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European Carbon Pricing

A PATHWAY TO NET-ZERO BY 2050

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1. Introduction

By adopting the European Green Deal, the European Union (EU) has embraced the ambitious goal of becoming the first climate-neutral continent by 2050. The Fit-for-55 Package provides concrete initial proposals to achieve this target. For it to succeed, it is essential to implement effective policy tools and continuously revise them if necessary.

This paper addresses the question *"Through which policy tools can the EU (considering political and strategic challenges faced by member states) achieve carbon neutrality by 2050?"* by focusing on the EU's carbon pricing scheme: the Emission Trading System (ETS).[1] Since its introduction in 2005, the ETS has led to a 35% emissions reduction in covered sectors (European Commission, 2021a). To begin, this paper outlines the ETS design and its proposed Fit-for-55 amendments. Next, it discusses the current debate on improving effectiveness of EU carbon pricing with a particular focus on addressing technical adjustments, implementation issues, uncertainty, and socio-political backing. Finally, three recommendations are proposed to align its ambition with EU objectives.

2. EU-ETS: Current Design

The ETS is the EU's flagship climate policy and the first system of its kind (European Commission, 2021b)**.** It aims to reconcile the reduction of emissions with the profit-protection of companies by creating an artificial market for trading atmospheric pollution (Verbruggen et al., 2019). The *cap-and-trade* principle sets an emissions cap for targeted sectors, within which stakeholders buy or receive allowances and can trade them to cover their annual emissions. Exceeding permit-specified quantities is fined (Dorsch et al., 2020).

The ETS functions in trading phases based on pre-set legislative frameworks, reducing caps, and increasing abatement targets. Phases (I-III) expanded it to include nitrous oxide and perfluorocarbons alongside CO_2 (Verde et al., 2021), replaced national caps with EU-wide limits, established a Market Stability Reserve (MSR)[2], and introduced international carbon credits (Woerdman & Nentjes, 2019).

The ETS delivered on the short-term reduction of emissions (45% cf. 2005), but failed to align with the EU 2050 Roadmap. Phase IV (2021-2030) revisions have been proposed within *Fit-for-55* to hit the 2030[3] 55% reduction and 2050 net-zero objectives, including the increase of the linear reduction factor from 2.2% to 4.2% starting 2023 (European Commission, 2021b). The ETS will additionally encompass the maritime sector, while buildings and road transport[4] will be covered separately by a new upstream "ETS II". To address the risk of carbon leakage[5], ensure compatibility with international EU obligations, and maintain incentives to decarbonize, free allocation will be phased out and a Carbon Border Adjustment Mechanism (CBAM) introduced. Additionally, a Social Climate Fund (SCF), financed by 25% of revenue from ETS II, will be created in order to mitigate the disproportionate effect on low income member states.[6] Its funds should be allocated to member states to provide direct income support to households and support investments to reduce dependence on fossil fuels (European Commission, 2021a). Member states remain responsible for identifying solutions and funding targets to enact social climate responses by submitting action plans and are obliged to match any amount of EU money received.

[1] See Methodological Annex for the reasoning of the selected focus.
[2] See Annex A. 4.2. for definition.
[3] Compared to 1990 levels.
[4] Jointly responsible for 30% of EU emissions.
[5] See Annex A. 4.2. for definition.
[6] Comment of its importance by the European Commission expert.

3. Broader Picture and Current Challenges

To be effective, the EU-ETS needs to meet certain standards and efficiently interact with existing policies. It is crucial that negotiations on the current Fit-for-55 Package are successful in addressing these aspects. Nonetheless, there are challenges beyond the proposal that are important to consider.

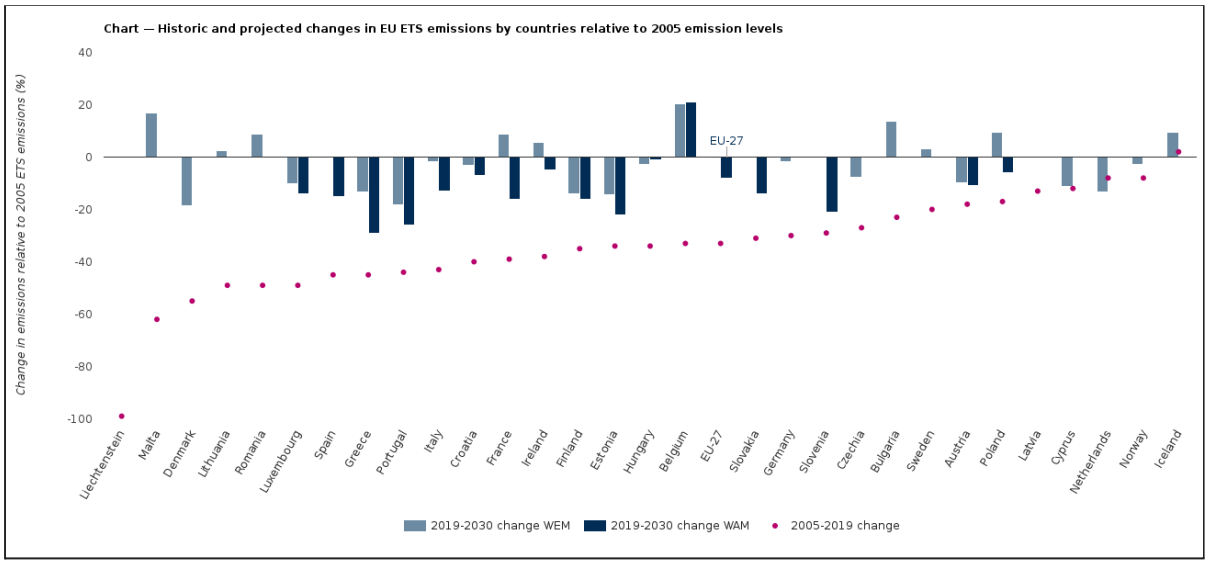

Figure 1: Historical and projected changes in the EU ETS covered-sector emissions, presented by country, as benchmarked by their 2005 level of emissions. Significant heterogeneity can be seen in forecasted changes in emissions reflecting the shared burden principle of European Climate Policy, i.e. showing that some countries will need to adjust more than others [Source: European Environment Agency (EEA). Published on 17th November, 2020. Last modified on 7th December, 2021. Available at: https://www.eea.europa.eu/data-and-maps/daviz/historic-and-projected-changes-in-2#tab-chart_3]

Heterogeneity in the Effective Carbon Price

Significant inter-sectoral heterogeneity in the effective ETS price exists given that trade-exposed sectors receive relatively more allowances and free permit allocation is output-linked (Fuss et al., 2018). Diverse national regulations also lead to firms experiencing varied carbon shadow prices.[7] The Hertie School expert expressed concerns this could jeopardise the benefits of the system in the long run and increase price uncertainty. In its current form the ETS does not allow effective expression of disparate policy preferences among member states (Edenhofer et al., 2017). Expected price increase due to ETS II introduction is probable to disproportionately impact the most vulnerable households, micro-enterprises, and transport users, mostly in lower-average-income member states (E3G, 2021).

[7] See Section 4.3 for a discussion and Annex A. 4.2. for a formal definition.

Low Prices Undermine Credibility

The EU carbon price historically oscillating below the effective level (for 2020)[8] advocated by the Stiglitz-Stern Commission (2017) likely reflects market distortions[9] and a suboptimal system design as opposed to low mitigation costs (Edenhofer et al., 2017).[10] Moreover, additional downward pressure on the price can stem from free permit allocation, especially within high-leakage-risk sectors. Historically, downward price movements have been the main source of economic volatility. (Burtraw et al., 2010). Although EU-ETS carbon prices have experienced a significant increase from approximately 10€/tonne to 75€/tonne (Figure 2), doubts revolve around their drivers and persistence at socially optimal levels (Flachsland et al., 2020). The surge could stem from speculation (Friedrich and Pahle, 2019)[11]. Suboptimal prices cause economic inefficiency by failing to motivate allocation of funds to capital-intensive low-carbon investment (Fuss et al., 2018).

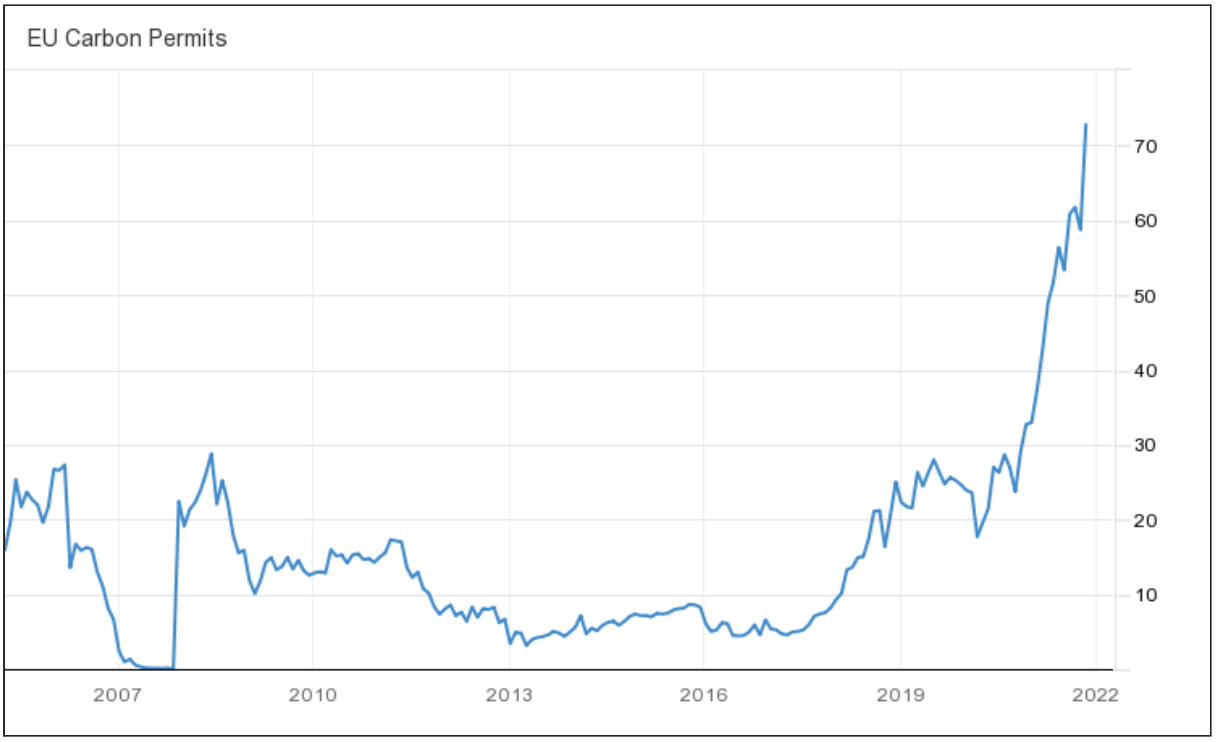

Figure 2: Development trajectory of EU Carbon Prices (€/tonne CO2) from the introduction of the ETS in 2005 until December 2021 [Source: Trading Economics. Carbon Emissions Allowances Price data was sourced from the EU ETS. Last accessed on 10th December, 2021. Available at: https://tradingeconomics.com/commodity/carbon].

[8] The effective level was estimated to be $40-$80 for 2021. The equivalent for 2030 is $50-$100 (Stiglitz, 2017).
[9] For example high discount rates, a probable consequence of uncertainty and depressed credibility in the ETS (Schopp and Neuhoff, 2013).
[10] If it were caused by low mitigation costs, then this may signal that the EU-ETS is functioning efficiently (Ellerman et al., 2016).
[11] Also see "Prices in the world's biggest carbon market are soaring" (2021, February 27). *The Economist.*

Policy and Price Uncertainty Impact ETS Performance

The ETS performance is hindered by uncertainty surrounding prices, long-term policy support, and presence of market distortions (Flachsland et al., 2020; Borenstein et al., 2019). Expert comments highlight the importance of reducing unpredictability by setting expectations for policy and providing clear regulatory frameworks. Sustained levels of price uncertainty impede ETS participants from long-term planning, e.g. due to lack of sufficiently distant futures markets[12] (Fuss et al., 2018), and lead to suboptimal financing decisions. Durable investment in low-carbon assets needs confidence in guaranteed lifetime return. Unanticipated shifts can have both short- and long-run characteristics (Burtraw et al., 2010).[13] Continuous readjustments and volatility of the ETS may negatively affect short-term financial allocation and be detrimental to political support.

Country-Level Policy Can Distort the EU-ETS

Concerns revolve around higher prices stemming from unilateral climate policies being passed on to domestic consumers, which undermines political support and national competitiveness (Maxwell, 2011; Grimwood, 2017). Potential **waterbed effects** may occur, i.e. while domestic country emissions shrink, aggregate ETS emissions may not (Bausch et al., 2017). That is as emission reductions in one sector increase allowance supply, which lowers the market price to the point that other sectors purchase them, in turn increasing their emissions. Another distortive risk to the ETS's performance is **carbon leakage**. Firms might shift their activity to other markets with less stringent climate rules to minimise costs (Demertzis & Tagliapietra, 2021).

Socio-Political Backing

An ambitious ETS reform requires sustained socio-political backing given the inherent political nature of permit supply, credibility issues, and consumer-good price impact (Flachsland et al., 2020). Challenges also emerge from divergent preferences for climate policy stringency. The Hertie expert sees social acceptability as the major ETS challenge.[14] Over time, consumers could recognise that it does not safeguard against price hikes for carbon-intensive goods (Hepburn et al., 2013). Emphasising aspects of distributional fairness, revenue salience, political trust and stability are central for effective ETS performance.[15] Credible signalling of commitment to the scheme could result in increased investor confidence in long-term performance (Sheppard, 2018) and strengthening political acceptability may be more important than traditional economic considerations of efficiency (Klenert et al., 2018).

[12] For a definition of Futures Markets, see Annex.
[13] Price volatility can reflect short-term shocks to allowance changes, economic activity, weather, or fuel prices, augmented by e.g. technological change in the long-run.
[14] The Bocconi expert suggested it may become more salient over time, though has not historically been as contentious as carbon taxes.
[15] See A. 4.3. Box Popular News on the ETS for how European policymakers quoted in the news take up the issue.

4. Policy Recommendations

This section introduces three policy recommendations addressing the current challenges. The presented order is according to their importance of contributing to the system, rather than feasibility.

4.1 Introducing a Carbon Price Floor (CPF)

The introduction of an **EU-wide minimum trading price for the ETS** has high emissions reduction upside and complements the recently introduced reform. Potential benefits involve: 1) reduced uncertainty due to transparent market guidance, 2) signalling long-term political commitment to a stated emissions quantity, 3) mitigating downward price risk[16], which would maintain selling permits profitable and solidify innovation incentives, and 4) additional government revenue (Flachsland et al., 2020; Zuckerman et al., 2014).[17] A CPF robustifies the system to constant need of revision (Burtraw et al., 2010) and fills the missing market gap of longer-term (beyond-three-year-horizon) prices, which brings investment forward in time (Fuss et al., 2018; Brauneis et al., 2013). Lower uncertainty would allow dynamic cost-efficient allocation of funds into low-carbon transition, thus help avert surges in future abatement costs resulting from suboptimal early-year ETS investment (Flachsland et al., 2020).

In practice the CPF **works best if non-binding**, i.e. set below the calculated cost-effective trajectory (Flachsland et al., 2020). When binding, it nonetheless aids in avoiding shortsighted price formation and helps price alignment to optimal trajectory. A key issue behind this proposal is its enforceability given the announcement itself of a minimum price does not imply market creation. This induces risk of collusion to lower prices (Demertzis & Tagliapietra, 2021). Changes would have to be clearly communicated to reinforce the scheme's credibility over time. CPF design matters and, given dynamic context, a **Buyback method is the optimal** implementation strategy to follow (Hintermayer, 2020; Wood & Jotzo, 2011).[18] In this approach, the market operator engages in buying back permits should the market price fall below the CPF. It induces immediate price surge due to arbitrage incentives following post-announcement anticipation and unambiguously reduces overall emissions.[19] Its strength comes from synergies with the MSR. To avert waterbed effects, the CPF is recommended to work in parallel to reductions in the cap, and more allowances are to be intaken by the MSR and cancellations to achieve desired market tightness (Hintermayer, 2020).

In specifying price level and its growth trajectory, it is optimal to follow international practice wherein price increases, at the minimum, reflect the social discount rate, i.e. are 3-5% above the inflation rate (Fuss et al., 2018). **EU-wide implementation** is desirable from an efficiency standpoint (Demertzis & Tagliapietra, 2021). National CPFs could induce intra-EU trade distortions, further depress the overall price due to potential waterbed effects, and require complementary measures to prevent spatio-temporal emissions displacement (Fuss et al., 2018; Edenhofer et al., 2017). Despite relevant political obstacles, an EU-wide CPF is probable to be politically and legally feasible (Fischer et al., 2019; Flachsland et al., 2020).[20] If considering linking the ETS in the future with other trading systems, a CPF is also in line with the Paris Agreement's Article 6.2 (Parry, 2017).[21]

[16] Leading to Burtraw Palmer, & Kahn (2010) labelling it a one-sided "safety valve".
[17] A point also made during the interview by the expert from Bocconi.
[18] See Box A. 4.1. in Annex for comparison with other mechanisms. Also, it describes the mechanisms in full.
[19] As such allowing avoiding a situation referred to in academic literature as The New Green Paradox, i.e. when well-intended policies are ill-timed or designed (e.g. the CPF introduction) can increase overall emissions due to endogenous response among different approaches in place (Gerlagh et al., 2019).
[20] Alternatively, the Hertie expert proposed the introduction of a CPF temporarily in a coalition of climate-policy-frontrunner countries as a second-best approach.
[21] See Annex A. 4.4. for exact wording of Article 6.2. Separate considerations apply to a carbon price ceiling (Fuss et al., 2018).

4.2 Revenue Recycling under the Social Climate Fund

For the SCF's revenue recycling mechanism to efficiently address inequalities and boost socio-political acceptability, stricter social and climate conditionalities should be taken into account in evaluating member states' Social Climate Plans (E3G, 2021).[22] Concrete short- and medium-term targets for direct financial support to affected households are needed during its first period (2025-2032). They should depend on member states' gross national income, population, poverty risk in rural areas, and utility fossil-fuel dependence. The optimal choice of revenue recycling mechanism at the state-level will be context-dependent, committing to progressive burden sharing, and follow the 'polluter pays' principle.[23] Providing clear guidance and a specific point of contact for governments to submit their Social Climate Plans would further address problems affecting the absorption of other EU funds, particularly by Eastern European countries, which have not fully received the funds they are entitled to (Kersan-Škabić & Tijanić, 2017).

The SCF promoting existing technologies and investment in R&D is essential to reach post-2030 abatement targets (E3G, 2021). It would make clean technologies broadly available, should be addressed in national plans, and be a fund access condition.[24] Implementation would be practically possible and politically feasible, as only the conditions would be adjusted, not the fund design. This would incur Commission monitoring costs of countries' plans. It is central that the agency is staffed adequately to ensure timely auditing. Funding could be provided by an earlier phase-out of free allocations under the current ETS (E3G, 2021).

The SCF is not nearly sufficient to meet the socio-political challenges of the EU's carbon price policies. It is necessary that national welfare systems incorporate and emphasise distributional fairness, revenue salience, and trust to ensure ETS preservation under partisan changes in parliament composition (Klenert et al., 2019). Nevertheless, **increasing the size of the SCF** in the long-term to address inequalities between European states is crucial. The limitation here is the political support of member states' negotiating the current proposal. Therefore, this recommendation intends to address post-2032. The Commission's solution to the political challenge also has to extend beyond financial compensation. It should support information on the instrument, broaden understanding of carbon pricing, and involve transparent communication of efficacy in managing distributional concerns (E3G, 2021, Maestre-Andrés et al., 2018).

4.3 Estimating a European Carbon Shadow Price

To tackle price uncertainty, the EU Commission should regularly estimate and publicly announce the **carbon shadow price** which aligns with its targets. To achieve a uniform carbon pricing system in the long-run (post-2030), the shadow price should also be used in the EU's cost-benefit analyses of other climate policies including subsidies, standard setting, or technology bans (Schmidt et al., 2021). Its implementation would be rather simple, as the shadow price forms a theoretical construct and so is costless in practice (Schmidt et. al, 2021; Bennett, 2019). Nonetheless, it sets a benchmark and improves the transparency of the EU's overall climate policy.

[22] A point also made during the interview by the expert from Hertie.
[23] Lump-sum per-capita dividends (targeted or uniform) could be a more relevant and stable mechanism to building citizen support than green spending, tax cuts, or directed transfers (Klenert et al., 2018).
[24] Here, the Commission should adopt stricter evaluation criteria in line with the EU Taxonomy.

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