should be given to the latter to make environmentally stringent policy politically feasible (PMR, 2019). Experimental research and survey findings also show that earmarking enhances political acceptability as voters' primary concern is the distributional impact and not efficiency considerations (Carattini, Carvalho and Fankhauser, 2017). A stringent CPM with marginal inefficiencies is undoubtedly more effective in all aspects of policy evaluation (social, environmental and economic) than a weak CPM with higher efficiency. Here I theorize that higher political acceptability depends on policymakers giving adequate responses to local political economy constraints.

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Explanatory Conditions

Structural Conditions

The proposed interactive theoretical model consists of three political economy and three revenue recycling conditions, and stringency is assessed through the configurations of these different conditions. Structural conditions were selected based on two key criteria: 1. There is available empirical evidence indicating that they influence carbon pricing policy stringency; and 2. They can theoretically interact with revenue recycling measures. There are good reasons why only those conditions that were found to specifically affect carbon pricing should be considered, and not other types of climate policy. Public opinions consistently favor green technology subsidies and regulation over carbon pricing policies. This is especially the case in scenarios without revenue recycling, in relation to domestic mitigation efforts (Dechezleprêtre et al., 2022; Krosnick and MacInnis, 2013). The main reason for the muted public support for carbon pricing, as compared to other mitigation policies, is that the cost of this type of policy tangibly affects consumers and businesses, while the public remains skeptical about the emissions reduction capacity of these policies. On the other hand, the costs associated with green subsidies (increasing taxes and/or lowering spending in other policy domains) or command and control measures might be more hidden, thus less noticeable to the public (Fairbrother, 2022).

Existing large N econometric studies have identified and confirmed three political economy conditions that explain variation in carbon pricing stringency, and which effects might be influenced by revenue recycling (e.g., Dolphin et al. 2020; Furceri, Ganslmeier and Ostry, 2021; Levi, Flachsland, & Jakob, 2020 and see the literature review above, under the 'Political Economy of Carbon Pricing Stringency'). These are: economic development, income inequality, and fossil fuel dependence. Incorporating these factors into the analysis is essentially equivalent to doing a two-step QCA in which only those remote conditions (macro variables) are analyzed with proximate conditions (policy-specific variables) that presumably have an important effect in explaining outcome (Schneider, 2019). The conditions are introduced in the following subsection.

1. <u>Economic Development</u>

As environmentally effective carbon pricing might impose substantial costs on households and private firms, higher income level is an important condition for stringency due to enhanced cost-absorption capacity. Furthermore, there is a great deal of literature that argues that climate

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change is only prioritized in the public agenda if the basic needs of the citizens, such as job security, are met (e.g., Fankhauser, Gennaioli and Collins, 2015). Economic development enables a higher appreciation of post-material values in society, such as environmental concerns (Inglehart 1990; Stern 2000). Finally, countries with higher economic development may feel obligated to engage in serious decarbonization efforts, due to their historical emissions records.

2. Income Inequality

The regressive, negative distributional impact of carbon pricing is more pressing in countries with higher levels of poverty and existing economic inequalities (Andersson and Atkinson, 2020; Markkanen and Anger-Kraavi, 2019), a problem which magnifies the political costs of carbon pricing implementation (Furceri, Ganslmeier and Ostry, 2021). It must be noted that carbon pricing may not necessarily cause regressive effects in various countries (Dorband et al., 2019; Feindt et al., 2021), but some social groups might still be disproportionately affected by stringent policy such as the elderly, or rural households without affordable low carbon alternatives for heating and transport (on horizontal equity issues, see e.g., Cronin, Fullerton and Sexton, 2019; Douenne, 2020). In conclusion, (the perceived) inequitable outcome of carbon pricing policies severely affects the political feasibility of implementation.

3. Fossil Fuel Dependence

The third condition is fossil fuel dependence. Any meaningful climate action thwarts the interests of businesses that extract, process and sell hydrocarbons, because their valuation gets depreciated and assets (infrastructure) get stranded in a rapid, clean energy transition scenario (Jenkins, 2019). Similarly, the business model of energy intensive industries such as steel, cement and paper, which rely on cheap fossil fuel, is challenged in a 'greener' world, and this may also have a negative economic impact on (local) governments through employment-and-revenue loss. For these reasons, the fierce opposition from fossil fuel interests against climate policies, and their successful blocking of green initiatives is well-documented in the literature (e.g., Jenkins 2014). In essence, the more reliant a country is on fossil fuel resources, the less likely it is that they can introduce meaningful carbon pricing in their jurisdiction. Extensive discussion on fossil fuel interest can be found under the section 'Actors' above.

Revenue Recycling Conditions

Three main revenue recycling alternatives that theoretically enhance the stringency of carbon pricing are identified, based on the supposition that higher levels of social tolerance and

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political acceptability enable the implementation of higher carbon prices (Maestre-Andrés, Drews and van den Bergh, 2019).

4. Compensation

The first revenue mechanism is compensation (also called social cushioning in the literature, Carattini, Carvalho and Fankhauser, 2017). Crucially, by compensating negatively affected social groups and eliminating the possibly regressive effects of carbon pricing, the public's perception on policy fairness can be changed. Using approximately 30% of the revenue from a relatively high to moderate price level to compensate low-income households would make carbon pricing policy outcome progressive (IMF 2019; Vogt-Schilb et al. 2019). Compensation may come in different forms, such as direct transfer to households or energy bill assistance. Other compensatory schemes can take the form of enhanced welfare and labor support in regions where low-carbon transition implies social and economic calamities (especially coal-dependent countries and regions) or reduced social security payments (pension system and health insurance in Switzerland) (PMR, 2019).

Furthermore, making low carbon technologies more accessible to companies and providing them with assistance to bear the increased costs could help stabilize or even increase their competitiveness, thus diluting their resistance. There are several alternatives to compensating firms that would not compromise the environmental integrity of the policy. For example, reducing existing taxes (e.g., corporate tax) in parallel to introducing carbon pricing ('revenue neutrality') could be a politically viable strategy, as was done in Nordic countries as part of a Green Tax Reform agenda (Carattini, Carvalho and Fankhauser, 2018). Subsidizing the use of clean energy, implementation of energy-efficiency measures, and development of low-carbon technologies may have similarly positive effects on acceptability (Trim et al 2018).

5. Decarbonization Efforts

The second mechanism is to be found in decarbonization efforts, which covers green projects such as renewable energy deployment and energy efficiency programs. The effects through which higher political acceptance can be achieved are twofold. First, such initiatives help to overcome public skepticism concerning the general environmental effectiveness of carbon pricing by producing demonstrable results through tangible environmental projects (Carattini, Carvalho and Fankhauser, 2018; Dominioni and Heine 2019). In countries where the issue of climate change is high on the public agenda, decarbonization projects enjoy obvious public support. This is important, because research shows that public acceptance for command-and-

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control climate measures, or clean energy incentives, is higher than for carbon pricing (e.g., Krosnick and MacInnis 2013). Also, green spending may make low carbon technologies (e.g., heat pumps, electric vehicles) commercially more viable and readily available to citizens. This would enable the financially advantageous behavioral changes that are envisaged by carbon pricing theory. Secondly, from a coalition building perspective, spending carbon revenue on climate action directly benefits and mobilizes clean energy ('sunrise') sectors such as renewables, energy storage and batteries, green hydrogen, or geothermal energy. The more resources green industries acquire through increasing climate action expenditures, the stronger the political coalitions they can develop to pressure policy-makers to implement more ambitious and comprehensive regulation on decarbonization (Meckling et al. 2015).

6. Social Objectives

The last mechanism, 'social objectives,' refers to spending on policy objectives highly regarded by the public. If public sentiment is focused on a high debt rate, a low level of education, and other needed public services, then "policy bundling" that specifically addresses these concerns by using the revenue generated from carbon pricing, may increase public acceptance of the policy (Bergquist, Mildenberger and Stokes, 2020, 1; PMR 2019; Steenkamp 2021). For instance, Drews et al. (2022) found that carbon tax revenue proposed to finance Covid-19 expenditures performed well in enhancing public acceptance for the policy, even when compared to other, previously proven, uses of funds, such as on climate projects. The following table shows some forms of revenue recycling in these three different revenue recycling categories.

7. Table - Forms of revenue recycling.

Compensation	**Decarbonization Efforts**	**Social Objectives**
• Direct transfer (lump-sum) to households (H) • Energy bill assistance (H) • Revenue neutrality + Green Tax Reform (H+F) • Just transition (H+F) • Research and development support (tax breaks) (F)	• Renewable energy sources (wind, solar, green hydrogen, geothermal, feed-in-tariffs etc.) (F) • Energy efficiency programs (H + F) • Green infrastructure (smart grid, mass transit, railway development, EV charging stations, etc.) (H+F)	• Education • Healthcare • National debt reduction • Peacebuilding • Poverty reduction

Note: H = Households, F = Firms

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It is important to emphasize that types of revenue uses can be combined. For example, in the state of California, a special fund was launched that has a joint objective of assisting disadvantaged groups and reducing emissions. This is theoretically a more effective strategy politically because it can address various political economy constraints. As most studies suggest (e.g., Parry, 2019; Vogt-Schilb et al., 2019), even a relatively small fraction of revenues (around 30%) would be sufficient to make carbon pricing progressive and deliver net gains to low-income households, hence a significant portion remains in the budget to address other issues. Therefore, countries may decide to spend 25% on social cushioning, 25% on subsidies to firms and the rest on decarbonization projects. A more diverse revenue recycling scheme may also prevent backsliding during subsequent changes in government because it serves voters and social groups across the political spectrum (Klenert et al., 2018).

As a concluding note, this framework is only concerned with those revenue recycling mechanisms that simultaneously enhance the political acceptance of carbon pricing and preserve its environmental integrity, by acknowledging that the primary aim of CPMs is to drive emissions down. Therefore, measures that weaken the goal of CPMs to deliver on their environmental promises, such as free allocations to industries, will not be considered.

3.5. Theoretical Expectations

After delineating the explanatory conditions, the theoretical expectations derived from the conceptual interactions of these conditions are laid out. In most economically developed countries, climate change is a salient issue (UNDP and University of Oxford 2021), thus in these countries, revenue spending on climate-related projects, to affirm or improve perceptions about the environmental effectiveness of carbon pricing, is the most favorable option from the perspective of political acceptability. However, if high economic development is conjoined with a relatively high level of inequality, some forms of compensatory mechanisms will be inevitable in order to implement a more stringent carbon pricing policy. The main reason for this is that growing inequality increases regressivity (Andersson and Atkinson, 2020). When there are more people at or close to their subsistence level of consumption, equity concerns become more pressing, highlighting the need for effective redistribution to counteract negative impacts (Konc et al. 2022). Here, the most effective strategy would be to combine compensation with environmental projects.

It is also expected that no country with a high level of fossil fuel dependence will be able to implement and sustain stringent carbon pricing policy without significant social compensation

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to support *just transition* (income support, retraining of workforce, etc.). Additionally, there will need to be environmental spending to lower the costs of technological transition and nurture abatement firms, to fill the void of employment loss in countries with high fossil fuel dependency. In developing countries, climate change is a less salient issue, possibly due to competing developmental objectives and a lower awareness of climate change (Lee et al. 2015). Therefore, spending on compensation and realizing key social objectives may be the most promising revenue recycling strategy. However, even if all revenues are used effectively, it cannot realistically be expected that countries with less advanced economies and high levels of fossil fuel dependence will introduce stringent carbon pricing, because of more pressing socio-economic objectives (e.g., poverty reduction, industrialization). The expectations, formulated into QCA-conforming Boolean terms are demonstrated in the following table.

8. Table - Theoretical expectations on sufficiency paths and outcome.

Sufficiency Paths	**Outcome**
High Economic Development * Low Income Inequality * Low Fossil Fuel Dependence * High Decarbonization Efforts + High Economic Development * High Income Inequality * Low Fossil Fuel Dependence * High Compensation * High Decarbonization Efforts + High Economic Development * Low Income Inequality * High Fossil Fuel Dependence * High Compensation * High Decarbonization Efforts + Low Economic Development * High Compensation * High Social Objectives	Stringent Carbon Pricing
Low Economic Development * High Fossil Fuel Dependence + Low Economic Development * High Income Inequality	Lax Carbon Pricing

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3.6. Caveats of the Framework

The above constructed political economy framework helps by explaining current challenges in introducing ambitious climate policy and delineating possible strategies to overcome these challenges. However, it also highlights some limitations that need our analytical attention before we move on to the empirical part of the thesis. Most importantly, it appears that the

sector that most requires compensation is the one sector that should not get it. Given the power of fossil fuel interests in all spheres of social life (both economic and discursive), it is expected that they will fight ferociously with all available means to oppose ambitious climate policies. Some theorists even go so far as to suggest that a one-time compensation for this industry, like the one given to compensate the slave owners at the time of the abolition of slavery, is inevitable if we are to escape from their domination and embark on the road to sustainability (see e.g., Broome, 2020; Coplan, 2016). Such a measure would be socially abhorrent, and it is also unclear how it could be executed in liberal market economies. Nevertheless, the fact that it is even contemplated highlights the desperation of people who understand that tearing down the political power of this group may be a precondition for a safer climate. This problem raises doubts about the potential success of implementing effective incentive structures around carbon pricing or any other climate policies.

Furthermore, compensation works well in theory, but it ignores the fact that what people want in the first place is to avoid paying (loss aversion) (Jenkins, 2014). A possible solution to this problem is to make 'upfront' compensation, as implemented in British Columbia, Canada where households got the first installment of transfer at the time of policy implementation (Government of Canada, 2008). Such smart policy choice cannot be factored into my QCA analysis but can be well considered in the follow-up case study.

Another issue concerns the strengthening of the political coalition of the abatement lobby through policy sequencing. Policy sequencing refers to the process when green industrial policy precedes the adoption of carbon pricing. The role of deliberative sequencing can be substantial because it helps to depress the prices for low-carbon technology and strengthen the political support and power of clean-energy industries by providing economic rents (Meckling, Sterner, & Wagner, 2017; Pahle et al., 2018). If green industrialization nurtured and strengthened abatement technology firms to a reasonable degree, then less state intervention would be needed in the form of further public spending on decarbonization (Meckling et al., 2015). Unfortunately, operationalizing sequencing in large or medium-N studies is very difficult without a precise assessment of sequencing attempts.[56] But again, I will analyze this crucial

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[56] Questions that would inevitably come up: To what extent was state support successful in strengthening green industries? Which policies should be included in policy sequencing? For instance, would it include only climate policies such as feed-in tariffs, or research and development spending and environmental regulation (performance and process standards) as well?

aspect in the second part of my analysis, to shed light on whether the empirical findings confirm that policy sequencing deserves the importance attributed to it in the emerging literature.

My framework also cannot take into account important pre-conditions for stringency that do not have direct political economy implications. To give an example: the necessity for clear and transparent communications from governments on the environmental effectiveness of CPMs, and the intended use of revenues, as well as the co-benefits of carbon pricing that might be essential to enhance political acceptance. Such things cannot be analyzed in a medium-N study[57] (Carattini, Carvalho and Fankhauser, 2018; Maestre-Andrés, Drews and van den Bergh, 2019).

Easing the political economy constraints may come at a certain cost. We discussed considerations on efficiency, but it might well be the case that the mix of revenue recycling increases administrational costs substantially. Financing developmental projects from the budget is relatively easy, but calculating entitlement for government transfer, energy bill assistance or corporate R&D subsidies increase the need for state capacity. Therefore, it might happen that a country is well-aware of the main political economy challenge it faces (e.g., economic inequality) but due to low fiscal and technical capacity it cannot implement the adequate policy solutions. This issue may be especially salient in developing countries.

Lastly, given the ubiquities of revenue recycling schemes across CPMs,[58] it is very likely that revenue recycling alone is not a panacea for high carbon prices. Nevertheless, I do believe that shedding light on which schemes in different local circumstances prove to be particularly effective in bolstering support, and thus rendering implementation of stringent CPMs politically feasible, is an important step towards developing more effective policies. Finding out about the necessary and sufficient conditions (both among structural conditions and revenue use type) is itself a valuable act scientifically that has crucial, ready-to-use policy implications.

3.7. Conclusion

The implementation of stringent climate policy is severely constrained by international and domestic political economy conditions. First and foremost, climate change represents a massive collective action problem, a situation where countries have great incentives to free ride on the climate change mitigation efforts of other countries. Domestically, the distributional impact of

[57] And these circumstances could hardly be operationalized.
[58] It should be noted, however, that it is not that simple, as most countries have some sort of revenue-recycling scheme in place, but most of the revenue still goes into the central budget.

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climate policy imposes a political roadblock to effective climate policy implementation; an effect that is more accentuated than in other policy sectors due to intergenerational challenges and unique spatio-temporal dynamics among other factors. These constraints create a political stalemate, where implemented climate policies become insufficient to achieve scientifically determined levels of emissions reduction. However, the acceleration of climate change, and the politics around it, facilitate the emergence of conditions that impel enhanced stringency, such as increased public awareness of climate change. Furthermore, by accumulating knowledge on how climate change affects social and economic spheres of life, the benefits of climate action become more obvious and tangible showing immediate and localized positive effects. This is clearly demonstrated by carbon pricing policies, which can deliver more benefits to societies and national economies than the costs they impose, even in the short term.

Yet, economic and political considerations may collude, thus producing suboptimal policy outcomes (Jewell and Cherp, 2020). My theoretical premise is that this political impasse can be ameliorated (or at least the effects mitigated) by utilizing the incentive structure around carbon pricing more effectively. Carbon pricing is unique in generating substantial revenue for states that can be employed to offset negative social reverberations; to build long-lasting political coalitions behind stringent policies; and to provide immediate social benefits. These mechanisms change the challenging cost-benefits structure of carbon pricing; modify perception on their fairness, environmental effectiveness and competitiveness, all of which could ultimately lead to higher political acceptability and more stringent policy implementation.

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Chapter 4: Research Design and Methodology[59]

4.1. A Multi-Method Approach

This chapter delineates how this proposed research design facilitates realizing the scientific objectives of this dissertation and introduces the methods applied to empirically examine the development of carbon pricing stringency by jointly analyzing structural political economy conditions and revenue-recycling alternatives. The research employs an explanatory sequential design, in which the qualitative phase builds directly upon the results of the quantitative section. By definition: "The explanatory design is a mixed methods design in which the researcher begins by conducting a quantitative phase and follows up on specific results with a second phase […]. The second, qualitative phase is implemented for the purposes of explaining the initial results in more depth, and it is due to this focus on explaining results that is reflected in the design name" (Creswell & Clark, 2011, p. 82).

In the first phase, I use fuzzy-set Qualitative Comparative Analysis (fsQCA) to analyze which configurations of structural political economy conditions and revenue-recycling schemes to produce stringent carbon pricing mechanism (outcome). In the second phase, I conduct an in-depth case study based on my QCA findings to explain underlying causal mechanism linking revenue recycling to stringent policy outcome. Such nested approaches in QCA are termed "set-theoretic multi-method research" (SMMR) (Schneider and Rolfing, 2013; 2019).

The chapter develops as follows. First, I introduce the employed methods of this research and demonstrate why QCA is a suitable tool for my research purposes. I also provide key information about the methodological approach to the qualitative part of empirical research, including how combining deductive content analysis and semi-structured elite interviews can enhance the quality of research as well as outlining crucial information about the interview process. Following the first section, I present the universe of cases under QCA investigation, time span covered by the empirical analysis and calibration of explanatory conditions. Calibration is roughly analogous to operationalization in other research methods, but it has features unique to set-theoretic methods. After setting the scene, the QCA analysis is presented in the next chapter.

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[59] This chapter includes sections from the paper 'Pathways to stringent carbon pricing: Configurations of political economy conditions and revenue recycling strategies. A comparison of thirty national level policies', published in Ecological Economics, Volume 214 (2023), available at https://doi.org/10.1016/j.ecolecon.2023.107995.

4.2. Applied Methods

For the first part of empirical research, fuzzy-set Qualitative Comparative Analysis (fs/QCA) is employed. QCA is a set-theoretic method that helps us understand social phenomenon in terms of set relations (Ragin 2008). At the center of inquiry, researchers applying QCA are interested in examining whether certain sets are deemed to be necessary conditions (a superset of outcome) or sufficient conditions (a subset of outcome) to explain social outcome. What fundamentally drives the choice to use QCA, however, is not finding a single necessary/sufficient condition, but exploring different combinations of conditions that are jointly producing an outcome. For example, Ide (2020) shows that countries' insufficient climate policies can be more accurately and comprehensively explained through the intersections of conditions (economic recession and fossil fuel dependence or low level of human development) than by single factors. This is the realm of causal complexity, which acknowledges that there can be multiple, non-exclusive pathways to the same outcome (*equifinality*), and that a certain pathway may include a composition of intersecting conditions that jointly exert influence on the outcome (*conjunctural causation*) (Schneider and Wagemann 2012).

There are well-founded, theoretical and methodological considerations that make QCA employment in this research a promising analytical strategy. As discussed in previous chapter, contextual differences between countries matter, as they theoretically require the prescription of disparate revenue recycling strategies. By using QCA we can capture this diverse set of combinations. Increasing heterogeneity of countries that have recently adopted carbon pricing also confirms the suitability of this approach. Equally important is the capability of QCA to detect hybrid revenue recycling strategies. If revenue recycling benefits different social groups across the political spectrum by combining different spending options, we lessen the chance of backtracking on stringent carbon pricing adoption due to public reluctance to give up acquired benefits (Klenert et al. 2018). The more people or social groups benefit from revenue recycling, the more political support can be garnered. Therefore, one of the main theoretical contributions this research makes is an examination of hybrid uses of revenues in all currently implemented national carbon pricing mechanisms, which is a pathway presumably more viable as a political strategy to secure public support. Furthermore, QCA can be used for theory evaluation and for set-theoretic multi method research (SMMR). To the best of my knowledge, this is the first empirical undertaking that compares all national-level CPMs from a revenue-recycling perspective. Thus, it is interesting to see to what extent the novel theoretical framework is able

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explain carbon pricing stringency and where avenues for future research lie. SMMR is a formalized case selection mechanism which allows researchers to choose a case which can be served to probe the causal properties of QCA model. Lastly, it is worth noting that the number of cases (N=30) in this study is well-suited for the method.

For the qualitative part of the dissertation, I employ process-tracing case study. Process tracing is a "research method for tracing causal mechanisms using detailed, within-case empirical analysis of how a causal mechanism operated in real-world cases" (Beach and Pedersen, 2019, p. 1). In this research, I investigate how revenue recycling, used in such a way as to change the public's perception on the fairness and environmental effectiveness of these policies through compensatory measures and green spending, leads to enhanced political acceptability and thus enabling the implementation of more stringent carbon pricing mechanism.

In order to accomplish the qualitative part of research objective, an integrative data collection strategy is employed. First, a large amount of data and information is gathered and analyzed from a wide range of sources including but not limited to transcripts of parliamentary hearings, manifestos, party reports, position papers of interest groups, academic research and policy analyses (George and Bennett, 2005; Krippendorff, 1989). Second, semi-structured elite interviews are conducted with key politicians, climate policy advisors and other actors who were directly involved in the policy making process. Combining deductive content analysis and interview research significantly enhances the depth of scientific investigation and serves various purposes (Elo & Kyngäs, 2008). Notably, it can corroborate and cross-check previous findings from other sources, and deliver essential insights and a greater understanding of the context in which policy outcome occurred. The findings that might be of interest to a researcher include the perspectives of, and roles played by, different actors and circumstantial factors that could facilitate or hinder the development of the outcome (Tansey, 2007). Interview research, nevertheless, comes with its own liabilities and limitations. For instance, certain actors may be invested in appearing more/less influential in the policy making process, and thus offer a misleading account of the events. To increase transparency, I acknowledge the discrepancy when views shared by interviewees conflict with written sources or with other interview data.

I conducted sixteen interviews in total, and had several off-the-record discussions, which are not included in the data. Eight in-person interviews were conducted in January and February in Dublin, Ireland, and the rest were conducted online in February and March 2023. One respondent sent his written answers to my questions. Due to the political sensitivity of topic, participants took the survey under the condition of anonymity (informed consent form can be

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found in the Appendix). What can and must be said is that four politicians, three civil servants, four climate policy advisors and five professionals from think tanks and interest groups were interviewed, representative of all parties in parliament, and major interest groups formally involved in policy making process. Except in the case of two interviewees, who did not give their authorization, all interviews were voice recorded, transcribed and then coded, using a process consisting of ten key variables or themes. These variables or themes included the position of the interviewees party or interest group to carbon tax reform, public perception of reform and the role revenue recycling played in influencing political outcome. The interview questions and informed consent form can be found in Appendix B.

4.3. Research Design

4.3.1. Cases

This section defines the case selection guided by the researcher's theoretical interests and approach. My cases are national-level, explicit carbon pricing policies (carbon taxes and emissions trading systems). There are no arbitrary decisions concerning the selection of cases as all policies that have been operational since the Paris Agreement of 2015 are included in my analysis. The only exceptions are the omissions of Canada, as its CPM design is incompatible with my analysis (see below), and Liechtenstein, in which data on structural factors (inequality, fossil fuel dependence) were absent. I argue that the Paris Agreement serves as a useful framework for climate policy comparison between different countries since each state currently implementing CPMs has signed the agreement and made a pledge to work towards realizing its sustainability goals. Furthermore, the literature admits that the most important public actor in decarbonization matters is the state (see my discussion and references in the Theoretical Framework). As a consequence, supranational (e.g., EU ETS), regional (RGGI) and lower-level of policies (Tokyo) are excluded from analysis.

The time span assessed begins 12 December 2015 when the Paris Agreement was adopted, and finishes October 2021. The Accord serves as the framework for this study, hence determines a clear beginning point. However, my end point might need some explanation. First, parties in the Agreement had the opportunity to update their Nationally Determined Contributions (NDC)[60] before COP26 which took place in November 2021. COP26 in Glasgow marked the

[60] Plan on how the countries aim to achieve their emissions reduction targets. NDCs reflect on the "bottom-up" approach of the Paris Agreement.

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end of the first compliance cycle constituted by the Agreement.[61] Furthermore, this 6-year period between COP21 in Paris and COP26 seems a sufficient amount of time for states to implement the promises they made or to scale-up their commitment level in line with their NDCs.

Although there are marked differences between carbon tax and emissions trading systems, it is logical and advantageous to bundle them together for the purposes of research. From a theoretical perspective, the overarching economy principle and expected environmental outcomes of carbon taxes and ETSs are similar (Aldy et al. 2010). Empirically, these instruments interact in numerous ways since some jurisdictions use both instruments to price emissions despite their overlapping emissions scopes, as seen in Finland, and employ policies that resemble policy characteristics of both instruments (e.g., German ETS with fixed price allowances). As Dominioni and Faure (2022) also effectively demonstrate, there is a general trend towards greater similarity in the price stabilizing properties of carbon taxes and cap-and-trade systems, resulting in similar economic and environmental effects. Lastly, by jointly analyzing carbon taxes and emissions trading systems, the empirical results are comparable and build upon those seen in other studies taking similar approach (e.g., Levi, Flachsland, & Jakob, 2020). In this way, the data can contribute to the crucially needed knowledge accumulation process in the dynamically evolving field of political economy of climate policy development.

All policies that have been operational since the Paris Agreement of 2015 are included in the analysis. However, it is important note that only those EU member states and European Economic Area countries are included that deliberately chose to adopt carbon pricing mechanism in addition to being part of the EU ETS. Countries that have only been participating in the EU ETS are excluded, as the development of the main design elements of the carbon market are outside of their discretion. However, EU ETS prices in countries that use other types of carbon pricing (tax or ETS) are accounted for because they interact with each other in numerous ways. For example, there can be significant overlap between the scope of carbon tax and that of EU ETS (e.g., Finland). In other countries, carbon tax was introduced as a complementary policy instrument to EU ETS (Ireland, Iceland, Portugal), to address emissions in non-ETS sectors or as mechanism to strengthen ETS price signal (the Netherlands, United Kingdom). From a revenue recycling perspective, if EU ETS revenues are spent on climate investments, then carbon tax revenue can possibly be used for compensatory mechanisms or

[61] Due to COVID-19, COP26 was postponed, thus my analysis encompasses six years instead of the five which were originally planned.

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other different social objectives, and the combination of these approaches is theoretically more appealing politically (see above). Therefore, countries employing a carbon pricing mechanism in conjunction with participating in the EU ETS should be part of the analysis, as any examination of the stringency of their carbon pricing framework and revenue recycling strategies would be incomplete without this information.

Canada is excluded from the analysis due to unique features of their national carbon pricing mechanisms that make comparison to other national level CPMs impossible. The Canadian federal fuel charge and baseline-and-credit ETS work as backstop systems (World Bank, 2021). If the provinces do not implement CPMs or the adopted schemes do not meet federal carbon pricing standards (e.g., minimum price), the federal scheme replaces the provincial system.[62] Furthermore, the revenues generated by the federal carbon pricing system are given back entirely to the provinces, thus the national government does not have any decision-making power to use the funds on realizing its own policy objectives (World Bank, 2021). Since the analysis focuses on national-level policies and the role of revenue-recycling in shaping the stringency of CPMs, Canada is excluded.

The Netherlands represents another interesting case, since the scope of its carbon tax overlaps almost 100% with the EU ETS. Functionally, the carbon tax works as a price floor in an emissions trading system. If ETS prices fall below the tax rate, companies need to buy additional allowances from the national authorities. By implementing that rule, the government intended to ensure that decarbonization efforts were not hampered by the fluctuating or low prices of ETS (Sleven, 2021). However, since its inception (January, 2021), EU ETS prices have been consistently higher than the Dutch tax rate (EUR 30/t CO_2), and it is very unlikely that this situation will change in the foreseeable future (despite the Dutch rate being set to increase over time), due to increasing stringency in the 'Fit for 55' climate scenarios[63] (European Commission, 2021). Nevertheless, the Dutch tax is included in the analysis because, when the policy was deliberated, ETS prices were below the envisaged tax rate and thus aimed to increase in stringency. As the ETS prices exceeded the tax rate, only ETS share and prices were included in the calculation for the Netherlands.

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[62] As a note, the design of implemented carbon pricing schemes in the Canadian provinces varies greatly, using different approaches to pricing emissions.

[63] Fit for 55 is an ambitious climate package introduced by the European Commission. It covers all emissions-intensive sectors (transportation, building, energy, etc.) to reach climate targets by 2030 by significantly reducing EU emissions.

4.3.2. Measurement and Calibration

Calibration is one of the most decisive parts of QCA research. Calibration is the procedure, by which set-membership scores for cases based on empirical information are assigned, which establishes the qualitative differences between the conditions and outcome under investigation (Schneider and Wagemann, 2012). The process includes the identification of a suitable measurement that reflects the social science concepts we want to capture, and determines the qualitative anchors defining: the crossover point (0,5) (a case is more in or out of a set); full membership (1); and full non-membership (0). In this research¸ fuzzy-set analysis that allows assigning partial membership scores from 0 to 1, is used, in contrast to crisp sets that are dichotomous (e.g., High Income/Not High-Income countries). Using fuzzy sets allows the research to show empirical diversity among cases (High-, Middle-, Low-Income countries). Raw data is calibrated by using the *direct method of calibration* that applies a logistic function to transform raw data into calibrated scores between the qualitative anchors (Schneider and Wagemann, 2012). Calibration and all other analytical steps are performed in *R* (Dusa, 2018; Oana and Schneider, 2018; Oana, Schneider and Thomann, 2021). Used data, codes and developed formulas (calibration functions, data diagnostics, robustness tests, solution formulas, etc.) can be found in the online data repository and the Appendix A.

Outcome Measurement and Calibration

The focus of this research is to analyze which constellation of conditions produces the most stringent environmental outcomes. In carbon pricing, this outcome is best represented by price level, since the higher the emission prices are, the more incentive actors have to reduce their carbon footprint and to invest in low-carbon technologies. However, which economic sectors and fossil fuel types are included in the policy (called "coverage") is at least as important as the price level, because the broader the coverage, the more sectors are compelled to engage in decarbonization efforts. Therefore, this research combines the price level and coverage to calculate the so-called "emissions-weighted carbon price" (ECP) (after Dolphin et al., 2020, p. 480).

This is how the basic formula looks:

PRICE * COVERAGE (% SHARE OF GHG) = ECP

The data used for calculating ECPs are from April 2021 for carbon taxes (most recent available data) (World Bank, 2021) and October 2021 for emissions trading systems. The primary data source is the Carbon Pricing Dashboard, developed and run by the World Bank (2021), which

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collects various types of information on the operation of CPMs, such as price level, coverage, overlap with other policies and compliance mechanisms. Carbon tax rates rarely change during a year and I have not encountered any in my data collection process, except in Ireland for which I used the updated tax rate (May, 2021) for calculation. ETS prices tend to change according to supply-demand dynamics, so I collected the latest available data on price development (average October price as of cut-off point before COP26). Nevertheless, it should be noted that the data collection technique on ETS prices does not affect the calibration as 4 out of 7 ETSs (China, Korea, New-Zealand, Kazakhstan) have prices far too low to qualify as stringent policy. The German ETS currently has a flat price and the remaining two ETSs did not show any signs of market dysfunctions (too-low prices, price hikes or changing trends) in 2021 that could distort my calculation.[64]

Methodological Issues with Outcome Measurement and Coping Strategies

The intention for this more accurate ECP measurement produced some methodological challenges. The first group for which additional calculation was needed comprised the countries that participate in the European Emissions Trading System (EU ETS). Here, the calculation included ETS price and share of GHGs as well as other domestic carbon pricing initiatives. The main challenge was that the share of GHGs covered by ETS vary by country. Although, for most countries the share was close to EU-average (approximately 40%, for example in Sweden and Spain), some countries have much higher (Estonia: 73.3%) or lower (Luxembourg:15%) values. Therefore, I calculated the exact share of GHG emissions covered by EU ETS for each country extracted from the 'National Energy and Climate Plans' of member states, as submitted to the European Commission (see the dataset). Here, the latest available verified emissions data (2017) was used. To provide an example, the French emissions-weighted carbon price developed as follows:

(52*0.35) + (68,95*0.238) = 34.61 (USD/t CO2)

where, 52 is the carbon tax rate;

0.35 (35%) is the share of GHGs emissions covered by the tax;

68.95 is the ETS price level in USD;

0.238 (23,8%) is the share of GHG emissions covered by the ETS in the country.

[64] See the price trends for both ETSs represented visually at: https://ember-climate.org/data/carbon-price-viewer/ and EU ETS price developments on longer time horizon at: https://tradingeconomics.com/commodity/carbon.

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Another methodological challenge occurred when the scope of different carbon pricing mechanisms overlapped by fossil fuel types as it occurred, for example in Finland (see all countries in the dataset). Here, I attempted to disaggregate data by sectors (e.g., subtracting share of emissions from the transportation that is not part of the EU ETS and calculate accordingly). When such data was not available (Ireland and Norway), I made conservative estimations, so excluded overlapping emissions (so either counted for the carbon tax or the EU ETS). It is important to note that no countries have been affected by this conservative (low) estimation in the calibration, although Ireland is between full membership (1) and the point of indifference (0.5) thus that country might have earned full membership if data had been available.

Furthermore, calculation was also adjusted when CPMs applied different price rates for different greenhouse gases. For example, F-gases[65] are priced at a lower rate (US$24/tCO2) than other fossil fuels (US$28/tCO2e) in the Danish carbon tax (World Bank, 2021). Here, I looked for data that shows the contribution of different gases/fossil fuels to domestic GHG emissions and calculated prices accordingly.

As an example, the Danish emissions-weighted carbon price developed as follows:

(28*0.332) + (24*0.018) + (68.95*0.3125) = 31.27

‘other GHG’ F-gases

carbon tax ETS ECP

where, 24 is the carbon tax rate for F-gases; 28 is the carbon tax rate for other greenhouse gases; 0.018 (1.8%) and 0.332 (33.2%) are the respective shares of GHGs emissions covered by the carbon tax for these gases; 68.95 is the ETS price level in USD; 0.3125 (31.25%) is the share of GHG emissions covered by the ETS in the country.

The following figure visualizes calculated emissions-weighted carbon price for each country.

[65] They are gases that damage our ozone layer but are also potent greenhouse gases. There are numerous types of F-gases, emitted by commodities from kitchen appliances (refrigerators) to high-voltage power systems (Danish Environmental Protection Agency 2018).

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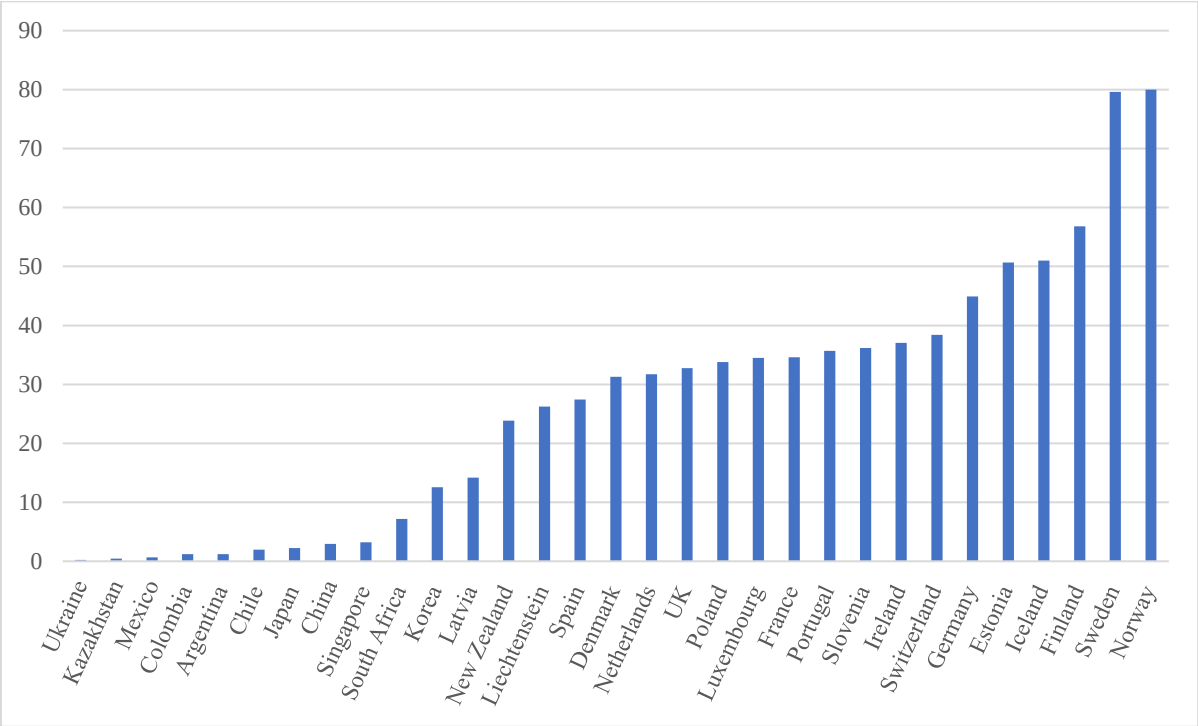
6. Figure - Emissions-weighted carbon price (USD/t CO2) by country.



Among the top performing countries, we find the Nordic-countries (with the exception of Denmark) and Germany, which is in line with our expectations. Nordic countries were the first in the world to implement CPMs and their outstanding environmental performance is demonstrated by numerous empirical works and indices. Germany also performs high in climate change mitigation efforts (see e.g., Burck et al., 2021 for both Nordic countries and Germany). The only country that gave us cause for surprise was Estonia, especially because it has a very low carbon tax rate (USD 2/t CO_2). Its high ranking can be explained by its exceptionally high share of ETS coverage (73.3% compared to average 40% in the EU). The group of countries in the lower end (less than USD 10) is represented largely by Latin-American and Asian economies. While these countries' economic development is low compared to top performers, there are remarkable exceptions (Japan and Singapore). Countries that roughly fall between the middle-range (between 10 and 40), are quite diverse with non-EU countries placed at the very end of the spectrum (Switzerland: USD 38 and Korea: USD 12).

To decide which carbon prices are considered stringent, the 'safety criterion' is applied, a principle which is also embodied in the Paris Agreement (Boyce 2018). This entails that climate policies should be primarily assessed against how well they perform to keep global warming at a safe, socially tolerable level of increase. To define full membership, the most-cited price range in the literature is used, a level that was developed by the High-Level Commission on Carbon

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Prices in 2017, led by Joseph Stiglitz and Nicholas Stern. They argue that a minimum price of 40-80 USD/t CO_2 by 2020 would be needed to achieve the Paris Agreement's temperature goals (World Bank 2017). The 30 Euro benchmark (USD 34.26 in 2020 prices), developed by OECD (2021a), is used as the crossover-point for the minimum carbon price level required for meaningful decarbonization efforts, which is optimistically still aligned with the Paris Agreement's temperature goals. Other studies came up with very similar estimations (e.g., International Energy Agency, 2012; CPC, 2017). Full non-membership is set at USD 10 as an often-cited benchmark used by the World Bank (e.g., 2018; 2020).[66]

Conditions Measurement and Calibration

High Economic Development (HED) is measured by GNI per capita, and the World Bank's income classification system, the Atlas Method, is applied for defining qualitative anchors, with the further qualitative distinction made between Western European and Eastern European countries to reflect differences in terms of cost absorption and technological capacity between them. Therefore, non-membership (0) is set at 4095 USD (the difference-maker between lower-middle income- and upper-middle income countries); the crossover point (0,5) is at 12 695 USD (threshold for high income countries) and full membership (1) is at 35 000 USD. For economic development, data from 2020 were used.

For emissions-weighted carbon prices and economic development, the calibration is purely theory-guided. Unfortunately, for income inequality and fossil fuel dependence, no such theoretical guidelines are outlined/emerged yet in the literature. Therefore, the calibration of these indicators primarily uses empirical reasoning. The set of Low Income Inequality (LII) is measured by the Gini index with the following calibration thresholds: non-membership: 0.4, crossover point: 0.3, and full membership: at 0.2. In this respect, the United Nations (2023) argues that: "Although there are no internationally defined, standard cut-off values, it is commonly recognized that Gini index<0.2 corresponds with perfect income equality; 0.2–0.3 corresponds with relative equality; 0.3–0.4 corresponds with a relatively reasonable income gap; 0.4–0.5 corresponds with high income disparity; and above 0.5 corresponds with severe income disparity." Also, an article published by The International Journal for Equity in Health (Lin et al., 2017) used the following measurement in their quantitative approach: "The Gini coefficient at the city level was calculated to measure social income inequality and was

[66] This is understandable as, for example, a USD 10 carbon price would be translated roughly into a 2-3 cents price increase per liter ($0.09 per gallon) of petrol/diesel at tank stations. Current fuel excise taxes are much higher in most countries and this carbon price level would be easily lost in monthly gasoline price changes (Jenkins, 2019, p. 6)

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categorized into low (0.2 < Gini <= 0.3); medium (0.3 < Gini <= 0.4); high (0.4 < x < = 0.5); and very high (Gini >0.5)." These approaches are in line with my calibration.

Low Fossil Fuel Dependence (LFD) is measured by the share of fossil fuels taken up by primary energy consumption. In this research, I only take energy consumption into account and not energy intensive industries (EII, see the theoretical framework), for several reasons. The first is a practical one, to keep the number of relevant conditions at a moderate level to avoid model complexity. More importantly, previous studies could not consistently confirm the importance of the relative strength of EII on carbon pricing stringency, in contrast to the share of fossil fuels in power generation that has been shown to be highly influential in weakening carbon price signal (Dolphin, Pollitt & Newbery, 2020; Levi, Flachsland & Jakob, 2020). This is most probably due to several exemptions granted to industries, either in terms of not covering them in the policy or giving them special treatment if they are enrolled. Therefore, fossil fuel dependence will be measured by the share of fossil fuel used in energy consumption in a jurisdiction. By using this share as the yardstick, we can also indirectly capture the effect of their industrial strength since the higher the share of industries in an economy, the more fossil fuel is consumed.[67] Such economies are heavily impacted by rising energy prices. More than 90% of energy consumed by fossil fuels constitutes full membership. I take 80% as the cross-over point, in reference to the EU relatively ambitious climate objective of increasing the proportion of renewable energy use to 20% by 2020, seen as a realistic goal which can be realized by additional efforts from countries (European Commission, 2012). I use an empirical argument to set full non-membership at 60% (instead of 50) to include countries with high shares of energy from nuclear power (predictable, long term energy generation in contrast to more fluctuating renewables) such as France and Finland. To measure income inequality and fossil fuel dependence, the mean value between the years 2015 and 2019 is taken for each country, corresponding to the time period examined in the course of this research.

The data collection on countries' revenue recycling measures is a result of extensive desk research. Information was collected through publicly available governmental and policy reports on revenue recycling (e.g., Marten and Van Dender, 2019; PMR, 2019). To reflect the examined time period of this research, revenue recycling measures introduced between 2016 and 2021 were considered. Information on the revenue usage of different countries was checked against at least two sources. These efforts resulted in a unique dataset of all national level carbon pricing

[67] Industrial heating is a very carbon-intense process and is hard to decarbonize with current level of technology. https://www.iea.org/commentaries/clean-and-efficient-heat-for-industry

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revenue recycling systems. The dataset, along with all used sources, is available in the online repository.

The compiled dataset reveals that, out of thirty countries, twelve countries do not link revenue to any specific purposes. Eleven countries apply hybrid revenue recycling, combining different spending options. For example, Ireland compensates vulnerable social groups and invests in low-carbon transition using funds from carbon taxes, or Norway, which uses all three revenue recycling channels by reducing taxes, putting a portion of the revenue into a pension fund and financing renewable energy and energy efficiency programs. One country, Colombia, spends carbon revenue solely on social objectives (supporting the peace process in post conflict zones), whilst the remaining six countries, including Japan and Latvia, use carbon pricing proceeds towards decarbonization efforts.

The share of the revenue spent on the three different conditions is taken into account when calculating revenue recycling conditions. For example, if 60% of the revenue is spent on social cushioning (e.g., transfers to low-income households) and the rest on energy efficiency programs, then the value of 0,6 is assigned to 'Compensation' and 0,4 to 'Decarbonization Efforts'. Both legally earmarked (ring-fenced) revenue and politically committed (hypothecated) spending are taken into account. Regarding calibration, non-membership is set at 0; full membership set at 0.5; the crossover point is 0.25, but 0.3 for compensation, because most studies suggest that approximately 30% of the revenue should be repaid to low-income households to make carbon pricing progressive (see the Theoretical Framework). Similarly, in calculating the 'emissions-weighted price,' carbon taxes and ETS are combined by analyzing the share of both carbon tax and ETS from the total carbon pricing revenue. This is necessary because countries' revenue from carbon tax and emissions trading differ rather considerably in some cases. Looking at raw data, for instance, in Finland and seeing that 100% of the ETS revenue is spent on furthering climate change mitigation efforts, and 50% of carbon tax revenue is spent on tax reductions may lead us to the wrong conclusion that ETS revenue use is more salient socially, whilst in fact it is marginal to carbon tax revenue utilization because ETS revenue only accounts 15% of the total carbon pricing revenue (see the dataset).

Due to the complexity of calibration for some cases, and being mindful that some readers may not be entirely familiar with QCA as method, an example is provided below to demonstrate how raw data are converted into set membership scores for the explanatory conditions.

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Regarding its political economy conditions, Portugal's GNI/capita is 21 790 USD; Gini coefficient is 32.28%, and 75.8% of its energy consumption comes from fossil fuels. These values are converted into calibrated scores according to the above discussed qualitative thresholds, resulting in values of 0.77, 0.34, 0.65, respectively. This implies that Portugal is a member of the 'High Economic Development' and 'Low Fossil Fuel Dependence' sets, and a non-member in the Low Income Inequality set. Please note, however, that scores do not imply full membership.

By looking at its revenue recycling strategy, Portugal spent 89.75% of its EU ETS revenue on climate related projects. 36% of carbon tax revenue was utilized to finance electric and public transport development, and the rest went to tax reduction for large families as part of its Green Fiscal Reform. After taking into account the share of carbon tax (49%) and EU ETS revenue (51%) of the total carbon pricing revenue, Portugal earned the calibrated score of 0.31 on compensation and 0.63 on its decarbonization efforts, thus it is member of the sets, 'High Compensation' and 'High Decarbonization Efforts.' Sources can be found in the dataset.

It is important to note that the calibration of the explanatory conditions is highly robust (see the results and explanations of different robustness tests below: sensitivity ranges and also fit-and-case-oriented robustness below).

To give an overview, the measurement and qualitative thresholds of membership scores for all explanatory conditions are visualized below.

9. Table - Measurement and thresholds of membership scores for explanatory conditions.

Conditions/sets	**Measurement and data source**	**Calibration (all with direct method)**
High Economic Development (HED)	GNI/capita (World Bank)	Non-membership: 4095 USD/capita Crossover point: 12 695 USD/capita Full membership: 35 000 USD/capita
Low Income Inequality (LII)	GINI index (OECD and World Bank)	Non-membership: >0.4 corresponding with high income disparity

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		Crossover point: 0.3 corresponding with a relatively reasonable income gap Full membership: <0.2 corresponding with perfect income equality
Low Fossil Fuel Dependence (LFD)	Share of fossil fuels in primary energy consumption (BP Statistical Review of World Energy)	Non-membership: 90% (0.9) or more Crossover point: 80% (0.8) Full membership: 60% (0.6)
High Compensation (HCO) High Decarbonization Efforts (HDE) High Social Objectives (HSO)	Share of revenue spent on the three different conditions (multiple sources)	Non-membership: 0 Crossover point: 0.25 (0.3 for compensation – 'progressive outcome') Full membership: 0.5

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Chapter 5: QCA Analysis[68]

In this chapter, the analyses of necessity and sufficiency are performed. These measures include the construction of the Truth Table and logical minimization process as well as interpretation of results. In order to apply QCA in a rigorous way and provide a comprehensive examination, the analysis is rounded up by applying some crucial post-QCA tools, such as robustness tests. The analysis ends with discussion on set-theoretic multi method research (SMMR) which introduces the selected case for in-depth investigation about the causal mechanisms linking revenue recycling to stringent policy outcome.

For a short recap, the below analysis tests the novel theoretical framework set forth in this research. The main hypothesis is that revenue recycling may ease/overcome structural challenges posed by rigid political economy conditions, and thus enables the implementation of stringent climate policy. The results below demonstrate the following: higher carbon prices are achieved in countries with enabling political economy environment: high economic development, low income inequality and fossil fuel dependence. Furthermore, countries where structural conditions are more constraining (have higher level of income inequality and/or fossil fuel dependence) can still implement more stringent policies if they use hybrid revenue recycling, the combination of compensatory mechanisms and climate spending. This result provides substantial empirical support for the main hypothesis, and therefore the explanatory power of framework, especially because it is shown that those countries that do not provide any compensation to negatively affected socioeconomic groups with similarly constrained environment, have lower carbon prices.

5.1. Analysis of Necessity

As a first step, the analysis of necessity is performed for both the outcome (stringent carbon pricing) and its non-occurrence (not having a stringent policy, referred to as “lax carbon pricing”). No single condition or disjunction of conditions has been proven to be necessary for stringent carbon pricing. However, not introducing compensatory mechanisms (~HCO) along with carbon pricing has been found to be necessary for the absence of an outcome. This is an important finding from a revenue-recycling perspective because it shows that countries that have lax carbon pricing policies, also do not provide compensation for households or businesses

[68] This chapter includes sections from the paper 'Pathways to stringent carbon pricing: Configurations of political economy conditions and revenue recycling strategies. A comparison of thirty national level policies', published in Ecological Economics, Volume 214 (2023), available at https://doi.org/10.1016/j.ecolecon.2023.107995.

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(~HCO). In other words, whenever we see low carbon prices, a lack of compensation is also present.

5.2. Analysis of Sufficiency

Table 10 shows the developed Truth Table, which represents all possible, logical combinations of conditions and respective cases. This is the essence of QCA because this information is used for *logical minimization* which is a process of expressing the empirical information in a more parsimonious way by using formal logic (Boolean algebra). I interpret the intermediate solutions of the Enhanced Standard Analysis which takes into account all combinations of conditions with empirical information (19 rows out of 64, see below) and *Directional expectations*[69] which are positive for all explanatory conditions.

10. Table - Truth Table stringency

	HED	LII	LFD	HCO	HDE	HSO	OUT	n	incl	PRI	cases
61	1	1	1	1	0	0	1	2	0.991	0.984	Finland,Sweden
58	1	1	1	0	0	1	1	1	0.975	0.959	Norway
47	1	0	1	1	1	0	1	2	0.961	0.923	Portugal,Switzerland
55	1	1	0	1	1	0	1	1	0.956	0.882	Ireland
63	1	1	1	1	1	0	1	2	0.930	0.858	Denmark,France
59	1	1	1	0	1	0	1	2	0.924	0.853	Germany,Slovenia
57	1	1	1	0	0	0	1	1	0.907	0.839	Iceland
39	1	0	0	1	1	0	1	1	0.902	0.752	Luxembourg
36	1	0	0	0	1	1	1	1	0.844	0.713	Estonia
51	1	1	0	0	1	0	0	1	0.841	0.625	Poland
49	1	1	0	0	0	0	0	1	0.736	0.232	Netherlands
43	1	0	1	0	1	0	0	2	0.718	0.517	Latvia,Spain
35	1	0	0	0	1	0	0	2	0.562	0.284	Japan,Singapore
41	1	0	1	0	0	0	0	2	0.559	0.300	Chile,New Zealand
33	1	0	0	0	0	0	0	2	0.419	0.059	Korea,United Kingdom
25	0	1	1	0	0	0	0	1	0.364	0.038	Ukraine
17	0	1	0	0	0	0	0	1	0.337	0.111	Kazakhstan
10	0	0	1	0	0	1	0	1	0.336	0.035	Colombia
1	0	0	0	0	0	0	0	4	0.128	0.032	Argentina,China,Mexico,South Africa
2	0	0	0	0	0	1	?	0			
3	0	0	0	0	1	0	?	0			

[69] Directional expectations are theoretically underpinned assumptions about how the conditions relate to outcome (Oana, Schneider and Thomann, 2021). For example, it is theorized that higher economic development leads to higher carbon prices due to enhanced cost-absorption capacity of firms and individuals.

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Two separate analyses are run, and the intermediate solutions are interpreted for both cases in which the outcome was present (high stringency) and absent (not high stringency). First, the conditions sufficient for stringent carbon pricing mechanisms are presented.

11. Table - Solution formula for stringent carbon pricing (HS)[70]

HED*LII*LFD + HED*HCO*HDE + HED*~LFD*HDE*HSO -> HS

Sufficiency Paths	inclS	PRI	covS	covU	Cases
High Economic Development AND Low Income Inequality AND Low Fossil Fuel Dependence (HED*LII*LFD)	0.910	0.863	0.550	0.279	Iceland, Norway, Germany, Slovenia, Finland, Sweden, Denmark, France
High Economic Development AND High Compensation AND High Decarbonization Efforts (HED*HCO*HDE)	0.841	0.731	0.413	0.124	Luxembourg, Portugal, Switzerland, Ireland, Denmark, France
High Economic Development AND High Fossil Fuel Dependence AND High Decarbonization Efforts AND High Social Objectives (HED*~LFD*HDE*HSO)	0.852	0.724	0.121	0.045	Estonia
	0.868	0.810	0.737		

inclS: sufficiency inclusion score
PRI: proportional reduction in inconsistency
covS: raw coverage
covU: unique coverage

The solution formula shows three sufficiency paths to stringent carbon pricing. 1. HED*LII*LFD demonstrates that a combination of favorable political economy conditions

[70] '*' is the logical operator for AND; '+' is the logical operator for OR; '~' is the logical operator for NOT, used in Boolean algebra.
'inclS' shows the extent to which the sufficiency path is consistent with the empirical data. More deviant cases imply lower inclS scores. The obtained inclS scores imply a very high consistency (Schneider and Wagemann, 2012).
PRI demonstrates simultaneous subset relations, meaning a path is sufficient for both the outcome (stringent carbon pricing) and the negated outcome (lax carbon pricing), which is illogical. PRI score close to or lower than 0.5 should be avoided, in order to consider the path sufficient. The obtained PRI scores imply no issue with simultaneous subset relation.
covS and covU show the empirical relevance of sufficiency paths. covS demonstrates to what extent a single sufficiency path (e.g., HED*LII*LFD) can explain outcome. The closer covS is to 1, the more cases are covered by the solution formula. CovU demonstrates the amount of coverage that is attributable to only one sufficiency path (removing empirical overlap with other paths). (Oana et al. 2021)

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(high economic development, low income inequality, low fossil fuel dependence) enable the implementation of ambitious carbon pricing. 2. HED*HCO*HDE shows that developed countries that are constrained by one or two structural political economy conditions (having higher income inequality and/or greater reliance on fossil fuels in their energy mix) can still implement stringent carbon pricing if they use a hybrid revenue recycling strategy. Lastly, HED*~LFD*HDE*HSO indicates that even high economic development and fossil fuel dependence conjoined with high decarbonization efforts and spending on social objectives can produce stringent carbon pricing.

Second, the condition sets that result in lax carbon pricing developed as follows:

12. Table - Solution formula for non-stringent carbon pricing (~HS).

~LFD*~HCO*~HSO + ~HED*~LII*~HCO*~HDE + ~HED*~HCO*~HDE*~HSO + HED*~LII*~HCO*~HSO -> ~HS

Sufficiency Paths	inclS	PRI	covS	covU	Cases
High Fossil Fuel Dependence AND No Compensation AND No Social Objectives (~LFD*~HCO*~HSO)	0.869	0.832	0.665	0.064	Argentina, China, Mexico, South Africa, Kazakhstan, Korea, United Kingdom, Japan, Singapore, Netherlands, Poland
Low Economic Development AND High Income Inequality AND No Compensation AND No Decarbonization Efforts (~HED*~LII*~HCO*~HDE)	0.976	0.974	0.332	0.053	Argentina, China, Mexico, South Africa, Colombia
Low Economic Development AND No Compensation AND No Decarbonization Efforts and No Social Objectives (~HED*~HCO*~HDE*~HSO)	0.977	0.975	0.349	0.035	Argentina, China, Mexico, South Africa, Kazakhstan, Ukraine
High Economic Development AND High Income Inequality AND No Compensation AND No Social Objectives (HED*~LII*~HCO*~HSO)	0.813	0.738	0.492	0.081	Korea, United Kingdom, Japan, Singapore, Chile, New Zealand, Latvia, Spain
	0.845	0.812	0.835		

inclS: sufficiency inclusion score
PRI: proportional reduction in inconsistency
covS: raw coverage
covU: unique coverage

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This solution formula is more complex than the previous one. As the first solution formula shown above only applies to highly developed economies, it is worthwhile to begin interpretation with the last sufficiency path, which applies exclusively to them. HED*~LII*~HCO*~HSO suggests that highly developed countries with higher levels of income inequality cannot implement stringent carbon pricing if they do not employ compensatory mechanisms and spend on socially beneficial programs. The first path, ~LFD*~HCO*~HSO, shows that higher fossil fuel dependence conjoined with a lack of social compensation also produces lax carbon pricing. ~HED*~LII*~HCO*~HDE and ~HED*~HCO*~HDE*~HSO both demonstrate that unfavorable political economy conditions (not having developed economy and having higher income inequality) conjoined with a lack of revenue recycling lead to low carbon prices.

One of the fruitful outcomes of the obtained solutions is the ability to construct a typology that elegantly encapsulates the main argument of this study, concerning how stringency is affected by the interaction between structural political economy conditions and revenue recycling strategies. Additionally, this typology enables the interpretation of the obtained solution formulas to proceed in a more substantial and systemic way.

13. Table - Typology on political economy environments and revenue recycling.

	Highly Constrained Environment	**Constrained Environment without Compensation**	**Constrained Environment with Hybrid Revenue Recycling**	**Enabling Political Economy Environment**
Sufficiency paths (nr. of cases)	Low Economic Development *High Income Inequality * No Compensation * No Decarbonization Efforts (5) Low Economic Development * No Compensation * No Decarbonization Efforts * No Social Objectives (2)	High Economic Development * High Income Inequality * No Compensation * No Social Objectives (8) High Fossil Fuel Dependence * No Compensation * No Social Objectives (2)	High Economic Development * High Compensation * High Decarbonization Efforts (4) High Economic Development * High Fossil Fuel Dependence * High Decarbonization Efforts * High Social Objectives (1)	High Economic Development * Low Income Inequality * Low Fossil Fuel Dependence (7)
Outcome	Lax Carbon Pricing	Lax Carbon Pricing	Stringent Carbon Pricing	Stringent Carbon Pricing

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Cases	Argentina, China, Mexico, South Africa, Kazakhstan, Colombia, Ukraine	Korea, United Kingdom, Japan, Singapore, Chile, New Zealand, Latvia, Spain, the Netherlands, Poland	Luxembourg, Portugal, Switzerland, Ireland, Estonia	Iceland, Norway, Germany, Slovenia, Finland, Sweden, France

Explaining from right to left, we find the first category comprised of countries with enabling political economy conditions and stringent carbon pricing mechanisms. Basically, they are affluent countries with low income inequality and low fossil fuel dependence. These are the Nordic countries (Finland, Iceland, Norway, Sweden), France, Germany, and Slovenia. Most of these countries also use various revenue-recycling strategies, but model results suggest that implementing these is not necessarily needed to adopt stringent carbon pricing mechanism. Algorithms used by QCA assume that if two sufficiency statements differ only by additional conjunct(s) (e.g., 1. High Economic Development * Low Income Inequality * Low Fossil Fuels Dependence and 2. High Economic Development * Low Income Inequality * Low Fossil Fuels Dependence * High Social Compensation) then the additional conjunct (High Social Compensation) is irrelevant, logically redundant, as outcome occurs without it. This explains why revenue recycling is not necessary to produce stringent outcome for countries with 'Enabling Political Economy Environment'. These findings are in line with the literature for studies using quantitative methods to assess stringency according to structural political economy factors (e.g., Dolphin et al. 2020; Levi, Flachsland & Jakob, 2020), and with the theoretical expectations of this study, with the exception of green spending as being a necessary condition for stringency.

The second group consists of countries that deviate from the enabling political economy environment (high economic development but also higher income inequality and/or higher fossil fuel dependence). The model results show that if these countries use hybrid revenue recycling strategies, meaning a combination of compensation and climate change mitigation efforts, they can overcome challenges posed by structural conditions and implement stringent carbon pricing policies. The countries in this group include Luxembourg, Portugal, Switzerland, Ireland and Estonia. This finding supports the core argument of this dissertation that, under

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constrained political economy conditions, effective revenue recycling may well be a prime contributing factor in adopting stringent climate policy.

The third group stands in stark contrast to the previous one from a revenue recycling perspective. These countries have similarly constrained political economy environments, but they do not provide any compensation to negatively-affected social groups (households, firms) and their carbon pricing rate is considered low. The data from these countries contradicts that of the previous group, reinforcing the evidence that revenue recycling, especially compensatory mechanisms, is an important policy feature that can push carbon pricing policies towards higher stringency.

The last group includes countries with a 'highly constrained' political economy environment. These are less-developed countries with a higher level of inequality and/or fossil fuel dependence, which implement or perpetuate lax carbon pricing policies. These results confirm the theoretical expectations and corroborate the assessments that carbon pricing implementation will be exceedingly challenging in emerging economies where political economy constraints are greater than in more developed countries (Finon 2019). We do not know whether effective revenue recycling, especially compensatory mechanisms, could foster more stringent policies, as none of these countries apply any redistributive measures.

The only country that does not fit into this classification is Denmark, which has an enabling political economy environment for stringent carbon pricing and employs a hybrid revenue recycling strategy, yet it still fails to introduce a meaningfully high carbon price. However, the country already has one of the highest tax rates on energy in OECD countries, and it recently reached a political agreement to introduce the world's highest corporate carbon tax (OECD 2021a).

The following figure shows the obtained sufficiency plot, demonstrating that most cases are located above diagonal, indicating high consistency of our sufficiency statement, and there is only case in the problematic lower-right quadrant showing *deviant consistency in kind cases*, Denmark and no cases in the upper-left quadrant for *deviant coverage cases*.

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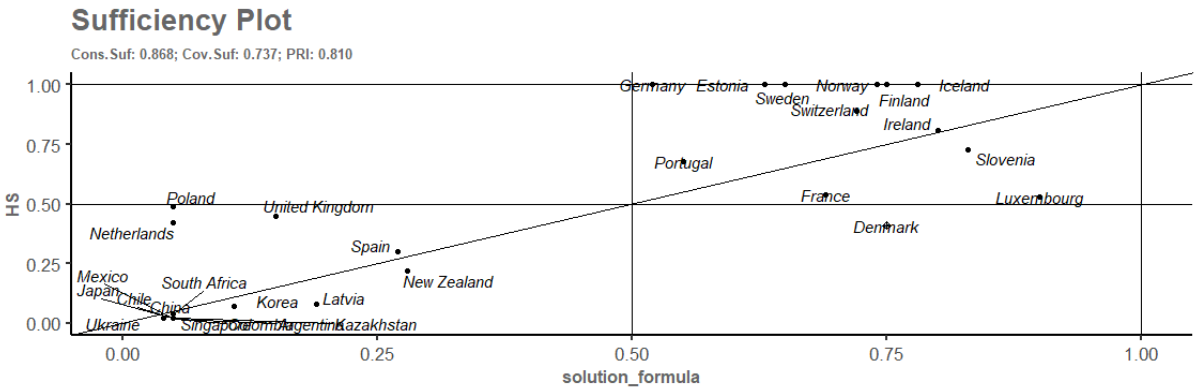
7. Figure – Sufficiency plot



5.3. Discussion

When we analyze specifically the empirical importance of revenue recycling, the main focus of this research, we can make some crucial observations. Compensation is the most significant form of revenue recycling to enhance carbon pricing stringency. This statement is buttressed by the necessity claim for the non-occurrence of outcome (~HCO -> ~HS) and is further supported by the fact that all countries that implemented compensatory mechanisms also have stringent carbon pricing. While the decarbonization effort is the most popular form of revenue recycling (seventeen countries out of thirty employ it), it is, in itself, insufficient to produce stringent policy, as indicated by numerous countries who spend revenue solely on green causes and not having high carbon prices (e.g., Poland, Japan, Singapore). Building on the assumption that public support is a prerequisite for stringent policy outcome, it must be noted that this result casts a shadow on the findings in the literature that suggest the most effective way to enhance public acceptability for carbon pricing is to use the revenue for environmental projects (for meta-analyses, see: Carattini, Carvalho and Fankhauser, 2018; Maestre-Andrés, Drews and van den Bergh, 2019). Rather, the results support more recent findings in the literature asserting that social transfers are a more constructive means to secure public support for stringent climate policy, because they contribute to the population's overall wellbeing and have positive distributional effects (Konc et al. 2022). One possible explanation for this discrepancy is provided by Sommer, Mattauch and Pahle (2022). They have found that people who chose green investments as a preferred form of revenue recycling are more likely to support a carbon tax, but their support is reduced when confronted with more stringent policy outcomes, whilst the public's demand for social cushioning increases. Therefore, public's preferred method of revenue recycling may change with increasing stringency, which explains why compensation is more important for implementing ambitious carbon pricing than green spending, which

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generally remains the most popular measure. Another possible explanation for this discrepancy is the variability in perception detected by surveys and experiments, compared to in practice. People may initially believe that the most adequate way of spending revenue is climate investment but when they materially feel the price increase (e.g., electricity bill), they may change their behavior as a sort of ex-post rationalization (for a discussion, also see: Jenkins, Stokes and Wagner, 2020).

Although compensation appears to be the most important single revenue recycling measure, model results suggest that hybrid revenue use (compensation plus green spending) is even more favorable for stringent policy outcome, especially in constrained political economy environments. This finding is in line with the theoretical literature suggesting that: 1. The larger the share of the population that directly benefits from carbon pricing, the more likely it is that meaningful carbon prices can be introduced and perpetuated (Klenert et al 2018). 2. The possible combination of public benefits such as improving the environmental conditions for low-income/marginalized communities (insulating their homes from state funds) can be a more viable political strategy to secure political acceptance than single benefits such as energy bill assistance (Raymond 2019).

5.4. Follow Up Analyses

5.4.1. Theory Evaluation

The main objective of theory evaluation is to assert how empirics support the theoretical foundations of the research and reveal parts of the theory that should be amended (Oana, Schneider and Thomann, 2021, Chapter 6). Through the intersection of the QCA findings and theoretical expectations, theory evaluation identifies different types of cases. For example, it reveals the most likely cases covered (empirics support theory) or the least likely cases covered (unexpected and necessitating theory expansion).

In my formal theory evaluation, I compare my enhanced intermediate solution with the theoretical expectations I set forth in the Theoretical Framework, to ascertain how well my theoretical hunches fare in comparison to my empirical findings. After I run the analysis, I see that 50% of the cases (6/12) are supported by both the theoretical and empirical findings (covered most likely cases (T*S*Y)). The other half of the cases are ‘covered least likely’ cases, meaning that are not anticipated by theory but are part of the solution and show the outcome (~T*S*Y). Normally, this would suggest expanding the theory to explain these cases but, in my model, what is needed is theory refinement. Four out of these six cases (Iceland, Finland,

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Norway, Sweden) have 'ideal' political economy environments (HED*LII*LFD), enabling the implementation of stringent carbon pricing without spending on environmental projects, a situation that was theorized (HDE) (see my discussion above).[71]

The remaining two cases are Luxemburg and Estonia. Luxemburg came out as a covered least likely case because I did not expect that a country with two structural hurdles (~LII*~LFD) could implement stringent carbon pricing even if it used an effective combination of revenue recycling (HCO*HDE). However, it turned out that hybrid use of revenue is even able to alleviate these 'double' constraints in a highly developed country.

Lastly, as was discussed above, Estonia has a rather unique sufficiency path. It deviates from my expectation in a similar fashion to Luxemburg, since the country operates under more burdening political economy conditions (~LII*~LFD).

In a nutshell, theory evaluation demonstrates that, 1. countries with favorable structural conditions do not necessarily need to recycle revenue to implement stringent climate policy. 2. hybrid revenue recycling (HCO*HDE + HDE*HSO) can overcome political economy hurdles even in more constrained (~LII*~LFD) environments.

5.4.2. Cluster Diagnostics on Trust in Institutions

The developed typology in the study can logically lead to further lines of inquiry. For instance, is stringency contingent upon the trust people place in institutions and governments to use the revenue in a responsible way, rather than being contingent on spending for specific causes (for a discussion and meta-analysis on the relationship between trust in institutions and climate policy, see: Cologna and Siegrist 2020)? To assess the validity of such an argument, cluster diagnostics as a follow-up analysis is performed to see whether obtained solutions hold for clusters of low, medium and high trust countries.

I use corruption as proxy for trust in institutions and I apply the Corruption Perceptions Index developed by Transparency International (2021). I evaluate using the mean value of the period between 2016 and 2020. Countries that score higher than 75 are considered high-trust countries; (1), countries that score between 50 and 75 are medium-trust countries; (2) and countries that score under 50 are considered low-trust countries (3).

[71] Whilst spending on environmental projects do not necessarily lead to enhanced stringency, it can be an important policy feature to multiply the positive environmental effects of carbon pricing.

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Consistencies:

	HED*LII*LFD	HED*HCO*HDE	HED*~LFD*HDE*HSO
Pooled	0.910	0.841	0.852
Between 1 (12)	0.922	0.827	0.923
Between 2 (11)	0.892	0.914	0.945
Between 3 (7)	0.727	0.471	0.471

Generally, above results suggest that the different sufficiency paths are closely aligned with trust level in institutions. However, the lack of difference between medium and high trust countries indicates that trust in itself cannot explain variation in stringency. Yet, it is a promising field for future research. For example, one may theorize and examine whether trust is a necessary condition to implement stringent climate policy or trust must be achieved through institutional efforts (ring-fencing of revenue, clear communication about costs and benefits, etc.).

5.4.3. Alternative Model

To delve deeper into how institutional factors may influence stringency and interact with revenue recycling, an alternative model specification, including risk perception of population about climate change, is also executed. A variable that repeatedly came up during the discussions on early draft of dissertation, and later from the Reviewers from Ecological Economics where parts of this dissertation were published, was public attitudes (Muth, 2023).

I believe there could be a (theoretical) interaction between public attitude and revenue recycling. We may theorize that, in countries where a significant number of people believe in climate change and consider it to be serious threat, the public would be more willing to accept stringent carbon pricing, with or without revenue recycling. On the contrary, if a large chunk of the population didn't believe in climate change or perceive it as a threat, they might be less willing to support carbon pricing. However, revenue recycling, through delivering immediately available, tangible benefits for their lives (e.g., via support schemes for building weatherization to reduce personal costs), could increase public acceptability and thus raise the acceptable level

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of stringency. To test this very assumption, the World Risk Poll Data (Lloyd's Register Foundation, 2022) was used. Other datasets were also considered (e.g., UNDP and University of Oxford, 2021) that perhaps posed more suitable questions for the purpose of this analysis, but they proved to be very limited in scope, as none of them, even nearly, covered all my cases. The only study that tested the factor of climate threat to explain carbon pricing variation used data from 2008 Gallup survey, but that is seriously outdated, considering recent developments on this issue (salience of problem, mass environmental protests in 2019, etc.), a fact which is also acknowledged by the authors (Best and Zhang, 2020).

World Risk Poll Data (WRPD) covers 29 cases out of my sample of 30. Luxembourg was the country not included, so its value was populated with the average score for the North/Western region of Europe (57.54). The data measures the percentage of the population that believes climate change will be a threat to people in their country over the next 20 years. Responses were sorted into the following categories: very serious threat, somewhat serious threat, not a threat at all, do not know, refuses to answer. To calibrate the condition of 'Risk,' I use the first category (very serious threat) to assess the overall perception of the threat. One may argue that it is reasonable to bundle the first two categories in the analysis, to take into account of all people who perceived climate change as a serious issue. However, this would make the assessment rather futile since, in most countries, more than 80% of people think it is a serious/rather serious issue. Furthermore, one may also assert that people who think climate change is not a pressing issue (somewhat serious) would be less willing to pay for mitigation efforts. To calibrate the condition, the following thresholds were used: 30% for non-membership, 40% for the cross-over point and 50% for full membership. The lowest three scores in the dataset were for China (20.22%), Kazakhstan (29.15%) and Estonia (30.85%), and the highest scores were for Chile (87.13%), Spain (79.21%) and Portugal (76.56%). To describe the calibrated data: 76.67% of cases belong to the set of countries with High Risk Perception (RI).

The updated formula developed as follows:

HED*LII*LFD + HED*HCO*HDE*RI + HED*~LFD*HDE*HSO -> HS

HED*LII*LFD + HED*HCO*HDE*RI + HED*~LFD*HDE*HSO*~RI -> HS

HED*LII*LFD + HED*HCO*HDE*RI + HED*~LFD*~HCO*HDE*HSO*~RI -> HS

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For the solution, we got three formulas instead of one. This is called model complexity, and it is caused by treating excessive numbers of logical remainders in our analysis, which are represented by truth table rows that are not populated with empirical cases (Oana, Schneider & Thomann, 2021). There is a methodological limitation of including excessive number of factors into QCA inquiry. Despite this complex formula, two observations can be clearly made: the first two sufficiency paths (HED*LII*LFD + HED*HCO*HDE*RI) are almost identical with the initial paths, except that Risk perception is now part of the second sufficiency path. The third sufficiency path only applies to Estonia, which is similar to the original path, except that in two alternative formulas, it includes No Risk Perception (~RI).

These results suggest that the initial hypotheses could not be confirmed. First, RI (High Risk Perception) is not part of the first sufficiency path which only contains structural conditions. Here we theorized that if perception is high, the public may accept more stringent policies even without revenue recycling, but this is not proven empirically. In the updated solution formula, RI is part of second sufficiency path that shows that countries with higher income inequality and/or fossil fuel dependence can implement stringent policies, if they use hybrid revenue recycling (compensation and decarbonization efforts). However, there is no plausible explanation as to why High-Risk Perception would entail hybrid revenue recycling measures, and/or how they can jointly affect stringency. Furthermore, in the updated solution path, the only difference is the addition of RI in the sufficiency path. Algorithms used by QCA assume that if two sufficiency statements differ only by additional conjunct(s) (e.g., 1. High Economic Development AND High Compensation AND High Decarbonization Efforts 2. High Economic Development AND High Compensation AND High Decarbonization Efforts * High Risk Perception) then the additional conjunct (High Risk Perception) is irrelevant, logically redundant, as the outcome occurs without it. All in all, I conclude that the perception of climate change being a high risk is not an empirically relevant factor to explain carbon pricing stringency, neither as a structural condition, nor in interaction with revenue recycling. To check the alternative model, the revised Codes (ALT_Codes) and Dataset (POL_REV) are uploaded into the online data repository. Here, the entire analysis can be executed, which also includes the sensitivity range robustness check. The latter shows that the calibration is not sensitive at all, since the cross-over point should be changed to the two extremes (22 and 86) to alter the obtained solution formula, which is theoretically untenable.

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5.4.4. Robustness Tests

Scholars using QCA in their research are advised to perform systematic robustness tests (RT) to demonstrate the sensitivity of the methodological decisions they make throughout the analytical steps. RTs are desirable in numerous situations such as working with blurred conceptual boundaries or dealing with theoretical debates in the literature, which make some of the methodological decisions guided by theoretical knowledge seem less straightforward (e.g., qualitative anchors in calibration). Therefore, RTs examine the consequences of our analytical choices in key indicators and assess how changes in our approach would alter the findings of the analysis. Oana and Schneider (2019 as cited and discussed in Oana, Schneider and Thomann, 2021) produced a comprehensive 'Robustness Test Protocol' which is used in this research. In applying this strategy, three distinct steps are performed: (1) evaluating sensitivity ranges, (2) evaluating fit-oriented robustness and (3) evaluating case-oriented robustness.

A. Evaluation of sensitivity ranges

Sensitivity ranges show the extent to which various sources of robustness can be altered without changing the Boolean expression for the obtained solutions. This form of evaluation includes changes in calibration (qualitative anchor), consistency threshold, and the frequency cutoff. The wider these ranges are, the more robust our solution is.

First, I check the sensitivity ranges for the calibration of my conditions. All the calibration is fairly robust, allowing for the possibility of considerable change. The only exception is 'High Income Inequality,' where almost no change is allowed at the critical 0.5 threshold, but this can be explained as most cases (20/30) fall between the 0.25 and 0.35 ranges. When we analyze the raw consistency threshold and frequency cut-off, we find that our solution is relatively sensitive to changes. Significant change is allowed at the lower bound, but no alteration can be made without changing the final solution when the consistency threshold is set. Similarly, no changes are allowed for the frequency cut-off values, but this is not problematic as I have relatively low number of cases.

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Economic Development

#Exclusion: Lower bound NA Threshold 4095 Upper bound 8095

#Crossover: Lower bound 6195 Threshold 12695 Upper bound 15195

#Inclusion: Lower bound NA Threshold 35000 Upper bound NA

Income Inequality

#Exclusion: Lower bound 0.37 Threshold 0.4 Upper bound 0.42

#Crossover: Lower bound 0.3 Threshold 0.3 Upper bound 0.31

#Inclusion: Lower bound NA Threshold 0.2 Upper bound 0.29

Fossil Fuel Dependence

#Exclusion: Lower bound 80 Threshold 90 Upper bound NA

#Crossover: Lower bound 76 Threshold 80 Upper bound 90

#Inclusion: Lower bound NA Threshold 60 Upper bound 71.5

Compensation

#Exclusion: Lower bound -0.48 Threshold 0 Upper bound 0.29

#Crossover: Lower bound 0.009 Threshold 0.3 Upper bound 0.49

#Inclusion: Lower bound 0.32 Threshold 0.5 Upper bound NA

Decarbonization Efforts

#Exclusion: Lower bound -0.25 Threshold 0 Upper bound 0.24

#Crossover: Lower bound 0.009 Threshold 0.25 Upper bound 0.49

#Inclusion: Lower bound 0.26 Threshold 0.5 Upper bound 0.77

Social Objectives

#Exclusion: Lower bound -0.15 Threshold 0 Upper bound 0.24

#Crossover: Lower bound 0.009 Threshold 0.25 Upper bound 0.29

#Inclusion: Lower bound 0.26 Threshold 0.5 Upper bound NA

Stringency

#Exclusion: Lower bound 4.72 Threshold 10 Upper bound 11.98

#Crossover: Lower bound NA Threshold 34.26 Upper bound 38.55

#Inclusion: Lower bound 34.28 Threshold 40 Upper bound NA

Raw Consistency T.: Lower bound 0.74 Threshold 0.8 Upper bound 0.8

N.Cut: Lower bound 1 Threshold 1 Upper bound 1

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B. Fit-Oriented Robustness

Whilst sensitivity ranges provide important information about the extent to which key parameters can be changed, a very serious limitation with them is that they do not allow researchers to assess how simultaneous alterations in the analytical decisions would change the solution formula, which is a more realistic application. To overcome this limitation, one needs to create a Test Set (alternative solutions) that includes various, conceptually plausible, changes in the analytical setup, which can then be compared with the Initial Solution (original solution). The intersection of the Test Set (TS) and Initial Solution (IS) will produce the Robust Core (RC). The higher the value of the RC, the more robust our solution is.

For the robustness analysis I use the enhanced intermediate solution (IS) which is interpreted in the study. For the Test Set, I change the calibration for 'Income Inequality,' the only condition where the sensitivity range indicated that my calibration was not robust (0.42,0.32,0.22 which are also outside of the sensitivity ranges found above) and increased the raw consistency threshold to a relatively high level to 0.85.

The obtained robustness parameters of fit demonstrate that my solution is very robust.

	RF_cov	RF_cons	RF_SC_minTS	RF_SC_maxTS
Robustness_Fit	0.92	0.974	0.896	0.919

While the values for RF_cov (coverage), RF_cons (consistency) are less than 1, meaning that IS and TS do not entirely overlap, their very high values indicate that there is almost perfect set coincidence. To conclude, even though sensitivity ranges for the raw consistency threshold and calibration of income inequality were rather narrow, the solution is fairly robust.

C. Case-Oriented Robustness

The case-oriented approach helps reveal important changes in case types after robustness performance. This is crucial because we can see if, for example, some typical cases turn out to be deviant (so called shaky cases), requiring a different analytical approach for further analysis. What we see after plotting the changes in the type of cases, is the following: there is only one problematic case found in the lower-right quadrant, as shown in the figure below. Estonia is a shaky typical case, meaning that it is part of the outcome in the Initial Solution but turned into a deviant case when the analytical decision changed. Considering the rather unique sufficiency path of Estonia, it is not very concerning. Especially, as no other cases are found to be 'shaky' or 'possible' (becoming a new typical/deviant case as a result of a change in analytical decision

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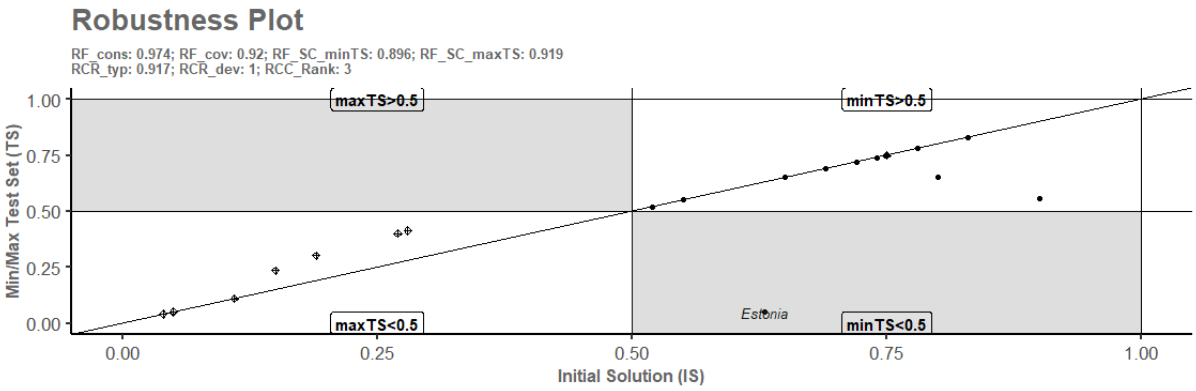
resulting in altered membership scores), we can conclude that the solution is very robust from a case-oriented perspective as well.

8. Figure - Robustness plot.



5.4.5. SMMR

Integrating QCA with other methods that help us unravel causality might be a rewarding strategy if one aims to explain how certain conditions exert influence on outcome. Indeed, this is my main research objective, namely, to explain carbon pricing stringency according to how the interaction of structural political economy conditions and effective revenue recycling schemes alleviates political gridlock around implementation. In doing that, I employ explanatory sequential design in my dissertation (also called "confirmatory" design) (Beach and Rohlfing, 2018, p. 11) where QCA is followed by process tracing. In QCA, such design is called set-theoretic multi method research (SMMR). By definition: "SMMR is defined as the purposeful combination of a truth table analysis and a within-case analysis to formulate integrated, set-relational, descriptive or causal inferences about a phenomenon of interest" (Schneider, 2023 (forthcoming), p.2). Basically, by applying SMMR, two different analytical goals can be pursued: model refinement by identifying overlooked conditions, and "probing the causal properties" of our QCA model (Oana, Schneider and Thomann, 2021, p. 182). Considering the novelty of proposed interactive framework of this dissertation, and lack of deviant coverage- and consistency in kind cases (except Denmark which is explained), the key objective of SMMR is to confirm the causal link between revenue recycling and stringent carbon pricing. Therefore, if we can find empirical evidence of the causal mechanisms linking revenue recycling measures (conditions) to increased stringency (outcome), we can also strengthen our QCA-based inferences and therefore increase our confidence in the theory. SMMR formalizes the case selection mechanism by using computational aid (R packages developed by Dusa, 2018 and Oana and Schneider, 2018) and some overarching rules such as

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the positive outcome principle (i.e., outcome should occur in the case study) (see: Schneider and Rohlfing, 2013).

Our solution formula consists of three sufficiency paths: HED*LII*LFD + HED*HCO*HDE + HED*~LFD*HDE*HSO -> HS. As I am primarily interested in how revenue recycling helps overcome political economy barriers, the second and third paths are suitable for follow up analysis (as the first only includes structural conditions). Since the third path only applies for one, quite unique case, Estonia, the selection for the second path appears a more promising strategy in terms of prospective generalization of findings. The second path applies to four countries: Luxembourg, Portugal, Switzerland, Ireland, but Luxembourg is a *deviant consistency in degree case* which is not recommended for SMMR, thus three countries remain (Oana, Schneider and Thomann, 2021). When conditions exert influence on outcome in conjunction, as the case in our second path, we need to select cases based on the so-called focal conjunct (one conjunct in the path). Here, only the High Compensation (HCO) and High Decarbonization Efforts (HDE) are relevant as focus is on revenue recycling, since the first HDE is a structural condition. After running the analysis, the best case for testing the causal properties of HCO (Compensation) is Portugal, and for HDE (Decarbonization Efforts) is Ireland (see Appendix A). Ultimately, for the process tracing case study, Ireland is selected. The main reason for that is the Portuguese carbon tax was introduced in 2015 but since then no major reforms were implemented (World Bank, 2021). In contrast, the Irish carbon tax went through two significant reforms since 2018 which makes the analysis timelier and more relevant and data collection an easier process, which is a crucial consideration given the need for large amount of information required by process tracing. In the following paragraphs, other important considerations what makes the Irish carbon tax reform a great case study are outlined.

The Republic of Ireland (Ireland henceforth) represents a suitable case for various reasons. Firstly, the country recently accomplished a carbon tax reform making the policy, which applies to natural gas, liquid- as well as solid fossil fuels (peat and coal), covering approximately 40% of domestic greenhouse gases emissions, more stringent (World Bank, 2022). In 2019, the government announced its commitment to annually increasing the carbon tax rate (from 20 EUR/tCO2 baseline) by 6 EUR/tCO2, scheduled to reach 80 EUR/tCO2 by 2030.[72] Crucially, the revenue recycling strategy also upgraded as a decision was made to implement a social cushioning program and various green spending in different sectors and geographies. This

[72] which was further increased after the general election in 2020.

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situation gives a unique opportunity to investigate the relationship between revenue recycling and political acceptability through various measures and disparate causal mechanisms in a politically critical and intense period, including the budget announcement as well as the lead up to general elections. By implementing a relatively stringent carbon tax with different compensatory and climate action measures, Ireland represents a *most likely case* from a theoretical perspective (Levy, 2007).

Furthermore, what makes the Irish case an interesting one from a political economy perspective is the highly challenging emissions profile of the country.[73] Emissions per capita were the second highest in the EU by 2020, reaching 57% higher than EU-average (Eurostat, 2022c). Decarbonizing the country's persistently high-emission transportation sector, partly caused by Ireland's diffuse residential settlements and low population density, as well as the building sector, which uses the highest share of fossil fuels (coal, peat, oil) for heating homes among European OECD countries, is particularly challenging (OECD, 2021b). These two sectors, and thus consumers, are the most heavily impacted by carbon tax, making stringent carbon pricing implementation a presumptively formidable task politically. The next chapter presents the in-depth case study.

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[73] also see Little and Torney (2017) for reasons why Ireland represents an apt and fascinating case for studying climate politics. Reasons include the small size of the country and its historically inconsistent policy approach to climate policy.

Chapter 6 – The Irish Carbon Tax Reform

6.1. Introduction

In this chapter, the case study process tracing of the research project is presented. For a short recap, the main objective of process tracing is to investigate whether theorized causal mechanisms are present and functioned as expected in a selected case. Causal mechanisms are understood here as "a theory of a system of interlocking parts that transmits causal forces from X to Y" (Beach and Pedersen, 2013, p. 29). In this chapter, I explain how hypothesized causal mechanisms, used in such a way as to change the public's perception on the fairness and environmental effectiveness of these policies through compensatory measures and green spending, leads to enhanced political acceptability and thus a more stringent carbon pricing mechanism. If we can find empirical evidence on the causal mechanisms linking revenue recycling measures (conditions) to more stringent carbon pricing policy (outcome) through mechanisms enhancing political acceptability, we can also strengthen our QCA-based inferences and therefore increase our confidence in the theory. In order to accomplish this research objective, an integrative data collection strategy is employed. First, a large amount of data and information is gathered and analyzed from a wide range of sources including, but not limited to, transcripts of parliamentary hearings, manifestos, party reports, position papers of interest groups, academic research and policy analyses. Second, semi-structured elite interviews are conducted with key politicians, climate policy advisors and other actors who were directly involved in the policy making process. More information on the data analysis techniques and interview research, including the number and background of experts interviewed for this research, can be found in the Methodological chapter and in Appendix B.

The sufficient terms and causal mechanisms leading to enhanced political acceptability of carbon tax, which are investigated are as follows. First is compensation. By compensating negatively affected social groups and eliminating the possibly regressive effects of carbon pricing, the public's perception on policy fairness can be changed. The second condition is decarbonization efforts which cover green projects, such as renewable energy deployment and efficiency programs. The effects through which higher political acceptance can be achieved are twofold. First, such initiatives help to overcome public skepticism concerning the general environmental effectiveness of carbon pricing by demonstrating these effects with tangible environmental projects. Also, green spending may make low carbon technologies (e.g., heat pumps, electronic vehicles) commercially more viable and readily available to citizens. This

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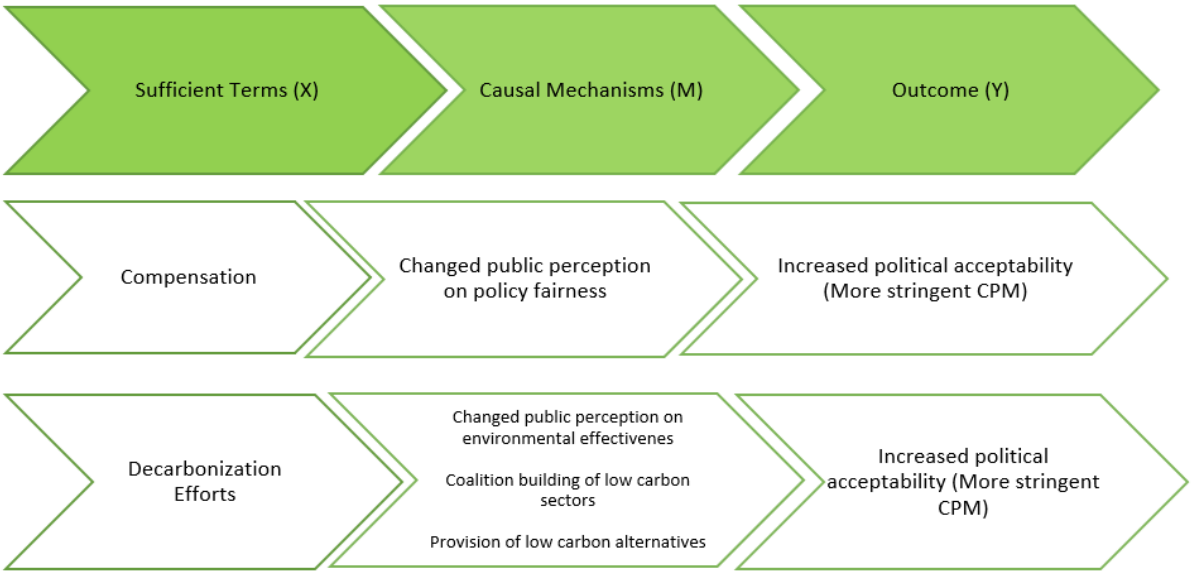
would enable the financially advantageous behavioral changes that are envisaged by carbon pricing theory. An extensive discussion on these conditions and mechanisms can be found in the Theoretical Framework. The following figure gives an overview of the sufficient terms and mechanisms which are investigated and tested in this chapter.

9. Figure - Sufficient terms and causal mechanisms under investigation.



Therefore, in this chapter, I analyze the relationship between various revenue recycling measures, such as different social cushioning transfers and ecological projects, and their effect on the political acceptability of carbon tax. One may argue, however, that testing these mechanisms raises methodological challenges. QCA-based inferences in the previous chapter were derived from the interaction of structural political economy conditions (remote conditions) and policy-specific conditions (proximate conditions). Some of these mechanisms are primarily linked to individual attitudes towards policy, and therefore should be examined via methodological tools that can better accommodate individual responses, such as surveys or focus group research. However, I argue that, examining how the political elites act upon and interpret these perceived public preferences is crucial to gain a deeper understanding about the political acceptability of these policies. There is a strong case for examining the effects of revenue recycling via real-world case studies rather than surveys and experiments. Although the literature is abundant with results of surveys and experiments about individual attitudes towards carbon tax acceptance, there is a lack of empirical investigation, thereby our understanding of how public acceptability manifests at a more abstract political level, is very limited. Indeed, significantly less attention has been paid to the role of party politics, and

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especially revenue recycling, despite its appealing theoretical effects, which have also been supported empirically in the 'laboratory' environment, in affecting the real-world political outcomes of carbon tax implementation/reform (for notable exceptions, see Crowley, 2017; Harrison, 2012; 2013). This is important because, as Mildenberger et al. (2022) effectively shows by examining the effect of existing revenue recycling measures on public support in Switzerland and Canada, surveys may not be an accurate representation of public opinion on carbon tax. It has been noted that the attitudes of citizens towards real-world policies may be far more negative than indicated in the surveys (also see, for similar assessments from the US and France: Anderson, Marinescu and Shor, 2019; Douenne and Fabre 2022). Therefore, a key objective and contribution of this case study is the tracing of the causal mechanisms that explain how revenue recycling can enhance political acceptability. This will be achieved by examining how political elites perceive, interpret, and act upon the policy preferences of the public. The main purpose of this research is fulfilled through conducting an in-depth case study of the Irish carbon tax reform.

At the outset, it is important to note that this case study focuses on the relationship between revenue recycling and the political acceptability of carbon tax, while setting the EU Emissions Trading System (EU ETS) aside for numerous reasons. Firstly, alteration of the policy design elements of the ETS largely fall outside of the national government's competence (for that discussion, see the methodological chapter). Secondly, the Irish tax covers a significantly higher share of domestic emissions in Ireland than ETS (50 vs. 25%). Thirdly, in the case of ETS, the cost of carbon pricing is indirectly paid by citizens and offset for corporations through the free allocation of allowances. However, in Ireland, both citizens and corporations directly bear the financial burden of carbon tax, thus making revenue recycling more significant politically. Nevertheless, an overview of various, crucial aspects of the Irish emissions trading (e.g., emissions coverage and revenue management) is provided in the Appendix B, to paint a fuller picture of carbon pricing development in the country.

The chapter is structured as follows. After the introduction, there is a brief overview of the climate policy's context in Ireland, including the political landscape which gave rise to the carbon tax reform. After setting the scene, I offer an analysis of the political processes leading to carbon tax reform in chronological order, followed by an extensive discussion on the causal mechanisms linking revenue recycling to enhanced political acceptability, and thus more stringent policy outcome. Substantial evidence is presented attesting to the positive effects of social compensation and decarbonization efforts on political acceptability. Notably,

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compensating low-income households helps to neutralize the argument from opposition parties that carbon taxes are unfair to certain socioeconomic groups. Furthermore, an important finding of the case study is that compensation bridges the ideological gap between center-right and left-wing parties. Centre-right parties endorse carbon tax as an effective market-based climate policy. Moderate left-wing parties (Greens, Social Democrats, the Labour) accept carbon tax, but they are concerned about the regressive effect of policy change. The government, by providing direct financial compensation through increased welfare payments, as well as upgrading state-led energy efficiency programs for poor households, effectively addresses the concerns of these parties, which creates a broad political consensus around carbon tax reform. Government decarbonization efforts also significantly improve the negative political dynamics around the reform, which previously culminated in fierce attacks from opposition parties who vied for political gains and sustained media attention. Carbon revenue investments in energy efficiency measures and green transportation produce tangible environmental benefits, a reassuring response to voices opposing the tax increase based on perceived environmental ineffectiveness of the policy, and they ease the concerns and criticisms regarding the limited availability of affordable low carbon alternatives in rural regions. Also, both the Citizens' Assembly and the government-led public consultation find these two types of spending to be the most popular. Lastly, concentrating a significant portion of the funds on the Midland region, where low-carbon transition has induced negative social changes (e.g., increasing unemployment), curtails social repercussions to some extent, which prevents the political escalation of public discontent.

6.2. Policy Context

The Republic of Ireland is a highly developed, small, open economy that also ranks very high on various aspects of the human development index (UNDP, 2020). The Irish economy is characterized by robust service sectors (e.g., IT and medical services), a relatively light, but high value-added, industrial base. Additionally, it has a historically strong agricultural sector including ruminant livestock and beverages. While this sector's contribution to the GDP is small (1%), it employs 7% of the workforce, and generates approximately 10% of total exports (OECD, 2021b). The country has a population of nearly 5 million and 40% of the people live in the Greater Dublin Area. However, more than 30% of the population lives in rural areas (Central Statistics of Ireland, 2019), and 90% of the country is predominantly rural (OECD, 2021b). In terms of income inequality, the country performs modestly well, a fact which is explained by the by the major role the Irish state plays in redistributing wealth through

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progressive taxation and welfare measures (Sweeney, 2019). A more extensive discussion on the structural conditions in the country can be found in the Appendix B.

What makes the Irish case an interesting one from a political economy perspective is the highly challenging emissions profile of the country, which deviates considerably from other advanced economies. The main reason for this discrepancy is the unusually high emissions from the agricultural sector, responsible for approximately 35% of total emissions, in stark contrast to the EU average of 12.4% (Government of Ireland (GOI), 2021b, p. 159-160), and Ireland's heavy dependence on fossil fuels in energy generation.[74] Emissions per capita became the second highest in the EU by 2020, reaching 57% higher than EU-average (Eurostat, 2022c). Decarbonizing the country's persistently high-emission transportation sector, which is responsible for 17.7% of the domestic emissions, as Ireland has many diffuse residential settlements with low population density, as well as the building sector, which uses the highest share of fossil fuels (coal, peat, oil) for heating homes among European OECD countries, is particularly challenging (Environmental Protection Agency 2022a; OECD, 2021b). These two sectors, and thus consumers, are the most heavily impacted by carbon tax, making stringent carbon pricing implementation a presumptively formidable political task.

Ireland has been long regarded as 'laggard' due to its continuously poor performance in climate change mitigation efforts (Robbins, Torney and Brereton, 2020). Carbon emissions closely and persistently followed economic performance in the last decades in Ireland, with environmental considerations being subordinate to economic growth (Fahy, 2020; Fitzgerald et al., 2021). The country's lax approach to environmental issues has long been resistant even to powerful, external pressures, such as the Europeanization of climate policy development; and the political parties' attention to climate issues has remained persistently limited (Green-Pedersen and Little, 2022; Little, 2020; Torney and O'Gorman, 2019). Despite this backdrop, considerable changes unfolded recently in the country's approach to climate change, which may usher in a new chapter (Torney, 2020). Since 2018, Irish governments have demonstrated an increasing commitment towards more ambitious domestic climate objectives, strongly leaning on cross-party support, facilitated by the public's increasing environmental concern and demand for urgent measures. This demand culminated in various political actions, such as mass protests and a landmark court case filed against the Irish state for insufficient climate action (Gold, 2020; Robbins, Torney and Brereton, 2020; O'Neill and Alblas, 2020). These public

[74] Both electricity generation and heating. Production of and use of peat, a very carbon intense fuel which is also able to store significant amount of carbon, is particularly high (OECD, 2021b).

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commitments and urgings have been reflected by an increasingly ambitious trajectory of national pledges embodied in the country's statutory laws, such as the target of a 51% emission reduction by 2030, as well as the implementation of ambitious policy plans (Government of Ireland (GOI), 2021a; 2021b, also see Appendix B for a comprehensive overview of climate policy development).

Ireland is a developed, representative democracy with a bicameral, national parliament (Oireachtas Éireann, Oireachtas in short) that consists of the House of Representatives (Dáil Éireann, Dáil in short) and the Senate (Seanad Éireann, Seanad in short). The main legislative body is the Dáil, whose 160 members (Teachta Dála, TD in short[75]) are directly elected. The Seanad performs mainly an advisory role in the legislation process. The executive power is vested in the government, headed by the Taoiseach (prime minister), who is nominated by the Dáil, and who, in turn, nominates the ministers in the cabinet. During the course of the examined time period of this research project, two governments served in Ireland. Between 2016 and 2020, a minority government of Fine Gael (FG) led the country, supported, by special arrangement, by the other historically large party, Fianna Fáil (FF).[76] In this coalition, FF facilitated the government's work, while maintaining their position in the opposition. In 2020, the two parties, that were originally descendants of opposing forces in the Irish Civil War, and who have alternated in power since 1932, formed a historic coalition together with the Greens, securing 84 seats in the 160-seat-Dáli.

The government is the main actor of climate governance as it brings forward new bills, manages the consultation process before and during the legislation process, and introduces and implements the annual budget (for more about the top-down approach to climate action in Ireland, see, see: Robbins, Torney and Brereton, 2020; also demonstrated by a network analysis of the Climate Action Plan 2019, see: Wagner, Torney and Ylä-Anttila, 2021).

6.3. Carbon Tax

6.3.1. Scope

The decision on the introduction of carbon tax in Ireland was made in 2009 and enacted in the Finance Act in 2010 (GOI, 2010). As opposed to the European emissions trading system, where the direct emissions of specific sectors or entities are targeted, the Irish carbon tax covers

[75] Equivalent to Member of Parliament.
[76] Based on a *confidence and supply* agreement, where small parties abstain from votes on confidence in return for policy commitments from the government.

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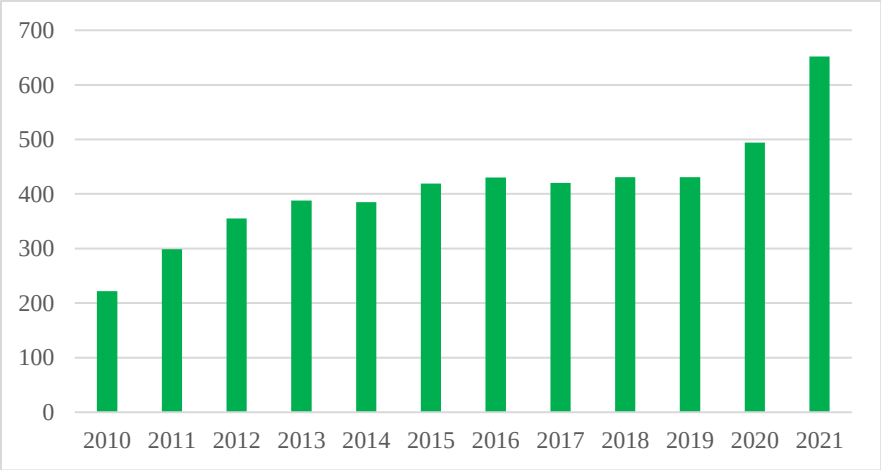
various fossil fuels. The tax is charged 'upstream' and 'midstream,' entailing that the tax covers the main sources of emissions (producers, importers) and fuel distributors, rather the end users although consumers are directly impacted through increased heating and transportation costs (PMR, 2017). The tax was implemented in a phased manner, meaning that it was initially applied to motor fuels and subsequently extended to liquid fuels, natural gas in May 2010, and solid fossil fuels (coal and peat) in 2013 (Department of Finance (DOF), 2021). As a result, the current tax covers approximately 40% of the total greenhouse gas emissions in the country (World Bank, 2022). The starting rate of 15 EUR/tCO2 increased progressively for all fuels to 20 EUR/tCO2 by 2014. A major decision was made in 2019 when an annual escalator (6 EUR/tCO2) was legislated to reach a carbon price of 80 EUR/tCO_2 by 2030[77], (GOI, 2020b; World Bank, 2014, p. 80; 2022, p. 34, 60).

6.3.2. Revenue

Carbon tax generated almost 5 billion EUR in revenue for the Irish state budget between 2010 and 2021.[78] The annual revenue has increased steadily since the inception of the tax. The years 2020 and 2021 saw a considerable rise in the amount raised through the carbon levy as a result of the reform, as can be seen in Figure 10. The 490 million EUR generated by carbon tax in 2020 is equivalent to approximately 0.5% of state budget. Among the thirty countries assessed in the previous chapter, Ireland held the 13th position, when measuring the percentage of carbon revenues as compared to gross national income per capita in the year 2020 (Institute for Climate Economics, 2022).

10. Figure - Annual carbon tax revenue (million EUR)



[77] The new government in 2020 committed to an even more stringent carbon tax (see below).
[78] 490 million EUR generated by carbon tax in 2020 is equivalent to approximately 0.5% of state budget.

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Own formatting. Source: Department of Finance (2021, p.21) between 2010 and 2020, and Oireachtas (2022) for 2021.

How these funds were used and the role they played in contributing to the tax reform is analyzed thoroughly in the next sections.

6.4. The Political Process of Carbon Tax Reform

6.4.1. 2016-2017

Two general elections and a major carbon tax reform occurred in Ireland during the course of the examined time period of this research (December, 2015- November, 2021). Regarding developments in carbon tax, the first two years of the first government (2016 and 2017) were relatively uneventful as the tax rate remained at a modest 20 EUR/tCO_2 level with no clear plans by the government to enhance the stringency of the scheme (see the government's program, GOI, 2016b and the major climate mitigation plan of that time, GOI, 2017). According to Professor John Fitzgerald, chairman of the Climate Change Advisory Council (CCAC), an independent advisory body to government, slow progress on climate issues in this period was largely caused by the change in administration and subsequent dislocation of policy development and coordination of climate change issues from one department to another (Oireachtas, 2018d).

6.4.2. Citizens' Assembly (September 2017 – April 2018)

The winds of change started to blow in late 2017 with the politically and socially innovative Citizens' Assembly. In 2016, the then new government committed to establish the Assembly made up of a 99-member, randomly selected, representative group (in age, gender, social class and regional spread) of people prepared to deliberate on key legal and possibly divisive, pressing policy issues in Ireland. Climate change was one of these issues, under the theme of "How the State can make Ireland a leader in tackling climate change" (Citizens' Assembly, 2022). The deliberation in the Fall of 2017 was aided by public submissions on the issue (1185) and extensive input from experts on climate change science and possible mitigation efforts. The forum resulted in a final report sent to the parliament in April 2018, which included several recommendations, such as a demand for placing climate change at the heart of policy making, and financially prioritizing the expansion of public transport over building new roads (Citizens' Assembly, 2018a). The overall position of the Assembly was considerably more radical than expected, which reflected accurately the increasing level of environmental concern and climate awareness in Ireland (Leiserowitz et al., 2021; OECD, 2021b, p. 55).

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On carbon pricing, academics and policy experts, among other organizations, all argued for the necessity for ambitious carbon pricing to send a market price signal that would be powerful enough to enact behavioral changes by corporations and citizens, as well as to achieve the Paris Agreement temperature targets (Citizens' Assembly, 2018b). After deliberation, 80% of participants agreed to pay higher carbon prices with three crucial qualifications. These were that carbon tax would be increased gradually on an annual basis; revenue was to be solely spent on climate action, such as retrofitting; and that the 400,000 households most vulnerable to poverty would be exempt from paying the tax increase. The chairperson Mary Laffoy explained the last measure as shielding the poor from the negative distributional impacts of carbon tax (Citizens' Assembly, 2017). The final report including the specific recommendation on carbon tax increase, was submitted to the Parliament on the 18 April 2018.

6.4.3. Joint Committee on Climate Action (July 2018 – May 2019)

A parliamentary 'Joint Committee on Climate Action' (Committee/Joint Committee) made up of members of both houses of the parliament was established in July 2018 to discuss the recommendations made by the Citizens Assembly and provide an adequate response to its expressed desire for urgent climate action taken by the Irish state (Oireachtas, 2018b). Public hearings started in September 2018 with the authors of the Assembly's report, followed by various expert hearings such as CCAC, members from a network of environmental NGOs, ministers, bureaucrats, policy analysts, and students (Oireachtas, 2018c). The deliberation lasted for seven months, and the committee published its final report entitled, "Climate Change: A Cross-Party Consensus for Action" in March 2019 (Oireachtas, 2019a).

The committee asserted that the Citizens' Assembly recommendations represented an impulsion to implement a meaningful climate policy framework in Ireland, legitimated and mandated by the strong desire expressed by citizens for urgent action. In line with their expressed desire, the parties unanimously agreed that current mitigation efforts of the state had proven to be insufficient, especially considering the worsening emissions records compared to the relatively good Irish economic performance, enabling the country to make elevated levels of climate investment. Given the considerable political pressure created by this situation, it is not surprising that the committee built upon the Assembly's report, and added, and further refined, the citizens' thirteen voted-on recommendations resulting in forty-two policy- and thirty-nine ancillary recommendations, including a highly progressive set of proposals on carbon pricing reform (Oireachtas, 2019a).

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The report recognized carbon pricing mechanisms as the most cost-effective climate policy to drive decarbonization efforts, underpinned by strong support from domestic and international experts.[79] The committee accepted the citizens' recommendations and CCAC's assessment that the then current level of carbon tax was insufficient to drive down emissions, and they embraced the proposal of a rising price trajectory, reaching 80 Euros/tCO_2 to 2030, in line with CCAC expert recommendations (Oireachtas, 2019a, p. 43-44; to see the original proposal: CCAC, 2018).

Furthermore, the report also recognized that the political acceptability of these policies may depend on how the generated revenue is spent by the government. They assessed that a nationally appropriate use of carbon funds was needed to facilitate sustainable transition, which is also perceived favorably by the public. Therefore, given the role revenue recycling could play in the significant joint aspects of furthering climate mitigation efforts and political acceptability, an entire subsection in the report was devoted to the possible use of carbon revenue (6.6.3 "Use of hypothecated proceeds from carbon pricing policy" in Oireachtas, 2019a, p. 44-46). The committee made it clear that increasing revenue from carbon pricing should be ring-fenced in a transparent manner to "ensure public acceptability" for policy reform towards enhanced stringency. A particular concern arose regarding how vulnerable households would cope with the increasing financial burden posed by carbon tax increase, since 28% of Irish people experienced energy poverty, and low-income households spend disproportionately more on heating than richer households (Oireachtas, 2019, p. 44). Therefore, the committee endorsed the Assembly's approach, and asserted that social protection should be at the center of discussions about the way revenue is utilized. According to the CCAC, increasing social welfare payments could be an effective solution to protect those segments of society that were exposed to the detrimental effects of the policy (Oireachtas, 2018d), and the merits of the "fee and dividend approach" were also discussed (see below) (e.g., Oireachtas, 2018e; Oireachtas, 2018f). However, the committee did not come up with a definitive plan or suggestion as to how to spend increasing proceeds from carbon tax, as this would have required a more careful analysis to find an effective response to the social challenges associated with carbon tax increase. But it did formulate the following recommendations considering above factors (p. 45-46):

[79] The independent advisory body to the government, the Climate Change Advisory Council (CCAC) and the Irish Economic and Social Research Institute (ESRI) as well as the IPCC are specifically mentioned. The representatives of CCAC and ESRI also gave presentations to the committee and discussed issues related to carbon pricing at great length (Oireachtas, 2018d; Oireachtas, 2018i).

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- The government should thoroughly assess the likely impact of carbon tax increase on low-income households and introduce appropriate measures such as welfare transfers to protect the most vulnerable segments of society from adverse effects.
- Generated carbon funds should be hypothecated and not channeled into the general budget. Citizens should be informed and engaged to ensure public acceptance of increasing carbon prices.
- A public consultation should be launched to consider two alternatives for effective use of carbon pricing revenue: 1.) Combination of compensatory mechanisms such as increasing fuel allowance for low-income households and climate investment such as energy retrofitting. This option precisely reflected the Assembly's recommendation; 2.) "Fee and dividend" approach meaning that all proceeds are redistributed equally to members of society where poor households possibly gain the most.[80]
- The results of this public consultation would inform a future policy paper prepared by Department of Communications, Climate Action and Environment jointly with the Department of Finance and Department of Public Expenditure and Reform submitted before July 2019 that assesses above options of revenue use applying the "principles of transparency, simplicity, public acceptability, equity and effectiveness" as a touchstone for a decision on carbon funds utilization up to 2030. The scope of the paper should extend to a discussion on advantages/disadvantages, and possibly divergent impacts on different socioeconomic groups, and adequate mitigation strategies of adverse effects of the two options recommended by the committee.
- The report would be scrutinized and debated by the Committee on Climate Action to develop a consensual, cross-party position on revenue use in the period between 2020 and 2030.

Committee members were well aware of their mandate and responsibility and strived to forge common position which improved on the poor performance of the country's climate change mitigation efforts. As said earlier, the pressure to act ambitiously was created by the shared voice of the Citizens' Assembly, but further strengthened by the increasing climate awareness of the general public, manifested in protests and climate strikes in early 2019 when the committee worked on its joint report (Oireachtas, 2019b; Oireachtas, 2019c). As a result, the committee agreed on most issues, and it took pride in the quality of the process which led to the final recommendations.

[80] Based on the assumption that emissions increase proportionately with income (author's note).

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However, carbon pricing emerged as a marked exception to the avowedly evidence-based debates, as it became politicized towards the end of the deliberations, leading to heated discussions. Without a doubt, agreeing on the exact wording, measures and recommendations in article six of the report that dealt with carbon pricing was the most contentious part of the deliberations according to assessments by the written sources as well as interviewees (Oireachtas, 2019b; Oireachtas, 2019c).

The main cause of disagreement and frustration was the adverse impact of carbon tax on the poor, the ambiguity of the exact measures in the committee proposal to protect the most vulnerable households, and the perceived lack of affordable low-carbon alternatives. References were also made to the political turmoil created by the yellow-vest protests in France at the time of the committee deliberations, and the crucial need for the government to give an adequate response to social challenges to avoid similar discontent and public outcry in Ireland (Oireachtas, 2018e; Oireachtas, 2018g; Oireachtas, 2018h). Although, there was a consensus on the need for social protection, the committee could not develop a clear plan as to how these socioeconomic groups would be shielded from the adverse effects of a carbon tax increase. There was no prior work done by experts, or specific recommendations by politicians and bureaucrats, that could lead the committee to propose a clear-cut revenue recycling measure for social protection, despite the political will expressed to do that (Oireachtas, 2018i; Oireachtas, 2018e, Oireachtas, 2018h; Oireachtas, 2018j; Oireachtas, 2019h, also see Appendix B). In the end, a decision was made to enact a progressively increasing tax rate that enjoyed stable support in the committee. But the decision on appropriate revenue recycling was postponed, with the government being directed to thoroughly examine and deliberate on the two above-mentioned social protection options, which would be scrutinized and further discussed by the committee.

The committee report was accepted and endorsed by the Dáil on 9 May, 2019 (Oireachtas, 2019o). Most recommendations laid out by the Committee enjoyed cross-party support in the Parliament as well. The envisaged carbon tax reform was backed by the two traditionally dominant parties, Fine Gael and Fianna Fáil, as well as the Green and Labour Party. The party of Sinn Féin (SF), and People Before Profit (PBP), however, objected to (increasing) the carbon tax. To interpret the political outcome of the joint report and its subsequent parliamentary vote, it is indispensable to understand the parties' approach and position towards carbon tax.

The political party Fine Gael (FG, centre-right, Christian democrats), which held 32% of the seats in Parliament and governed with a *confidence and supply arrangement*, supported an increase in the tax rate. This was based on their endorsement of the polluter pays principle,

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which advocates for reflecting the environmental impact in the cost of fossil fuels through carbon tax. Fine Gael widely endorsed the idea that carbon pricing, as a market mechanism, was essential and effective in incentivizing behavioral changes among producers and consumers. Furthermore, they viewed the revenue generated from carbon pricing as a potential fiscal base to fund targeted climate interventions (Interview #9; #11; #14). In relation to policy implementation, FG wanted to demonstrate its commitment to climate action by increasing the carbon tax (Interview #9). Their main concern was the effect reform might have on its popularity, and thus they endeavored to design the policy to avoid the appearance of overly penalizing poor households (Interview #12). The other big party, Fianna Fáil (centre-right) (28%) also accepted the policy. Their main focus was on legally ring-fencing revenues, supporting vulnerable communities to prevent regressive negative impacts with "evidence-based plans", spending on specific climate measures, and securing commitments from other parties to gradually increase the rate over a 10-year period to provide certainty (Interview #12).

Small left-wing and middle-ground parties in the Parliament (Labour – 4%; Social Democrats – 2% and the Greens –1%) endorsed carbon tax but they were concerned about the negative distributional impact. The main focus of the Social Democrats and Labor Party was achieving an equitable social outcome and an elevated level of public acceptance for the final policy design by using revenue on social support, and climate incentives to enable low carbon transition. The Greens advocated for a carbon rate of 200 EUR/t CO_2, which, they believed, would put Ireland on a fast track to decarbonization. They also promoted the theoretically neat fee and dividend approach for revenue recycling (Green Party, 2020a). They argued that this model is suitable for addressing equity and distributional issues associated with carbon tax increases, and is a smart policy solution that can be easily expanded and scaled up in line with rising carbon prices.

There were two parties who vehemently opposed carbon tax, Sinn Féin (SF) (15%) and People Before Profit (4%) (PBP/Solidarity). Despite agreeing to most of the recommendations on climate action laid out by the Joint Committee, they did not sign the final report, due to their opposition to carbon tax, but instead issued their own minority reports. PBP rejected carbon tax based on grounds that changes in the behavior of the individual, as envisioned by carbon pricing theory was, in itself, insufficient to effectively address the massive challenge of climate change. They went on to argue that a systemic change, a complete overhaul would be needed in the economy. According to their position, a tax on the profits of companies linked to fossil fuel production, rather than a tax on 'ordinary people' could be a way forward. Sinn Féin argued

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that carbon tax would do nothing more than penalize and impoverish people who could not make the necessary behavioral changes due to lack of (affordable) low carbon alternatives. By implementing a punitive, negative policy, they also argued, carbon tax does more harm than good, as it erodes public buy-in for climate action (Interview #3). Furthermore, both parties stated that there was no substantive, evidential base for believing that carbon tax would reduce GHG emissions. The demand for heating and motor fuels is inelastic, thus carbon tax would have a negative impact on people's welfare (health and wellbeing) by forcing them to turn down their heat and/or limit expenditures on other essentials; and the distributional impact is regressive, penalizing vulnerable segments of society. PBP and SF also believed there were other, fairer and more effective ways to raise revenue for climate action (People Before Profit, 2019; Sinn Féin 2019).

6.4.4. Budget Day - Period between June 2019 and October 2019

June 2019 marked a major milestone in the country's climate policy, when the Climate Action Plan was published (see Appendix B). In this plan, the government committed to implementing a carbon tax rate of at least 80 EUR/tCO_2 by 2030, and to making sure "that the use of additional carbon tax revenues takes account of the purpose for which a carbon tax was introduced, including consideration of the appropriate balance between a possible dividend-based approach and expanding funding to decarbonisation programmes" (GOI, 2019a, p. 43). The plan also referred to the Economic and Social Research Institute's (ESRI)[81] report that analyzed the distributional impact of tax increase, as well as different revenue recycling options (more on this below), and pledged to "carefully examine the impacts on low-income and rural households and those experiencing fuel poverty" (GOI, 2019a, p. 44).

After publishing the plan, discussions on the budgetary and fiscal consequences of climate change policies, as well hearings on the viewpoints of interest groups as to the planned carbon tax increase, took place in the Parliament. The Irish Congress of Trade Unions (ICTU), the Nevin Economic Research Institute (NERI), Dublin Chamber of Commerce (DCC), and Chambers Ireland (CI), all appeared in the Committee on Budgetary Oversight (Oireachtas, 2019d; Oireachtas, 2019e). ICTU and NERI accepted the proposed carbon tax increase, contingent upon equal dividends being paid to all Irish households, which would leave the bottom 50% better off, and called for increased investment in public transport and retrofitting

[81] ESRI is an independent, partly state-funded research institute that delivers research work and policy analyses mainly for the Irish government.

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in order to provide low carbon alternatives. Business representatives from DCC and CI expressed support for the carbon tax, but called on the government for enforcing predictable, gradual implementation of tax increases, as well as for ring-fencing carbon funds for green infrastructure development, including public transport, energy efficiency measures, and grid network improvements. This would allow people to gain access to low carbon alternatives, as without them, the carbon tax was seen as penalizing.

In addition to the trade union and business associations, it is important to discuss the position of environmental, non-governmental organizations (ENGO) who were more vocal about carbon tax. ENGOs were generally supportive of carbon tax as an instrument in the state policy toolkit to cope with climate crisis effectively, but they all made clear to the government that their support was contingent on protecting the vulnerable households from its detrimental effects, thus instituting just transition as a key pillar of their consent. There was a concerted, coordinated effort from progressive NGOs with different social agendas (environment, poverty, etc.) to put pressure on policy makers to implement carbon tax in a socially just and fair manner.

Efforts to find common ground between social justice and environmental objectives during the preparation for the elections, where carbon tax emerged as an important issue, included a media campaign (e.g., O'Sullivan, 2019b), submission of consultation papers (Interview #2), and organization of workshops (Interview #2; #10; #12) for elected officials, party staff, climate policy advisors, and researchers, to collectively determine a consensual position on how carbon tax should be designed to ensure social fairness and acceptability. Obviously, revenue recycling was an important part of this discussion, as it could help alleviate the NGOs' concerns regarding negative social effects, although most of these organizations did not have a clear preference or endorse any particular recycling measures.

The Tax Strategy Group (TSG)[82] published the results of the public consultation in July 2019 (DOF, 2019). In total, the call received 66 submissions, breaking down as follows: 19 submissions from private individuals, 28 from businesses or business associations, 13 from 'Social, Voluntary and Community' (SVC) organizations and 6 from other sources including

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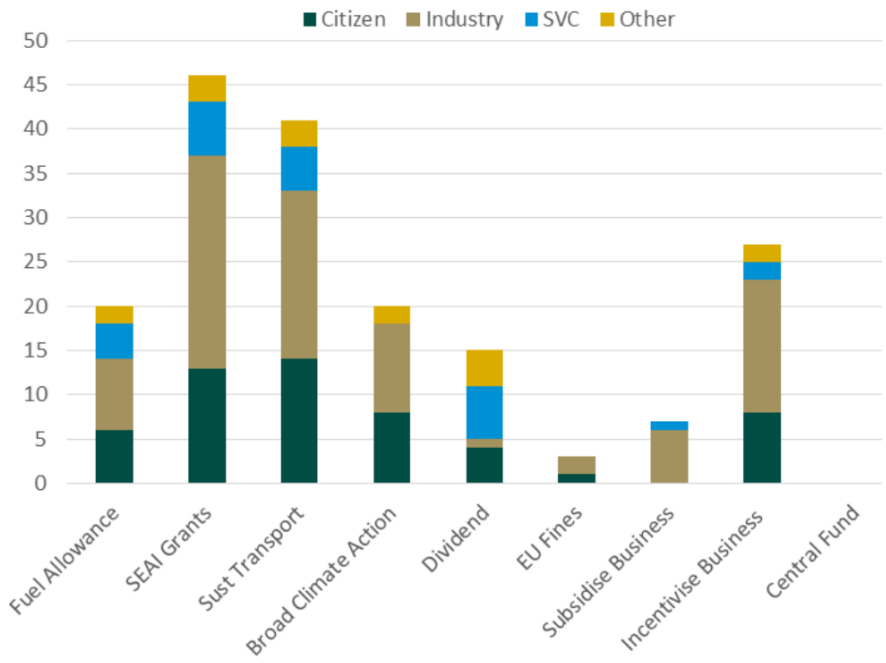
[82] TSG is described as follows in the government's website: "The Tax Strategy Group (TSG) is in place since the early 1990's and is chaired by the Department of Finance with membership comprising senior officials and political advisers from a number of Civil Service Departments and Offices." TSG is not a decision-making body but it provides input to the budgetary process by analyzing different tax options and changes. Source: https://www.gov.ie/en/collection/d5b41-budget-2023-tax-strategy-group-papers/

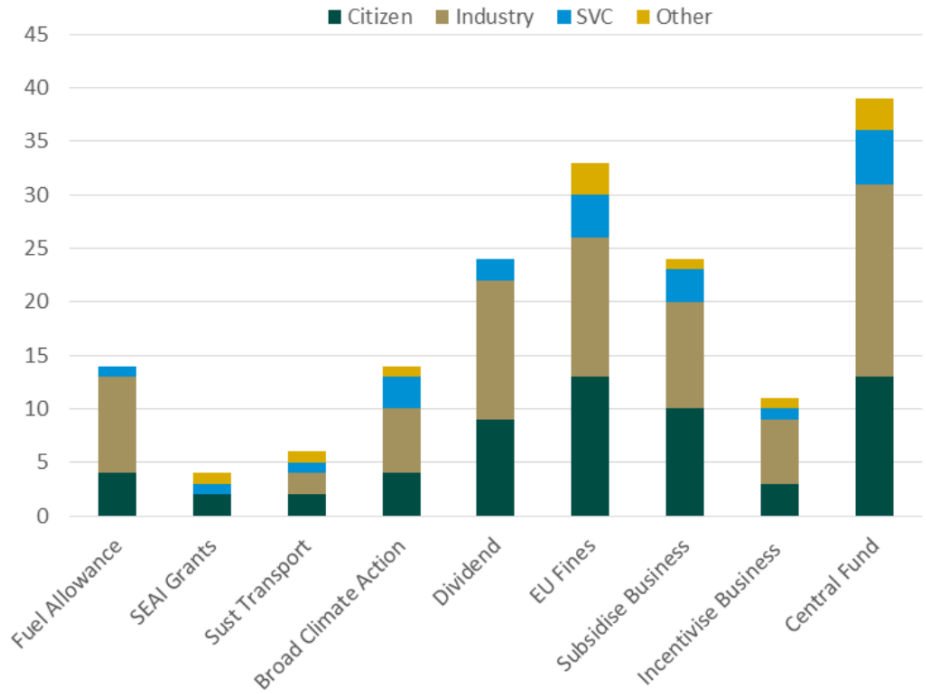
political organizations, members of parliament, and academics (DOF, 2019, p. 28). The aggregated results are shown in the following two figures.

11. Figure - Supported revenue recycling measures (nr. of respondents and options).



Note and source: Reprinted from DOF (2019, p. 29).

12. Figure - Opposed revenue recycling measures.



What emerged clearly from the exercise was that the most popular measure of revenue recycling would be ring-fencing funds for energy efficiency (SEAI Grants) and sustainable transport. The

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most opposed measure would be channeling funds into the general budget. According to the analysis provided by DOF (2019, p. 30): "most respondents [*answered by*] stating their preference for transparent and visible use of revenue arising for measures related to climate change." Perhaps their clear preference explains why the fairly vague term, "Broad Climate Action" did not get a particularly positive response. This all provided a very strong signal from various stakeholders to the government for hypothecation. Regarding the specific recommendations of revenue recycling by the Joint Committee, increasing existing welfare payments (fuel allowances) to poor households got mixed reviews, but performed considerably better than the dividend option which received overall a negative response.[83]

ESRI also published a series of works before the budget announcement in October. They used different econometric models and data sources, produced by different research teams on the economic, social and environmental impact of a projected carbon tax increase. Special attention was paid to the distributional impact and how different revenue recycling measures could allay concerns about regressivity. The salient conclusion of these studies was that carbon tax's impact is regressive, but lump-sum payments (fee and dividend), or increasing social transfers, would create a progressive pattern, although the former might entail greater administrative costs and bureaucratic complexity. Therefore, the ESRI recommended using the existing welfare system to achieve the Committee's objective of protecting vulnerable households from negative effects of tax increase (Bercholz and Roantree, 2019, p. 15 and publicly: Oireachtas, 2019h). A summary of all studies is provided in Appendix B.

On 8 October, the Minister for Finance and Public Expenditure and Reform, Paschal Donohoe, announced a budget for 2020, including the decision to increase the carbon tax rate by 6 Euros (to 26 EUR/tCO_2). This was in line with the price trajectory aspiring to reach 80 EUR per ton by 2030, as recommended in the joint report, and which the government had now committed to achieving in the national Climate Action Plan (GOI, 2019d). Instead of frontloading costs (making a one-time large increase), the government aimed to increase the tax rate steadily approaching the 2030 target, as requested by the Committee and Assembly. The new rate applied to motor fuels, beginning the day right after the announcement, and to other fuels after the heating season, beginning in May 2020. According to the Department's calculation, the

[83] It should be noted that Eamon Ryan (Greens) heavily criticized the public consultation as he asserted that no sufficient information was provided to the public on this particular approach which possibly distorted the outcome (Oireachtas, 2019i) Nevertheless, by solely looking at the results, the first revenue recycling option was more popular among respondents.

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reform would raise 90 million Euros, the whole of which would be ring-fenced for specific purposes. The breakdown of spending on specific programs is shown in the following figure.

14. Table - Allocation of additional carbon tax revenue in 2020.

Program	Expenditure (million EUR)	% from Total Expenditure
Protecting the Vulnerable	**34**	**37,8%**
1. Fuel Allowance	21	23,3%
2. Energy Poverty Efficiency Upgrades	13	14,4%
A Just Transition	**31**	**34,37%**
3. Aggregated Housing Upgrade Scheme	20	22,2%
4. Peatlands Rehabilitation (non Bord na Mona)	5	5,5%
5. Just Transition Fund	6	6,67%
Investing in the Low Carbon Transition	**25**	**27,78%**
6. Greenways/Urban Cyclin	9	10%
7. Continuation of Electric Vehicle Grants	8	8,88%
8. Further Investment in EV Charging Infrastructure	3	3,33%
9. ODA - Green Climate Fund	2	2,22%
10. Green Agricultural Pilots	3	3,33%
Total	90	100%

Source: Department of Public Expenditure and Reform (DPER) (2019a, p. 1)

By citing ESRI's most recent research on the matter, the decision to allocate more than 1/3 of all addition revenue to social protection was justified by the Government to counteract the burden of the price increase on lower income households. According to the DPER (2019a), increasing the fuel allowance by two Euros per week would leave vulnerable households entitled to the allowance better off than before carbon tax reform.[84] Furthermore, 13 million in revenue was ring-fenced for the Warmer Homes scheme that provided free energy efficiency

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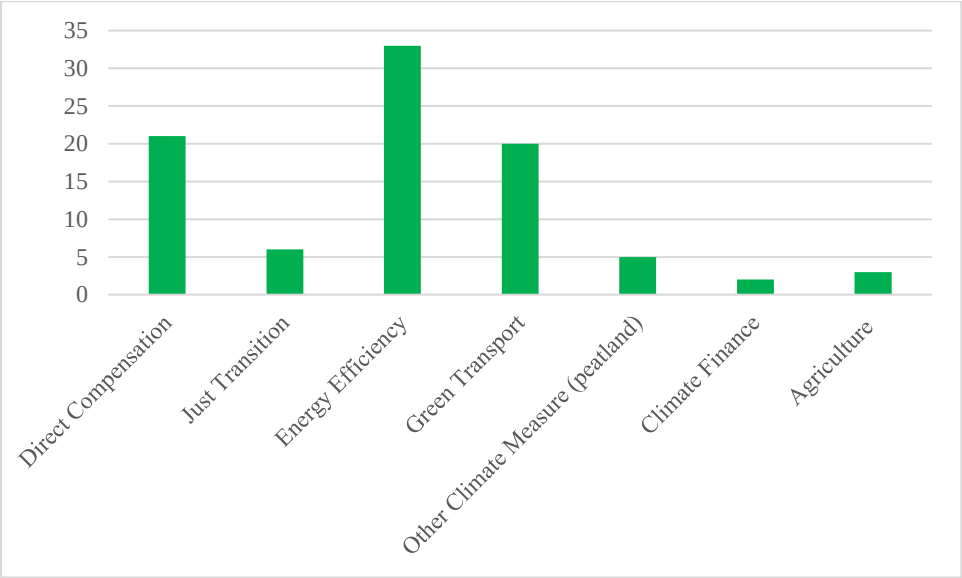
[84] It should be noted, however, that the Minister of State at the Department of Finance, Michael D'Arcy provided a different insight about regressivity during the debate in the Parliament on the Budget on 24 October 2019 by saying: "the Government is increasing the fuel allowance by €2 per week. The increase applies from 1 January and entails an annual benefit of €56. This will leave the 22% of households in receipt of the fuel allowance better off than before the increase in the carbon tax. This ensures that the most vulnerable in society are protected from the increased carbon tax." (Oireachtas, 2019n)

upgrades to households that were suffering energy poverty (for more info, see Oireachtas, 2018a).

Just Transition spending focused on geographies, jobs and sectors that would experience (or already were experiencing) disruption during the low carbon transition (Midland region). The Aggregated Housing Upgrade Scheme was launched to "upgrade the energy efficiency of the social housing stock in the midlands" (DPER, 2019a, p. 3). Five million was allocated to peatland rehabilitation, to finance the shift away from peat as fuel for electricity generation and heating, and to the sequestration of greenhouse gas emissions and preservation of biodiversity. Lastly, a Just Transition Fund was established to support economic and employment objectives in areas where sustainable transition would have negative social consequences (but no specific program was outlined).

The last main category was investing in the low carbon transition, where a majority of the funds (80% in this category and 22% of total spending) were specifically allocated to green transportation through developing greenways and urban cycling paths (9million), providing grants for electric vehicles and developing the charging infrastructure (11 million). The remaining five million was dispersed to climate finance in developing countries (2 million) and sustainable agricultural projects (3 million). As can be seen in the following figure, 27 million was allocated to compensation (direct + indirect) and 63 million to green investments.

13. Figure - Revenue recycling by main categories.



My own calculation based on (DPER, 2019a) to reflect on revenue recycling measures and mechanisms detailed in the Theoretical Framework.

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6.4.5. Between Budget 2020 and General Election (October 2019 – February 2020)

To complete the description of the political processes leading to carbon tax reform, one should analyze the parliamentary debates on Finance Act 2019 that legislated the carbon tax increase announced by the government in the 2020 budget (GOI, 2019e). However, I only refer to the debate in passing, since the discussion on the challenges related to carbon pricing in the Dáil, to a large extent, mimicked the deliberations of the Joint Committee (e.g., lack of low-carbon alternatives, unjust for lower income people), and because the parliamentary acceptance of the finance bill was not in jeopardy, due to support from big parties (Oireachtas, 2019k). Two things should be mentioned, though. Firstly, there were two vulnerable social groups who were disproportionately, negatively affected by the increase in carbon tax, but apparently did not get protection from revenue recycling (Oireachtas, 2019l). First, not everyone among the lowest earners of the country was entitled to a fuel allowance, as it generally targeted the older population and people on long-term social welfare payments. Second, while farmers enjoyed apparently generous compensatory support (double tax relief and lower excise tax rate for marked gas oil) to cover their costs associated with the fuel price increase, agricultural contractors and farmers who did not earn enough to make their income taxable could not benefit from the scheme (Oireachtas, 2019m). After all, perhaps not surprisingly, many of the rural TDs were also hostile to carbon tax reform, due to lack of affordable, low carbon alternatives in rural areas. The critics cited the underdeveloped natural gas infrastructure, making a fuel switch impossible, the lack of public transport, technological difficulty in replacing diesel for agriculture, among other issues. All of these shortcomings put a higher burden on their constituency (rural TD Thomas Pringle representing the "Independents for Change" political grouping in the Joint Committee did not sign up for the carbon tax chapter in the committee report, either).[85] These gaps were acknowledged by the Minister for Finance, but he insisted that existing and developed, compensatory mechanisms were adequate for social protection.

Secondly, one should also note that a six Euro increase in the carbon tax rate implied a marginal cost increase for motor fuels (0.02 cent per liter) (DPER, 2019b, p. 17), which could easily be indistinguishable from weekly prices fluctuations, so the government could have asserted that this would be tolerable even for people who were not compensated, as indicated by the government representatives during the parliamentary debate (Oireachtas, 2019l; Oireachtas, 2019m). The price increase could have gone especially unnoticed, because the increase in the

[85] Some rural TDs associated with pro carbon pricing parties and certain interest groups, such as trade unions were silent on the issue, did not express support or rejection publicly.

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price of home heating fuel, a much greater financial burden, was delayed until the end of heating season, May 2020 (Oireachtas, 2019n).

6.4.6. General Election in 2020

The 32nd Dáil (2016-2020) was dissolved on 14 January 2020 and the general election took place on 8 February 2020. The new government could have blocked the newly initiated carbon tax reform, but the elections also held the opportunity for implementing more stringent policy through elevated legitimacy. As Professor Kathryn Harrison from the University of British Columbia pointed out at an Oireachtas briefing in July 2019: "If a carbon tax can survive the first year or the first election, they tend to be quite resilient" (Sargent, 2019), thus it was worthwhile analyzing the stances of parties running for office on the ongoing carbon tax reform.

Notably, from the perspective of the carbon tax, the new parliament had become more polarized, as parties that rejected the carbon tax, such as Sinn Féin and PBP, increased their number of seats to 42 out of the 160 in the Dáil. However, despite this polarization, the new government committed to increasing the tax rate further, aiming for 100 EUR/tCO_2 by 2030. The annual rate escalator (7.5 EUR) was approved by Parliament in December 2020. According to interviewees, accelerating the carbon tax trajectory from what was announced just a few months before the general election, could be almost exclusively attributed to the influence of the Green Party's ascendance into power. The Green Party was able to leverage the conditions for stronger climate action, including a higher carbon price, due to their favorable political position. Their support was needed to secure a majority for the traditionally rival parties of FG and FF, who forged an unlikely coalition. A comprehensive description of the political stances of parties running for office, particularly their position on the ongoing carbon tax, along with a justification for further increase in the carbon tax rate, is provided in Appendix B.

Regarding revenue recycling, two important observations must be made. First, it was announced in the Programme for Government that all proceeds from the tax increase would be legally ring-fenced to social cushioning (30%), retrofitting programs (50%) and sustainable agriculture (rest, approx. 20%) (GOI, 2020a, p. 24). For Budget 2021, the government decided to introduce three different compensation measures, in contrast to Budget 2020, when only the fuel allowance was increased as a direct compensatory mechanism (DPER, 2020). In the new package, the Qualified Child Payment (targeting low-income families), the Living Alone Allowance (e.g., elderly and disabled people) as well as the Fuel Allowance were all increased due to recognition that different social groups are impacted differently by carbon pricing,

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necessitating targeted measures to account for these diverging effects. In line with the government's program, energy efficiency (100 million EUR) and sustainable agricultural projects (20 million) would be funded from the proceeds in combination with the continuation of investment programs (greenways, peatland rehabilitation. etc.,) initiated in the budget of 2020.[86]

The Finance Act 2020 that legislated the annual rate escalator was approved by Parliament on 16 December. That final certification concludes my analysis, as no new carbon tax increase or revenue recycling measures have been announced by the government since then. It is important to stress that carbon tax in Ireland has remained resilient, despite the severe energy crisis that unfolded in 2021 and 2022, caused by the economic rebound effect after Covid-19, which has been further exacerbated by the war in Ukraine.

6.5. Discussion

After outlining the chain of events leading up to the announcement and legislation of carbon tax reform; the subsequent political analysis is largely based on data and information derived from interviews. This analysis delves into public reactions and it explains how revenue recycling influenced attitudes through different channels. First it provides an explanation of why hypothecation of funds was more appealing politically than the fee and dividend model. While the argument for carbon dividends has been presented in various strands of literature and policy circles, emphasizing positive distributional outcomes and macroeconomic effects, there is a lack of scholarly assessment on how it is perceived politically by the government, major interest groups, and socioeconomic segments (see e.g., Boyce, 2019; Nystrom and Luckow, 2014).This study and its findings are hoped to make an important addition to the literature. The second section explains the role revenue recycling played in shaping both political opposition to and support for carbon tax reform.

6.5.1. Fee and Dividend or Hypothecation of Carbon Funds?

Gathered evidence shows that, all in all, there was a politically more compelling case for using carbon tax revenue on direct compensatory mechanisms and green investments than for applying the “fee and dividend” approach, for numerous reasons. Firstly, the Assembly expressed its desire that their preferred method of using the revenue to further climate change mitigation efforts was through support for renewable energy deployment, retrofitting and

[86] Except the energy upgrade program in the Midlands.

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adaptation measures; and they expressed a clear preference for social protection. Deviation from these concrete recommendations might have implied political costs for the government. Furthermore, this integrative approach also enjoyed broader support in the public consultation than the "fee and dividend" approach which earned negative reactions overall. Businesses also accepted the increasing stringency of carbon tax on the condition that revenue would be invested in developing low-carbon alternatives (e.g., green infrastructure), a condition which was also included in the final policy.

Secondly, using revenue for various programs, rather than introducing a single compensatory mechanism, gave more leeway to the government to prioritize and change social objectives in the future. For example, as a response to Eamon Ryan's (leader of the Greens) note that the Finance Department seemed to want to keep the decision on redistribution in its remit, Paschal Donohoe, the Minister for Finance said: *I understand that and similarly the idea of any kind of any ring-fenced tax would be traditionally anathema to taxation decisions that we make, but as I said I see the taxation of carbon as different from other forms of taxation. The kinds of considerations that I am weighing up at present is that we will have parts of our economy that will experience rapid change as a result of the change to a lower emission economy. It is already happening. Is there not a case to be made for using the proceeds from changes in carbon tax to help cushion or support people in adjusting or getting new jobs or forms of work?(Oireachtas, 2019g, p. 27).*[87] The final design of revenue recycling reflected this position accurately. By committing a significant chunk of the funds to help the Midland region, which was negatively affected by the low carbon transition, due to its heavy reliance on jobs provided by the newly-redundant fossil fuel power plants, the government demonstrated their support for vulnerable communities, and dissipated some of the concerns about negative social effects (Interview #2; #7; #13). Indeed, this hybrid use of revenue gave more leeway to the government to respond to the burden, which fell unequally on different regions and social groups during their transition to lower carbon economy, which would have been impossible with the fee and dividend approach. Therefore, a hybrid use of revenue was better aligned with the concept of just transition, a principle which has been continuously embraced by the Irish political elite (see e.g., GOI, 2019a).

[87] Eamon Ryan brought up this issue again a week later in the Committee on Climate Action, where he made a strong statement saying that the decision to offer many alternatives on revenue recycling in the public consultation, as opposed to the concrete recommendations laid out by the Joint Committee, and providing insufficient information on the "fee and dividend" approach, "looked and read like the Department of Finance wanted to kill this first pace because, as Mr. Kenny says, it is a revenue-raising Department and likes to hold on to the revenue." (Oireachtas, 2019i, p. 25)

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Additionally, financing numerous programs with carbon tax revenue enabled the government to respond to divergent opinions, on how to use these funds, voiced by different socioeconomic groups, and thereby gain their political support. For instance, direct compensation and energy efficiency programs were demanded by citizens, and green infrastructural development (esp. transportation) was pushed by business interests, both of which were included in the final version of the revenue recycling scheme. Even the notoriously high-emitting, but politically influential, agricultural sector got a small share of the funds, despite it already receiving relatively generous compensation for their costs. Interviewees mentioned two possible reasons why agriculture received funds from the carbon pricing pot when they did not contribute directly to carbon tax. 1.) Addressing emissions in the agricultural sector is particularly challenging, thus funding is urgently needed to incentivize even small-scale changes. Allocating revenue towards sustainable agriculture is a recognition of this challenge. 2.) Crucially, from a perspective of political acceptability, a relevant aspect is providing additional compensation for sustainable agriculture, to secure political buy-in from rural Ireland. This acknowledges the potential opposition to emissions pricing and climate policy in these areas, which could have been significant.

Crucially, targeted social transfers and green spending was useful for the government to neutralize political attacks from the opposition. Interviewees (#10; #11; #12) confirmed that big parties were well aware of how opposing forces would frame carbon tax reform—as a punitive measure disproportionately hitting the poor. Compensating low-income groups, represented heavily by left-wing opposing parties, and spending on climate projects with a strong social dimension (e.g., energy efficiency programs for poor households) helped neutralize opposing parties' argument about the unfairness of carbon tax. Another political challenge was that people did not necessarily make the link or fully understand the relationship between the carbon dividend approach and fairness (Interview #7; 15; about this linkage issue in the literature, see: Sælen and Kallbekken, 2011). The compensatory model was more self-evidently targeted and thus it was easier to explain to the public that these measures could help protect poor households and allow them to transition to a low carbon lifestyle (Interview #11). The link between carbon tax and spending on decarbonization was more evident, and seen by the public as a legitimate, reasonable decision (Interview #14; #15). Furthermore, from a distributional perspective, affluent households that could afford the transition to electric vehicles and adopt low-carbon heating solutions, such as heat pumps in well-insulated homes, might potentially benefit more from the carbon dividend than low-income households. This

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inequality in potential gains could have created a political opportunity for opposing parties to challenge the fairness of the carbon dividend model. Since the government only wanted to ring-fence 90 million Euros of the revenue that was generated by tax increase, (equivalent to six euros per ton of CO_2) instead of the entire revenue from 26 Euros, the fee and dividend contribution to individual workers would have been negligible (Interview #4; #5; #6).[88] It is unlikely that the public would have perceived the concept of *additionality* in that way. Lastly, the hybrid uses of revenue aligned more closely with the consensus of supporting parties, as the fee and dividend approach was only championed by the Green Party.

Thirdly, from a bureaucratic point of view, welfare payments that functioned on an existing infrastructure would be less costly than lump sum transfers. Lump sum transfers would have required the establishment of a new payment system and solving other logistical issues, such as data gathering on the composition of households, to account for the greater spending of larger households (Bercholz and Roantree, 2019). The highly-developed social welfare system in Ireland enabled targeted social transfers. Furthermore, there has been a strong opposition at the Ministries of Finance around the world, including Ireland, against hypothecation of funds. This was perceived as an inefficient approach because it might not align with immediate fiscal needs, like education, tax reform. However, the idea of raising revenue and 'immediately' giving it away, which would also mean giving away the decision on how to redistribute it, was even more radical (Interview #12; #16). In addition, as climate action requires far more financial resources than carbon tax can generate, ring-fencing does not impose a meaningful constraint on governments' spending options, but in terms of political saleability, it can play an important role (Interview #8).

Lastly, it is interesting to note that even the Green's changed their approach to revenue recycling after the elections, transitioning from advocating for fee and dividend to endorsing hypothecation. Once the Greens came into power, and inherited the existing revenue recycling structure, they did not want to change it back to fee and dividend, because the recycling structure allowed them to use the funds towards policy goals in their leading domains, such as energy and transport (Interview #12).

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[88] It is interesting to note that, the Greens argued that fee and dividend goes hand in hand with sufficiently high carbon tax rate, which would obviously make carbon dividend a financially more tangible help to most households.

6.5.2. Reaction from Public and Major Interest Groups and the Role of Revenue Recycling

This section explains the role revenue recycling played in shaping both political opposition to, and support for, carbon tax reform. In this capacity, it details how carbon pricing opponents framed the reform, attempting to use it for political advantage. The section also shows how parties supporting carbon pricing might point to social and environmental benefits financed by the proceeds to neutralize their opponents' arguments about policy fairness, and to strengthen the argument for stringent carbon prices. Although there is some overlap with the previous analysis on why the hypothecation of funds has proven to be politically superior than the fee and dividend model in Ireland, this section specifically focuses on the theorized causal relationship between various revenue recycling measures and increased political acceptability. Further, the analysis makes an important contribution to the literature by finding that revenue recycling policy facilitated the formation of a broad coalition between center-right and center-left parties, supported by influential interest groups, around carbon pricing reform.

Despite varying assertions by certain stakeholders about the intensity of the public reaction after the announcement on carbon tax reform, most interviewees agreed that carbon tax increase was not a major issue for the general public. Precisely two interviewees said that there was serious backlash and carbon tax became a politically hot topic after announcement; two reported that there was not any significant negative public reaction; and twelve interviewees said that there was some discontent around the reform, especially for certain groups, but there was no vehement opposition. Clearly, there were not big protests or other widespread, visible demonstrations of discontent. However, dissatisfaction from certain social groups was repeatedly mentioned by a majority of interviewees (also by representatives of pro carbon tax parties). It was especially noted that rural households and small farmers expressed a negative sentiment towards carbon tax reform because low carbon alternatives were not in place for them (for media coverage, see: Bielenberg, 2019; Byrne, 2019). Carbon tax reform was used and cited by the opposition to stir up the long-lasting, urban-rural division over climate policies (Interview #4; #5; #6; #9; #16). Notably, most interviewees also mentioned increased media coverage and exaggerated political opposition, out of proportion to the actual, modest economic impact of the Irish carbon tax.

Apart from the ideological reasons for opposing the carbon tax, including its unfairness towards certain social groups, there were material benefits for some political parties, as well as for the

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media, for keeping the issue on the public agenda. Crucially, carbon tax provided unique incentives and opportunities for certain parties to build political capital. It was widely believed that carbon tax reform would be unpopular, so opposition to it could deliver political gains. Also, there was no party in Ireland that challenged the climate science, and there was broad agreement about implementing most climate change mitigation efforts (e.g., a large-scale deployment of renewables) required to meet pre-defined environmental targets (on the Irish political consent on climate change, see: Little, 2020). However, the controversy surrounding carbon tax, including concerns about its perceived ineffectiveness, negative distributional impact, and the exacerbated rural-urban division, provided opportunities for political parties to differentiate themselves from others by opposing this instrument and appealing to specific sections of voters with their alternative approaches to climate change mitigation (#Interview #11; #12). Carbon tax also provided an easy to understand, divisive tool for politicians to convince the public about its unfairness (Interview #4; #5; #6). The existing divisions between parties, and the simplicity of this political story, were also used by the media to generate sustained attention and controversy through the debates. Carbon tax received media and press coverage which exceeded its economic weight and may have had an overly polarizing effect, even by the standards of some members of opposition parties. This was confirmed by one interviewee who believed that this kind of 'Punch and Judy' politics could backfire, because it could be suggested that vocal opponents of carbon tax were also opponents of climate change mitigation (Interview #3).

In essence, most interviewees perceived that the announcement on carbon tax reform had a overall muted effect on the public. Despite being measured against counterfactual outcomes, when interviewees were asked about the role revenue recycling played in shaping public support, they all agreed that it played a vital role in securing acceptance of reform.

Notably, pro-carbon tax parties were aware of how opposition political forces would frame the reform by suggesting that it was a punitive, regressive policy hitting the financially vulnerable hard and leaving them without viable alternatives to avoid paying the tax. By committing approximately 60% of the revenue to social cushioning to compensate the poorest households and improve existing energy efficiency programs, specifically targeting people at risk of energy poverty and populations in rural areas where low-carbon transition may entail economic and social disruption (Midland), the government was able to take the sting out of the opposition argument about the policy's unfairness. By shielding the most vulnerable households from the negative effects of carbon tax increase, the political elite were putting into practice lessons

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learned from the disastrous governmental failure to introduce water charges in Ireland in 2014 and 2015. This failed attempt, largely caused by opposition to its unfairness and adverse effect on low-income households, erupted mass protests across the country. The importance of these past events in relation to carbon tax reform was repeatedly mentioned by interviewees, despite the fact that the financial impact of carbon tax was considerably less than those in the proposed water charges (also, see references made to water charges in relation to carbon tax reform by the prime minister and minister for finance in the Appendix B).

By emphasizing the progressive outcome of the policy, and the investment in urgent climate action, the government and civil servants had a pre-prepared answer to media inquiries about the fairness and necessity of this policy change, which attenuated any attempt to generate attention over a controversial reform. By publishing the scientific report discussing the distributional impact of the tax increase[89] along with the budget proposal, as well as detailing the plan in a separate document, called, "Carbon tax increase. What it will be spent on," the government's plan to make distributional impact progressive through social cushioning, it helped eliminate concerns about adverse effects. Underpinning the argument for an effective compensation strategy using data and information made tax increase easier to defend from a political perspective. Interviewees (#4; #5; #6) also mentioned that showcasing environmental benefits arising from carbon tax and making the ecological outcome more discernible through specific climate action programs, was important to increase acceptability for three reasons. First, government grants, such as the ones for retrofitting financed from carbon tax, are obviously more popular than taxes. Secondly, it helped to demonstrate the environmental effectiveness of the policy, which was oftentimes doubted by the general public, partly due to deliberate efforts from certain groups to contest scientific evidence about the emissions reduction effect of carbon tax.[90] Lastly, ring-fencing on climate action contributed to overcoming the general distrust in the government's handling of taxation issues. While these three reasons seem very plausible explanations for the increased public acceptance, it should be noted that there is no specific evidence, such as polling commissioned by ministries, available to support these claims. Instead, existing national and international research were cited by

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[89] As these reports were mainly produced by ESRI (also on efficiency of different compensation measures to reach progressive outcome), they had significant influence on policy discussions as acknowledged by four interviewees.
[90] For example, Sinn Féin and PBP argue that carbon tax is environmentally ineffective, citing examples where emissions had not decreased after it was implemented. In response to this criticism, CCAC noted during the committee meetings, citing scientific evidence, that the emissions increased in these places at a lower rate than they would have without carbon tax. CCAC further emphasized that the emissions reduction potential of carbon tax is largely a matter of price level which tends to be low in most places.

interviewees to underpin these statements. They argued that they didn't see any evidence that attitudes of the Irish society had shifted over time and the public consultation in 2019 reflected similar views and conclusions (on the Irish context, see: Clinch, Dunne and Dresner, 2006).

Notably, some interviewees mentioned that they doubted the majority of people would closely follow the discussions on all policy changes, including carbon tax, but rather, they would be guided by prevailing political discussions and media coverage of key policy issues. And the media coverage could be better managed if directed to highlight the policy designs that alleviated negative social impacts and revenue used to accelerate sustainable transition in key areas.

Furthermore, developed revenue recycling strategy enabled the government to respond directly to the needs and preferences of different social groups. Social compensation and climate action expenditures from carbon pricing proceedings were among the public demands in the Citizens Assembly. Specifically, green spending, retrofitting, and sustainable transportation, all of which were included in the final plan, earned a clear majority in the public consultation as the revenue use preferred by citizens and businesses. Both programs enabled the government to showcase how targeted spending can contribute to accessible, low carbon alternatives in sectors that are most affected by carbon tax increase, an issue which was heavily debated by the opposition.

It has to be mentioned, as was pointed out by numerous interviewees (#2; #4; #5; #6), that after the price increase in 2019, the initial compensation measure for vulnerable groups was limited. This fact drew heavy criticism from opposition and rural TDs in the parliament during debates on the Finance Act 2019, since the compensation excluded significant numbers of people who were also disproportionately affected by carbon tax (see above). The civil service did not have sufficient time in the lead up to Budget 2020 to carefully assess how different social groups would be affected by the carbon tax increase. Therefore, the approach to mitigate the possible negative distributional impact of carbon tax increase was based on readily available, albeit limited, evidence. In this context, fuel allowance was viewed as the most targeted and effective measure to compensate low-income households. The increase of €2 in the fuel allowance per week was seen as a proportionate measure to offset the impact of carbon tax in Budget 2020, and it was relatively easy to administer, making it accessible to a broad range of recipients. Lack of time to prepare a more elaborated compensation strategy could be explained by the cross-party political pressure to enforce an immediate carbon tax increase, as promised in the national Climate Action Plan in June 2019. The fuel allowance was tied to home heating costs and was not intended to address other price increases associated with carbon tax, such as those

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related to transportation (Interview #15). These two issues, narrowness of support, and lack of compensation for rising motor fuel prices, showed the limitations of the fuel allowance to fully address the negative distributional aspects of policy. Therefore, from a political acceptability standpoint, it was important to forge a compensation strategy that captured the wider impact, and addressed segments of society, such as the elderly and poor families with children, who had negative experiences with the carbon tax increase.

Lastly, revenue recycling served as a unifying factor among different parties in supporting carbon tax reform, as its design made the tax acceptable to parties with divergent ideological stances. Centre right parties were generally in favor of the policy instrument, whilst centre left parties were, at least, reassured that the policy was implemented fairly with the help of revenue recycling. When carbon tax reform was announced, the negative reaction could have escalated due to subsequent political attacks from the opposition. However, the broad coalition between centre-right and centre-left parties, backed by major trade unions, business associations, and NGOs, played an essential role in countering the narrow but vocal opposition, thereby reducing the probability of it becoming a significant political issue (Interview #12; #16). Sinn Féin's relatively inconsistent stance on the carbon tax, entangled in prolonged political discussion, also helped reduce the probability of escalation. While they did not accept an increase in the rate, they also did not want to abolish the policy, as they saw the revenue was important for desperately needed retrofitting of old housing stock in Ireland.

As a closing remark, it is worth noting the political significance of carbon tax. While interviewees may have had differing reactions to the public effect of the announcement of carbon tax reform, they all said unequivocally and unanimously that carbon tax did not become a major issue in the elections in 2020. Further, the government’s willingness to call for early elections after the carbon tax reform announcement, was telling. Interviewees asserted that, perhaps, some rural seats were lost by big parties who backed the reform and shifted towards Sinn Féin and PBP, but the importance of carbon tax, and climate change in general, which certainly received significantly more attention than in previous elections due to environmental strikes and growing climate awareness, paled in comparison to the issues of housing and health care, which dominated political discussions leading up to elections.

6.6. An Overview on Mechanisms

With regards to the main objective of carrying out process tracing on the progression of Irish carbon tax policy forged by the various parties, solid evidence has been found concerning both

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interventions and related mechanisms, compensation and green spending, as explained in the Theoretical Framework. Through all of these measures, carbon pricing stringency was enhanced. Some of the direct evidence gathered on the relationship between compensation and green spending, and more ambitious carbon pricing policy, are as follows. First and foremost, the Citizens Assembly sent clear policy recommendations to the Parliament indicating that their willingness to pay for higher carbon tax was contingent upon protection for the most vulnerable households who would be detrimentally impacted by the rising fuel and energy prices (fairness). Further, it was also contingent on spending all revenue from the tax increase on low carbon measures such as retrofitting homes and renewables deployment to facilitate sustainable transition (environmental effectiveness).

Deliberations on carbon tax reform in the Joint Committee largely focused how to implement the policy in a socially fair way. In the final report, an increased rate of carbon tax was recommended, and a requirement made that governments carry out a detailed analysis on fuel poverty and the distributional impact on various social groups before enforcing any increase of carbon tax. Specifically, the committee recommended that revenue recycling should primarily aim to mitigate the negative social impact of carbon pricing (through direct compensation or lump-sum transfers) and facilitate elevated level of public acceptability. Governments were charged "to ensure that all necessary steps are taken to protect those who are unable to afford increased costs caused by rising carbon pricing" (Oireachtas, 2019a, p.45).

Different interest groups made their acceptance of carbon tax reform dependent on how the revenue was used. Business associations shared their view that securing public acceptance on reform would be challenging without providing low-carbon alternatives for the public, which would require a significant investment from the government. To that end, carbon funds should be ring-fenced for developing green infrastructure (public transport especially). This view was also shared by research institutions and trade unions who further stipulated that their support for carbon tax reform was contingent upon the elimination of the negative distributional impact of an increased tax rate. Crucially, progressive NGOs, who had a deep interest in carbon tax reform, jointly invested their resources into shaping and implementing the carbon tax policies to achieve a socially just outcome. By committing 30% of the funds directly to social cushioning in the form of increasing existing welfare payments and spending on energy efficiency programs which, at least partially, targeted households at risk of energy poverty, as well as financing green infrastructure developments, the government assured that the demands of these interest groups were met.

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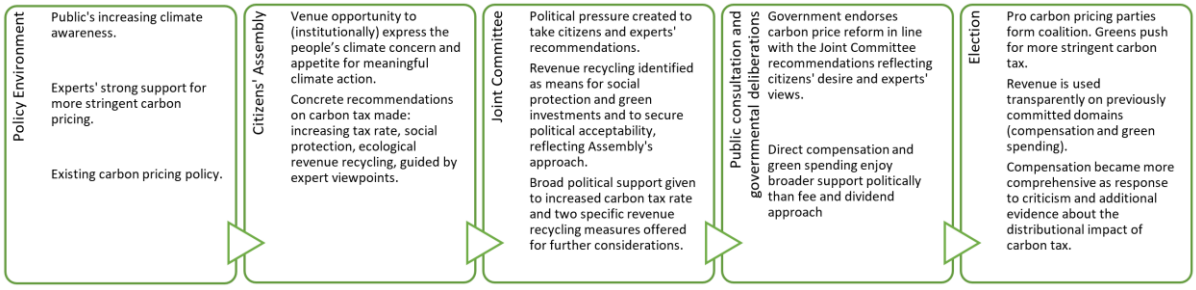
From a coalition building perspective, revenue recycling made carbon tax reform politically acceptable as well as durable through the following mechanisms. First it helped to construct a broad coalition between the centre right, big parties who endorsed the policy as an effective climate change mitigation tool, and centre left parties, who accepted carbon tax but were concerned about the regressive effect of policy. This broad coalition minimized the potential for political controversy around carbon tax reform. Secondly, compensating vulnerable households, and spending on retrofitting and green transportation helped pro-carbon pricing parties neutralize the opposition argument that carbon tax penalizes the poor without offering viable alternatives. It also prevented negative media coverage that might have resulted in sustained public attention focused on the deprivation of certain social groups and other potential sticking points, such as availability of low carbon alternatives.

Additionally, the causal relationship between revenue recycling and stringent carbon pricing was further underpinned by additional, indirect, but clear, evidence including the result of public consultation, which rejected channeling revenue into the general budget and endorsed using these funds for green spending (energy efficiency and public transport) and compensation (increasing Fuel Allowance). An overview of the causal chain on the progression of Irish carbon tax reform is provided in the following figure.

14. Figure - Causal chain of the Irish carbon tax reform.



To offer a more methodological explanation (Beach and Pedersen, 2013), distinguishable types of evidence, known as sequence evidence, account evidence and trace evidence, were able to be gathered on the causal mechanisms linking compensation and green spending to more stringent carbon pricing. Sequential evidence includes the temporal and spatial chains of events. This was represented by the clearly-traced, political progression of carbon pricing, documenting the citizens' contingent acceptance of higher carbon prices, and their explicit recommendations, and transparent communication of revenue recycling measures, prior to legislative policy changes. Account evidence encompassed the content of empirical material found in the reports written by Citizens' Assembly and Joint Committee, focusing on revenue recycling and

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political acceptability. Lastly, various types of trace evidence, including commissioned studies on distributional impact and revenue recycling, transcripts of parliamentary hearings, news articles, interviews revealing discussions on how political acceptability could be secured through revenue recycling, were gathered.

The Citizens' Assembly recommendations on carbon pricing, targeted studies, public consultation, parliamentary deliberations, and government communications on revenue recycling, specifically those mentioning its role in enhancing political acceptability, offer a relatively unique convergence. Gathered evidence strengthens our confidence in theories on how the distributional impact of carbon pricing influences public acceptability and, consequently, its stringency.

The figure below presents the results of the process tracing analysis, specifically focusing on the confirmation of causal mechanisms. Compensation was found to be a crucial condition for elevating political acceptability by changing the political discourse about policy fairness. An important addition to the literature is the finding that revenue recycling (esp. compensation which allayed concerns about regressivity) helped construct a broader political coalition behind carbon tax reform. Politically, it was significant that the Irish government specifically prioritized the Midland region for revenue recycling. This demonstrated their commitment to addressing the social impacts of the low carbon transition and helped mitigate negative political effects. Decarbonization efforts were effective in facilitating smooth policy implementation, as they allowed pro-carbon pricing parties to showcase the environmental benefits of the policy, and provided households with low carbon alternatives, enabling behavioral change. This helped address challenges posed by opposition parties. Admittedly, no evidence has been found that green spending mobilized low-carbon sectors to exert pressure on policy-makers. Nevertheless, the creation of new constituencies of interest may take more time to develop, and additional investment in emerging sectors might prove necessary.

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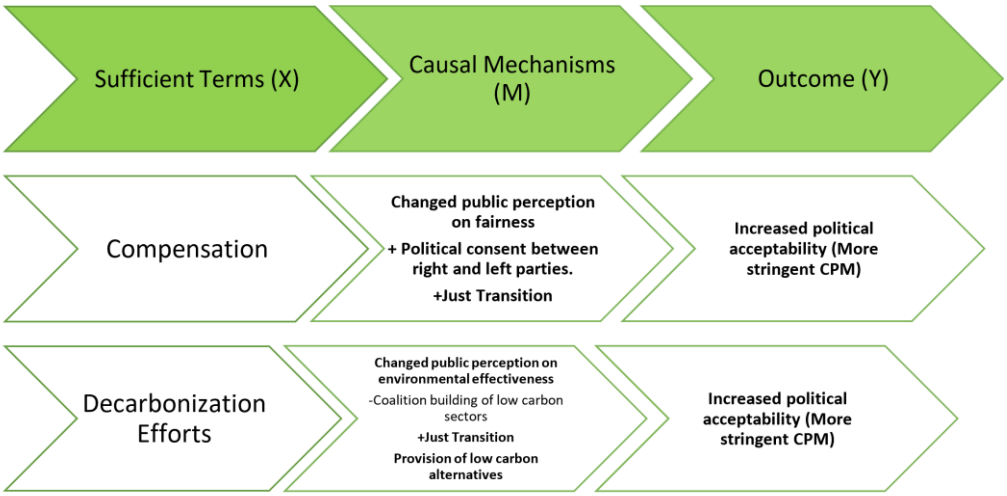
15. Figure - Presence/Absence of causal mechanisms in the Irish tax reform case.



Although, process tracing aims to analyze how theorized mechanisms manifest in a case under specific conditions, it is worthwhile to briefly compare my research findings with previous assessments in the literature about the mechanisms linking hybrid revenue recycling measures (compensation and decarbonization efforts) to enhanced political acceptability and stringency of carbon pricing. Karapin's (2020) illuminating process tracing analysis shows that the revenue-neutral design of British Colombia carbon tax, consisting of handing the entire revenue back to businesses and consumers through corporate and income tax reductions, as well as tax credits for low-income earners, helps this climate policy survive political backlash during implementation. This move strengthens its acceptance over time by securing consent from businesses and subsidizing poor households, both of which dilute public opposition to the perceived increasing inequality resulting from the implementation of the tax. Raymond's (2019) case studies offers additional insights into the causal mechanisms linking hybrid revenue recycling and stringent policy outcome. He explains how increased political legitimacy, and support for ETS implementation and reform, could be forged in California and the Northeastern states, if the US pays for tangible, pertinent public benefits from the carbon revenues. These could include subsidizing renewable energy installations for consumers, and funding zero-emissions housing for disadvantaged populations, which effectively addresses specific local conditions like pressing economic inequality. These assertions further enhance our confidence in the findings of this case study. A promising avenue for future research would be to study how successfully these mechanisms perform in distinct political economy contexts, such as areas with low economic development or rampant income inequality. Further suggestions for research are provided in the following, and final, chapter.

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Chapter 7: Conclusion[91]

This concluding chapter recalls the main argument of the dissertation and takes stock of the major findings of my multi-method research along with their policy implications. In the face of escalating climate challenges, there is an urgent need for bold, human-centric and far-reaching policies that can effectively combat global warming and secure a socially sustainable future. I hope the findings, conclusions and policy recommendations of this research will inform discussions about how climate policies, and carbon pricing mechanisms specifically, should be designed to deliver ambitious, socially just, and politically acceptable environmental objectives. The chapter ends with a discussion on the main constraints encountered in this course of study, and my suggestions for promising future research projects.

7.1. Main Argument

This dissertation focuses on the question of what explains varying levels of carbon pricing stringency across the world. Although these policies are lauded for their potential for reducing greenhouse gas emissions in a cost-effective manner, the price levels of most implemented schemes are far too low to induce transformative alterations in our fossil fuel economies or to prevent the dangerous escalation of the climate crisis. The dissertation argues that the main reason for this unambitious level of policy can be largely attributed to pressing political economy constraints, such as the negative distributional impact of carbon pricing, which is even more accentuated in domestic climate change mitigation efforts than in other policy domains.

I made significant efforts to investigate how these critical political economy constraints could be overcome and more stringent carbon pricing policies implemented. The main argument is that changing the incentive structure around carbon pricing makes the implementation of more ambitious policies politically more feasible. Specifically, I note the effectiveness of using the revenue generated by these policies to compensate adversely affected socioeconomic groups, such as low-income households and businesses exposed to international competition; invest in climate friendly programs or financing socially important and pertinent projects, such as housing in conjunction with climate policy implementation. This approach can help to garner enhanced political support for adopting higher carbon prices. To test this assumption, I compare the stringency of thirty national level policies, and create a novel, interactive theoretical

[91] This chapter includes sections from the paper 'Pathways to stringent carbon pricing: Configurations of political economy conditions and revenue recycling strategies. A comparison of thirty national level policies', published in Ecological Economics, Volume 214 (2023), available at https://doi.org/10.1016/j.ecolecon.2023.107995.

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framework analyzing how different combinations of structural political economy conditions and specific revenue recycling strategies produce stringent or lax carbon pricing outcome. The underlying assumption is that different local contexts require tailor-made policy responses, conveyed through revenue recycling measures, to mitigate and overcome political and social constraints. One important example of such a constraint is increasing regressivity in unequal societies, posed by structural conditions. To strengthen my QCA-based inferences, I conduct an in-depth case study on the Irish carbon tax reform, investigating the causal mechanisms linking revenue recycling to higher carbon prices.

7.2. Core Findings and Policy Implications

The QCA analysis detects two main pathways to stringent carbon pricing policy. The first path comprises economically highly developed countries with enabling political economy environments, low income inequality, and reduced dependence on fossil fuels in energy consumption. This result corroborates previous findings in literature about the structural conditions influencing the strength of carbon pricing (e.g., Furceri, Ganslmeier and Ostry, 2021; but also, climate policy: Lamb and Minx, 2020). More pertinently, the QCA analysis provides additional, crucial insights into a group of countries where the structural conditions discussed by Levi, Flachsland and Jakob (2020), or Dolphin, Pollitt and Newbery (2020), among others, were lacking, or less accentuated, but nevertheless produced stringent policy outcome. The comparative analysis reveals that barriers posed by one or two structural conditions (high fossil fuels dependence and/or high income inequality) can be mitigated by hybrid use of revenue, combining compensation and green spending from carbon pricing proceeds. The findings are most striking when these countries are compared to countries with similarly constrained political economy environments, but without compensation provided to citizens and firms in relation to carbon pricing policy, which results in the implementation only of low carbon prices. Therefore, the thesis provides substantial empirical evidence supporting the explanatory power of the intersectional framework and its associated hypotheses.

The main policy recommendation that can be drawn from QCA analysis is that the combination of compensation and climate investments can be a particularly effective strategy to secure political support for ambitious climate policy, even in countries that face considerable structural obstacles to their decarbonization path. The tasks of examining climate policy stringency and recommending measures to enhance it in constrained environments is particularly relevant today, because it reflects the current situation in most countries worldwide. The effectiveness

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of hybrid strategy is clearly demonstrated in the Irish case as well (see below). These cases demonstrate that a hybrid use of revenue can simultaneously serve the objectives of enhancing public acceptability, reversing negative distributional impact, and furthering climate change mitigation efforts.

Although hybrid use of revenue has been found to be the most politically effective strategy for achieving higher carbon prices, the empirical results obtained from the comparison of thirty national level carbon pricing mechanisms indicate that compensation is the most critical single measure for the implementation of ambitious policy. This finding challenges conventional wisdom in the literature asserting that green spending is the most effective revenue recycling measure to enhance public acceptability of carbon pricing (Carattini, Carvalho and Fankhauser, 2018; Maestre-Andrés, Drews and van den Bergh, 2019). While green spending might be the most popular measure, as indicated by numerous surveys and experiments, increasing stringency may entail responding to the growing need for social compensation, thereby explaining why compensation is more critical for the implementation of higher carbon prices than climate investment (Konc et al. 2022; Sommer, Mattauch and Pahle, 2022). Using the obtained results, substantial empirical evidence is provided to support theoretical claims about the relationship between enhanced carbon price level and effective redistributional policy choices. It is hoped that this evidence and the resulting conclusions can serve as an essential indicator to policy makers as to how these policies should be designed to be politically acceptable, socially tolerable, and fulfill their environmental purposes. It appears that social protections and/or preserving the competitiveness of businesses are prerequisites for stringent policy. Once these needs are effectively addressed by policymakers, significant fiscal resources can be directed towards advancing climate change mitigation efforts, aligning with the preferences of the general public and world economies.

The QCA analysis is followed by the process tracing case study on the Irish carbon tax reform to test the causal properties of theorized mechanisms linking revenue recycling to stringent carbon tax outcome. In nutshell, underlying mechanisms are confirmed in the Irish case, with the exception of the formation or strengthening of a ‘low carbon’ sector coalition advocating for increased spending on climate action. By committing most of carbon pricing proceeds to social cushioning, to compensate low-income household households for the tax increase, and to improving existing energy efficiency programs, the government is able to take the sting out of the opposition argument about the policy’s unfairness. This method specifically targets people at risk of energy poverty and populations in rural areas where low-carbon transition

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might entail economic and social disruption (Midland). Spending on decarbonization efforts meets the demands of citizens and businesses for low-carbon alternatives. Specifically, energy efficiency programs and sustainable transportation, all of which are included in the final plan, earns a clear majority in the public consultation, as the citizens and businesses' preferred use of revenue. Both programs also enable the government to showcase how targeted spending can contribute to accessible, low carbon alternatives in sectors that are most affected by carbon tax increase, an issue which was heavily debated by the opposition. Furthermore, revenue recycling helps forge a political coalition among differing parties that support carbon tax reform, as its design makes the tax acceptable to divergent ideological stances. Centre right parties are generally in favor of the policy instrument, whilst centre left parties, which were initially concerned about the regressive effect of policy change, are later reassured that the policy was implemented fairly because of its compensating low-income households.

Based on my case study and its findings, important insights may be added to the literature, to elucidate the relationship between revenue recycling and political acceptability and, in broader terms, about the public acceptability of climate change mitigation policies. In this way it could inform and enrich current policy discussions about effective policy design elements. First, collecting data on public opinions and viewpoints, as well as on how opposing political forces might frame a proposed carbon pricing reform or implementation, are essential pieces in the puzzle of developing a strategy to respond effectively to public concerns. Revenue recycling may prove an indispensable tool to directly address these concerns. It is also worthy to note that the Citizens' Assembly, as well as other deliberative forums, can be used for various purposes in the policy making process. They help to get the public involved, engaged and learning about climate policy. Crucially, policy makers can use citizens' consent as basis for legitimacy to initiate policy implementation or reform, and thus eliminate some of the contention during the political discussions about carbon tax. It is also a great forum to hear citizens' preferences concerning revenue recycling, and learn essential information, which can later be used to garner additional support.

One of the main theoretical contributions of the case study is the discovery that targeted revenue recycling brings parties with diverse ideological backgrounds, together, and finds common ground in the implementation of carbon tax. Spending carbon revenue on causes which enjoy bipartisan support, can solidify support for carbon tax, even in politically polarized contexts. For example, Amdur, Rabe and Borick (2014) find that a majority of Democrats, Republicans and Independents in the US all supported carbon tax implementation when the proceeds were

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used for clean energy development. This is the case despite an initial 32% gap between the Democrats (at 47%) and the Republicans (at only 15%), when surveyed before the proposed 'green' revenue recycling measure. Nowlin, Gupta and Ripberger (2020) also come to the conclusion that revenue recycling might be necessary in the US to build political coalitions behind specific carbon tax policies. Especially effective can be proposing revenue recycling measures that are priorities for Republican voters, demonstrated by the fact that the measures increased carbon tax support significantly among Republicans, as compared to the Democrats, who were likely to support carbon pricing without revenue recycling.

Also, there is evidence in the literature that green spending through providing discerning environmental benefits, may improve people's perception about the effectiveness of carbon pricing policy. However, politically speaking, what has been made most clear through this analysis is that an increased availability of low carbon alternatives, facilitated by revenue recycling, proved to be pivotal in avoiding the perception of carbon tax as a punitive measure. As the costs of climate action may increase substantially in the upcoming years and decades, availability of low carbon alternatives will likely gain increasing financial significance and political attention.

One of the challenges of climate mitigation is that benefits are diffuse, while costs are concentrated and concrete, which breeds resistance from those who have to pay the bill (Jenkins, 2019). That is why people who lose their jobs or experience a sudden drop in their living standards during a sustainable transition, must be properly compensated to avoid social disruption and political resistance (see Lübke, 2021 for information about how these vulnerable groups may turn against ambitious climate policies for existential reasons). In the case of the Midlands, using revenue from carbon tax to compensate families in that area is proven to be a politically smart idea; it shows solidarity and gives the impression that the government cares. Prioritizing aid for vulnerable groups in fossil fuel dependent regions is socially responsible, to avoid different forms of social disruption such as increasing unemployment and desolation. This being said, the aid can also be a political necessity to ensure public commitment to mitigation efforts by avoiding an escalation of discontent.

By committing the increasing revenue pot to popular climate measures, there is less chance of the government being forced to backtrack on ambitious carbon tax. This is simply because political parties fighting for abolition of the tax would need to respond to the ever-increasing need for funding for retrofitting, development of low carbon infrastructure (e.g., bikeways, EV charging stations) and just transition. If all of these growing imperatives are (partly) financed

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by carbon tax proceeds, the termination of these policies would involve some politically very sensitive decisions. Since the price increase trajectory was put into a bill, it has thwarted political attacks to abolish it, because it does not require the same coalition building process, nor trigger a possible political fallout each time a decision has to be made on increasing the tax rate. On the negative side, the fact that carbon tax automatically increases each year, gives opportunity to opposing parties to annually renew their attacks on the tax. This can have political consequences, particularly in changing political environments, such as the current cost-of-living crisis.

Although the increasing revenue spent on mitigation efforts is a welcome development from a climate point of view, there appears to be a trade-off between the incremental annual price increase and the environmental effectiveness of carbon tax. First, the envisioned 100 Euro/t CO_2 carbon tax, to be achieved by 2030, lags behind the price trajectory needed to meet 2030 climate targets (CCAC, 2020; 2021). While the relatively insubstantial annual price changes ensure political acceptability for carbon taxes, the major fear is that people will absorb the incremental price increase and will not act upon that incentive, by changing their environmentally harmful behaviors. Since the price of motor fuels might fluctuate weekly, the impact of carbon taxes on these prices is marginal and may not be significant enough to influence consumer behavior. Similarly, the decision to increase prices for heating fuels after the winter might be politically more acceptable, as people will feel it less because their heating bills generally go down in spring, however, it can also delay the incentive to change behavior.

Another important policy lesson learned from the Irish carbon tax reform is that a careful analysis of the distributional impacts enables more effective, targeted compensatory measures. This not only preserves the welfare of vulnerable groups but enables the government to give evidence-based responses to political and media attacks on carbon pricing. In this context, publishing the results of such an analysis along with corresponding compensatory measures, as it is done in Ireland each year on budget day, is very helpful for political concordance and acquiescence.

With regards to social cushioning measures, making compensation more comprehensive in 2020 by including social groups, such as the elderly and poor families—who were also adversely affected and had limited financial means to invest in low carbon alternatives—is a welcome development from a fairness point of view. However, these measures still exclude some people who are disproportionately affected by carbon tax and also experience financial hardship, such as people in precariat employment (the ‘working poor,” e.g., those holding part

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time and/or low-wage jobs), as demonstrated by Interviews #1, #2, and #7. This segment of society is likely to pay the tax, but unlikely to be compensated. They stand to benefit the least from available grants, as they are not entitled to free retrofitting, and also cannot afford to make upfront payments and investments that might be partially refunded by the government. However, instead of creating a patchy compensation structure around carbon tax, to find solutions for each social group (e.g., people in rented homes), a broader, income-based compensation strategy, which is partly financed by increasing carbon revenue, might be more suitable and efficient to protect low-income households during accelerated energy transitions.

The second key aspect that relates to public acceptability for carbon tax, which should be considered by the political elite, is the growing negative sentiment around the increasing climate action gap between citizens and corporations. Six interviewees mentioned that there is a growing number of people who feel that individuals bear the brunt of climate change mitigation efforts, while the government exempts big, polluting corporations and sectors, such as aviation and agriculture, an exemption which can erode strong public support for climate action. A tax on the profits of the fossil fuel industry and related sectors, such as plastics, as recommended by some in Ireland, could be an option for sharing the tax burden more equally, since it is harder to pass on to consumers (Interview #1). This tax could also engender the positive perception of citizens, especially since oil companies have recently made record high profits in the wake of the war in Ukraine. Another obvious candidate for easing the burden would be the reformation of fossil fuels subsidies, including lower, distorted excise taxes on diesel, which costs the state more than 2 billion EUR annually, four times more than what carbon tax generates (CSO, 2022a). These subsidies represent generous transfers made to polluting sectors, especially agriculture and transport, the two biggest emitting sectors in Ireland. Removing these subsidies (except for a fuel allowance to tackle energy poverty) would have negligible macroeconomic and welfare effects, but it could considerably reduce emissions and align the action with positive public perception (De Bruin, Monaghan and Yakut, 2019). Opposition to reform by these formidable sectors might be mitigated, and their sustainable transition accelerated, by keeping their transfers in place within the same sectors, on the condition of using these funds (previous subsidies) towards green investment.

One may find it a radical idea, but there is a strong argument, based around the elimination of economic distortions and maintaining a steady incentive structure for emissions reduction, to partially or fully replace existing excise taxes with a carbon tax on fossil fuels. This change

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could make the carbon tax corrective by detaching it, to a certain extent, from actual fossil fuel prices (Interview #7).

7.3. Limitations and Recommendations for Future Research

There are numerous avenues for further research that can go beyond the limitations of this study and provide additional insights into the relationship between revenue recycling and carbon pricing stringency. First, important theoretical lessons can be gained by breaking down the broad revenue recycling categories used in this research (e.g., Compensation) into more specific measures (Bourgeois, Giraudet and Quirion, 2021). Green spending and/or compensatory schemes targeting different socioeconomic groups can be examined, such as low-income households and energy-intensive industries, to assess whether these different approaches lead to different outcomes. For instance, the support-increasing effect of compensation might be different if provided in the form of tax breaks which, in general, tend to be regressive (Fremstad and Paul 2019; Murray and Rivers 2015). Although, it is demonstrated that the most effective political strategy for stringent carbon pricing is a hybrid use of revenue, it is, however, worth noting that, if revenues are used for more than one goal (e.g., compensating low-income households), complexity increases, and transparency decreases, which may affect public support negatively. In this respect, France would be a suitable case study to analyze the effect of hybrid revenue use on public support since its spending priorities changed relatively frequently between 2016 and 2020.

One of the interviewees (#12) from the Irish survey argues that what the current energy crisis (developed in wake of the war in Ukraine), demonstrates is that the social tolerance for a steep price increase for basic goods might be much higher than previously thought, if the negative effects are considerably offset by careful social cushioning. For the sake of comparison, the natural gas price hikes in the summer of 2022 caused by the war were equivalent to an approximately 700 EUR/tCO_2 carbon price (currently set at 48.5 EUR). The environmental effect was clear, as natural gas consumption across Europe reduced by 20% between August 2022, and January 2023 (Eurostat, 2023). Therefore, there might be a place for higher carbon prices if they are accompanied by enhanced social welfare and further climate mitigation measures to protect vulnerable households, as well as to accelerate energy transition. However, one may argue that the immediate social tolerance for skyrocketing energy prices is exceptional and cannot be compared to "normal times." It is also worthy to note that the government decided to give 200 Euros to each household on three occasions to help with increased prices, thus

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basically implementing a fee and dividend model in Ireland. It would be a theoretically interesting study to analyze the development of public perception in this case as compared to carbon tax reform, where targeted social transfers are proven to be superior. One could hypothesize that carbon dividends become politically more appealing at significantly higher tax prices, a theoretical argument also put forward by The Greens during carbon tax reform.

Even though the programme for the government in Ireland promised that the government would legally earmark carbon pricing revenue, it did not happen. There was a strong political commitment and communication around the use of revenue, but it was not legislated. Numerous interviewees see this as highly problematic, and they argue that, in these times, when trust in politicians is generally low, a broken promise can erode support for the carbon tax. However, lack of legal earmarking has the benefit of allowing the government flexibility to direct funds towards measures which enjoy public preference, and yet, might alter over time, depending on changing socioeconomic contexts. So, this flexibility may actually help reinforce the acceptance of carbon tax in the longer term. It appears, there is a tradeoff between flexibility and trust, and the political gains extracted from them may keep changing over time. In any case, this dilemma begs for more attention, since trust in institutions appears to be limited, even slowly diminishing, while need for flexibility is increasing in a world of increasing complexity (Homer-Dixon, 2011).

Lastly, insufficient empirical evidence is found to decisively conclude the extent to which the use of revenue to address social needs (HSO in the QCA analysis) influences stringency. There are only three countries that use this strategy. Colombia spends carbon revenue on a special fund that supports the peace process and development of post-conflict areas, but its carbon price rate is very low. In contrast, Norway and Estonia spend on different social objectives (channeling revenue into the national pension fund and supporting social and employment policies, respectively) while also managing to implement higher carbon prices. However, it is not clear exactly how much their social spending contributes to enhancing political acceptability (or if it does at all). Norway also uses other forms of revenue recycling; and we do not know how this specific spending in Estonia was perceived by local communities, since the success of such a recycling strategy is presumably contingent on local needs. They, nevertheless, demonstrate that this is an interesting avenue for future studies (including both national and sub-national CPMs), especially if we consider that carbon revenue that is projected to grow considerably on a global scale in the near future. Indeed, carbon revenues may well be used to

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address the economic and social repercussions caused by the recent Covid pandemic in times of climate emergency.

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Appendix A - QCA Results

Calibration Diagnostics

Skewness

[1] "Set HED - Cases > 0.5 / Total number of cases: 23 / 30 = 76.67 %"

[2] "Set LII - Cases > 0.5 / Total number of cases: 13 / 30 = 43.33 %"

[3] "Set LFD - Cases > 0.5 / Total number of cases: 16 / 30 = 53.33 %"

[4] "Set HCO - Cases > 0.5 / Total number of cases: 8 / 30 = 26.67 %"

[5] "Set HDE - Cases > 0.5 / Total number of cases: 14 / 30 = 46.67 %"

[6] "Set HSO - Cases > 0.5 / Total number of cases: 3 / 30 = 10 %"

[7] "Set HS - Cases > 0.5 / Total number of cases: 12 / 30 = 40 %

Ambiguity (cases on crossover point)

There are no ambiguous cases.

Analysis of Necessity for Stringency

Single Conditions

	Consistency	Coverage	Relevance of Necessity (RoN)
HED	0.983	0.574	0.460
LII	0.713	0.775	0.872
LFD	0.717	0.657	0.769
HCO	0.541	0.813	0.931
HDE	0.654	0.614	0.755
HSO	0.196	0.672	0.955
~HED	0.124	0.199	0.774
~LII	0.570	0.403	0.521
~LFD	0.441	0.354	0.575
~HCO	0.571	0.342	0.377
~HDE	0.466	0.367	0.570
~HSO	0.874	0.427	0.200

SUIN Conditions

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	Consistency	RoN	Coverage
LII + LFD + HCO	0.915	0.630	0.635

Analysis of Necessity for the Negated Outcome (Not-Stringent)

Single Conditions

	Consistency	Coverage	RoN
HED	0.626	0.489	0.416
LII	0.367	0.533	0.767
LFD	0.397	0.487	0.690
HCO	0.177	0.356	0.796
HDE	0.398	0.499	0.704
HSO	0.124	0.568	0.942
~HED	0.453	0.973	0.990
~LII	0.845	0.798	0.763
~LFD	0.720	0.772	0.794
~HCO	**0.907**	**0.725**	**0.592**
~HDE	0.692	0.728	0.755
~HSO	0.928	0.607	0.267

SUIN Conditions

	Consistency	RoN	Coverage
1 ~HCO	0.907	0.592	0.725
2 ~HED + ~LII	0.918	0.742	0.811
3 ~LII + ~LFD	0.924	0.592	0.733
4 ~LII + ~HDE	0.943	0.534	0.716

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Analysis of Sufficiency for Stringency

Truth Table Stringency

	HED	LII	LFD	HCO	HDE	HSO	OUT	n	incl	PRI	cases
61	1	1	1	1	0	0	1	2	0.991	0.984	Finland,Sweden
58	1	1	1	0	0	1	1	1	0.975	0.959	Norway
47	1	0	1	1	1	0	1	2	0.961	0.923	Portugal,Switzerland
55	1	1	0	1	1	0	1	1	0.956	0.882	Ireland
63	1	1	1	1	1	0	1	2	0.930	0.858	Denmark,France
59	1	1	1	0	1	0	1	2	0.924	0.853	Germany,Slovenia
57	1	1	1	0	0	0	1	1	0.907	0.839	Iceland
39	1	0	0	1	1	0	1	1	0.902	0.752	Luxembourg
36	1	0	0	0	1	1	1	1	0.844	0.713	Estonia
51	1	1	0	0	1	0	0	1	0.841	0.625	Poland
49	1	1	0	0	0	0	0	1	0.736	0.232	Netherlands
43	1	0	1	0	1	0	0	2	0.718	0.517	Latvia,Spain
35	1	0	0	0	1	0	0	2	0.562	0.284	Japan,Singapore
41	1	0	1	0	0	0	0	2	0.559	0.300	Chile,New Zealand
33	1	0	0	0	0	0	0	2	0.419	0.059	Korea,United Kingdom
25	0	1	1	0	0	0	0	1	0.364	0.038	Ukraine
17	0	1	0	0	0	0	0	1	0.337	0.111	Kazakhstan
10	0	0	1	0	0	1	0	1	0.336	0.035	Colombia
1	0	0	0	0	0	0	0	4	0.128	0.032	Argentina,China,Mexico,South Africa
2	0	0	0	0	0	1	?	0			
3	0	0	0	0	1	0	?	0			

OUT: output value
n: number of cases in configuration
incl: sufficiency inclusion score
PRI: proportional reduction in inconsistency

Enhanced Intermediate Solution

HED*LII*LFD + HED*HCO*HDE + HED*~LFD*HDE*HSO -> HS

Sufficiency Paths	**inclS**	**PRI**	**covS**	**covU**	**Cases**
HED*LII*LFD	0.910	0.863	0.550	0.279	Iceland, Norway, Germany, Slovenia, Finland, Sweden, Denmark, France
HED*HCO*HDE	0.841	0.731	0.413	0.124	Luxembourg, Portugal, Switzerland, Ireland; Denmark, France
HED*~LFD*HDE*HSO	0.852	0.724	0.121	0.045	Estonia
	0.868	0.810	0.737		

inclS: sufficiency inclusion score
PRI: proportional reduction in inconsistency
covS: raw coverage
covU: unique coverage

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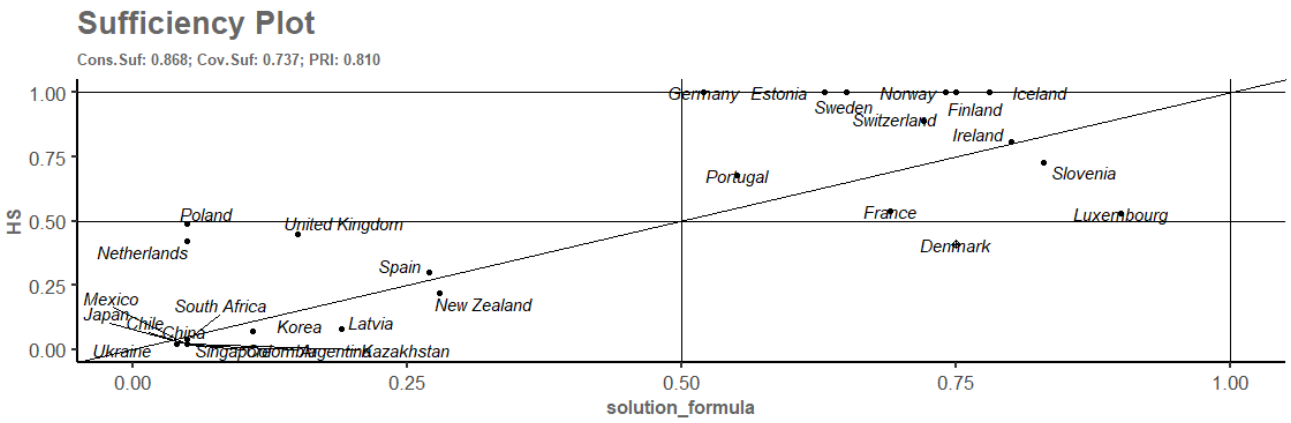
Sufficiency Plot



Analysis of Sufficiency for the Negated Outcome (Not-Stringent)

Truth Table for the Negated Outcome

	HED	LII	LFD	HCO	HDE	HSO	OUT	n	incl	PRI	cases
10	0	0	1	0	0	1	1	1	0.976	0.965	Colombia
25	0	1	1	0	0	0	1	1	0.975	0.962	Ukraine
1	0	0	0	0	0	0	1	4	0.972	0.968	Argentina,China,Mexico,South Africa
33	1	0	0	0	0	0	1	2	0.964	0.941	Korea,United Kingdom
49	1	1	0	0	0	0	1	1	0.920	0.768	Netherlands
17	0	1	0	0	0	0	1	1	0.917	0.889	Kazakhstan
35	1	0	0	0	1	0	1	2	0.826	0.716	Japan,Singapore
41	1	0	1	0	0	0	1	2	0.811	0.700	Chile,New Zealand
51	1	1	0	0	1	0	1	1	0.715	0.326	Poland
43	1	0	1	0	1	0	1	2	0.698	0.483	Latvia,Spain
39	1	0	0	1	1	0	0	1	0.683	0.198	Luxembourg
55	1	1	0	1	1	0	0	1	0.673	0.118	Ireland
36	1	0	0	0	1	1	0	1	0.613	0.287	Estonia
63	1	1	1	1	1	0	0	2	0.571	0.126	Denmark,France
47	1	0	1	1	1	0	0	2	0.532	0.077	Portugal,Switzerland
59	1	1	1	0	1	0	0	2	0.531	0.090	Germany,Slovenia
57	1	1	1	0	0	0	0	1	0.514	0.161	Iceland
58	1	1	1	0	0	1	0	1	0.421	0.041	Norway
61	1	1	1	1	0	0	0	2	0.410	0.016	Finland,Sweden
2	0	0	0	0	0	1	?	0			
3	0	0	0	0	1	0	?	0			

OUT: output value
n: number of cases in configuration
incl: sufficiency inclusion score
PRI: proportional reduction in inconsistency

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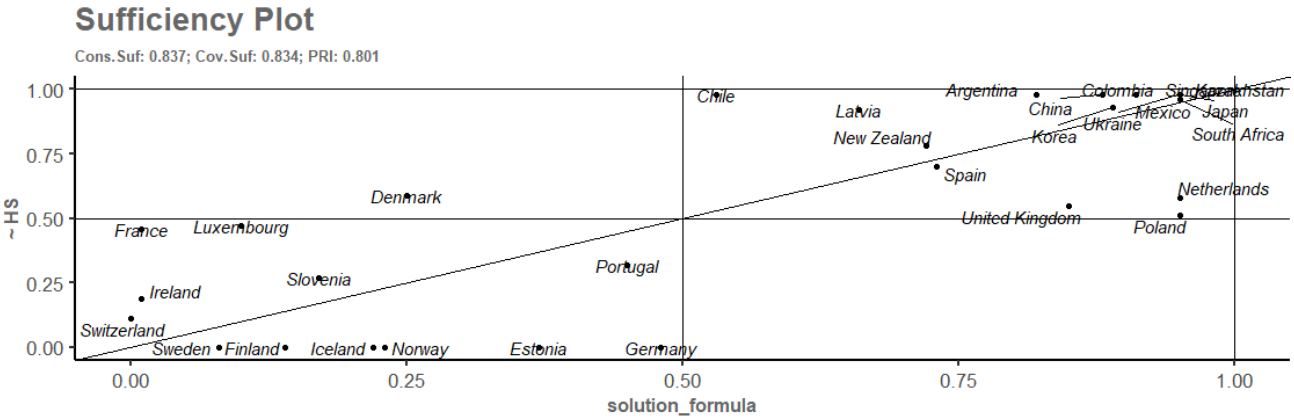
Enhanced Intermediate Solution

Model Ambiguity

1. ~LFD*~HCO*~HSO + ~HED*~LII*~HCO*~HDE + ~HED*~HCO*~HDE*~HSO + HED*~LII*~HCO*~HSO -> ~HS
2. ~LII*~HCO*~HSO + ~LFD*~HCO*~HSO + ~HED*~LII*~HCO*~HDE + ~HED*~HCO*~HDE*~HSO -> ~HS

Sufficiency Paths	**inclS**	**PRI**	**covS**	**covU**	**Cases**
~LFD*~HCO*~HSO	0.869	0.832	0.665	0.064	Argentina, China, Mexico, South Africa, Kazakhstan, Korea, United Kingdom, Japan, Singapore, Netherlands, Poland
~HED*~LII*~HCO*~HDE	0.976	0.974	0.332	0.053	Argentina, China, Mexico, South Africa, Colombia
~HED*~HCO*~HDE*~HSO	0.977	0.975	0.349	0.035	Argentina, China, Mexico, South Africa, Kazakhstan, Ukraine
HED*~LII*~HCO*~HSO	0.813	0.738	0.492	0.081	Korea, United Kingdom, Japan, Singapore, Chile, New Zealand, Latvia, Spain
	0.845	0.812	0.835		

Sufficiency plot



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Theory Evaluation

	Cons.Suf	Cov.Suf	PRI
HED*LII*LFD	0.910	0.550	0.863
HED*HCO*HDE	0.841	0.413	0.731
HED*~LFD*HDE*HSO	0.852	0.121	0.724
Sol.Formula	0.868	0.737	0.810
Theory	0.894	0.484	0.815
T*S	0.895	0.484	0.817
~T*S	0.935	0.607	0.896
T*~S	0.918	0.313	0.832
~T*~S	0.311	0.463	0.146

Cases

Covered Most Likely (T*S and Y > 0.5) :

Boolean Expression: HCO*HDE*HED*LFD + HCO*HDE*HED*LII + HDE*HED*HSO*LII + HDE*HED*LFD*LII

Cases in the intersection/Total number of cases: 6 / 30 = 20 %

Cases in the intersection/Total number of cases Y > 0.5: 6 / 12 = 50 %

Case Names:

France Germany Ireland Portugal Slovenia Switzerland

Covered Least Likely (~T*S and Y > 0.5) :

Boolean Expression: ~HDE*HED*LFD*LII + HCO*HDE*HED*~LFD*~LII + HDE*HED*HSO*~LFD*~LII

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Cases in the intersection/Total number of cases: 6 / 30 = 20 %

Cases in the intersection/Total number of cases Y > 0.5: 6 / 12 = 50 %

Case Names:

Estonia Finland Iceland Luxembourg Norway Sweden

SMMR

Typical Cases - Focal Conjunct HCO :

	Focal Conjunct	Outcome	CC_Min	Term	Rank	CleanCorr	FC<=Y	UniqCov	Best	MostTypFC
Portugal	0.55	0.68	0.77	0.55	1	TRUE	TRUE	TRUE	0.71	FALSE
Switzerland	1.00	0.89	0.72	0.72	2	TRUE	FALSE	TRUE	0.50	TRUE
Ireland	0.99	0.81	0.80	0.80	2	TRUE	FALSE	TRUE	0.56	FALSE

Typical Cases - Focal Conjunct HDE :

	Focal Conjunct	Outcome	CC_Min	Term	Rank	CleanCorr	FC<=Y	UniqCov	Best	MostTypFC
Ireland	0.8	0.81	0.99	0.80	1	TRUE	TRUE	TRUE	0.22	TRUE
Switzerland	0.72	0.89	1.00	0.72	1	TRUE	TRUE	TRUE	0.62	FALSE
Portugal	0.99	0.68	0.55	0.55	2	TRUE	FALSE	TRUE	07.jan	FALSE

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Appendix B – Irish Carbon Tax Reform

The following pages provide additional information about the interview research method, as well as supplementary data for the process tracing case study. They include the interview questions, background information of the interviewees, and the informed consent form, which was shared with and signed by research participants before the interview. Furthermore, this Appendix provides supplementary information about the policy landscape, including the structural political economy conditions of Ireland, as well as the climate policy framework. This information paints the backdrop in which the carbon tax reform developed, and outlines the carbon pricing system in the country, as well as policy deliberations in subsequent stages of policy making.

Interview Questions

- Can you tell me about how the carbon tax reform was initiated, and how you came to get involved?
- What was your position on carbon tax reform? Did you support or reject increasing the tax rate, and why? If you supported the increase, was your support contingent upon certain conditions, such as a minimum stringency, exemptions for certain groups, etc.? Did you have any reservations?
- How important to you was the way in which revenue would be allocated/ringfenced when you developed your position towards tax reform? What was your preference (priority) for revenue recycling? Why?
- After the Joint Committee published its final report, Climate Change: A Cross-Party Consensus for Action, it seemed there were two alternative proposals on revenue recycling: a fee and dividend approach, and hybrid use of revenue, combining compensatory measures for vulnerable groups and green spending. What do you think led to the implementation of the latter proposal?
- What were the main reasons that the government supported carbon tax reform?
- How popular has been carbon tax in Ireland for the public?
- What was the reaction from the public and major interest groups after the announcement of the carbon tax increase in October, 2019? Are you aware of any discontent or expressed dissatisfaction?
- Do you think revenue recycling had any effects on public support for carbon tax reform? Please explain.
- Do you think the announcement of the carbon tax reform influenced the outcome of the general elections in 2020? Was it a determining factor for voters?
- How do you think the outcome of the elections may have affected the trajectory or further development or application of carbon tax in terms of increasing its price level or in any other way? The decision on revenue recycling changed in 2020, making compensatory

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mechanisms more comprehensive. What do you think made the government implement these changes?

- Looking forward, where do you see carbon pricing going in Ireland's future?
- I thank you again for your valuable input. Is there anything more you might like to add on the topic of revenue recycling and carbon tax reform?

Before I leave Dublin, are there any other people I need to talk with in order to get the full story? Do you mind if I mention you as a reference with any of those other people? (or, The purpose of my research trip to Dublin has been to gather information such as this. Thank you so much for your time and answers! I wonder if you know any further people who I might interview to gain further insight into this matter? If I am fortunate enough to contact one of your associates, may I use your name as a reference?)

Interviewees

	Sector	**Date and location**
Interview 1	Politician (Elected TD)	January 30, Dublin
Interview 2	Civil Society	January 31, Dublin
Interview 3	Politician (Seanad)	February 1, Dublin
Interview 4	Civil Servant	February 1, Dublin
Interview 5	Civil Servant	February 1, Dublin
Interview 6	Civil Servant	February 1, Dublin
Interview 7	Politician (Elected TD)	February 2, Dublin
Interview 8	Civil Society	February 2, Dublin
Interview 9	Politician (Elected TD)	Written response
Interview 10	Climate Policy Advisor	February 2, online
Interview 11	Climate Policy Advisor	February 8, online
Interview 12	Civil Society	February 17, online
Interview 13	Civil Society	March 8, online

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Interview 14	Civil Society	March 6, online
Interview 15	Climate Policy Advisor	March 22, online
Interview 16	Climate Policy Advisor	March 24, online

Informed Consent Form

Research project title: The Irish Carbon Tax Reform; Revenue Recycling and Climate Policy Stringency

Research investigator: Daniel Muth, PhD candidate in Political Science at Central European University

- The main purpose of the interviews for this project is to gather information and data relating to the recent Irish carbon tax reform (2017-2020). The participants chosen are legislators, bureaucrats, policy advisors, academics directly involved in the policy-making process, and experts who closely followed the development of the reform.
- During the interview, I would like to discuss the following topics: the initiation of carbon tax reform; public support for carbon tax; implemented revenue recycling strategies, and the political effects of carbon tax.
- This interview is part of an academic research project. Please be assured that anything we discuss will be used solely for academic purposes; nothing will appear in any popular or journalistic outlet. Information gathered through our interview may be used in my doctoral dissertation, research- and policy papers.
- All participants in the data collection process shall remain anonymous. I will neither use your name, nor identify you in any way, in produced academic works. Therefore, I will not associate your remarks or quotes with your position or any other affiliations you might have. Moreover, I commit that I will not convey your comments to any other people I might interview.
- If you permit our interview to be recorded, it will be for my own note-taking purposes. The recording shall not be released, distributed, or used by any other person not directly involved in this project.
- Any information you deem to be "off the record" will be strictly treated as such, and not used in this research.
- The interview will take approximately 30-45 minutes.
- Your participation is voluntary and deeply appreciated. It would not be possible to do a thorough and honest research of this kind without first-hand documentation. I do not anticipate that there are any risks associated with your participation, but please be informed that you have the right to stop the interview at any time. In this event, I will not collect any more data from you, and, upon your request, I shall delete data already collected.
- If you have any questions about this project, please contact me at any time. If you have any concerns or complaints about this project, please contact Central European

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University, Quellenstraße 51, 1100 Vienna, Austria or the University's Ethical Research Committee (https://www.ceu.edu/administration/committees/ethical-research).

Thank you for your help in this important research project.

I confirm that I have read and understood the information above and I have had the opportunity to ask questions about the project.

Name of Participant: **Signature:**

Date:

Name of Researcher: **Signature:**

Date:

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Policy Context

The policy context analysis is built up in the following way. Firstly, I present the background of the policy and the political economy environment from which carbon pricing emerged and was developed in the Republic of Ireland (Ireland henceforth). The presentation addresses the structural conditions, economic development, income inequality and fossil fuel dependence that were identified and discussed in the previous chapters. Discussion of the structural context is followed by elucidating the national climate plans and strategies of Ireland, to help the reader understand the specific, accentuated role carbon pricing plays in realizing Irelands' climate objectives.

Structural Conditions

Economic Development

The Republic of Ireland is a highly developed, small, open economy that also ranks very high on various aspects of the human development index (UNDP, 2020). By Western European standards, the country transformed from a relatively poor country in the early 1990s to a wealthy one by the mid-2000s, after experiencing a high level of continued growth, mainly fueled by increasing foreign direct investments, a period which has become widely known as the era of the Celtic Tiger. Positive trends that were suddenly terminated by the Great Recession in 2008 and 2009, which hit Ireland particularly hard, resulted in various social calamities, such as rising unemployment and public sector indebtedness and eventually led to the financial rescue and economic adjustment program from 'Troika'[92] (Whelan, 2014). By the mid-2010s, the country's economic performance was restored and continues on an upward journey. The Irish economy is characterized by robust service sectors (e.g., IT and medical services), relatively light, but high value-added, industrial base and a historically strong agricultural sector (e.g., ruminant livestock and beverages) whose contribution to the GDP is limited (1%), but which employs 7% of the workforce and generates approximately 10% of total exports (OECD, 2021b).

The country has a population of nearly 5 million and 40% of the people live in the Greater Dublin Area. However, more than 30% of the population lives in rural areas (Central Statistics of Ireland, 2019) and 90% of the country is predominantly rural (OECD, 2021b).

[92] Troika refers to the trio of IMF, the European Central Bank and the European Commission involved in the financial rescue and economic adjustment programs for Ireland.

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Income Inequality

By using traditional indicators for measuring income inequality, Ireland performs modestly well. Their Gini coefficient remained basically unchanged between 2010 and 2018 and stabilized around the rate of 0.29 but, since 2019, income inequality in the country has been reduced (Central Statistics Office of Ireland, 2022b; Eurostat, 2022a). Other indicators (Palma, Interdecile 90/10, S80/20) all show roughly EU average rates (OECD, 2022), as does the percentage of the population at risk of poverty or social exclusion (around 20%) (Eurostat, 2022b). There is one indicator, market income inequality, where Ireland is a stark outlier. Market income inequality refers to income inequality before taxes are paid on gross income (earnings from market and capital income) and state transfers received. The huge difference between disposable income and market income can be explained by the larger role the Irish state plays in redistributing wealth through progressive taxation and welfare measures (Sweeney, 2019). Other remarkable facets of inequality include the highly disadvantaged positions of single parents (women) and young adults in the labor market, and the statistic that regional disparities are significant in the country and continue to rise (IMF, 2022; Roantree et al., 2021).

GHG Emissions Profile

Ireland has a deviant GHG emission profile compared to other advanced countries (OECD, 2021b). The main reason for this discrepancy is the unusually high emissions from the agricultural sector, responsible for approximately 35% of total emissions, which is in stark contrast to the EU average of 12.4% (Government of Ireland (GOI), 2021b, p. 159-160), and heavy dependence on fossil fuels in energy generation.[93] Emissions per capita became the second highest in the EU by 2020, reaching 57% higher than EU-average (Eurostat, 2022c). Since 2010, the country has made considerable progress in reducing the carbon intensity of the economy by doubling the share of renewable sources in the energy mix (esp. wind) and partially switching from coal and oil to natural gas. Nevertheless, significant challenges remain to decarbonize their persistently high-emission transportation, and the residential sector, which uses the highest share of fossil fuels (coal, peat, oil) in heating homes among European OECD countries (OECD, 2021b). The following figure captures Ireland's excessive GHG emissions profile in the non-ETS sectors in comparison to EU countries (more on this below).

[93] Both electricity generation and heating. Production of and use of peat, a very carbon intense fuel which is also able to store significant amount of carbon, is particularly high (OECD, 2021b).

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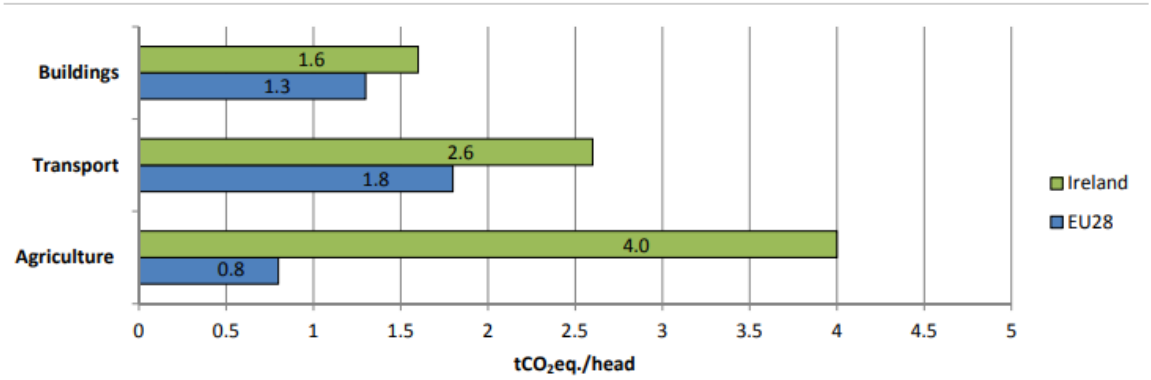
16. Figure - Emissions per capita (tCO2equivalvent) in Ireland's non-ETS sectors compared to the EU, 2016.



Source: reprinted from GOI, 2019a, p. 20.

Analyzing the development of GHG emissions since 1990, we can make the following observations. Total emissions increased steadily between 1990 and 2000 and then leveled off at around 70MtCO2eq., until the time of the Great Recession. In the wake of the recession, emissions decreased until 2011, at which time emissions started to again increase driven by the economic recovery, particularly in key emitting sectors: agriculture and transportation (GOI, 2019a). Importantly, emissions closely and persistently followed economic performance in Ireland, wherein lies the challenge of decarbonizing the economy in the upcoming decades, especially in the period leading up to 2030 when major emissions reduction (51%) is envisaged by the government on the country's path to becoming climate neutral by 2050 (GOI, 2021b). By 2021, the contribution of transportation to overall emissions had doubled since 1990, explained by increased economic activity and the country's scattered residential settlements and low population density making road transport the primary mode of travel. As mentioned, apart from agriculture (37.5%), the biggest emitting sectors are transportation (17.7%), energy industries sectors (16.7%) and the residential sector (11.4%) (Environmental Protection Agency (EPA), 2022a). The GHG emissions trend and sectoral contribution in Ireland is shown by the following figure.

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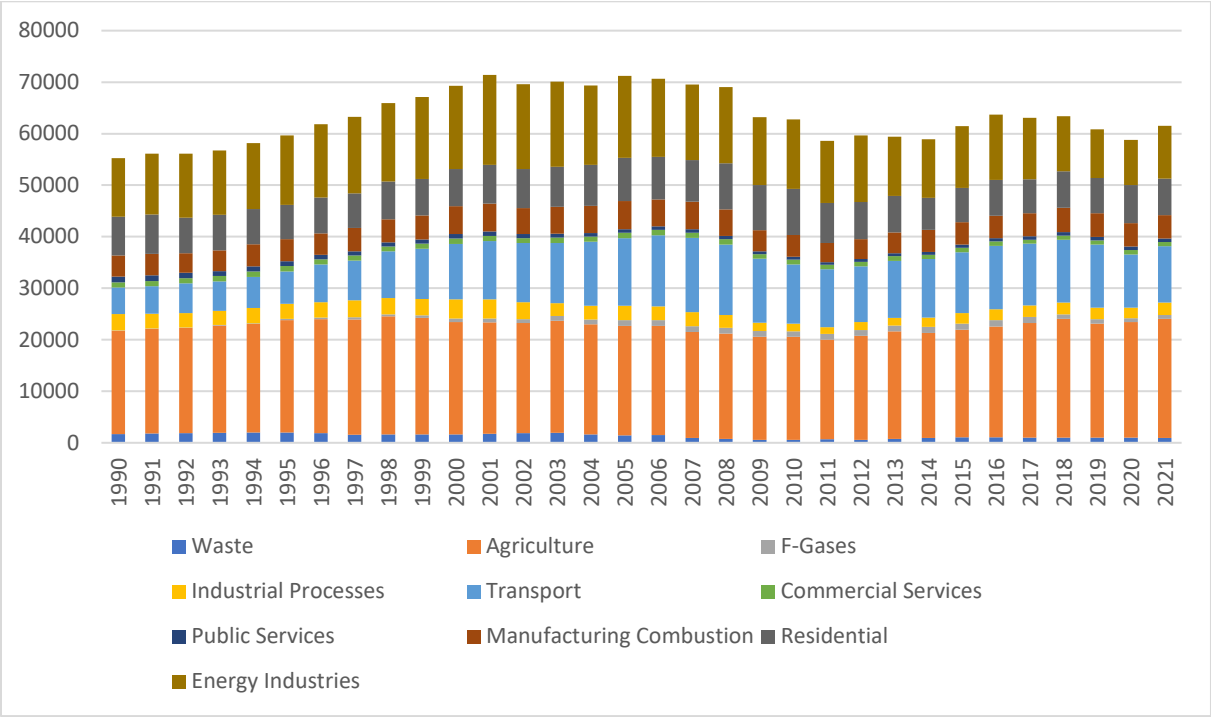
17. Figure - Ireland's CO2 emissions between 1990 and 2021 (kg CO2).



Own formatting. Data source: Environmental Protection Agency (2022a)

Climate Policy Development and Framework

Climate policy development has been an intense process in Ireland since 2015. Irish governments have demonstrated an increasing commitment towards more stringent, domestic, EU and international climate objectives, strongly leaning on cross-party support in key issues, and the public's increasing environmental concern and appetite for taking meaningful action. These commitments have been reflected by an increasingly ambitious trajectory of national pledges embodied in statutory laws, policy plans, budgetary commitments and governmental communication as well. However, their development process has also been characterized by crucially missing emissions reduction targets in key non-ETS sectors and insufficiently specifying paths of decarbonizing the economy, demonstrating a challenging road ahead for meaningful abatement efforts. Ireland has often been labeled as a "climate laggard," despite its growing aspirations for better environmental policy, primarily due to its persistent high emissions (Torney, 2020) The following brief overview guides the reader through the recent climate policy development process over the examined time period of this research in a chronological order.

The National Policy Position on Climate Action and Low Carbon Development (Government of Ireland (GOI), 2014), published in April 2014, purports a high-level commitment to

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"transition to a low carbon, climate resilient and environmentally sustainable economy" with an aspirational emissions reduction target of 80% in electricity generation, the built environment and transportation sectors by 2050 (compared to 1990 levels), with specific goals of reaching this target in an iterative, cost-effective, transparent and socially inclusive way. The Climate Action and Low Carbon Development Act 2015 (Climate Act 2015) built upon this commitment by providing a statutory framework and formalizing the authority and bureaucratic responsibilities for initial climate plans such as mandatory submission of the annual transition statement to both Houses of the Oireachtas[94] by the Minister for the Environment, Climate and Communications (see e.g., GOI, 2016a). They also established the Climate Change Advisory Council (CCAC), whose primary role has been to make independent expert recommendations to the government in developing national climate policies and review periodically their progress and performance (GOI, 2015).

In line with the statutory requirements of the Climate Act 2015, the first National Mitigation Plan (NMP) and the first National Adaptation Framework[95] were published in July 2017 and January 2018 (GOI, 2017; GOI, 2018a). The NMP specified existing climate measures and laid the foundation for mid- and long-term mitigation processes by proposing 106 actions in key emitting sectors (electricity generation, built environment, agriculture and transport) as set out in the National Policy Position on Climate Action and Low Carbon Development. The plan was a result of collaborative efforts of key stakeholders (ministries, different government departments and academics) and represented the first policy steps towards decarbonization of the economy envisaged in the National Policy Positions and following the Climate Action Act of 2015.

Induced by the need for planning how Ireland would accommodate an additional one million people in the country by 2040, the government developed and launched *Project Ireland 2040* (PI2040) in February 2018. PI2040 is an overarching strategy for regionally and socially balanced growth and sustainable operation of the country (GOI, 2018b). It includes the National Planning Framework (NPF) which is a region-focused, spatial plan to manage economic and population growth in a sustainable way (GOI, 2018c) and the National Development Plan 2018-

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[94] National Parliament, see the next section.

[95] Adaptation falls outside of the scope of this research, thus is not detailed here, but it is worth mentioning, in order to explain the Irish context better that in the wake of intensified climate related events and extreme weather events, Ireland's economic losses have been among the highest in the EU (EEA, 2019 as cited in OECD, 2021b, p. 21). Climate-related risks to Ireland include heavy raining, flooding and more intense storms damaging built infrastructure and agriculture. Most people in Ireland live near rivers and the coastline where these negative consequences of the materialization of these risks are more pressing (OECD, 2021b).

2027 (NDP) which is a capital investment framework to finance the so-called "National Strategic Objectives" derived from PI2040 and NPF, such as affordable housing and low-carbon mobility (GOI, 2018d). The projected total expenditure was 116 billion Euros which accounts approximately 4% of the Gross National Income (GNI).[96] Reflecting the government's commitment on climate issues, 22 billion of total NDP budget was specifically allocated to invest in the "transition to a low-carbon and climate-resilient society" along with 8.6 billion Euro investment in sustainable mobility and the previous launch of the 500 million Euro Climate Action Fund to support innovative decarbonization projects (GOI, 2018e; GOI, 2018f).

Ireland witnessed the public's increasing attention to climate change in 2018 and 2019, which culminated in various political actions. This period indicated the possible emergence of more progressive climate politics where transformative changes were supported and encouraged by growing numbers of citizens and civil organizations, albeit somewhat slowed and watered-down by traditional political trade-offs between short term economic interests and ecological concerns (Fitzgerald et al., 2021). After publishing NMP in 2017 and NPF in early 2018, a lawsuit was initiated by an advocacy group, 'Friends of the Irish Environment,' against the Irish state, based on insufficient climate change mitigation efforts, inconsistent with the emission reduction targets set by the Climate Action and Low Carbon Development Act 2015. After a lengthy process seeing the Court's rejection of claims, and an appeal of the lower court ruling, the Supreme Court eventually made a landmark decision in July 2020 quashing the National Mitigation Plan, thus requiring from the government the development of a more ambitious plan with specific actions (Grantham Research Institute, 2022). Following a massive climate strike in Dublin in March 2019, which was part of an environmental movement sweeping across Europe, the government declared a climate emergency in May and published the Climate Action Plan 2019 (CAP 2019) in June (GOI, 2019a).

CAP 2019 represented a major improvement in the country's climate policy development since it expanded overall ambition and supported it with clear emission reduction targets and pathways by 2030 (30% reduction in the non-ETS sectors compared to 2005 levels), encompassing more economic sectors than previous, subdued plans. Also, the plan was endorsed by parties across the political spectrum and preceded by an extensive public consultation process (more on this and changes in climate governance in the next section). The most important commitments included increasing renewables' share in electricity generation

[96] In Ireland, GNI is more widely used than GDP as the latter may give a distorted picture of economic performance due to foreign multinationals' tax practices and cross-border factors of production.

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from 30 to 70%; closing coal and peat plants;[97] retrofitting 500,000 houses and installing 600,000 heat pumps; and increasing the number of electric vehicles to 1 million, all to be accomplished by 2030. Despite the ambitious plan with specific tasks to be undertaken, doubting voices challenged the feasibility of drastic emissions reduction in non-ETS sectors by 2030, as outlined in the Effort Sharing Decision.[98] These targets were missed by 2020 and Ireland's emissions are set to further increase in the 2020s (see the report itself or OECD, 2021b).

In February 2020, a general election was held in Ireland. After a balanced contest, a coalition agreement was reached among Fine Gael (center-right, Christian-democratic), Fianna Fáil (centre-right, republican), the two historically largest parties of Ireland, and the Green Party. The new government published its program document, 'Our Shared Future,' in June with climate change being a central theme, and numerous newly proposed plans and measures were introduced, such as the annual 7% emissions reduction target between 2021 and 2030 (GOI, 2020a). The government's climate commitments materialized in the Climate Action and Low Carbon Development Amendment Act 2021 (Climate Act 2021) which amended the Climate Action and Low Carbon Development Act 2015 (GOI, 2021a). The most important developments were the introduction of a legally binding, national climate objective requiring the state to become climate-neutral (net zero) by 2050, and the concept of carbon budgets to maximize cumulative emissions (ceilings) in different sectors, among other items largely related to strengthening the framework of climate governance (see next section). The Act states that the first two carbon budgets (five years each) shall deliver a 51% reduction of emissions compared to 2018 levels.

Whilst the Climate Act 2021 provided the statutory framework for mitigation efforts, the Climate Action Plan 2021, which was published in November 2021, just before the 26th United Nations Climate Change conference in Glasgow, laid a transition roadmap and listed actions in different sectors to reach Ireland's climate targets.[99] Compared to CAP 2019, the new plan did not set forth radical changes but rather widened the overall scope, increased the ambition of existing plans and refined some elements of the strategy, including the introduction of emissions

[97] Coal and peat-based electricity generation will be phased out by 2025 and 2028. Existing peat bogs have already been closed (OECD, 2021b, p. 20), contributing to the negative social impact in the Midland region. To see the government's Just Transition plan to mitigate these effects: GOI, 2021b, Chapter 6.

[98] The Effort Sharing Decision of the EU set binding overall emissions reduction targets for each member state in non-ETS sectors (e.g., heating and transportation).

[99] The government also published the Interim Climate Actions 2021 in March 2021 to close the ambition gap between Climate Action Plan 2019 and Climate Action Plan 2021 which was being prepared at that time (GOI, 2019a)

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ceilings in different sectors and the National Retrofit Plan (GOI, 2021b). The National Development Plan, which detailed how the new investment plans were integrated with national climate objectives, was revised and adjusted in October 2021, seeing a 49% increase in planned public capital investments between 2021 and 2030. This included an allocation of carbon tax revenue and the reform of the Public Spending Code concerning the mandatory environmental assessment of each investment decision (shadow price of carbon) (GOI, 2021c). While significant, the envisaged capital investment in the revised NDP falls considerably short of what IMF assesses to be the level of climate investment (approx. 20 billion annually) needed to achieve 2030 climate targets (IMF, 2021). The following table demonstrates the milestones of climate policy development.

15. Table - Climate policy development in Ireland between 2015 and 2021.

Date	Event
December 2015	The Climate Action and Low Carbon Development Act 2015
19 July 2017	National Mitigation Plan
19 January 2018	National Adaptation Framework
February- June 2018	Project Ireland 2040 and related policy documents: National Planning Framework, National Development Plan 2018- 2027 and Investing in the Transition to a Low-Carbon and Climate-Resilient Society.
9 May 2019	Parliament declared a climate and biodiversity emergency.
17 June 2019	Climate Action Plan 2019
June 2020	Government's program document 'Our Shared Future' published.
July 2021	Climate Action and Low Carbon Development (Amendment) Act 2021
November	Climate Action Plan 2021

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Governance of Climate Action and Citizens Involvement

Ireland is a developed, representative democracy with a bicameral, national parliament (Oireachtas Éireann, Oireachtas in short) that consists of the House of Representatives (Dáil Éireann, Dáil in short) and the Senate (Seanad Éireann, Seanad in short). The main legislative body is the Dáil whose 160 members (Teachta Dála, TD in short[100]) are directly elected. The Seanad performs mainly an advisory role in the legislation process. The executive power is vested in the government headed by the Taoiseach (prime minister), who is nominated by the Dáil. The Taoiseach nominates the ministers in the cabinet. During the course of the examined time period of this research project, two governments served in Ireland. Between 2016 and 2020, a minority government of Fine Gael (FG) led the country, supported by a special arrangement with the other historically large party, Fianna Fáil (FF),[101] where FF facilitated the government's work but remained in opposition. In 2020, the two parties, that were originally descendants of opposing forces in the Irish Civil War and alternated in power since 1932, formed a historic coalition together with the Greens, securing 84 seats in the 160-seat-Dáli.

The government is the main actor of climate governance as it brings forward new bills, manages the consultation process before and during the legislation process, and introduces and implements the annual budget (for more about the top-down approach to climate action in Ireland, see, see: Robbins, Torney and Brereton, 2020; also demonstrated by a network analysis of the Climate Action Plan 2019, see: Wagner, Torney and Ylä-Anttila, 2021). The Irish governments have had a strong sectoral approach to climate change mitigation efforts, represented by the institution of carbon budgeting and corresponding sectoral emissions ceilings and decarbonization plans (see above). Carbon budgets are proposed by the independent Climate Change Advisory Council (CCAC) and adopted by the government (for the process, see: Section 6 of GOI, 2021a). Ministers are responsible for the implementation of their respective actions in the Climate Action Plan, for adhering to their sectoral emissions ceiling and for reporting to the Oireachtas Committee on Climate Action where they are held accountable for their performance, thereby giving the Parliament greater oversight on policy implementation. The progress on and implementation of each sectoral action is overseen and strategically facilitated by the Climate Action Delivery Board, which was created in 2019 and is jointly chaired by the Department of the Environment, Climate and Communications and the

[100] Equivalent to Member of Parliament.
[101] Based on a *confidence and supply* agreement, where small parties abstain from votes on confidence in return for policy commitments from the government.

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Department of The Taoiseach,[102] and monitored by the quarterly published progress report (GOI, 2019b).

Although the national government plays the most prominent role in policy formulation and implementation, between 2016 and 2021, important new actors and initiatives on citizen's engagement were introduced into the Irish climate governance. The most remarkable initiatives concerned deeper engagement by the public in relation to climate action, such as the establishment of a deliberative, democratic body of Citizens' Assembly (Assembly), made up of 99 randomly selected, representative groups of people to deliberate on key legal and policy issues in Ireland, with climate change being one of these (Citizens' Assembly, 2022; OECD, 2021b). The deliberations resulted in a final report to the parliament (''How the State can make Ireland a leader in tackling climate change'), including several policy recommendations such as financially favoring the expansion of public transport over new road development (preferred at a ratio of no less than 2-1) (Citizens' Assembly, 2018a). The more radical stance on climate action of the Assembly reflected accurately the increasing level of environmental concern and climate awareness in Ireland (Leiserowitz et al., 2021; OECD, 2021b, p. 55). As a response to the citizens' desire for urgent and more ambitious climate action from the state, the parliamentary Joint Committee on Climate Action produced a report published in March 2019, entitled "Climate Change: A Cross-Party Consensus for Action," that recommended policy actions to scale up domestic efforts and meet international commitments (Oireachtas, 2019a). These reports informed the development of the Climate Action Plan 2019 and subsequent works on climate action such as the Climate Act 2021 (GOI, 2019a; GOI, 2021d).

The Irish Carbon Pricing System

The Irish government assigns an indispensable, crucial role to carbon pricing to deliver on the country's climate commitments (GOI, 2021b). Ireland takes a hybrid approach, meaning that it both uses emissions trading system and carbon tax for pricing emissions (Narassimhan et al., 2017). Ireland is part of the EU Emissions Trading System (EU ETS) since its 2005 inception. The scheme covers emissions from power generation and energy intense industries (e.g., cement-, glass- or steel production).[103] The carbon tax was introduced in 2009 and it has a complementary role to the ETS, covering non-ETS sectors such as transport and various fossil fuels (PMR, 2017, p. 79). Therefore, the two policies cover emissions economy-wide,

[102]Department of An Taoiseach is equivalent to the Prime Minister's Office in other countries.
[103] For an introduction to emissions trading, please see the Literature Review. Specific information on the operation of the EU ETS, see: European Commission (2022).

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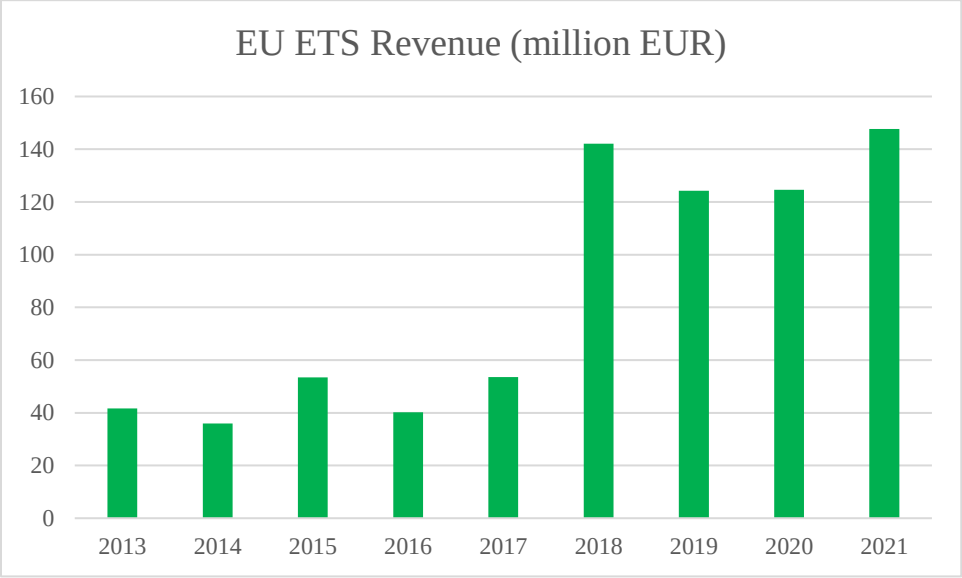
approximately 75% of the total domestic emissions. However, agriculture is a major exemption from carbon pricing measures.

The European Union Emissions Trading System

There are approximately100 installations enrolled into the trading scheme in Ireland, of which 70 are industrial installations.[104] ETS covers a relatively low share of domestic greenhouse gases in Ireland, 26% compared to roughly 45% in the EU on average, due to their weaker industrial base and large volume of agricultural emissions (GOI, 2019c, p. 95-96). Total ETS sectors' emissions decreased from 17.3 MtCO2 to 15.3 MtCO2 between 2005 and 2021, mostly driven by increased uptake of renewable energy in electricity generation. Industrial carbon emissions increased in this period and installations in the energy-intense industries received most of their pollution permits (allowances) for free since 2006, via the carbon leakage mechanism (European Environment Agency, 2022a).[105]

Revenue generated by auctioning allowances increased significantly in the third trading period of the system (2013-2020), accruing 616 million EUR revenue for the Irish state. The amount of annual revenue flow is shown in the following figure.

18. Figure - EU ETS revenue in Ireland between 2013 and 2020.



Own formatting. Source and note: Data on revenue flow between 2013 and 2019 was extracted from the European Commission's (2020, p. 45) report on the functioning of the European carbon market. Data for 2020 was found in Eamon

[104] 106 installations registered in August 2022 (EPA, 2022b).
[105] For more information on carbon leakage, see the Literature Review and the European Commission's (2022) site.

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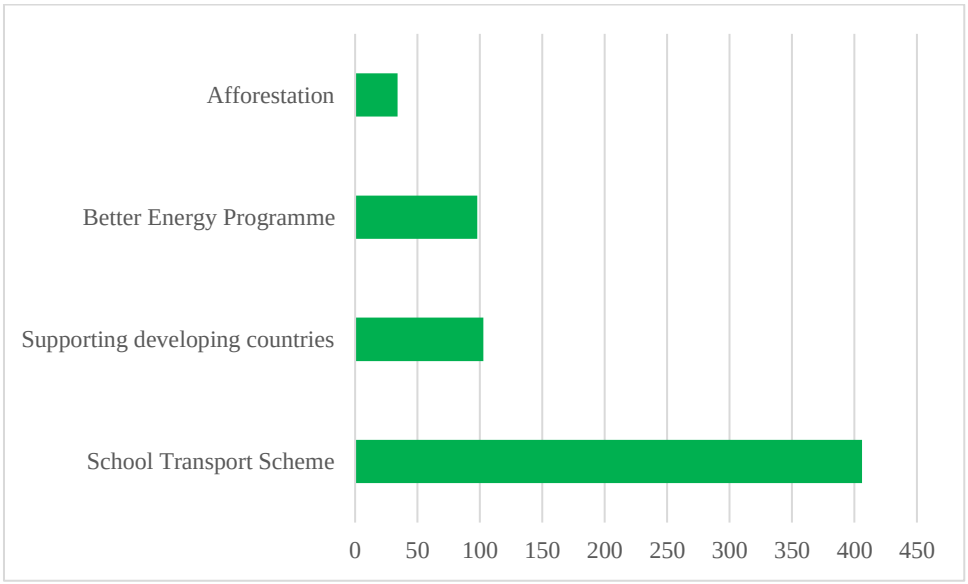
Ryan's, (Minister for the Environment, Climate and Communications) written answer in the Oireachtas (2021). Data for 2021 was provided by the Department of Public Expenditure and Reform after sending a written request.

Figure 19 demonstrates how the Irish state utilized EU ETS revenue between 2015 and 2021. Since 2015, most funds (405 million EUR) were channeled into the School Transport Scheme which supports transportation for children who live far from their primary and post-primary schools in rural areas and provides transportation for children with special educational needs (GOI, 2022). Furthermore, Ireland provided more than 100 million EUR climate finance to developing countries. Almost 100 million EUR was spent on the Better Energy Programme which consists of three main schemes, one of which is free of charge and targeted specifically for vulnerable households exposed to energy poverty, working by enhancing households' energy efficiency performance through better insulation and heating controls (Oireachtas, 2018a). Lastly, Ireland spent 34 million EUR on conservation measures through an afforestation program.

19. Figure - EU ETS revenue use 2015-2019 (million EUR)



Own formatting. Source and notes: Primary data source was the European Environment Agency (2022b) which collects reports from EU member states on use of auction revenues (MMR Article 17 Report). However, report for 2016 was missing for unknown reason, so information was extracted from an audit report (Comptroller and Auditor General, 2019, p. 131) and is based on estimation. Information for 2020 and 2021 were provided by the Department of Public Expenditure and Reform after sending a written request.

Brief Historical Overview of Carbon Tax Implementation

Even though the possible implementation of an emissions levy had already been discussed in governmental and policy circles in the early 2000s, the decisive push for introduction was brought in by the 2008-09 crisis and subsequent financial adjustment program by the Troika,

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whereby the Irish government pledged to reduce expenditures and introduce revenue raising policy instruments in return for the financial support (PMR, 2017; Tol et al., 2008). Between 2010 and 2012, carbon tax revenue contributed to approximately 20-25% of the tax increases required by the Troika (Convery, Dunne and Joyce, 2013, p. 16). But how did this unpopular climate policy get accepted without significant political resistance? Convery, Dunne and Joyce (2013, p. 33) suggest a range of political factors that facilitated implementation: i) Greens were part of the governing coalition at the time of enactment and leadership strongly supported carbon tax (see also the Government program, GOI, 2007); ii) in wake of the financial crisis, the public experienced various social calamities such as decreased wages, increased debt, unemployment and taxes, so carbon tax implementation got lost "in a cacophony of bad news" for the public; iii) support from academics and policy experts and iv) avoiding a clash with the powerful agricultural lobby by not including the main greenhouse gases of their sector (methane and nitrous oxide) in the tax[106] as well as removing big enterprises from the scope of the tax that are part of the emissions trading scheme.

Additional Empirical Information on the Political Process of Carbon Tax Reform

Citizens Assembly

The governmental program document of 2016 proposed an innovative way to deal with pressing issues Ireland faced by establishing the Citizens' Assembly (GOI, 2016b, also see the policy context section). The theme of the Assembly's third meeting was *"How the State can make Ireland a leader in tackling climate change"* (Citizens Assembly, 2022). The meetings were intended to last a weekend but due to the complexity of issues on the agenda, two weekends were devoted to the topic (30 September - 1 October 2017 and 4-5 November 2017). Furthermore, the importance of the topic and the sense of urgency felt by citizens was demonstrated by the fact that the Assembly voted to discuss climate change earlier than originally scheduled, as it was planned that this deliberation would be the final in the series of five topics dealt by the Assembly (Oireachtas, 2018i).

The discussions on climate change and mitigation policies during the four-day event were guided by extensive input from various experts, including academics, policy experts, and other organizations. These experts unanimously argued for the urgent need for ambitious carbon pricing implementation, along with other mitigation efforts (Citizens' Assembly, 2018b). For

[106] What is more, farmers get compensation for their occurring costs related to motor fuels usage (see about these measures: Department of Finance, 2021).

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example, the independent advisory body, the Climate Change Advisory Council (CCAC) established by the Climate Act 2015,[107] made a presentation where their recommendations on carbon tax reform were shared with citizens. The presentation compared the then current rate of Irish carbon tax (20 EUR/tCO_2) with the one recommended by the High-Level Commission on Carbon Pricing (World Bank, 2017),[108] to drive meaningful decarbonization efforts. According to CCAC, the Irish rate fell in the middle range, leaving space for increasing ambition to send a market price signal that would be powerful enough to enact behavioral changes by corporations and citizens, as well as to achieve the Paris Agreement temperate targets. Deliberations were facilitated by roundtable discussions, question and answer sessions, and a debate on the ballot whose results served the basis for the final recommendations made to the parliament (for more information, see Citizens Assembly, 2022).

The draft ballot paper included the following two questions specifically on carbon taxation (Question 3 and 4) (Citizens' Assembly, 2018b, p. 502-503).

Question 3:

"There should be much higher progressive taxes, which build year-on-year, on carbon intensive activities (for example Carbon Tax on the use of petrol and diesel and the use of fossil fuels for home heating). The revenue raised by these taxes should only be spent on measures that directly aid the transition to a low carbon and climate resilient Ireland (for example making solar panels more cheaply and easily available, retrofitting homes, flood defenses, developing infrastructure for electric vehicles)." It was a 'yes or no' question.

Question 4 aimed to assess how much citizens would be willing to pay for carbon tax if the revenue was solely used for low-carbon investments (see question 3 for examples of such investment), thus making carbon taxation revenue neutral. The question and possible answers were phrased in the following way:

"Following on from question 2, and on the assumption that all revenues raised from much higher progressive taxes on carbon intensive activities would only be spent on measures that directly aid the transition to a low carbon and climate resilient Ireland, I would;
Option 1. be willing to pay an increase of 100% in carbon tax
Option 2. be willing to pay an increase of 50% in carbon tax

[107] See the policy context section above.
[108] This benchmark is also used by the author of this dissertation to assess which national level carbon pricing policy deems to be 'stringent' (please see the methodological chapter).

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Option 3. not be willing to pay any increase in carbon tax"

However, after the deliberations, the two questions were essentially combined by the assembly members (Citizens' Assembly, 2018a, p. 23-26). The number of options to choose from was also reduced to either accept or reject paying higher taxes and the revenue recycling part of question 3 became integrated into the following qualifications:

"Subject to the qualifications below:
• I would be willing to pay higher taxes on carbon intensive activities
• I would not be willing to pay higher taxes on carbon intensive activities

Qualification 1: Any increase in revenue would be only spent on measures that directly aid the transition to a low carbon and climate resilient Ireland: including, for example, making solar panels more cheaply and easily available, retrofitting homes and businesses, flood defenses, developing infrastructure for electric vehicles.
Qualification 2: An increase in the taxation does not have to be paid by the poorest households (the 400,000 households currently in receipt of fuel allowance).
Qualification 3: It is envisaged that these taxes build year-on-year."

The original proposal set out that carbon funds should be exclusively used in furthering climate change mitigation efforts through decarbonization projects. However, after deliberations the final question included two additional, crucial qualifications that reflected expert advice shared with the Assembly before voting (see e.g., Tipperary, Codema or CCAC presentation in the Citizens' Assembly, 2018b). One qualification mandates the gradual increase of tax rate over time. The second qualification exempts the most vulnerable 400,000 households (approximately 23% of total households[109] that are entitled for fuel allowance) from paying increased taxes, thus introducing an important aspect of social protection from taxation. Adding this qualification was later underpinned by the following argument from the chairperson, Mary Laffoy: *"Assembly would be recommending that the Government should take account of distributional impacts when imposing tax. In other words, it should seek to ensure that those already in poverty or at the risk of poverty are not disproportionately burdened. There may be other ways of doing that but this is what we have suggested in the question."* (Citizens' Assembly, 2017, p. 50). All members who were present voted. The result was that the majority

[109] Own calculation based on Central Statistics Office of Ireland (2016).

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of voters (80%) expressed their willingness to pay higher taxes on carbon polluting activities, thus it became part of the final recommendations to be made to the Parliament as follows (Citizens' Assembly, 2018a, p. 25-26):

"The Members said they would be willing to pay higher taxes on carbon intensive activities (80%), subject to the qualifications identified in the question."

Joint Committee

To understand the outcome of the final report, a couple of factors on the process should be stressed. The consensual position of the Assembly on demanding meaningful and urgent climate action put significant pressure on the committee to develop an ambitious plan as a satisfactory response to the Assembly's position and recommendations. The political importance of reaching a cross-party position on climate action was highlighted by the members throughout the discussions in the committee meetings, and also demonstrated by several invited figures who argued that a unanimous position would enable a political environment where taking meaningful and swift action on climate change becomes more likely. For example, Professor Brian Ó Gallachóir asserted in his opening statement that: *"If the committee can achieve cross-Oireachtas consensus on urgent climate action, that would be a key requirement for Ireland to move forward from a laggard position to a leadership position."* (Oireachtas, 2018e, p. 2). Specifically on carbon tax increase, the Minister for Communications, Climate Action and Environment, Richard Bruton said on 5 December (Oireachtas, 2018g, p. 32) : "*On the carbon tax, I am clear, as the Taoiseach [the Prime Minister] is, that we need to have a trajectory of where the carbon tax will be in 2025 and in 2030 and a pathway to get there. The Taoiseach indicated that he was supportive of it, as was Deputy Eamon Ryan, the leader of the Green Party. The Taoiseach made the comment that it would be good if the committee as a whole reached consensus around a trajectory for it. Such a consensus would help its implementation."*

Several references were also made to the climate strikes that took place before the final committee meetings. For example, Eamon Ryan (leader of the Greens) gave the following reading of the situation and urged for swift actions: "Having heard the call from the students, some of whom are still in the Visitor's Gallery, I believe we should act now. We should start this year and not wait 12 years. If we do not start next year, we all know that, in politics, the year after that is not going to be any easier. In fact, this is probably the moment in time more

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than any other moment because of those climate strikes putting pressure on us to get this over the line." (Oireachtas, 2019c, p. 10).

On the lack of clear plan on how to protect vulnerable segments of society from the detrimental effects of carbon tax increase: Dr. Kelly de Bruin from ESRI said: (Oireachtas, 2018i, p. 32): *"Professor Barrett also referred to the revenue recycling. These are all elements that are very important. It is important to find a way to provide a carbon tax that provides the incentives but does not hurt the most vulnerable in the economy. It is something that we will look into to a certain degree but we not done so yet."* Furthermore, Professor Brian Ó Gallachóir said (Oireachtas, 2018e, p. 8): *"Different ideas are emerging now such as using it for dedicated climate action activities or, indeed, just handing it back to people. Therefore, for instance, one could take €400 million, divide it across the population of Ireland and hand it back. That would help offset energy poverty, and those emitting higher levels would pay a greater amount. However, we have not looked at this in detail and they are just some reflections on things I have seen."* Bureaucrats and politicians admitted the key role of revenue recycling in mitigating the negative social effects of carbon tax, but did not propose any concrete measures (Oireachtas, 2018h; Oireachtas, 2018j). Also, the Climate Change Advisory Council expressed several times that revenue recycling and making decision on measures to mitigate the negative distributional impact of carbon pricing is essentially a political question, so it is up to the government and the Parliament to decide (e.g., Oireachtas, 2019h).

Information about how the government approached carbon tax increase from a social perspective: In parallel to the committee work, the government also started to think about the design of carbon tax reform, and their considerations were very similar to the committee deliberations. Taoiseach Leo Varadkar made it clear that Ireland wanted to avoid a public outcry, as had happened in France ("gilets jaune" protests), partly caused by increasing carbon taxes. He asserted that Ireland needed a policy "*that doesn't hit people disproportionately in their pockets, and one that we can explain to the public,"* and the government considered giving rebates to households (fee and dividend) or increasing various welfare payments as means for compensation. He concluded that the *"lessons from France and Australia, and from water charges in Ireland, is that you need to bring people with you and that is why I firmly believe that if we increase carbon tax in the next budget and the budgets thereafter, [we need] to give that money back to people, put it back in their pockets so that we reward people who live low carbon-emitting lifestyles"* (O'Sullivan, 2019a).

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Period between June and Budget Day in October, 2019

On 18 June, the day after publishing the Climate Action Plan, the Committee on Budgetary Oversight held a meeting to discuss the budgetary and fiscal consequences of climate change policies with CCAC, ESRI and representatives of the Department of Communications, Climate Action and Environment (Oireachtas, 2019h). Regarding the annual increase of the tax rate, the principal advisor for the Department, Frank Maughan said: "implementing a carbon tax rate of €80 per tonne by 2030 […] was recommended by the Climate Change Advisory Council in its 2018 annual review and was also broadly endorsed by the joint committee in its report" (Oireachtas, 2019h, p. 7-8). In this way, Maughan demonstrated that the government took the expert views and political recommendations from the committee to initiate a carbon tax reform. He also stated that the Department of Finance was considering the specific options of revenue recycling recommended by the Joint Committee to mitigate the negative distributional impact of stringent carbon pricing based on the results of a research project carried out by ESRI and a then ongoing public consultation process on this issue (see below).[110]

The budgetary meetings proceeded by the invitation of Social Justice Ireland (a think tank and advocacy organization), the Nevin Economic Research Institute (NERI, research organization supported by ICTU) and the Irish Congress of Trade Unions (ICTU), on 19 June (Oireachtas, 2019d). On carbon tax reform, they made the following statements. The trade unions said that they accepted carbon tax increase if it was conjoined with equal dividends paid to every person in Ireland, so the recipients from the bottom half of the income distribution would be better off while, at the same time, greenhouse gas emission would be reduced.[111] The NERI stated that: "*It is certainly our position that any increase in the carbon tax is conditional upon an offsetting, hypothecated fund which would provide a dividend to every person living in Ireland. If constructed properly, that would produce a cash benefit for the bottom 50% of the population from an income distribution point of view. Our view is that a carbon tax increase should be conditional upon that happening*" (Oireachtas, 2019d, p. 15). They also made it clear that the

[110] This information was later confirmed on 3 July by the Minister for Finance: "On carbon taxes, a decision has not been made in respect of what I will propose to do. We will publish our tax strategy group papers at the end of July as we do every year. They will include a paper on carbon taxes which will be informed by a public consultation, which is closing soon, regarding different options for how carbon taxation could be implemented and how the revenue from it could be used in the economy and society" (Oireachtas, 2019f, p. 8).

[111] To wit, Dr. Tom McDonnell said in a joint opening statement (Oireachtas, 2019d, p. 5): "In principle, Congress supports an increase in the carbon tax but that is contingent on an accompanying and linked climate justice fund that would channel the revenue raised in the form of a dividend for every person living in Ireland. Our plan would reduce greenhouse gas emissions while the average household in the bottom half of the income distribution would see their purchasing power increase after the introduction of the linked carbon tax and annual dividend, that is, they would receive more in the form of a dividend than they would expect to pay in carbon tax."

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success of carbon tax would be contingent on large scale efforts of the government to invest in public transport and retrofitting houses to provide low-carbon alternatives.

The second pre-budget meeting with selected nation stakeholders was held on 24 September with associations representing business interests, Dublin Chamber of Commerce (DCC) and Chambers Ireland (CI). Regarding the intended carbon tax reform, they made the following statements. "*Dublin Chamber of Commerce fully accepts the need for the carbon tax while calling for a clear schedule of planned increases to ensure that businesses can plan and adapt in good time. Securing public buy-in will be difficult if the Government punishes carbon use without providing alternatives. Improving public transport is the place to start."* Therefore, they asserted that the *"revenue from future carbon tax increases should be ring-fenced for green infrastructure investment"* (Oireachtas, 2019e, p. 3). CI shared DCC's views but also gave more details on investments needed to provide low-carbon alternatives: *"While there is broad acceptance in the business community of the need for carbon taxes, it is vital that the proceeds of such taxes do not flow into the general fund. Over €400 million is already collected through carbon tax each year. We welcome the early indications from the Taoiseach that ring-fencing will be the Government's chosen approach. It is crucial that the current revenues and any future increased revenues are ring-fenced and channeled into schemes and infrastructure which will allow people to access lower-carbon alternatives. Increased carbon taxes which are not complemented with investment in grid infrastructure, public transport and retrofitting will have a disproportionate impact on poorer people and the more remote parts of the country. We believe that a schedule for carbon tax increases should be set out because this would help businesses to plan and budget for such increases and would bring greater predictability to the present value of energy-efficiency measures, thereby encouraging viable investment* (Oireachtas, 2019e, p. 5).

In addition to the trade union and business associations, it is important to discuss the position of environmental, non-governmental organizations (ENGO) who were more vocal about carbon tax. ENGOs were generally supportive of carbon tax as an instrument in the state policy toolkit to cope with climate crisis effectively, but they all made clear to the government that their support was contingent on protecting the vulnerable households from its detrimental effects, thus instituting just transition as a key pillar of their consent. There was a concerted, coordinated effort from progressive NGOs with different social agendas (environment, poverty, etc.) to put pressure on policy makers to implement carbon tax in a socially just and fair manner.

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Efforts to find common ground between social justice and environmental objectives during the preparation for the elections, where carbon tax emerged as an important issue, included a media campaign (e.g., O'Sullivan, 2019b), submission of consultation papers (Interview #2), and organization of workshops (Interview #2; #10; #12) for elected officials, party staff, climate policy advisors, and researchers, to collectively determine a consensual position on how carbon tax should be designed to ensure social fairness and acceptability. Obviously, revenue recycling was an important part of this discussion, as it could help alleviate NGOs' concerns regarding negative social effects, though most of these organizations did not have a clear preference or endorse any particular recycling measures[112].

To sum up, the NERI (research institute) and the Irish Congress of Trade Unions accepted a carbon tax increase contingent upon proper revenue recycling; specifically, they preferred the "fee and dividend" approach that should also be supplemented by governmental green investments, but not specifically from carbon tax revenue, in public transport and retrofitting. Business interests shared a similar approach, emphasizing the need for using accrued revenue to provide low-carbon alternatives through green investments but asked for a clearly communicated, gradually increasing tax rate to provide sufficient time to firms for adaptation. ENGOs collaborated with other progressive organizations to advocate for policy outcomes that were socially fair in which revenue recycling was believed to play a role.

Following the requests from other departments to carry out public consultation and develop a policy paper on revenue recycling, two meetings were held in the end of September 2019 in the Joint Committee on Climate Action to specifically discuss the results of the instructed works in question. However, only the public consultation was executed in June (see below). The committee members gave voice to their frustration about the perceived lack of cooperation between departments and missing deadlines for developing the draft policy paper on energy poverty and revenue recycling measures. In response to the criticism, officials said that work on energy poverty was initiated and ongoing. Furthermore, it was also stated that there was an extensive research project carried out by the Economic and Social Research Institute (ESRI) financed by both the Department of Communications, Climate Action and Environment and the Department of Finance, which aimed to offer additional information to the policy development on revenue recycling (Oireachtas, 2019i). Indeed, one of research papers ESRI published in June acknowledged the funding from the Department of Public Expenditure and Reform and

[112] Friends of Earth, probably the biggest and most influential of all these organizations, endorsed the fee and dividend approach, but they were largely indifferent to the issue until end goal (equitable outcome) was achieved.

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the Department of Finance and directly addressed the Committee's recommendation to analyze the impact of carbon tax reform on vulnerable households and consider different supporting measures to mitigate negative distributional implications (see below) (Bercholz and Roantree, 2019, p. 5, 13). Nevertheless, the Committee concluded that it was "unable to report" and "arrive at a consensus position on the precise mechanism for the recycling of carbon tax revenues in the budget" since the requested departments "have failed to produce a policy paper on the result of the public consultation process and the fuel poverty review, as recommended by the committee" (Oireachtas, 2019j, p. 2).

Despite not delivering the instructed works in the way requested by the Joint Committee, public consultation occurred and ESRI, commissioned by the government, also delivered four studies between March and October, specifically on the distributional impact and revenue recycling alternatives of carbon tax. These works were referred to on numerous occasions by the government, as well as by interviewees, as valuable contributions for consideration on appropriate revenue recycling (e.g., Oireachtas, 2019i; Oireachtas, 2019f).

ESRI's Series of Works on Carbon Tax Increase and Revenue Recycling

Funded by the government, ESRI also published a series of works produced by different research teams on the economic, social and environmental impact of a projected carbon tax increase before the budget announcement in October (DOF, 2019). Specifically on the distributional impact and revenue recycling measures of an incrementally increasing carbon tax rate, Bruin and Yakut (2019) found, by using a computable general equilibrium model, that carbon tax had regressive effects, but recycling revenue in the form of lump-sum transfer ("fee and dividend" approach) would create a more progressive outcome, as households' disposable income would be increased due to higher wages[113] and welfare transfers from the accrued carbon tax revenue.

Angel Tovar Reaños and Lynch (2019) applied a different microeconomic model (Exact Affine Stone Index demand system) to analyze the distributional consequences of carbon tax and came to the same conclusion, that the tax was regressive. However, equal lump sum payments to households (fee and dividend approach) would mitigate this negative effect, whilst a targeted social payment to the most vulnerable households would make the policy outcome progressive and reduce inequality in the country. Therefore, the study concluded that: "The results suggest that combining carbon taxation with an appropriate revenue recycling mechanism can not only

[113] As a result of an economic shift towards more labor-intensive services (Bruin and Yakut, 2019).

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allay any concerns surrounding the regressive nature of carbon taxation, but that the policy can actually be net progressive, and may prove a useful tool for policy makers seeking to increase the distributive element of a given tax and welfare system;" (Angel Tovar Reaños and Lynch, 2019, p. 11). Furthermore, the authors assessed that the targeted mechanism would likely be administratively less costly than flat allocation as it does not require direct transfers to each household, only an adjustment to the existing welfare system.

Bercholz and Roantree (2019) analyzed the impact of a10-Euro rate increase on carbon tax on households' income and considered different revenue recycling measures for compensation. By using data from the Household Budget Survey collected by the CSO and ESRI's own tax and benefit microsimulation model, the authors confirmed the previous findings about the regressive effects of more stringent carbon pricing. With regards to possible revenue recycling measures to offset negative distributional impact, increasing tax credits would worsen regressivity as high-income earners would profit disproportionately because some of the most vulnerable segments of society (pensioners, unemployed, low-income households that do no earn enough to pay income taxes, etc.) could not benefit from income tax reduction. Therefore, Bercholz and Roantree (2019, p. 16-17) asserted that "it is reasonable to conclude that increasing income tax credits alone cannot achieve the Oireachtas Joint Committee on Climate Action's objective of protecting those on low incomes, at least in the short run." However, increasing existing welfare payments (state pension, Working Family Payment, etc.) would make policy outcome highly progressive. Both the lump-sum transfer and a combination of reducing income tax with increasing social welfare payment (e.g., Child Benefit) would create a progressive pattern, but the former comes with greater administrative costs and complexity.

As a result, the authors assert that: "Using these [welfare payments] may then offer a significantly less complex and costly means of compensating households and achieving the objective set by the Oireachtas Joint Committee on Climate Action: protecting those on low incomes from the effects of increases to the carbon tax," (Bercholz and Roantree, 2019, p. 15). ESRI's expert recommendation, in which the revenue recycling option was deemed preferable was also confirmed publicly in the hearing of the Committee on Budgetary Oversight in June by Dr. John Curtis (Oireachtas, 2019h, p. 14): *"As we published last week in our quarterly economic commentary, one of the teams is looking at whether the revenue should be handed back in a green cheque or targeted at those most in need. It was concluded that even though giving every household back the same amount in a green cheque would compensate for the*

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extra tax, it would be much better to focus the recycling of revenue on those most in need, including the fuel poor. That was clearly demonstrated."

The last study came out along with a budget announcement on 8 October but I do not detail the findings and specific revenue recycling measures examined in the study because they were identical to previous works (see above: Bruin, Monaghan and Yakut, 2019). However, I mention here that the study specifically acknowledges funding from the Department of Finance and the Department of Communications, Climate Action and Environment (DCCAE), underpinning what the representatives of these Departments communicated to the Joint Committee in September 2019.

First Reactions after Budget Announcement

After the budget announcement, a journalist asked Paschal Donohoe, Minister for Finance about the political acceptability of reform in the following way:

"Minister, you finally moved on carbon tax today. How confident are you that there isn't going to be a public backlash or protests that we've seen around water charges in the past?"[114]

and the Minister responded, "*There is a risk that there will be a reaction back to us. I'm very sensitive to that. It's the reason why I did not make a move on carbon taxation last year […] I've learned from us there's two things that I've looked to do to try to respond back to that level of anxiety. The first one is I'm giving a commitment that money that is raised by carbon tax next year due to this increased rate will be going back to climate related measures and activity and the second thing that I'm doing is putting in place a very modest first change, so I'm doing both of those things in recognition of all I learned from dealing with water charging."* (Independent.ie, 2019). Therefore, he asserted that an incremental increase of carbon tax conjoined with climate related spending should prevent public opposition to carbon pricing reform. Although, competing explanations cannot be ruled out (e.g., relatively low energy prices at that time conjoined with good economic performance), negative sentiments (and more radical forms of discontent) of population were not noted after the announcement (see more detail below).

[114] The Irish government introduced water charges in 2015 but suspended it a year later due to strong public opposition.

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General Election in 2020

The 32nd Dáil (2016-2020) was dissolved on 14 January 2020 and the general election took place on 8 February 2020. The new government could possibly have blocked the initiated carbon tax reform, but the elections also held the opportunity for implementing more stringent policy through elevated legitimacy. As Professor Kathryn Harrison from the University of British Columbia pointed out at an Oireachtas briefing in July 2019: "If a carbon tax can survive the first year or the first election, they tend to be quite resilient" (Sargent, 2019), thus it is worthwhile analyzing the stances of parties running for office on ongoing carbon tax reform. Instead of giving a detailed, written analysis of all parties' pledges and aspirations on the policy, I provide the reader with the following table that succinctly but comprehensively gives an overview with some explanation provided afterwards for deeper understanding.

16. Table - Political parties' commitments on carbon tax.

Party	Carbon tax rate	Revenue recycling
Fine Gael[115]	€80 per ton by 2030	• Social protection (fuel allowance and retrofitting) • Just transition • Green projects (transportation, agricultural projects, etc.)
Fianna Fáil[116]	€80 per ton by 2030	• Protecting those on low incomes • Tackling fuel poverty • The retrofitting of social housing • Peatland restoration • Rural areas (p. 105)

[115] Fine Gael (2020)
[116] Fianna Fáil (2020)

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Sinn Féin[117]	Objection to carbon tax increases.	Use existing revenue and funds from carbon tax on retrofitting.[118]
Green Party[119]	Gradually increase to €100 per ton	Increasing social welfare payments and tax credits.
Labour Party[120]	€80 per ton by 2030 (not explicit but pledged to take all recommendations of the Joint Committee).	Funding Warmer Homes scheme, public transport, new sustainable jobs.
Social Democrats[121]	Accept carbon tax but no indication on aspired rate.	Providing low carbon alternatives (retrofitting homes and improving electric vehicle infrastructure mentioned specifically).
People Before Profit[122]	No carbon tax on ordinary people but on big polluting corporations (e.g., aviation)	Not applicable as it is incomparable to other parties.
Aontú[123] **(small republican party with mixed ideologies)**	No mention.	

As can be seen, the two traditionally dominant center-right parties (FG and FF) supported pre-agreed level of carbon price increase with specific plans on how the proceeds should be spent. Left-wing parties were divided on this issue, since Sinn Féin opposed any increase of tax and PBP rejected the design of carbon tax which targeted private households instead of big

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[117] Sinn Féin (2020)
[118] Sinn Féin declared during a parliamentary debate: "We are collecting substantial amounts by way of carbon tax. Sinn Féin wants the existing carbon tax we currently bring in each year to be ring-fenced for retrofitting homes, which would help people to reduce their energy use and bills in a positive way, as well as reducing greenhouse gas emissions." (Oireachtas, 2019o)
[119] Green Party (2020b)
[120] Labour Party (2020).
[121] Social Democrats (2020).
[122] People Before Profit (2020).
[123] Aountú (2020).

polluters, whilst other small parties accepted carbon pricing as an element in the state's mitigation policy portfolio.

The general election was held on 8 February 2020 and the results showed a balanced outcome as the two dominant parties, as well as Sinn Féin, all secured voting shares between 20-25%. The Greens achieved a significant breakthrough, gaining 12 seats in the new parliament, whilst small left-wing parties (Labour, Social Democrats, PBP) got 6-6-5 seats. There were 19 independent candidates who were elected to the parliament representing divergent ideological positions. The share of seats gained by each party is shown in the next table.

17. Table - Irish election result in 2020.

Party (position on carbon pricing)	Seats in Dáil (percentage)
Fianna Fáil (pro carbon tax)	38 (23,75%)
Sinn Féin (opposing carbon tax)	37 (23,125%)
Fine Gael (pro carbon tax)	35 (21,875%)
Green Party (pro carbon tax)	12 (7,5%)
Labour Party (pro carbon tax)	6 (3,75%)
Social Democrats (pro carbon tax)	6 (3,75%)
Solidarity (PBP) (opposing carbon tax)	5 (3,125%)
Áontu (no position)	1 (0,6%)
Independents 4 Change (no position)	1 (0,6%)
Independents (not applicable)	19 (11,875%)
	160 (100%)

Source: Oireachtas (2020a, p. 65)

As demonstrated in the table, pro carbon pricing parties enjoyed a stable majority even if independents were not counted. However, Sinn Féin, who received the most votes,[124] attempted to construct a coalition from left-wing parties, that could have possibly led to blocking the continuation of the aspired-to tax increase. But they simply fell short of having enough seats to get a majority in the legislation and their ideological positions would have also made it far more challenging for the coalition to function (Carroll, 2020a; Hutton et al., 2020). The two major

[124] SF got the most first-preference votes but due to automatic returning of the Dáil's chairperson (Ceann Comhairle), FF got 38 seats.

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parties, Fine Gael and Fianna Fáil, were also reluctant to form a coalition with Sinn Féin,[125] which effectively sidelined and drove Sinn Féin into a political dead-end. The traditional way of coalition building in the country (one dominant party and possibly a small one such as Labour forming the government) was not tenable due to high fragmentation. The situation resulted in a stalemate, which was eventually broken by the COVID-19 pandemic, requiring swift responses from political actors to handle the health emergency. The pandemic situation facilitated forging a previously unlikely coalition between the rivalling parties of FG and FF (Carroll, 2020b; Cunningham, 2020). However, together they only had 72 seats (80 were needed for majority in the 160-seat-Dáil), thus they needed other parties to join the emerging coalition.

FG and FF entered into talks with smaller parties, one of them being the Green Party (GP). GP was a good candidate, as an FG-FF-GP coalition would capture a majority (84/160) in the Dáil and they were not ideologically too far apart from one another, but the Green Party made it clear that it had several conditions to be met before joining the government, such as a commitment to seven percent annual reduction in greenhouse gas emissions (McConnell, 2020). The parties eventually reached a compromise on key issues, and the agreement was materialized in the Government Programme. Finalizing the coalition building process hinged on the three parties' members voting on the program, which eventually won stable support. After party members gave their consent, the new government was formed at the end of June 2020.

The Programme for Government was published in June 2020, in which the governments committed to gradually increasing the carbon tax to 100 EUR per tonne by 2030. According to interviewees, Green Party's rise to power was responsible for making the carbon tax trajectory even more stringent than was announced a few months before the general elections. A higher carbon tax was an important priority for them during coalition negotiations, among other issues such as enhanced protection of biodiversity, and spending more on public transport as opposed to road development. Their success in pushing through their relatively ambitious climate agenda can be explained by their favorable political position. Firstly, by including Greens in the government, FG and FF could secure a majority in a fragmented parliament. As a result, they were under pressure to make significant concessions in return for the Green's participation. This left the Greens in a more advantageous position. Between 2007 and 2011, the last time

[125] FG consistently communicated that they were not willing to join a coalition with SF, whilst FF showed an openness for negotiations after the election, but the party remained highly divisive on a possible coalition with SF (Carroll, 2020a).

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they served in the cabinet, the Greens were punished by their voters and lost all their seats in the following election due to perceived lack of impact on government performance. Leadership of the party was, therefore, under considerable pressure both externally and internally to only join the new government on the condition that they could move forward with their environmental agenda and deliver tangible policy results. Being in opposition and clearly representing environmental causes was a politically more appealing and less risky option than being in government with limited influence on policy discussions (Finn, 2020). Therefore, their support was contingent on the inclusion of strong provisions for climate change in The Programme for Government. FG and FF were willing to endorse more ambitious carbon pricing and enact other environmental policies in exchange for the Green's support because the measures did not collide with the policy agenda or ideological position. Being big tent parties, FG and FF were guaranteed the votes/power to deliver on a range of policy domains with the help of Greens' support. Eventually, The Greens were able to leverage the conditions for their seats in many, (but not all)[126] of their preferred policies, including increased spending on public transport over roads, steeper emissions reduction, a ban on imported, fracked gas, as well as a higher rate of carbon tax increase, up to €100 per ton by 2030, quite a bit higher than the 80 Euros that FG and FF had pledged in their manifestos.

According to the consolidated political agenda, carbon tax increase is set to generate approximately 9.5 billion euros between 2020 and 2030. All proceeds from the increase would be legally ring-fenced and spent in the following way (GOI, 2020a, p. 24): To

A. "Ensure that the increases in the carbon tax are progressive by spending €3 billion on targeted social welfare and other initiatives to prevent fuel poverty and ensure a just transition." The government's decision on preventing fuel poverty in the most effective way would be informed by the findings of a commissioned ESRI research due in October which coincided with budget announcement.
B. "Provide €5 billion to part fund a socially progressive national retrofitting programme targeting all homes but with a particular emphasis on the Midlands region and on social and low-income tenancies."
C. "Allocate €1.5 billion to a REPS-2 programme to encourage and incentivise farmers to farm in a greener and more sustainable way."

[126] Agriculture being a prominent omission where FF and FG have strong political incentive to protect farmers' interests.

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As can be seen, approximately 30% of the funds will be used on social cushioning, more than half of carbon tax proceeds will be invested in energy efficiency programs and the rest targeted towards the agricultural sector. After laying out the plans on carbon tax increase and revenue recycling, the parliament did not pick up the issue again until October when the budget for 2021 was announced. The relative silence on carbon tax at that time might be explained by the fact that it was already considered a settled issue, it had broad political support and the parliamentary committees had been set up quite late due to slow government formation and disruptions caused by Covid-19 (Murphy, 2020).

The budget for 2021 detailed the government's plan on carbon tax revenue recycling which was informed by ESRI's research analyzing how the regressive effects of committed carbon price increase could be offset by redistributive measures. O'Malley, Roantree and Curtis (2020) found that by using one third of the revenue on compensation, regressivity would be eliminated and poverty reduced. However, as different social groups are impacted differently by carbon pricing (for example families with children were more vulnerable), targeted measures were necessary to account for these diverging effects. Therefore, the government decided to introduce three different compensation measures in contrast to Budget 2020 when only the fuel allowance was increased as a direct compensatory mechanism (DPER, 2020). In the package, the Qualified Child Payment (targeting low-income families), the Living Alone Allowance (e.g., elderly and disabled people) and the Fuel Allowance were all increased. In line with the government's program, energy efficiency (100 million EUR) and sustainable agricultural projects (20 million) would be funded from the proceeds in combination with the continuation of investment programs (greenways, peatland rehabilitation. etc.,) initiated in the Budget of 2020[127].

Circumstantial Factors Leading to Carbon Tax Reform

Even though, in process tracing analysis, it is not necessary to assess how circumstantial factors contributed to an outcome, as the focus is on investigating defined conditions (while not ruling out competing explanations), it is helpful to mention the following factors to give a fuller picture of how the reform has unfolded in Ireland.

Four interviewees (#2; #4; #5; #6) mentioned that while the Citizens Assembly served as an important institutional avenue for more stringent carbon tax, their role should not be over exaggerated, as they were not the sole driver to heightening climate ambitions. According to these interviewees, more ambitious climate policy development, including increased carbon tax

[127] Except the energy upgrade program in the Midlands.

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rate, can be understood as an outcome of a gradually building political momentum. Firstly, emissions were continuously rising from mid-2010's, clearly indicating that the country would not be able to meet with the EU's Effort Sharing Regulation. This clear underperformance in non-ETS sectors was paired with growing public climate awareness, manifested in the youth climate strikes, and increasing media coverage of climate change, including the landmark IPCC report. Both injected a sense of urgency into the climate policy discussions between 2018 and 2020. However, this does not invalidate explanation above. Rather, it seems that contextual and institutional processes were mutually reinforcing. For example, growing climate awareness made the citizens' stance on climate action more radical, which in turn created a narrower political window for the government to delay carbon tax reform. At the same time, external pressure initiated deeper institutional engagement with ENGOs and opposition parties, as the government needed their consent to secure political support for reform, in which revenue recycling became a crucial link.

Another significant institutional factor mentioned by interviewees was the extra resources policy makers received to support their work, rather unusual in Irish parliamentary work. The Joint Committee received funding to deal with the recommendations of the Citizens Assembly, enabling parties to hire climate policy researchers. Researchers were tasked with briefing policy makers on issues addressed by the committee and worked collaboratively to find common ground for solutions and produce the final report. This collaborative effort helped to keep discussions evidence based and to find a consensual position towards more ambitious climate policy positions. Interviewees frequently mentioned that there was a determined effort from policy makers to maintain a very solid evidence base for the discussion on carbon tax. The reasons and motivation for these efforts are not entirely clear, but one interviewee asserted that it could possibly be explained by the fact that Irish MEPs have a higher degree of scientific background than those in other countries. (He made a comparison with the US where 1/3 of the House of Representatives have legal background.) Lastly, one interviewee (#16) said that implementation of stringent carbon tax was also facilitated by the fact that the Irish civil service is predominantly guided by eco-modernist ideas in environmental policy, and the market-based policy instrument of carbon tax is aligned with this approach, thus they supported the reform (about the dominance of ecological modernization in Ireland's approach to climate policy, see: Fahy, 2020).

It is worthwhile to note that the implementation of carbon tax reform took place in a low fuel price context, which helped facilitate acceptance (see also the reasons why the COVID era was

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a favorable time for carbon tax implementation: Mintz-Woo et al., 2021). The current price environment caused by the war in Ukraine presents a heightened political challenge for the implementation of carbon tax, as shown by the Irish government's need to reduce excise taxes on fuels in conjunction with the annual carbon tax increase to prevent further price escalation, considering that fuel prices are already perceived as too high by many consumers.

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References

Acemoglu, D., & Robinson, J. A. (2013). Economics versus politics: Pitfalls of policy advice. *Journal of Economic perspectives, 27*(2), 173-92.

Adams, J., Clark, M., Ezrow, L., & Glasgow, G. (2006). Are niche parties fundamentally different from mainstream parties? The causes and the electoral consequences of Western European parties' policy shifts, 1976–1998. *American Journal of Political Science, 50*(3), 513-529.

Agrawala, S., & Andresen, S. (2001). Two level games and the future of the climate regime. *Energy & Environment, 12*(2/3), v–xi. http://www.jstor.org/stable/43734395

Aldy, J. E. (2017). *The political economy of carbon pricing policy design.* Harvard Project on Climate Agreements. Discussion Paper ES 2017-7. Retrieved from: https://www.belfercenter.org/sites/default/files/files/publication/aldy-ets-tax-final.pdf.

Aldy, J. E., & Pizer, W. A. (2015). The competitiveness impacts of climate change mitigation policies. *Journal of the Association of Environmental and Resource Economists, 2*(4), 565-595.

Aldy, J. E., & Stavins, R. N. (2012). The promise and problems of pricing carbon: Theory and experience. *The Journal of Environment & Development, 21*(2), 152-180.

Aldy, J. E., Krupnick, A. J., Newell, R. G., Parry, I. W. H., & Pizer, W. A. (2010). Designing climate mitigation policy. *Journal of Economic Literature, 48*(4), 903-934.

Amdur, D., Rabe, B. G., & Borick, C. P. (2014). Public views on a carbon tax depend on the proposed use of revenue. *Issues in Energy and Environmental Policy,* (13).

Andersen, M. S. (2019). The politics of carbon taxation: how varieties of policy style matter. *Environmental Politics, 28*(6), 1084-1104.

Anderson, S., Marinescu, I., & Shor, B. (2019). *Can Pigou at the polls stop us melting the poles?* National Bureau of Economic Research (NBER) Working Paper No. 26146.

Andersson, J. J. (2019). Carbon taxes and CO 2 emissions: Sweden as a case study. *American Economic Journal: Economic Policy, 11*(4), 1-30.

Andersson, J., & Atkinson, G. (2020). *The distributional effects of a carbon tax: The role of income inequality.* Grantham Research Institute on Climate Change and the Environment.

Angel Tovar Reaños, M., & Lynch, M. A. (2019). *Distributional impacts of carbon taxation and revenue recycling: a behavioural microsimulation.* ESRI Working Paper 626, Dublin: ESRI. https://www.esri.ie/publications/distributional-impacts-of-carbon-taxation-and-revenue-recycling-a-behavioural

Aountú (2020). *Think outside the political cartel: Vótáil Aountú!* Olltogchán 2020. Retrieved September 21, 2022, from http://michaelpidgeon.com/manifestos/docs/aontu/Aontu%20GE%202020.pdf.

Arregui, N., Chen, R., Ebeke, C. H., Frie, J. M., Garcia-Macia, D., Iakova, D. M., ... & Weber, S. (2020). Sectoral Policies for Climate Change Mitigation in the EU. *Departmental Papers, 2020(014).*

CEU eTD Collection

Atteridge, A. (2011). *Multiple identities: behind South Africa's approach to climate diplomacy*. SEI Policy Brief. Available at: https://www.sei.org/publications/multiple-identities-behind-south-africas-approach-to-climate-diplomacy/

Badgley, G., Freeman, J., Hamman, J. J., Haya, B., Trugman, A. T., Anderegg, W. R., & Cullenward, D. (2021). *Systematic over-crediting in California's forest carbon offsets program.* bioRxiv.

Baker, L., Newell, P., & Phillips, J. (2014). The political economy of energy transitions: the case of South Africa. *New Political Economy, 19*(6), 791-818.

Baranzini, A., & Carattini, S. (2017). Effectiveness, earmarking and labeling: testing the acceptability of carbon taxes with survey data. *Environmental Economics and Policy Studies, 19*(1), 197-227.

Barrett, S. (2007). *Why cooperate?: the incentive to supply global public goods*. Oxford University Press on Demand.

Bataille, C., Guivarch, C., Hallegatte, S., Rogelj, J., & Waisman, H. (2018). Carbon prices across countries. *Nature Climate Change, 8*(8), 648-650.

Bättig, M. B., & Bernauer, T. (2009). National institutions and global public goods: are democracies more cooperative in climate change policy?. *International organization, 63*(2), 281-308.

Bazerman, M. H. (2006). Climate change as a predictable surprise. *Climatic Change, 77*(1-2), 179-193.

Beach, D., & Pedersen, R. B. (2013). *Process-tracing methods: Foundations and guidelines.* University of Michigan Press.

Beach, D., & Pedersen, R. B. (2019). *Process-tracing methods: Foundations and guidelines.* University of Michigan Press.

Beach, D., & Rohlfing, I. (2018). Integrating cross-case analyses and process tracing in set-theoretic research: Strategies and parameters of debate. *Sociological Methods & Research, 47*(1), 3-36.

Beiser-McGrath, L. F., & Bernauer, T. (2019). Could revenue recycling make effective carbon taxation politically feasible?. *Science advances, 5*(9), eaax3323.

Bercholz, M. and B. Roantree (2019). *Carbon taxes and compensation options, Budget Perspectives 2020/1*, Dublin: ESRI, https://doi.org/10.26504/bp202001

Bergquist, M., Nilsson, A., Harring, N., & Jagers, S. C. (2022). Meta-analyses of fifteen determinants of public opinion about climate change taxes and laws. *Nature Climate Change, 12*(3), 235-240.

Bergquist, P., Mildenberger, M., & Stokes, L. C. (2020). Combining climate, economic, and social policy builds public support for climate action in the US. *Environmental Research Letters, 15*(5), 054019.

Best, R., & Zhang, Q. Y. (2020). What explains carbon-pricing variation between countries?. *Energy Policy, 143*, 111541.

Best, R., Burke, P. J., & Jotzo, F. (2020). Carbon pricing efficacy: Cross-country evidence. *Environmental and Resource Economics, 77*(1), 69-94.

CEU eTD Collection

Bielenberg, K. (2019, October 12). *The Big Read: 'You can't put cattle on the bus' - the post-budget carbon tax backlash in rural Ireland. Independent.* Retrieved September 21, 2022, from https://www.independent.ie/life/the-big-read-you-cant-put-cattle-on-the-bus-the-post-budget-carbon-tax-backlash-in-rural-ireland-38583222.html.

Black, R., Cullen, K., Fay, B., Hale, T., Lang, J., Mahmood, S., Smith, S.M. (2021). *Taking Stock: A global assessment of net zero targets.* Energy & Climate Intelligence Unit and Oxford Net Zero. Available at: https://ca1-eci.edcdn.com/reports/ECIU-Oxford_Taking_Stock.pdf?mtime=20210323005817&focal=none

Böhm, S., & Dabhi, S. (eds) (2009). *Upsetting the offset: The political economy of carbon markets.* London: Mayfly.

Böhm, S., Misoczky, M. C., & Moog, S. (2012). Greening capitalism? A Marxist critique of carbon markets. *Organization Studies, 33*(11), 1617–1638. https://doi.org/10.1177/0170840612463326.

Böhringer, C., Rosendahl, K. E., & Storrøsten, H. B. (2017). Robust policies to mitigate carbon leakage. *Journal of Public Economics, 149*, 35-46.

Bolton, P., Despress, M., da Silva, L. A. P., Samama, F., & Svartzman, R. (2020). *The green swan—central banking and financial stability in the age of climate change*. Bank for International Settlements. Available at: https://www.bis.org/publ/othp31.htm

Bose, S., Bridges, A.L., DeFrancia, K. (2019). *Carbon pricing as a policy instrument to decarbonize economies.* Enel Foundation. Available at: https://www.enelfoundation.org/content/dam/enel-found/Carbon%20Pricing%20Report%20July%2019%202019%20FINAL1.pdf [04.04.2020]

Bourgeois, C., Giraudet, L. G., & Quirion, P. (2021). Lump-sum vs. energy-efficiency subsidy recycling of carbon tax revenue in the residential sector: A French assessment. *Ecological economics, 184*, 107006.

Boyce, J. K. (2018). Carbon pricing: effectiveness and equity. *Ecological Economics, 150*, 52-61.

Boyce, J. K. (2019). *The case for carbon dividends.* John Wiley & Sons.

Boyce, J. K. (2020). *Distributional issues in climate policy: air quality co-benefits and carbon rent.* In Handbook on the Economics of Climate Change. Edward Elgar Publishing.

Boyce, J. K., & Pastor, M. (2013). Clearing the air: incorporating air quality and environmental justice into climate policy. *Climatic change, 120*(4), 801- 814

Brenan, B. M. (2021, May 6). *Water pollution remains top environmental concern in U.S.* Gallup.Com. https://news.gallup.com/poll/347735/water-pollution-remains-top-environmental-concern.aspx.

Broome, J. (2020, December 1). *Why not a carbon tax? [Keynote Address].* Promises and Pitfalls of Taxing Carbon Conference, Rotterdam, the Netherlands (online). https://www.youtube.com/watch?v=3SOD1Bhy9zU

Bruin, D. and M. Yakut (2019). *The effects of an incremental increase in the Irish carbon tax towards 2030.* ESRI Working Paper 619, Dublin: ESRI, https://www.esri.ie/publications/the-effects-of-an-incremental-increase-in-the-irish-carbon-tax-towards-2030

CEU eTD Collection

Bruin, D., E. Monaghan and M. Yakut (2019). *The economic and distributional impacts of an increased carbon tax with different revenue recycling schemes*, ESRI Research Series 95, Dublin: ESRI, https://doi.org/10.26504/rs95.pdf

Brulle, R. J. (2018). The climate lobby: a sectoral analysis of lobbying spending on climate change in the USA, 2000 to 2016. *Climatic change, 149*(3), 289-303.

Bryant G. (2016b). Creating a level playing field? The concentration and centralisation of emissions in the European Union Emission Trading System. *Energy Policy, 99*, 308-318.

Bryant, G. (2016a). The politics of carbon market design: Rethinking the technopolitics and post-politics of climate change. *Antipode, 48*(4):877-898.

Bryant, G. (2019). *Carbon markets in a climate-changing capitalism.* Cambridge University Press.

Bulkeley, H., van der Heijden, J. and C. Certomà. (2019). *Urban climate politics: Agency and empowerment.* Cambridge University Press. https://books.google.hu/books?id=hbWQDwAAQBAJ

Bumpus, A., & Liverman, D. (2008). Accumulation by de-carbonization and the governance of carbon off sets. *Economic Geography, 84*(2), 127–155.

Burck, J., Hagen, U., Bals, C., Höhne, N., & Nascimento, L. (2020, December). *Climate change performance index 2021.* https://ccpi.org/download/the-climate-change-performance-index-2021/

Burke, M., Hsiang, S. M., & Miguel, E. (2015). Global non-linear effect of temperature on economic production. *Nature, 527*(7577), 235-239.

Burtraw, D., Keyes, A., & Zetterberg, L. (2018). *Companion policies under capped systems and implications for efficiency—the North American experience and lessons in the EU Context.* Washington, DC: Resources for the Future.

Byrne, A. (2019, November 26). *Hundreds of farmers roll tractors into Dublin city centre for protest over "demise of rural Ireland."* Irish Mirror. Retrieved September 21, 2022, from https://www.irishmirror.ie/news/irish-news/politics/farmers-protest-dublin-agriculture-creed-20964731.

Carattini, S., Carvalho, M., & Fankhauser, S. (2017). *How to make carbon taxes more acceptable.* London: Grantham Research Institute on Climate Change and the Environment, and Centre for Climate Change Economics and Policy, London School of Economics and Political Science. https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2017/12/How-to-make-carbon-taxes-more-acceptable.pdf.

Carattini, S., Carvalho, M., & Fankhauser, S. (2018). Overcoming public resistance to carbon taxes. Wiley Interdisciplinary Reviews: *Climate Change*, *9*(5), e531.

Carbon Pricing Corridors (CPC). (2017). *Carbon pricing corridors. The market view.* Available at: https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/002/112/original/Carbon-Pricing-Corridors-the-market-view.pdf?1495638527

Carbon Pricing Leadership Coalition. (CPLC). (2020, May). *Distributional impacts of carbon pricing on households.* https://openknowledge.worldbank.org/handle/10986/33686

Carbon Tax Center (2021). *FAQs.* https://www.carbontax.org/faqs/

CEU eTD Collection

CarbonBrief (2021). *The impacts of climate change at 1.5C, 2C and beyond.* https://interactive.carbonbrief.org/impacts-climate-change-one-point-five-degrees-two-degrees/?utm_source=web&utm_campaign=Redirect#

Carl, J., & Fedor, D. (2016). Tracking global carbon revenues: A survey of carbon taxes versus cap-and-trade in the real world. *Energy Policy, 96*, 50-77.

Carroll, R. (2020a, February 13). *Sinn Féin begins efforts to form leftwing coalition in Ireland.* The Guardian. Retrieved September 21, 2022, from https://www.theguardian.com/world/2020/feb/11/sinn-fein-begins-efforts-form-leftwing-alliance-ireland-election-mary-lou-mcdonald.

Carroll, R. (2020b, July 1). *Ireland's old political rivals hold talks over historic coalition.* The Guardian. Retrieved September 21, 2022, from https://www.theguardian.com/world/2020/mar/26/ireland-old-political-rivals-fine-gael-fianna-fail-hold-talks-historic-coalition.

Central Statistics Office of Ireland [CSO] (2016). *Census of Population 2016 - Profile 4 Households and Families.* Available at: https://www.cso.ie/en/releasesandpublications/ep/p-cp4hf/cp4hf/hhlds/

Central Statistics Office of Ireland [CSO] (2019). *Urban and Rural Life in Ireland, 2019.* Available at: https://www.cso.ie/en/releasesandpublications/ep/p-urli/urbanandrurallifeinireland2019/introduction/

Central Statistics Office of Ireland [CSO] (2022b). *Survey on Income and Living Conditions (SILC) 2021. [dataset].* https://www.cso.ie/en/releasesandpublications/ep/p-silc/surveyonincomeandlivingconditionssilc2021/income/

Central Statistics Office of Ireland [CSO]. (2022a). *Fossil fuel subsidies 2020.* Available at: https://www.cso.ie/en/releasesandpublications/ep/p-ffes/fossilfuelsubsidies2020/

Cherp, A., Jewell, J., & Goldthau, A. (2011). Governing global energy: systems, transitions, complexity. *Global Policy, 2*(1), 75-88.

Ciplet, D., Roberts, J. T., & Khan, M. R. (2015). *Power in a warming world: The new global politics of climate change and the remaking of environmental inequality.* MIT Press.

Citizens' Assembly. (2017). *The Citizens Assembly.* Meeting Sunday, 5th November 2017 in the Grand Hotel, Malahide, County Dublin [Transcript]. Retrieved September 3, 2022, from https://2016-2018.citizensassembly.ie/en/Meetings/Climate-Change-Voting-Transcript-5-November-2017.pdf.

Citizens' Assembly. (2018a, April). *How the State can make Ireland a leader in tackling climate change.* Final Report. Retrieved September 3, 2022, from https://2016-2018.citizensassembly.ie/en/How-the-State-can-make-Ireland-a-leader-in-tackling-climate-change/Final-Report-on-how-the-State-can-make-Ireland-a-leader-in-tackling-climate-change/Climate-Change-Report-Final.pdf.

Citizens' Assembly. (2018b, April). *How the State can make Ireland a leader in tackling climate change.* Appendix F. Retrieved September 3, 2022, from https://2016-2018.citizensassembly.ie/en/How-the-State-can-make-Ireland-a-leader-in-tackling-climate-change/Final-Report-on-how-the-State-can-make-Ireland-a-leader-in-tackling-climate-change/Appendix-V5.pdf.

CEU eTD Collection

Citizens' Assembly. (2022). *How the State can make Ireland a leader in tackling climate change.* The Citizens' Assembly. Retrieved August 15, 2022, from https://2016-2018.citizensassembly.ie/en/How-the-State-can-make-Ireland-a-leader-in-tackling-climate-change/How-the-State-can-make-Ireland-a-leader-in-tackling-climate-change.html.

Climate Change Advisory Council [CCAC]. (2020). *Annual review*. Available at: https://www.climatecouncil.ie/councilpublications/annualreviewandreport/

Climate Change Advisory Council [CCAC]. (2021). *Annual review.* Available at: https://www.climatecouncil.ie/councilpublications/annualreviewandreport/

Climate Change Advisory Council. (2018, July). *Annual review 2018* (No. 978-1-84095-788–4). Retrieved September 3, 2022, from https://www.climatecouncil.ie/media/climatechangeadvisorycouncil/contentassets/publications/CCAC_AnnualReview2018.pdf.

Climate Policy Info Hub (2021, April). *The costs of mitigation: An overview.* Retrieved at 04.04.2021 from: https://climatepolicyinfohub.eu/costs-mitigation-overview#footnote3_ju82m3f.

Clinch, J. P., Dunne, L., & Dresner, S. (2006). Environmental and wider implications of political impediments to environmental tax reform. *Energy Policy, 34*(8), 960-970.

Coase, R. E. (1960). The problem of social cost. *The Journal of Law and Economics, 3*, 1-44.

Coelho, R. (2009). *Rent seeking and corporate lobbying in climate negotiations. Upsetting the offset: The political economy of carbon markets.* London: MayFlyBooks, 203-213.

Coelho, R., (2015). *The high cost of cost-efficiency: A critique of carbon trading.* Doctoral Dissertation. Universidade de Coimbra.

Coen, D. (1997). The evolution of the large firm as a political actor in the European Union. *Journal of European Public Policy, 4*:1, 91-108.

Cole, D. H. (2008). Climate change and collective action. *Current Legal Problems, 61*(1), 229-264.

Cologna, V., & Siegrist, M. (2020). The role of trust for climate change mitigation and adaptation behaviour: A meta-analysis. *Journal of Environmental Psychology, 69*, 101428.

Comptroller and Auditor General (2019, September*). Report on the accounts of the public services 2018.* Retrieved September 1, 2022, from https://www.audit.gov.ie/en/find-report/publications/report%20on%20the%20accounts%20of%20the%20public%20services/report-on-the-accounts-of-the-public-services-2020.html.

Congleton, R. D. (2019). *The political economy of rent creation and rent extraction*. In The Oxford Handbook of Public Choice (Vol. 1, pp. 604–627). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190469733.013.26)

Congleton, R. D. (2019a). *Rational Choice and Politics: An Introduction to the Research Program and Methodology of Public Choice*. In The Oxford Handbook of Public Choice (Vol. 1, pp. 3-24). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190469733.013.26)

Convery, F., L. Dunne and D. Joyce (2013). *Ireland's carbon tax and the fiscal crisis: issues in fiscal adjustment, environmental effectiveness, competitiveness, leakage and equity*

CEU eTD Collection

implications. OECD Environment Working Papers, No. 59, OECD Publishing, Paris, https://doi.org/10.1787/5k3z11j3w0bw-en.

Cooper, G. S., Willcock, S., & Dearing, J. A. (2020). Regime shifts occur disproportionately faster in larger ecosystems. *Nature communications*, *11*(1), 1-10.

Coplan, K. (2016). Fossil fuel abolition: Legal and social issues. *Columbia Journal of Environmental Law*, *41*(2), 223–312.

Costanza, R., Cumberland, J. H., Daly, H., Goodland, R., Norgaard, R. B., Kubiszewski, I., & Franco, C. (2014). *An introduction to ecological economics*, Ch 2: The Historical Development of Economics and Ecology (p. 25-86).

Creswell, J. W., & Clark, V. L. P. (2011). *Designing and conducting mixed methods research (2nd ed.).* Thousand Oaks, California: SAGE Publications.

Cronin, J. A., Fullerton, D., & Sexton, S. (2019). Vertical and horizontal redistributions from a carbon tax and rebate. *Journal of the Association of Environmental and Resource Economists*, *6*(S1), S169-S208.

Crowley, K. (2017). Up and down with climate politics 2013–2016: the repeal of carbon pricing in Australia. *Wiley Interdisciplinary Reviews: Climate Change*, *8*(3), e458.

Cullenward, D. (2017). California's Foreign Climate Policy. *Global Summitry 3*(1): 1–26.

Cunningham, P. (2020, March 11). *Significant progress towards new government - now what?* RTE.Ie. Retrieved September 21, 2022, from https://www.rte.ie/news/politics/2020/0311/1121563-politics/.

Dabla-Norris and others (2023). *Public perceptions of climate mitigation policies: Evidence from cross-country surveys*. Staff Discussion Note SDN2023/002. International Monetary Fund, Washington, DC. https://doi.org/10.5089/9798400229756.006

Danish Environmental Protection Agency (2018). Danish consumption and emission of F-gases. Available online at: https://www2.mst.dk/Udgiv/publications/2018/02/978-87-93614-62-8.pdf, last accessed August 12, 2021.

De Bruin, K. C., Monaghan, E., & Yakut, A. M. (2019). *The impacts of removing fossil fuel subsidies and increasing carbon tax in Ireland (No. 98).* ESRI Research Series. https://www.esri.ie/publications/the-impacts-of-removing-fossil-fuel-subsidies-and-increasing-carbon-tax-in-ireland

Dechezleprêtre, A., Fabre, A., Kruse, T., Planterose, B., Chico, A. S., & Stantcheva, S. (2022). *Fighting climate change: International attitudes toward climate policies.* Centre for Climate Change Economics and Policy Working Paper 409/Grantham Research Institute on Climate Change and the Environment Working Paper 384. London: London School of Economics and Political Science. https://doi.org/10.3386/w30265.

Del Río, P., & Labandeira, X. (2009). Barriers to the introduction of market-based instruments in climate policies: an integrated theoretical framework. *Environmental economics and policy studies*, *10*(1), 41-68.

Department of Finance (DOF) (2019, July). *Climate action and tax.* Tax Strategy Group TSG 19/04. Retrieved September 12, 2022, from https://assets.gov.ie/19116/c447474fea5e422080a6384b7a84fbed.pdf

CEU eTD Collection

Department of Finance (DOF) (2021, September). *Climate action and tax paper*. Budget 2022 Tax Strategy Group papers. Retrieved September 15, 2022, from https://www.gov.ie/en/collection/d6bc7-budget-2022-tax-strategy-group-papers/.

Department of Public Expenditure and Reform (DPER) (2019a). *The carbon tax increase - what it will be spent on.* Retrieved September 15, 2022, from https://www.gov.ie/en/collection/b4c8d-budget-2020/.

Department of Public Expenditure and Reform (DPER) (2019b). *The budget in brief. A citizen's guide to budget 2020.* Retrieved September 15, 2022, from https://www.gov.ie/en/collection/b4c8d-budget-2020/.

Department of Public Expenditure and Reform (DPER) (2020). *Budget 2021. The use of carbon tax funds 2021*. Retrieved September 23, 2022, from https://www.gov.ie/en/collection/4e0ff-budget-2021/.

Di Gregorio, M., Fatorelli, L., Paavola, J., Locatelli, B., Pramova, E., Nurrochmat, D. R., ... & Kusumadewi, S. D. (2019). Multi-level governance and power in climate change policy networks. *Global Environmental Change, 54*, 64-77.

Dietz, T., Ostrom, E., & Stern, P. C. (2003). The struggle to govern the commons. *Science, 302*(5652), 1907-1912.

Directorate-General for Climate Action. (2015). *EU ETS handbook*. Retrieved from: https://ec.europa.eu/clima/sites/clima/files/docs/ets_handbook_en.pdf.

Dixit, A. K., Skeath, S., & Reiley, D. H. (2015). *Games of strategy.* New York: W.W. Norton & Company.

Dolphin, G., & Pollitt, M. (2018). International spillovers and carbon pricing policies. https://doi.org/10.17863/cam.21804.

Dolphin, G., Pollitt, M. G., & Newbery, D. M. (2020). The political economy of carbon pricing: Panel analysis. *Oxford Economic Papers, 72*(2), 472–500.

Dominioni, G., & Faure, M. (2022). Environmental Policy in Good and Bad Times: The Countercyclical Effects of Carbon Taxes and Cap-and-Trade. *Journal of Environmental Law, 34*(2), 269-286.

Dominioni, G., & Heine, D. (2019). Behavioural Economics and Public Support for Carbon Pricing: A Revenue Recycling Scheme to Address the Political Economy of Carbon Taxation. *European Journal of Risk Regulation: EJRR, 10*(3), 554-570.

Dorband, I. I., Jakob, M., Kalkuhl, M., & Steckel, J. C. (2019). Poverty and distributional effects of carbon pricing in low-and middle-income countries–A global comparative analysis. *World Development, 115*, 246-257.

Douenne, T. (2020). The vertical and horizontal distributive effects of energy taxes: A case study of a french policy. *The Energy Journal, 41*(3).

Douenne, T., & Fabre, A. (2022). Yellow vests, pessimistic beliefs, and carbon tax aversion. *American Economic Journal: Economic Policy, 14*(1), 81-110.

Drews, S., Savin, I., Van Den Bergh, J. C., & Villamayor-Tomás, S. (2022). Climate concern and policy acceptance before and after COVID-19. *Ecological Economics, 199*, 107507.

CEU eTD Collection

Dür, A. (2008). Interest Groups in the European Union: How Powerful Are They?, *West European Politics, 31*:6, 1212-30

Dür, A. (2008). Measuring interest group influence in the EU. A note on methodology. *European Union Politics, 9*(4), 559-576.

Dür, A. (2008a). Measuring Interest Group Influence in the EU. A Note on Methodology. *European Union Politics, 9*:4, 559-576.

Dusa, A. (2018). *QCA with R. Springer*.

Edenhofer, O., Jakob, M., Creutzig, F., Flachsland, C., Fuss, S., Kowarsch, M., ... & Steckel, J. C. (2015). Closing the emission price gap. *Global environmental change, 31*, 132-143.

Ellerman, A., Convery, F., & De Perthuis, C. (2010). *Pricing carbon: the European Union emissions trading scheme.* Cambridge: Cambridge University Press.

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62:1, 107-115.

Environmental Protection Agency (2022a). *Greenhouse gas emissions (GHG).* Key messages. https://www.epa.ie/our-services/monitoring--assessment/climate-change/ghg/key-messages/

Environmental Protection Agency (2022b). *Access to current permits.* https://www.epa.ie/our-services/licensing/climate-change/eu-emissions-trading-system-/emissions-trading-system---stationary-installations/access-to-current-permits-/

Ervine, K. (2018). How low can it go? Analysing the political economy of carbon market design and low carbon prices. *New Political Economy, 23*(6), 690–710.

Esty, D. C., & Moffa, A. L. (2012). Why climate change collective action has failed and what needs to be done within and without the trade regime. *Journal of International Economic Law, 15*(3), 777-791.

European Commission (2012). *2020 climate & energy package*. European Commission, Directorate General for Climate Action. https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2020-climate-energy-package_en#documentation

European Commission (2020). *Report from the Commission to the European Parliament and the Council. Report on the functioning of the European carbon market.* Retrieved September 3, 2022, from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0740&from=EN (Accessed on 08.16.2022).

European Commission. (2021). *Increasing the ambition of EU Emissions Trading. Climate action.* https://ec.europa.eu/clima/eu-action/european-green-deal/delivering-european-green-deal/increasing-ambition-eu-emissions-trading_en.

European Commission. (2022). *EU Emissions Trading System (EU ETS).* Climate Action. https://ec.europa.eu/clima/eu-action/eu-emissions-trading-system-eu-ets_en

European Environment Agency (2022a). *European Union Emissions Trading System (EU ETS) data from EUTL [Dataset]*. Retrieved September 3, 2022, from https://www.eea.europa.eu/data-and-maps/data/european-union-emissions-trading-scheme-17.

CEU eTD Collection

European Environment Agency (2022b). *Deliveries for use of auctioning revenue and project credits.* Reporting Obligations Database. https://rod.eionet.europa.eu/obligations/698/deliveries

European Environment Agency (EEA) (2019). *Economic losses from climate-related extremes in Europe.* Indicator Assessment, European Environment Agency, Copenhagen. https://www.eea.europa.eu/data-and-maps/indicators/direct-losses-from-weather-disasters-3/assessment-2.

European Environment Agency. (2019, October). *Air quality in Europe — 2019 report*. Retrieved from https://www.eea.europa.eu/publications/air-quality-in-europe-2019.

Eurostat (2022a). *Gini coefficient of equivalised disposable income - EU-SILC survey [dataset]*. ILC_DI12. https://ec.europa.eu/eurostat/databrowser/view/ilc_di12/default/table?lang=en

Eurostat (2022b). *Persons at risk of poverty or social exclusion by age and sex [dataset]*. ILC_PEPS01N. https://ec.europa.eu/eurostat/web/income-and-living-conditions/data/database?p_p_id=NavTreeportletprod_WAR_NavTreeportletprod_INSTANCE_CEM7npyJJgVL&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view

Eurostat. (2022c). *Greenhouse gas emissions per capita 2009-2020 [Dataset]*. http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=t2020_rd300&lang=en

Eurostat. (2023). *EU gas consumption decreased by 19%*. News articles. Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/DDN-20230221-1.

Ezrow, L., De Vries, C., Steenbergen, M., & Edwards, E. (2011). Mean voter representation and partisan constituency representation: Do parties respond to the mean voter position or to their supporters?. *Party Politics, 17*(3), 275-301.

Fahy, D. (2020). *Ecological modernisation, Irish-style: Explaining Ireland's slow transition to low-carbon society.* In: Robbins, D., Torney, D., Brereton, P. (eds) Ireland and the Climate Crisis. Palgrave Studies in Media and Environmental Communication. Palgrave Macmillan, Cham.

Fairbrother, M. (2022). Public opinion about climate policies: A review and call for more studies of what people want. *PLoS Climate, 1*(5), e0000030.

Fankhauser, S., Gennaioli, C., & Collins, M. (2015). The political economy of passing climate change legislation: Evidence from a survey. *Global Environmental Change, 35*, 52-61.

Feindt, S., Kornek, U., Labeaga, J. M., Sterner, T., & Ward, H. (2021). Understanding regressivity: Challenges and opportunities of European carbon pricing. *Energy Economics*, *103*, 105550.

Fianna Fáil (2020). *An Ireland for all. Manifesto 2020.* Retrieved September 21, 2022, from https://www.tcd.ie/Political_Science/people/michael_gallagher/Manifestoes2020/FFManifesto20.pdf.

Fine Gael (2020). *A future to look forward to.* Retrieved September 21, 2022, from http://michaelpidgeon.com/manifestos/docs/fg/Fine%20Gael%20GE%202020.pdf.

Finn, C. (2020). *"We will take down the government" - Green Party members promised drastic action if promises are broken.* TheJournal.Ie. Retrieved September 21, 2022, from https://www.thejournal.ie/green-party-government-formation-2-5125385-Jun2020/.

CEU eTD Collection

Finon, D. (2019). Carbon policy in developing countries: Giving priority to non-price instruments. *Energy Policy, 132*, 38-43.

Fiorino, D. J. (2019). *Can democracy handle climate change?* John Wiley & Sons.

Fitzgerald, L. M., Tobin, P., Burns, C., & Eckersley, P. (2021). The 'stifling'of new climate politics in Ireland. *Politics and Governance, 9*(2), 41-50.

Frank, R. H. (2014). *Microeconomics and Behavior, 9th edition.* New York, NY: McGraw-Hill Education.

Fremstad, A., & Paul, M. (2019). The impact of a carbon tax on inequality. *Ecological Economics, 163*, 88-97.

Furceri, D., Ganslmeier, M. and Ostry, M. J. D.(2021). *Are climate change policies politically costly?* IMF Working Papers 2021/156, International Monetary Fund. Available at: https://www.imf.org/en/Publications/WP/Issues/2021/06/04/Are-Climate-Change-Policies-Politically-Costly-460565

George, A.L., & Bennett, A. (2005). *Case studies and theory development in the social sciences.* BCSIA Studies in International Security. Cambridge, Massachusetts: MIT Press.

Gilbertson, T., Reyes, O. (2009). *Carbon trading: How it works and why it fails.* Dag Hammarskjöld Foundation, Uppsala.

Gillingham, K., & Stock, J. H. (2018). The cost of reducing greenhouse gas emissions. *Journal of Economic Perspectives, 32*(4), 53-72.

Gold, L. (2020). *The changing faces of the climate movement in Ireland.* In: Robbins, D., Torney, D., Brereton, P. (eds) Ireland and the climate crisis. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-47587-1_15.

Goulder, L. H. (1995). Environmental taxation and the double dividend: a reader's guide. *International tax and public finance, 2*, 157-183.

Government of Canada. (2008, February). *British Columbia's climate action dividends.* The Official Website of the Government of Canada. https://www.ic.gc.ca/eic/site/bsf-osb.nsf/eng/br01836.html.

Government of Ireland (2007). *Programme for Government 2007-2012.* Retrieved July 29, 2022, from http://michaelpidgeon.com/manifestos/docs/pfgs/PfG%202007%20-%202009%20-%20FF-Green-PD.pdf.

Government of Ireland (2010). *Finance Act 2010.* Irish Statue Book. Available at: https://www.irishstatutebook.ie/eli/2010/act/5/enacted/en/html.

Government of Ireland (2015). *Climate Action and Low Carbon Development Act 2015.* Retrieved August 15, 2022, from https://www.irishstatutebook.ie/eli/2015/act/46/enacted/en/print.

Government of Ireland (2016a). *Annual transition statement 2016.* Retrieved July 12, 2022, from https://www.gov.ie/en/publication/339e0-annual-transition-statement-2016/.

Government of Ireland (2016b). *A programme for a partnership government.* Retrieved August 15, 2022, from https://www.merrionstreet.ie/merrionstreet/en/imagelibrary/programme_for_partnership_government.pdf.

CEU eTD Collection

Government of Ireland (2017). *National Mitigation Plan*. Retrieved August 15, 2022, from https://www.gov.ie/en/publication/48d4e-national-mitigation-plan/.

Government of Ireland (2018a). *National Adaptation Framework.* Retrieved August 15, 2022, from https://www.gov.ie/en/publication/fbe331-national-adaptation-framework/.

Government of Ireland (2018b). *Project Ireland 2040.* Retrieved August 15, 2022, from https://assets.gov.ie/7335/7692660a70b143cd92b1c65ee892b05c.pdf.

Government of Ireland (2018c). *National Planning Framework.* Retrieved August 15, 2022, from https://www.gov.ie/pdf/?file=https://assets.gov.ie/166/310818095340-Project-Ireland-2040-NPF.pdf#page=1.

Government of Ireland (2018d). *National Development Plan 2018—2027.* Retrieved August 15, 2022, from https://www.gov.ie/pdf/?file=https://assets.gov.ie/37937/12baa8fe0dcb43a78122fb316dc51277.pdf#page=null.

Government of Ireland (2018e). *Investing in the transition to a low-carbon and climate-resilient society.* Retrieved August 2, 2022, from https://www.gov.ie/en/publication/f0eaa-investing-in-the-transition-to-a-low-carbon-and-climate-resilient-society/.

Government of Ireland (2018f). *Climate Action Fund.* Retrieved August 2, 2022, from https://www.gov.ie/en/publication/de5d3-climate-action-fund/#climate-action-call-for-applications-call-1.

Government of Ireland (2019a). *Climate Action Plan 2019.* Retrieved August 11, 2022, from https://www.gov.ie/en/publication/ccb2e0-the-climate-action-plan-2019/.

Government of Ireland (2019b). *Climate Action Plan Progress Reports.* Retrieved August 15, 2022, from https://www.gov.ie/en/publication/55fde-climate-action-important-publications/.

Government of Ireland (2019c). *Ireland's National Energy and Climate Plan 2021-2030.* Retrieved August 13, 2022, from https://www.gov.ie/en/publication/0015c-irelands-national-energy-climate-plan-2021-2030/.

Government of Ireland (2019d). *Budget 2020 statement of the Minister for Finance and Public Expenditure and Reform, Paschal Donohoe TD.* Retrieved September 15, 2022, from https://www.gov.ie/en/speech/b140d9-budget-2020-statement-of-the-minister-for-finance-and-public-expendi/.

Government of Ireland (2019e). *Finance Act 2019*. Irish Statue Book. Retrieved August 15, 2022, from https://www.irishstatutebook.ie/eli/2019/act/45/enacted/en/html.

Government of Ireland (2020a). *Programme for government: Our shared future.* Retrieved August 8, 2022, from https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/ (Accessed on August, 8, 2022).

Government of Ireland (2020b). *Finance Act 2020.* Irish Statue Book. Retrieved August 15, 2022, from https://www.irishstatutebook.ie/eli/2020/act/26/enacted/en/html.

Government of Ireland (2021a). *Climate Action and Low Carbon Development (Amendment) Act 2021*. Retrieved August 10, 2022, from https://data.oireachtas.ie/ie/oireachtas/act/2021/32/eng/enacted/a3221.pdf.

CEU eTD Collection

Government of Ireland (2021b). *Climate Action Plan 2021*. Retrieved August 10, 2022, from https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/.

Government of Ireland (2021c). *National Development Plan 2021-2030.* Retrieved August 15, 2022, from https://www.gov.ie/en/publication/774e2-national-development-plan-2021-2030/.

Government of Ireland (2022). *School transport.* Retrieved August 15, 2022, from https://www.gov.ie/en/service/07a71-school-transport/.

Government of Ireland (GOI) (2014). *National Policy Position on Climate Action and Low Carbon Development.* Retrieved August 15, 2022, from https://www.gov.ie/en/publication/6f393-national-climate-policy-position/.

Government of Ireland. (2021d, March 23). *Government approves landmark Climate Bill putting Ireland on the path to net-zero emissions by 2050* [Press release]. Retrieved August 15, 2022, from https://www.gov.ie/en/press-release/22e97-government-approves-landmark-climate-bill-putting-ireland-on-the-path-to-net-zero-emissions-by-2050/.

Gowdy, J., & Erickson, J. D. (2005). The approach of ecological economics. *Cambridge Journal of Economics, 29*(2), 207-222.

Gramsci, A. (2007). *Selections from the Prison Notebooks*. New York, USA: Duke University Press. https://doi.org/10.1515/9780822390169-020

Grantham Research Institute (2022). *Friends of the Irish Environment v. Ireland*. Retrieved August 20, 2022, from https://climate-laws.org/geographies/ireland/litigation_cases/friends-of-the-irish-environment-v-ireland.

Green Party (2020a). *Carbon dividend policy.* Retrieved April 5, 2023 from https://www.greenparty.ie/sites/default/files/2021-12/GP_CARBON_DIVIDEND_POLICY_JUNE2020.pdf.

Green Party (2020b). *Towards 2030. A decade of change.* Manifesto. Retrieved September 21, 2022, from http://michaelpidgeon.com/manifestos/docs/green/Green%20Party%20GE%202020.pdf.

Green-Pedersen, C., & Little, C. (2022): The issue content of party politics in Ireland: a new perspective on the Irish party system and its development. *Irish Political Studies,* 1-25. DOI: 10.1080/07907184.2022.2036039.

Gulbrandsen, L. H., Wettestad, J., Victor, D. G., & Underdal, A. (2019). The political roots of divergence in carbon market design: implications for linking. *Climate Policy, 19*(4), 427-438.

Haas, T. (2019). Struggles in European Union energy politics: A gramscian perspective on power in energy transitions. *Energy Research & Social Science, 48*, 66-74.

Hajat, A., Hsia, C., & O'Neill, M. S. (2015). Socioeconomic disparities and air pollution exposure: a global review. *Current environmental health reports, 2*(4), 440-450.

Hall, P. A. (1997). *The role of interests, institutions, and ideas in the comparative political economy of the industrialized nations*. In ed. M. I. Lichbach and A. S. Zuckerman. Comparative Politics: Rationality, Culture, and Structure. Cambridge: Cambridge University Press.

Hall, R. L., and Deardorff, A. V. (2006). Lobbying as legislative subsidy. *American Political Science Review, 100*:1, 69-84.

CEU eTD Collection

Hänsel, M. C., Drupp, M. A., Johansson, D. J., Nesje, F., Azar, C., Freeman, M. C., ... & Sterner, T. (2020). Climate economics support for the UN climate targets. *Nature Climate Change, 10*(8), 781-789.

Hardin, G. (1968). The tragedy of the commons. *Science 162,* 1243–8.

Harris, J.M., & Roach, B. (2017). *Environmental and Natural Resource Economics: A Contemporary Approach* (4th ed.). Routledge. https://doi.org/10.4324/9781315620190

Harris, P. G. (2007). Collective action on climate change: the logic of regime failure. *Nat. Resources J., 47,* 195.

Harrison, K. (2012). A tale of two taxes: The fate of environmental tax reform in Canada. *Review of Policy Research, 29*(3), 383-407.

Harrison, K. (2013). *The political economy of British Columbia's carbon tax.* OECD Environment Working Papers, No. 63, OECD Publishing, Paris, https://doi.org/10.1787/5k3z04gkkhkg-en.

Harrisson, T. (2020, January 3). *In-depth Q&A: How 'Article 6' carbon markets could 'make or break' the Paris Agreement.* CarbonBrief. https://www.carbonbrief.org/in-depth-q-and-a-how-article-6-carbon-markets-could-make-or-break-the-paris-agreement

Haug, C., Eden, A., & de Oca, M. M. (2018). *Addressing the distributional impacts of carbon pricing policies.* Berlin, adelphi. Available at: https://www.adelphi.de/en/system/files/mediathek/bilder/Addressing%20distributional%20impacts%20of%20carbon%20pricing%20policies%20-%20adelphi.pdf.

Heckelman, J. C. (2019). *Collective action*. In The Oxford Handbook of Public Choice (Vol. 1, pp. 467-488). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190469733.013.26).

Hillman, A. L., & Van Long, N. (2019). *Rent seeking: the social cost of contestable benefits.* In The Oxford Handbook of Public Choice (Vol. 1, pp. 489-518). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780190469733.013.26)

Hines, J. M., Hungerford, H. R., & Tomera, A. N. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *The Journal of environmental education, 18* (2), 1–8.

Holcombe, R. G. (2016). *Political markets: Interest groups, rent-seeing, and regulatory capture.* In Advanced introduction to public choice pp. 73-83. Edward Elgar Publishing.

Homer-Dixon, T. (2011). Complexity science. *Oxford Leadership Journal, 2*(1), 1-15.

Hsiang, S., & Kopp, R. E. (2018). An economist's guide to climate change science. *Journal of Economic Perspectives, 32*(4), 3-32.

Hu, X., Cheng, X., & Qiu, X. (2020). Impact of carbon price on renewable energy using power market system. *Lecture Notes in Electrical Engineering,* 671–677. https://doi.org/10.1007/978-981-15-2341-0_84.

Hutton, B., Bray, J., Carswell, S., & Horgan-Jones, J. (2020, February 11). *Election 2020: Doherty to lead Sinn Féin negotiations with smaller parties.* The Irish Times. Retrieved September 21, 2022, from https://www.irishtimes.com/news/politics/smaller-parties-raise-doubts-over-prospect-of-a-sinn-f%C3%A9in-led-leftist-coalition-1.4170243.

CEU eTD Collection

ICAP. (2021). *Emissions Trading Worldwide: Status Report 2021*. Berlin: International Carbon Action Partnership.

Ide, T. (2020). Recession and fossil fuel dependence undermine climate policy commitments. *Environmental Research Communications, 2*(10), 101002.

IEA (2012). *Energy technology perspectives 2012*. Available at: http://www.iea.org/etp/publications/etp2012/

IMF (2021). *Ireland: Selected issues. IMF country report No. 21/124.* https://www.imf.org/en/Publications/CR/Issues/2021/06/15/Ireland-Selected-Issues-460785

IMF (2022). *Ireland: Selected issues.* DOI: https://doi.org/10.5089/9798400213380.002

IMF and OECD (2021). *Tax policy and climate change.* IMF/OECD Report for the G20. Available at: https://www.oecd.org/tax/tax-policy/imf-oecd-g20-report-tax-policy-and-climate-change.htm

In, S. Y., & Schumacher, K. (2021). *Carbonwashing: A New Type of ESG Greenwashing in a Post-Paris Climate Agreement World.* Available at SSRN 3833668.

Independent.ie. (2019, October 8). *Paschal Donohoe on new carbon tax, housing and rural broadband [Video]*. YouTube. Retrieved October 6, 2022, from https://www.youtube.com/watch?v=OmLOq_qrbmU

Inglehart, R. (1990). *Culture shift in advanced industrial society.* Princeton University Press, Princeton, New Jersey. https://doi.org/10.1515/9780691186740.

Institute for Climate Economics. (2020). *Global carbon accounts 2020.* Retrieved from: https://www.i4ce.org/download/global-carbon-account-in-2020/.

Institute for Climate Economics. (2022). *Global carbon accounts 2022*. Retrieved from: https://www.i4ce.org/wp-content/uploads/2022/09/220915-18h13-i4ce3632-ComptesMondiaux2022-VA-10p.pdf.

Intergovernmental Panel on Climate Change (IPCC) (2007). *Chapter 2: Changes in atmospheric constituents and radiative forcing. Climate change 2013: The physical science basis.* Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. pp. 129–234.

International Energy Agency (IEA) (2020). *World Energy Outlook 2020.* OECD Publishing, Paris, https://doi.org/10.1787/557a761b-en.

International Labour Organization (ILO) (2012). *Working towards sustainable development. Opportunities for decent work and social inclusion in a green economy.* Geneva: International Labour Office

International Monetary Fund [IMF] (2019, May). *Fiscal policies for Paris climate strategies—from principle to practice.* Retrieved from https://www.imf.org/en/Publications/Policy-Papers/Issues/2019/05/01/Fiscal-Policies-for-Paris-Climate-Strategies-from-Principle-to-Practice-46826.

IPCC. (2018, October). *Global Warming of 1. 5°C.An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.* Retrieved from https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf.

CEU eTD Collection

IPCC. (2023, March). *Sixth assessment report.* Retrieved from https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf.

Jagers, S. C., Martinsson, J., & Matti, S. (2018). The impact of compensatory measures on public support for carbon taxation: An experimental study in Sweden. *Climate Policy,* 147–160. doi:10.1080/14693062.2018.1470963.

Jakob, M., Chen, C., Fuss, S., Marxen, A., Rao, N. D., & Edenhofer, O. (2016). Carbon pricing revenues could close infrastructure access gaps. *World Development, 84*, 254-265.

Jenkins, J. D. (2014). Political economy constraints on carbon pricing policies: What are the implications for economic efficiency, environmental efficacy, and climate policy design? *Energy Policy, 69*, 467–77.

Jenkins, J. D. (2019, November 11). *Why carbon pricing falls short.* Retrieved from https://kleinmanenergy.upenn.edu/policy-digests/why-carbon-pricing-falls-short.

Jenkins, J. D., & Karplus, V. J. (2017). *Carbon pricing under political constraints: Insights for accelerating clean energy transitions.* In Zinaman, O., Arndt, C., Tarp, F., Miller M., & Arent, D. J. (Eds.), The political economy of clean energy transitions (pp. 39–59). Oxford, United Kingdom: Oxford University Press.

Jenkins, J.D., Stokes, L. and Wagner, G. (Eds). (2020). *Carbon pricing and innovation in a world of political constraints.* Workshop Report. Available at: https://gwagner.com/wp-content/uploads/Jenkins-Stokes-Wagner-2020-Carbon-Pricing-Workshop.pdf

Jenkins, K. E., Sovacool, B. K., Błachowicz, A., & Lauer, A. (2020). Politicising the just transition: Linking global climate policy, Nationally Determined Contributions and targeted research agendas. *Geoforum*.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of financial economics, 3*(4), 305-360.

Jewell, J., & Cherp, A. (2020). On the political feasibility of climate change mitigation pathways: Is it too late to keep warming below 1.5 C?. *Wiley Interdisciplinary Reviews: Climate Change, 11*(1), e621.

Ji, C. J., Hu, Y. J., & Tang, B. J. (2018). Research on carbon market price mechanism and influencing factors: a literature review. *Natural Hazards, 92*(2), 761-782.

Johnstone, P., & Newell, P. (2018). Sustainability transitions and the state. *Environmental innovation and societal transitions, 27*, 72-82.

Kaplowitz, S. A., & McCright, A. M. (2015). Effects of policy characteristics and justifications on acceptance of a gasoline tax increase. *Energy Policy, 87,* 370–381. doi:10.1016/j.enpol.2015.08.037.

Karapin, R. (2016). *Political opportunities for climate policy*. Cambridge: Cambridge University Press.

Karapin, R. (2020). The political viability of carbon pricing: Policy design and framing in British Columbia and California. *Review of Policy Research, 37*(2), 140-173.

Kaupa, C. (2019a, November 19). "*Market-based" approaches to regulating emissions: cap-and-trade and carbon tax.* Retrieved from https://medium.com/climate-change-law/7-national-and-regional-regulation-of-emissions-i-market-based-approaches-cap-and-trade-and-b128755a82c5.

CEU eTD Collection

Kaupa, C. (2019b, September 5). *The international climate change regime - Climate Change Law*. Retrieved March 19, 2021, from https://medium.com/climate-change-law/5-the-international-climate-change-regime-15a45d33988.

Keohane, R. O., & Oppenheimer, M. (2016). Paris: Beyond the climate dead end through pledge and review?. *Politics and Governance, 4*(3), 142-151.

Klenert, D., Mattauch, L., Combet, E., Edenhofer, O., Hepburn, C., Rafaty, R., & Stern, N. (2018). Making carbon pricing work for citizens. *Nature Climate Change, 8*(8), 669-677.

Konc, T., Drews, S., Savin, I., & van den Bergh, J. C. (2022). Co-dynamics of climate policy stringency and public support. *Global Environmental Change, 74*, 102528.

Krippendorff, K. (1989). *Content analysis.* IN: International Encyclopedia of Communications Ed. by Erik Barnouw et al. Vol. 1-4, 403-407. Oxford University Press. New York & Oxford.

Krosnick, J. A., & MacInnis, B. (2013). Does the American public support legislation to reduce greenhouse gas emissions? *Daedalus, 142*(1), 26-39.

Krueger, A. O. (1974). The Political economy of the rent-seeking society. *The American Economic Review, 64*(3): 291-303.

Labour Party (2020). *Manifesto 2020.* Retrieved September 21, 2022, from http://michaelpidgeon.com/manifestos/docs/lab/Labour%20GE%202020.pdf.

Lamb, W. F., & Minx, J. C. (2020). The political economy of national climate policy: Architectures of constraint and a typology of countries. *Energy Research & Social Science, 64*, 101429.

Lane, R., & P. Newell. (2016). *The political economy of carbon markets.* In Van de Graaf, T., Sovacool, B. K., Ghosh, A., Kern, F., & Klare, M. T. (Eds.), The Palgrave Handbook of the International Political Economy of Energy (pp. 247–67). London: Palgrave Macmillan.

Lee, T. M., Markowitz, E. M., Howe, P. D., Ko, C. Y., & Leiserowitz, A. A. (2015). Predictors of public climate change awareness and risk perception around the world. *Nature climate change, 5*(11), 1014-1020.

Leiserowitz, A., Carman, J., Rosenthal, S., Neyens, L., Marlon, J., Desmond, M., Smith, S., Rochford, M. F., O'Mahony, J., and Reaper, L. (2021). *Climate Change in the Irish mind*. New Haven, CT: Yale Program on Climate Change Communication.

Levi, S., Flachsland, C., & Jakob, M. (2020). Political economy determinants of carbon pricing. *Global Environmental Politics, 20*(2), 128-156.

Levy, J.S. (2007). Qualitative methods and cross-method dialogue in political science. *Comparative Political Studies, 40*:2, 196-214.

Liebreich, M. (2007). *How to save the planet: be nice, retaliatory, forgiving and clear.* White Paper, New Energy Finance Ltd., London.

Lim, S., & Prakash, A. (2023). Does carbon pricing spur climate innovation? A panel study, 1986–2019. *Journal of Cleaner Production, 395*, 136459.

Lin, Y., Zhang, Q., Chen, W., & Ling, L. (2017). The social income inequality, social integration and health status of internal migrants in China. *International Journal for Equity in Health, 16*, 1-11.

CEU eTD Collection

Little, C. (2020). *The party politics of climate change in Ireland.* In: Robbins, D., Torney, D., Brereton, P. (eds) Ireland and the Climate Crisis. Palgrave Studies in Media and Environmental Communication. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-47587-1_6.

Little, C., & Torney, D. (2017). The politics of climate change in Ireland: Symposium introduction. *Irish Political Studies, 32*(2), 191-198.

Liverman, D. (2015). *Reading climate change and climate governance as political ecologies.* In The Routledge Handbook of Political Ecology (pp. 303-319).

Lloyd's Register Foundation. (2022). *World risk poll data explorer [Dataset]*. https://lookerstudio.google.com/u/0/reporting/a83a8818-fe7f-46c6-b15a-3561e2a6d7d8/page/p_abhbpiq94c?s=jVcgfElq434.

Lohmann, L. (2006). Carbon trading: A critical conversation on climate change, privatisation and power. *Development dialogue.*

Lohmann, L. (2012). Financialization, commodification and carbon: the contradictions of neoliberal climate policy. *Socialist Register,* Vol. 48.

Lübke, C. (2021): Socioeconomic roots of climate change denial and uncertainty among the European population. *European Sociological Review, 1.*, 153-168. https://doi.org/10.1093/esr/jcab035

Maestre-Andrés, S., Drews, S., & van den Bergh, J. (2019). Perceived fairness and public acceptability of carbon pricing: a review of the literature. *Climate Policy, 19*(9), 1186-1204.

Malm, A. (2013). The origins of fossil capital: From water to steam in the British cotton industry. *Historical Materialism 21.*1 (2013) 15 - 68.

Markkanen, S., & Anger-Kraavi, A. (2019). Social impacts of climate change mitigation policies and their implications for inequality. *Climate Policy, 19*(7), 827-844.

Markussen, P., & Svendsen, G. T. (2005). Industry lobbying and the political economy of GHG trade in the European Union. *Energy Policy, 33*(2), 245-255.

Marquardt, J. (2017). Conceptualizing power in multi-level climate governance. *Journal of Cleaner Production 154*, 167–75.

Marten, M., & Van Dender, K. (2019). *The use of revenues from carbon pricing.* OECD Taxation Working Papers, No. 43, OECD Publishing, Paris, https://doi.org/10.1787/3cb265e4-en.

Martinez-Alier, J. and Muradian, R. (2015). *Taking stock: the keystones of ecological economics* in Handbook of Ecological Economics, 1-26.

McConnell, D. (2020, July 9). *Greens demand 7% carbon emissions cut if they are to enter government.* Irish Examiner. Retrieved September 21, 2022, from https://www.irishexaminer.com/news/arid-30995713.html.

McCright, A. M., Xiao, C., & Dunlap, R. E. (2014). Political polarization on support for government spending on environmental protection in the USA, 1974–2012. *Social science research, 48*, 251-260.

McGlade, C., Ekins, P. (2015). The geographical distribution of fossil fuels unused when limiting global warming to 2 °C. *Nature 517*, 187–190. https://doi.org/10.1038/nature14016

CEU eTD Collection

McKinsey (2017). *A revolutionary tool for cutting emissions, ten years on.* Retrieved November 16, 2023, from: https://www.mckinsey.com/about-us/new-at-mckinsey-blog/a-revolutionary-tool-for-cutting-emissions-ten-years-on.

McKitrick, R. (2016). *A practical guide to the economics of carbon pricing*. SPP Research Papers, 9(28).

Meckling, J. (2015). Oppose, support, or hedge? Distributional effects, regulatory pressure, and business strategy in environmental politics. *Global Environmental Politics, 15*(2), 19-37.

Meckling, J., Kelsey, N., Biber, E., & Zysman, J. (2015). Winning coalitions for climate policy. *Science, 349*(6253), 1170-1171.

Meckling, J., Sterner, T., & Wagner, G. (2017). Policy sequencing toward decarbonization. *Nature Energy, 2*(12), 918-922.

Meyer, R. (2020, February 20). *The oil industry is fighting climate policy in the states.* The Atlantic. https://www.theatlantic.com/science/archive/2020/02/oil-industry-fighting-climate-policy-states/606640/

Michaelowa, A. (1998). Climate policy and interest groups—A public choice analysis. *Intereconomics, 33*(6), 251-259.

Mildenberger, M., Lachapelle, E., Harrison, K., & Stadelmann-Steffen, I. (2022). Limited impacts of carbon tax rebate programmes on public support for carbon pricing. *Nature climate change, 12*(2), 141-147.

Mintz-Woo, K., Dennig, F., Liu, H., & Schinko, T. (2021). Carbon pricing and COVID-19. *Climate Policy, 21*(10), 1272-1280.

Mitchell, T. (2011). *Carbon democracy. Political power in the age of oil.* Verso.

Morales, J. E. R., & López, F. R. (2017). The political economy of bioenergy in the United States: A historical perspective based on scenarios of conflict and convergence. *Energy research & social science, 27*, 141-150.

Murphy, M. (2020). *Ireland's new Parliament: Political and physical change coincide amid Covid-19 crisis.* Retrieved September 21, 2022, from https://www.hansardsociety.org.uk/blog/irelands-new-parliament-political-and-physical-change-coincide-amid-covid-19.

Murray, B., & Rivers, N. (2015). British Columbia's revenue-neutral carbon tax: A review of the latest "grand experiment" in environmental policy. *Energy Policy, 86*, 674-683.

Muth, D. (2023). Pathways to stringent carbon pricing: Configurations of political economy conditions and revenue recycling strategies. A comparison of thirty national level policies. *Ecological Economics, 214*, 107995.

Narassimhan, E., Gallagher, K. S., Koester, S. and Rivera Alejo, J. (2017). *Carbon pricing in practice: A review of the evidence.* Medford, MA. Climate Policy Lab. Available at: https://sites.tufts.edu/cierp/files/2018/07/Carbon-Pricing-In-Practice-A-Review-of-the-Evidence.pdf

Narassimhan, E., Gallagher, K. S., Koester, S., & Alejo, J. R. (2018). Carbon pricing in practice: A review of existing emissions trading systems. *Climate Policy, 18*(8), 967–991.

CEU eTD Collection

Nemet, G.F., Holloway, T., Meier, P., (2010). Implications of incorporating air-quality co-benefits into climate change policymaking. *Environ. Res. Lett. 5* (1), 014007, http://dx.doi.org/10.1088/1748-9326/5/1/014007

Newell, P., & Paterson, M. (1998). A climate for business: global warming, the state and capital. *Review of International Political Economy, 5*(4), 679-703.

Newell, P., & Paterson, M. (2010). *The politics of the carbon economy.* In M. T. Boykoff, The politics of climate change: A survey, pp. 80-99. Taylor & Francis.

Nordhaus, W. (1992). An optimal transition path for controlling greenhouse gases. *Science 258*, 1315–1319.

Nordhaus, W. (2018). Evolution of modeling of the economics of global warming: changes in the DICE model, 1992–2017. *Clim. Change 4*, 623–640.

Nordhaus, W. (2019). Climate change: the ultimate challenge for economics. *Am. Econ. Rev. 109*, 1991–2014.

Nordhaus, W. D. (2007). A review of the Stern review on the economics of climate change. *Journal of economic literature, 45*(3), 686-702.

Nowlin, M. C., Gupta, K., & Ripberger, J. T. (2020). Revenue use and public support for a carbon tax. *Environmental Research Letters, 15*(8), 084032.

Nystrom, S., & Luckow, P. (2014). *The economic, climate, fiscal, power, and demographic impact of a national fee-and-dividend carbon tax.* Washington, DC: Regional Economic Models.

O Neill, S., Alblas, E. (2020). *Climate litigation, politics and policy change: Lessons from Urgenda and Climate Case Ireland.* In: Robbins, D., Torney, D., Brereton, P. (eds) Ireland and the Climate Crisis. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-47587-1_4.

O'Sullivan, K. (2019a, January 8). *Varadkar keen to avoid 'yellow vest' effect with carbon tax.* The Irish Times. Retrieved October 6, 2022, from https://www.irishtimes.com/news/environment/varadkar-keen-to-avoid-yellow-vest-effect-with-carbon-tax-1.3750538.

O'Sullivan, K. (2019b, January 14). *Friends of the Earth warns Government over carbon tax.* The Irish Times. Retrieved January 23, 2023, from https://www.irishtimes.com/news/environment/friends-of-the-earth-warns-government-over-carbon-tax-1.3757417.

Oana, I. E., and Schneider, C.Q. (2018). SetMethods: An add-on R package for advanced QCA. *The R Journal*, 10(1):507–533.

Oana, I. E., Schneider, C. Q., & Thomann, E. (2021). *Qualitative Comparative Analysis Using R: A Beginner's Guide.* Cambridge University Press.

OECD (2018, September). *Effective carbon rates 2018: Pricing carbon emissions through taxes and emissions trading*. https://doi.org/10.1787/9789264305304-en

OECD (2021a). *Effective carbon rates 2021: Pricing carbon emissions through taxes and emissions trading.* OECD Publishing, Paris.

CEU eTD Collection

OECD (2021b). *OECD Environmental performance reviews: Ireland 2021*, OECD Environmental Performance Reviews, OECD Publishing, Paris, https://doi.org/10.1787/9ef10b4f-en.

OECD (2022), *Income inequality (indicator).* doi: 10.1787/459aa7f1-en

Ohlendorf, N., Jakob, M., Minx, J. C., Schröder, C., & Steckel, J. C. (2021). Distributional impacts of carbon pricing: A meta-analysis. *Environmental and Resource Economics*, *78*(1), 1-42.

Oireachtas. (2018a). *Better energy homes scheme data*. Dáil Éireann Debate, Tuesday - 24 July 2018. Retrieved August 16, 2022, from https://www.oireachtas.ie/en/debates/question/2018-07-24/2042/.

Oireachtas. (2018b, July 3). *Committee on Climate Action (32nd Dáil).* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/committees/32/climate-action/.

Oireachtas. (2018c, December 18). *Committee on Climate Action (32nd Dáil) - Debates.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/committees/32/climate-action/debates/.

Oireachtas. (2018d). *Joint Committee on Climate Action debate -Wednesday, 12 Sep 2018.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2018-09-12/.

Oireachtas. (2018e). *Joint Committee on Climate Action debate -Wednesday, 12 Dec 2018.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2018-12-12/.

Oireachtas. (2018f). *Joint Committee on Climate Action debate -Wednesday, 19 Dec 2018.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2018-12-19/.

Oireachtas. (2018g). *Joint Committee on Climate Action debate -Tuesday, 4 Dec 2018.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2018-12-04/.

Oireachtas. (2018h). *Joint Committee on Climate Action debate -Wednesday, 5 Dec 2018.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2018-12-05/.

Oireachtas. (2018i). *Joint Committee on Climate Action debate -Wednesday, 5 Sep 2018.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2018-09-05/.

Oireachtas. (2018j). *Joint Committee on Climate Action debate -Wednesday, 14 Nov 2018.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2018-11-14/.

Oireachtas. (2019a, March). *Report of the joint committee on climate action. Climate change: a cross-party consensus for action.* Retrieved August 12, 2022, from https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_climate_action/reports/2019/2019-03-28_report-climate-change-a-cross-party-consensus-for-action_en.pdf.

CEU eTD Collection

Oireachtas. (2019b). *Joint Committee on Climate Action debate -Wednesday, 27 Mar 2019.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2019-03-27/.

Oireachtas. (2019c). *Joint Committee on Climate Action debate -Thursday, 28 Mar 2019.* Retrieved September 5, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2019-03-28/.

Oireachtas. (2019d). *Committee on Budgetary Oversight debate -Wednesday, 19 Jun 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/committee_on_budgetary_oversight/2019-06-19/.

Oireachtas. (2019e). *Committee on Budgetary Oversight debate -Tuesday, 24 Sep 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/committee_on_budgetary_oversight/2019-09-24/.

Oireachtas. (2019f). *Committee on Budgetary Oversight debate -Wednesday, 3 Jul 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/dbate/committee_on_budgetary_oversight/2019-07-03/.

Oireachtas. (2019g). *Committee on Budgetary Oversight debate -Tuesday, 17 Sep 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/committee_on_budgetary_oversight/2019-09-17/.

Oireachtas. (2019h). *Committee on Budgetary Oversight debate -Tuesday, 18 Jun 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/committee_on_budgetary_oversight/2019-06-18/.

Oireachtas. (2019i). *Joint Committee on Climate Action debate -Wednesday, 25 Sep 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2019-09-25/.

Oireachtas. (2019j). *Joint Committee on Climate Action debate -Thursday, 26 Sep 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/joint_committee_on_climate_action/2019-09-26/.

Oireachtas. (2019k). *Dáil Éireann debate - Wednesday, 23 Oct 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/dail/2019-10-23/38/.

Oireachtas. (2019l). *Select Committee on Finance, Public Expenditure and Reform, and Taoiseach debate - Wednesday, 6 Nov 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/select_committee_on_finance_public_expenditure_and_reform_and_taoiseach/2019-11-06/2/.

Oireachtas. (2019m). *Dáil Éireann debate - Wednesday, 20 Nov 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/dail/2019-11-20/29/.

Oireachtas. (2019n). *Dáil Éireann debate - Thursday, 24 Oct 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/dail/2019-10-24/2/.

Oireachtas. (2019o). *Dáil Éireann debate -Thursday, 9 May 2019.* Retrieved September 12, 2022, from https://www.oireachtas.ie/en/debates/debate/dail/2019-05-09/32/.

Oireachtas. (2020a). *33rd Dáil general election. 8 February 2020 election results.* Retrieved September 21, 2022, from

CEU eTD Collection

https://data.oireachtas.ie/ie/oireachtas/electoralProcess/electionResults/dail/2020/2020-05-01_33rd-dail-general-election-results_en.pdf.

Oireachtas. (2022). *Tax data. Dáil Éireann Debate, Tuesday - 26 April 2022.* Retrieved August 15, 2022, from https://www.oireachtas.ie/en/debates/question/2022-04-26/477/#:~:text=Based%20on%20the%20most%20recent,been%20collected%20in%20January%202022.

Olson, M. (1965): *The logic of collective action: Public goods and the theory of groups*, Cambridge MA: Harvard University Press.

O'Malley, S., B. Roantree and J. Curtis (2020). *Carbon taxes, poverty and compensation options,* ESRI Survey and Statistical Report Series 98, Dublin: ESRI. Retrieved September 22, 2022 from: https://www.esri.ie/publications/carbon-taxes-poverty-and-compensation-options

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective actions*, Cambridge: Cambridge University Press.

Ostrom, E. (2010). Polycentric systems for coping with collective action and global environmental change. *Global environmental change, 20*(4), 550-557.

Ostrom, E., & Williamson, O. E. (2009). *The prize in economic sciences 2009.* Scientific Background on the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel.

Ostrom, V. and Ostrom, E. (1977). *Public goods and public choices.* in E. S. Savas (ed.), Alternatives for Delivering Public Services: Toward Improved Performance, Boulder, CO: Westview Press, 7–49.

Pahle, M., Burtraw, D., Flachsland, C., Kelsey, N., Biber, E., Meckling, J., ... & Zysman, J. (2018). Sequencing to ratchet up climate policy stringency. *Nature Climate Change, 8*(10), 861-867.

Parry, I. (2019, December). *Putting a price on pollution*. Finance and Development. International Monetary Fund, 56(4). Retrieved from https://www.imf.org.

Parry, I., Veung, C., & Heine, D. (2015). How much carbon pricing is in countries' own interests? The critical role of co-benefits. *Climate Change Economics, 6*(4), 1–26. https://doi.org/http://www.worldscientific.com/loi/cce

Partnership for Market Readiness (PMR). (2017). *Carbon tax guide: A handbook for policy makers.* World Bank. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/26300/Carbon%20Tax%20Guide%20-%20Main%20Report%20web%20FINAL.pdf?sequence=1&isAllowed=y.

Partnership for Market Readiness (PMR) (2015, October). *Carbon leakage: Theory, evidence and policy design.* World Bank, Washington, DC. https://www.thepmr.org/system/files/documents/Technical%20Note%2011_Carbon%20Leakage.pdf

Paterson, M. (2012). Who and what are carbon markets for? Politics and the development of climate policy. *Climate Policy, 12*(1), 82–97.

Paterson, M. (2020). Climate change and international political economy: Between collapse and transformation. *Review of International Political Economy, 28*(2), 394-405.

Paterson, M. (2021). 'The end of the fossil fuel age'? Discourse politics and climate change political economy. *New political economy, 26*(6), 923-936.

CEU eTD Collection

Paterson, M., & P-Laberge, X. (2018). Political economies of climate change. Wiley Interdisciplinary Reviews: *Climate Change, 9*(2), e506

Paterson, M., Hoffmann, M., Betsill, M., & Bernstein,S. (2014). The micro foundations of policy diffusion toward complex global governance: An analysis of the transnational carbon emission trading network. *Comparative Political Studies, 47*, 420–449.

Patt,A. and Liliestam, J. (2018). The case against carbon prices. *Joule 2*, 12, 2494-2498.

People Before Profit (2019). *Minority statement on the report of the Joint Committee on Climate Action.* Retrieved April 5, 2023, from https://www.pbp.ie/wp-content/uploads/2019/04/Minority-Report-Final.pdf.

People Before Profit (2020). *Planet before profit. A manifesto for radical climate action.* Retrieved September 21, 2022, from https://www.pbp.ie/policies/environmental-policy/.

Pigou, A. C. (1932). *The economics of welfare*, Fourth edition, London: Macmillan and Co. Limited.

Pindyck, R. S. (2013). Climate change policy: What do the models tell us? *Journal of Economic Literature, 51*(3), 860-72.

PMR (2021b, April). *Emissions trading in practice, second edition: A handbook on design and implementation.* https://openknowledge.worldbank.org/handle/10986/35413

PMR. (2019, August). *Using carbon revenues.* World Bank. https://openknowledge.worldbank.org/handle/10986/32247.

PMR. (2021a, April). *Gender and carbon pricing.* World Bank. https://www.thepmr.org/system/files/documents/Gender%20and%20carbon%20pricing%20discussion%20paper.pdf.

PMR. (2021c, May). *Beyond mitigation: Quantifying the development benefits of carbon pricing.* World Bank. https://openknowledge.worldbank.org/handle/10986/35624

Polányi, K. (1944). *The great transformation: The political and economic origins of our time*. Boston, MA: Beacon Press

Pujol J., Sunyer, J. Macía, D. (2016). Traffic pollution exposure is associated with altered brain connectivity in school children. *Neurolmage: 129*:175-184.

Putnam, R. D. (1988). Diplomacy and domestic politics: the logic of two-level games. *International organization, 42*(3), 427-460.

Rabbia, M. (2023). Why did Argentina and Uruguay decide to pursue a carbon tax? Fiscal reforms and explicit carbon prices. *Review of Policy Research, 40*(2), 230-259.

Rabe, B. G. (2018). *Can We Price Carbon?* The MIT Press, Cambridge.

Rafaty, R. (2018). Perceptions of corruption, political distrust, and the weakening of climate policy. *Global Environmental Politics, 18*(3), 106-129.

Ragin, C. C. (2008). *Redesigning social inquiry: Fuzzy sets and beyond.* University of Chicago Press.

Rajamani, L. (2000). The principle of common but differentiated responsibility and the balance of commitments under the climate regime. *Review of European, Comparative & International Environmental Law, 9*(2), 120-131.

CEU eTD Collection

Raymond, L. (2019). Policy perspective: Building political support for carbon pricing—Lessons from cap-and-trade policies. *Energy Policy, 134,* 110986.

Ritchie, H. and Roser, M. (2017). *CO_2 and Greenhouse Gas Emissions.* Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions' [Online Resource]

Roantree, B., B. Maître, A. McTague and I. Privalko (2021). *Poverty, income inequality and living standards in Ireland,* https://doi.org/10.26504/bkmnext412

Robbins, D., Torney, D., & Brereton, P. (Eds.). (2020). *Ireland and the climate crisis.* London: Palgrave Macmillan.

Røpke, I. (2005). Trends in the development of ecological economics from the late 1980s to the early 2000s. *Ecological economics, 55*(2), 262-290.

Sælen, H., & Kallbekken, S. (2011). A choice experiment on fuel taxation and earmarking in Norway. *Ecological Economics, 70*(11), 2181–2190.

Sargent, N. (2019, September 23). *Fair carbon tax model could be 'ideal Robin Hood tax.'* Green News Ireland. Retrieved September 21, 2022, from https://greennews.ie/carbon-tax-robin-hood-model/.

Schlosberg, D. and Collins, L.B. (2014). From environmental to climate justice: climate change and the discourse of environmental justice, *WIREs Climate Change,* doi: 10.1002/wcc.275

Schneider, C. Q. (2019). Two-step QCA revisited: the necessity of context conditions. *Quality & quantity, 53*(3), 1109-1126.

Schneider, C. Q. (2023, forthcoming). *Set-theoretic multi-method research: A guide to combining QCA and case studies.* Cambridge University Press, Cambridge

Schneider, C. Q., & Rohlfing, I. (2013). Combining QCA and process tracing in set-theoretic multi-method research. *Sociological Methods & Research, 42*(4), 559-597.

Schneider, C. Q., & Rohlfing, I. (2019). Set-theoretic Multimethod Research: The Role of Test Corridors and Conjunctions for Case Selection. *Swiss Political Science Review, 25*(3), 253-275.

Schneider, C. Q., & Wagemann, C. (2012). *Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis.* Cambridge University Press.

Schuur, E. A. G. others. (2015). Climate change and the permafrost carbon feedback. *Nature, 520,* 171-179.

Schwartz, H. M. (2017). Club goods, intellectual property rights, and profitability in the information economy. *Business and Politics, 19*(2), 191.

Sinn Féin (2019). *Pathways to equitable and sustainable climate change in Ireland.* Minority report. Retrieved April 5, 2023, from: https://www.sinnfein.ie/files/2019/Climate_Minority_Report.pdf.

Sinn Féin (2020). *Giving workers and families a break.* 2020 general election manifesto. Retrieved September 21, 2022, from http://michaelpidgeon.com/manifestos/docs/sf/Sinn%20Fein%20GE%202020.pdf.

CEU eTD Collection

Skovgaard,J., Ferrari, S., Knaggård, A. (2019) Mapping and clustering the adoption of carbon pricing policies: what polities price carbon and why?, *Climate Policy, 19*:9, 1173-1185.

Sleven, K. (2021). *What can we learn from the Dutch national carbon tax?* Carbon Market Watch. Available online at: https://carbonmarketwatch.org/2020/12/21/what-can-we-learn-from-the-dutch-national-carbon-tax/, last accessed December 22, 2022.

Social Democrats (2020). *Invest in better.* General election manifesto 2020. Retrieved September 21, 2022, from http://michaelpidgeon.com/manifestos/docs/sd/Social%20Democrats%20GE%202020.pdf.

Solomon, B.D. and Heiman, M.K. (2010). Integrity of the emerging global markets in greenhouse gases. *Annals of the Association of American Geographers, 100*:4, 973-982.

Sommer, S., Mattauch, L., & Pahle, M. (2022). Supporting carbon taxes: The role of fairness. *Ecological Economics, 195*, 107359.

Spash, C. (2007). The economics of climate change impacts à la Stern: Novel and nuanced or rhetorically restricted?, *Ecological Economics, 63*, 706-713.

Steenkamp, L. A. (2021). A classification framework for carbon tax revenue use. *Climate Policy, 21*(7), 897-911.

Steffen, W., Rockström, J., Richardson, K., Lenton, T. M., Folke, C., Liverman, D., ... & Schellnhuber, H. J. (2018). Trajectories of the Earth System in the Anthropocene. *Proceedings of the National Academy of Sciences, 115*(33), 8252-8259.

Steinebach, Y., Fernández-i-Marín, X., & Aschenbrenner, C. (2021). Who puts a price on carbon, why and how? A global empirical analysis of carbon pricing policies. *Climate Policy, 21*(3), 277-289.

Stern, N. (2008). The economics of climate change. *American Economic Review, Papers & Proceedings 98*(2), 1-37.

Stern, N., (2007). *The Stern review on the economics of climate change.* Cambridge: Cambridge University Press.

Stern, P. C. (2000). New environmental theories: toward a coherent theory of environmentally significant behavior. *Journal of social issues, 56*(3), 407-424.

Stigler, G. (1971) The theory of economic regulation. *The Bell Journal of Economics and Management, 2*, 3–21.

Stiglitz, J. (2019). *Addressing climate change through price and non-price interventions.* NBER Working Paper 25939.

Stiglitz, J. E., & Rosengard, J. K. (2015). *Economics of the public sector: Fourth international student edition.* WW Norton & Company.

Sweeney, R. (2019, January). *The state we are in: inequality in Ireland Today*. TASC and Foundation for European Progressive Studies. https://www.tasc.ie/assets/files/pdf/18457_inequality_in_irelandinnerfinalweb.pdf

Szabo, J., & Fabok, M. (2020). Infrastructures and state-building: Comparing the energy politics of the European Commission with the governments of Hungary and Poland. *Energy Policy, 138*, 111253.

CEU eTD Collection

Tansey, O. (2007). Process tracing and elite interviewing: A case for non-probability. sampling. *PS: Political Science & Politics, 40*:4, 765-772.

Thisted, E.V. and Thisted, R.V. (2019) The diffusion of carbon taxes and emission trading schemes: the emerging norm of carbon pricing, *Environmental Politics*, DOI: 10.1080/09644016.2019.1661155

Tol, R. S. (2009). The economic effects of climate change. *Journal of economic perspectives, 23*(2), 29-51.

Tol, R. S., Callan, T., Conefrey, T., Gerald, J. D. F., Lyons, S., Malaguzzi Valeri, L., & Scott, S. (2008). *A carbon tax for Ireland (No. 246).* ESRI working paper. Available at: https://www.econstor.eu/bitstream/10419/50164/1/576824259.pdf.

Torney, D. & O'Gorman, R. (2019) A laggard in good times and bad? The limited impact of EU membership on Ireland's climate change and environmental policy, *Irish Political Studies, 34*:4, 575-594, DOI: 10.1080/07907184.2019.1647174.

Torney, D. (2020). *Ireland's policy response to climate change: An historical overview.* In: Robbins, D., Torney, D., Brereton, P. (eds) Ireland and the Climate Crisis, pp. 37-54. Palgrave Studies in Media and Environmental Communication. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-47587-1_3.

Transparency International (2021). *Corruption Perceptions Index. [Dataset]*. https://www.transparency.org/en/cpi/2021.

Trim, I,, Zhang,J. Monschauer,Y. and Grace, E. (2018). *Raising the acceptability and effectiveness of carbon pricing, The crucial role of carbon revenue recycling*, New York, United States. https://guidehouse.com/-/media/www/site/downloads/energy/2018/cpu2018carbonrevenuerecycling.pdf (last accessed December 8, 2021).

Tullock, G. (1967). The welfare costs of tariffs, monopolies and theft. *Western Economic Journal, 5:* 224-232.

Tvinnereim, E., & Mehling, M. (2018). Carbon pricing and deep decarbonisation. *Energy Policy, 121*, 185-189.

UNDP & University of Oxford. (2021, January). *Peoples' climate vote.* https://www.undp.org/publications/peoples-climate-vote.

UNDP (United Nations Development Programme). (2020). *Human development report 2020: The Next frontier: Human development and the Anthropocene.* New York.

UNFCCC (2016). *Just transition of the workforce, and the creation of decent work and quality jobs*. https://unfccc.int/resource/docs/2016/tp/07.pdf.

UNFCCC, (2020). *Nationally Determined Contributions (NDCs).* Retrieved from: https://unfccc.int/process/the-paris-agreement/nationally-determined-contributions/ndc-registry.

United Nations (2023). *Figure 2.7 National Gini index, 2003–2017.* Website article. Available at: https://www.unicef.cn/en/figure-27-national-gini-index-20032017.

United Nations Environment Programme (2020). *Emissions gap report 2020 - Executive summary*. Nairobi

CEU eTD Collection

United Nations Environment Programme (UNEP) (2019). *Emissions gap report 2019.* UNEP, Nairobi.

United Nations, (2020). *Treaty Collection. Chapter XXVII Environment, Paris Agreement.* Retrieved from: https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-1&chapter=27&clang=_en.

University of Oxford (2023). *Energy transition and the changing cost of capital: 2023 review*. Oxford Sustainable Finance Group. Available: https://sustainablefinance.ox.ac.uk/wp-content/uploads/2023/03/ETRC-Report-2023_March.pdf

Ürge-Vorsatz, D., Herrero, S. T., Dubash, N. K., & Lecocq, F. (2014). Measuring the co-benefits of climate change mitigation. *Annual Review of Environment and Resources, 39*, 549-582.

Van den Bergh, J. C. (2000). Ecological economics: themes, approaches, and differences with environmental economics. *Regional Environmental Change, 2* (1), 13-23.

Vogt-Schilb, A., Walsh, B., Feng, K., Di Capua, L., Liu, Y., Zuluaga, D., ... & Hubaceck, K. (2019). Cash transfers for pro-poor carbon taxes in Latin America and the Caribbean. *Nature Sustainability, 2*(10), 941-948. https://www.nature.com/articles/s41893-019-0385-0.

Wagner, P. M., Torney, D., & Ylä-Anttila, T. (2021). Governing a multilevel and cross-sectoral climate policy implementation network. *Environmental Policy and Governance, 31*(5), 417-431.

Wang Q, Hubacek K, Feng K, Wei Y-M, Liang Q-M (2016) Distributional effects of carbon taxation. *Appl Energy 184*:1123–1131.

Whelan, K. (2014). Ireland's economic crisis: The good, the bad and the ugly. *Journal of Macroeconomics, 39*, 424-440.

Wilkinson, R., & Pickett, K. (2020). *The inner level: How more equal societies reduce stress, restore sanity and improve everyone's well-being.* Penguin Books.

World Bank & OECD. (2015). *The FASTER principles for successful carbon pricing: an approach based on initial experience (English).* Retrieved from: http://documents.worldbank.org/curated/en/901041467995665361/The-FASTER-principles-for-successful-carbon-pricing-an-approach-based-on-initial-experience.

World Bank (2014). *State and trends of carbon pricing 2014.* Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/18415

World Bank (2018). *State and trends of carbon pricing 2018.* Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/29687

World Bank (2019). *State and trends of carbon pricing 2019.* Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/31755.

World Bank (2020). *State and trends of carbon pricing 2020.* Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/33809

World Bank (2022). *State and trends of carbon pricing 2022*. Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/37455

CEU eTD Collection

World Bank. (2017, May). *Report of the high-level commission on carbon prices.* https://static1.squarespace.com/static/54ff9c5ce4b0a53decccfb4c/t/59b7f2409f8dce5316811916/1505227332748/CarbonPricing_FullReport.pdf.

World Bank. (2021). *World Bank carbon pricing dashboard.* https://carbonpricingdashboard.worldbank.org/map_data

World Bank. (2023). *State and trends of carbon pricing 2023.* Washington, DC: World Bank. © World Bank. https://openknowledge.worldbank.org/handle/10986/39796.

World Health Organization. (2021). *Ambient air pollution.* Retrieved May 26, 2021, from https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/ambient-air-pollution.

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