How should the ideal EU climate policy be designed?

By Line Andersen and Otto Brøns-Petersen (+45 20 92 84 40)

01-04-2025

Ideal global climate policy

Greenhouse gas (GHG) emissions cause global temperatures to rise. This leads to weather and other environmental changes, which are associated with economic losses. As the damages associated with GHG emissions are global, the world collectively bears the burden of the emissions of any one emitter. Basic economic theory suggests that externalities are most efficiently addressed through pricing – for example, through a Pigouvian tax (Pigou 1920). The literature questions the feasibility of well-functioning Pigouvian taxes and suggests more nuanced policies instead (Coase 1960). For example, economists have proposed the creation of cap-and-trade schemes, under which allowances are exchanged in order to achieve a least-cost allocation of the emissions cuts. This is the case of the EU Emissions Trading System (EU ETS). Unlike a Pigouvian tax, the ETS sets a cap on emissions and leaves it to the market to find the cheapest way to cut emissions; the price of CO2 allowances reflects the marginal cost of emissions abatement. In an ideal world, the price of ETS allowances under the optimal cap will be equivalent to the optimal carbon tax that leads to a reduction in CO2 emissions to a level equal to the ETS cap.

GHG emissions should ideally be priced according to the global marginal damage. It is well established in the economic sciences that establishing a uniform price for GHG emissions would be the most cost-effective path to reducing emissions (Mankiw 2008; Tirole 2017).[1]

Putting a price on GHG emissions will ensure that the negative externalities of emissions are internalised within production costs and that production will only take place if the benefits exceed costs. An optimal climate policy would impose a global, uniform, and technology-neutral price, which would incentivise nations to achieve the cheapest emission reductions. Putting a price on GHG emissions will not only impact the price of the energy produced using fossil fuels, but also that of all products made using energy from fossil fuels or whose production processes release GHG emissions into the atmosphere (e.g. cement or steel). This move will ensure that emissions reductions are implemented more quickly in sectors where GHG emissions create the least value (e.g. in sectors with cheap green alternatives) and more slowly in sectors where GHG emissions create more value (e.g. in sectors where it is harder to transition to green technologies). Thus, the price solves an information problem for governments and consumers, who would otherwise be unaware of the true climate impact of their consumption choices. The price mechanism is the only way to handle complex economic processes (Hayek 1945) and avoid the political dangers of regulatory state and central planning.

At the same time, imposing a uniform price on GHG emissions would work as an indirect 'subsidy' for energy-saving initiatives, renewable energy, and research and development on green technologies.

[1] 'Economists' statement on carbon dividends', Wall Street Journal, 16 January 2019 (https://www.wsj.com/articles/economists-statement-on-carbondividends-11547682910).

This is because the price on emissions will incentivise emitters to reduce their costs by using alternatives that emit less.

However, there is no global institution that can lead the negotiations among governments to introduce a uniform tax on GHG emissions. This raises the question of what the second-best alternatives are. The Tiebout mechanism suggests that political tasks should be solved at the level best equipped to handle them and in as decentralised a manner as possible (Tiebout 1956). As the climate crisis is a global phenomenon, policy action should be taken at a level that is as close to global as possible. In this instance, the EU is well-positioned to be a key player. This approach is also reflected in the EU's participation in the Paris Agreement on behalf of its member states.[2] The EU does not have the ability to impose a European climate tax, but it can introduce an emissions trading system (ETS), which indirectly puts a price on emissions, and has the same desirable properties as a Pigouvian tax.

The current climate policy in the EU

In 2021, the EU set a climate target, 'Fit for 55', to reduce EU emissions to at least 55 per cent below its 1990 levels by 2030, and to achieve climate neutrality by 2050. In 2024, the European Commission also proposed a 2040 climate target to reduce emissions by 90 per cent relative to 1990.[3] To achieve these targets, the EU has adopted several provisions. The emissions covered by EU provisions can be divided into two classes: those covered by the ETS and those that member states are required to mitigate as per national targets (Effort Sharing Regulation and Regulation on Land Use, Land-Use Change, and Forestry (LULUCF)).

The EU often promotes cost-effective climate policies. In 2005, it introduced the world's first international ETS.[4] It was based on the 'cap and trade' principle, which puts a cap (that declines over time) on the GHG emissions that can be emitted by certain sectors in the EU. The cap is enforced using emissions allowances, where one allowance gives the right to emit one tonne of CO2 eq (i.e., carbon dioxide equivalent). This implies that the ETS is technology-neutral. The allowances are then sold in auctions and may be traded.[5] This means that the price of allowances (and thereby the price of GHG emissions) is determined by the EU carbon market.

ETS (I)[6] covers electricity and heat generation, energy-intensive industry, aviation within the European Economic Area (EEA), and maritime transport. In 2023, an additional ETS (II)[7] was introduced. ETS II will be fully operational in 2027. It covers buildings, road transport, and additional sectors. The Effort Sharing Regulation, initially adopted in 2018, requires member states to reduce

[2] 'Paris Agreement on climate change', European Commission, n.d. (https://www.consilium.europa.eu/en/policies/climate-change/paris-agreement/).
[3] '2040 climate target', European Commission, n.d. (https://climate.ec.europa.eu/euaction/climate-strategies-targets/2040-climate-target_en).
[4] 'Development of EU ETS (2005–2020)', European Commission, n.d. (https://climate. ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/development-euets-2005-2020_en).
[5] 'What is the EU ETS?', European Commission, n.d. (https://climate.ec.europa.eu/ eu-action/eu-emissions-trading-system-eu-ets/what-eu-ets_en).
[6] 'Scope of the EU ETS', European Commission, n.d. (https://climate.ec.europa.eu/ eu-action/eu-emissions-trading-system-eu-ets/scope-eu-ets_en).
[7] 'ETS2: buildings, road transport and additional sectors', European Commission, n.d. (https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/ets2- buildings-road-transport-and-additional-sectors_en).

their emissions from the following sectors by 2030: domestic transport (excluding aviation), buildings, agriculture, small industry, and waste. This means that emissions from the transportation and buildings sectors will be covered by both ETS II and the Effort Sharing Regulation in 2027–2030, when ETS II is scheduled to be fully operational. The LULUCF regulation requires member states to ensure that emissions from the land use and forestry sectors are compensated through the equivalent removal of CO2 in 2021–2030.[8]

The revenue from the ETS primarily flows toward national budgets. However, member states are required to use it to support investments in renewable energy, energy-efficiency improvements, and low-carbon technologies.[9]

Fit for 55 significantly strengthens the ambitions of the EU's climate policy. Some calculations suggest that if the rest of the world limits its emissions to the same extent as indicated in the EU's plans, global, cumulative GHG emissions would be close to the level required to keep the global temperature rise below 1.5 °C (Hassler, Krusell, and Olovsson 2024).

The backbone of the EU climate policy is the ETS. However, the EU climate policy also incorporates sector-specific regulations outside of the ETS. These regulations will increase the cost of the green transition as they counteract the cost-effective properties of the ETS. Some sector-specific targets include a ban on new internal combustion engines (ICEs) by 2035. By 2035, CO2 emissions from newly-registered cars and vans are required to be gradually reduced. Another sector-specific target aims to increase energy efficiency by having member states reduce their energy consumption by 2030.[10] In addition, the EU has a binding renewable energy target: renewable energy must make up at least 42.5 per cent – ideally 45 per cent – of the total energy use by 2030.[11] Additionally, suppliers of aircraft fuel are required to gradually increase the share of supply of sustainable aviation fuels (such as synthetic fuels or advanced biofuels).[12] These are only a few examples of extant sector-specific regulations.

The ideal EU climate policy

The foundation for an ideal EU climate policy is already in place in the form of the ETS. The ETS serves the same purpose as a Pigouvian tax, as it sets a price for emissions. This means that all externalities are internalised within production costs through the price on emissions. This allows market mechanisms to work efficiently and ensures that GHG emissions are mitigated in those sectors where mitigation is cheapest, ensuring a cost-effective climate policy in the EU.

As we described earlier, emissions within the EU are covered by ETS I, ETS II, or national policies to mitigate them. This implies that the price on emissions is not uniform across sectors, which goes against the basic principle of a Pigouvian tax. To achieve a cost-effective climate policy in the EU, all

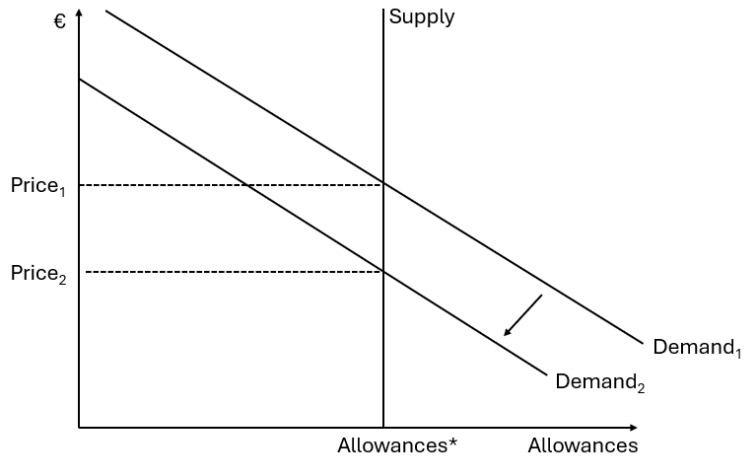
[8] 'Land use sector', European Commission, n.d. (https://climate.ec.europa.eu/eu-action/land-use-sector_en).
[9] 'What is the EU ETS?', European Commission.
[10] 'Energy efficiency directive', European Commission, n.d. (https://energy.ec.europa. eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energyefficiency-directive_en).
[11] 'Renewable energy targets', European Commission, n.d. (https://energy.ec.europa. eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/ renewable-energy-targets_en).
[12] 'ReFuelEU Aviation', European Commission, n.d. (https://transport.ec.europa.eu/ transport-modes/air/environment/refueleu-aviation_en).

emissions should be priced uniformly within a single ETS that covers all EU emissions. Herby (2023) shows that costs could be reduced by around 25 per cent if the sectors covered by ETS I and II were brought under a single ETS. From 2027, when ETS II takes effect, until 2030, the transportation and buildings sectors are covered by both ETS II and the Effort Sharing Regulation, which leads to inconsistent pricing on emissions. This problem of double regulation can be addressed by removing national policies affecting the sectors covered by ETS II.

Another area for improvement would be to include negative emissions in the ETS. For instance, carbon capture, storage, and utilisation (CCSU) initiatives should be granted new allowances. These allowances can then be sold in the market. This would create an incentive to capture, and thereby reduce, the amount of GHGs in the atmosphere, just as the price on emissions does. Including negative emissions in the ETS promotes cost-effectiveness, as it ensures that the cheapest emission reductions are implemented.

Sector-specific targets are supposedly aimed at promoting faster emission reductions. However, this approach is not aligned with the idea of a single ETS. In an ETS, there is a supply of – and a cap on – allowances for GHG emissions, which companies must procure if they produce emissions as part of their production processes. This implicitly puts a price on GHG emissions. Figure 2 illustrates how the ETS works.

Figure 2. The number of allowances (emissions) are unaffected by shifts in demand[13]



Source: Authors' illustration

As Figure 2 shows, the number of allowances (and thus emissions) is fixed by the supply of allowances (the cap). Because the supply of allowances is fixed, a downward shift in demand reduces the price (from Price1 to Price2) on allowances in the carbon market without affecting the number of allowances, and thus, the total emissions permitted under the ETS. In a fully efficient ETS, there will be 100 per cent leakage, i.e., a reduction in emissions in one sector covered by the ETS will be offset by growing emissions in another sector covered by the ETS, leaving the total amount of emission unaffected.

[13] The figure is purely illustrative. There are exceptions to this mechanism, e.g. the market stability reserve.

Imposing sector-specific targets, such as a ban on new ICEs, will cause a downward shift in the demand for emissions allowances as car manufacturers will then only sell non-CO2 -emitting vehicles. As Figure 2 illustrates, the number of allowances – and thereby emissions – will remain unaffected by the ban. If the ban is not effective, i.e., the carbon price rather than the ban drives the phasing out of new ICEs, the cost of the green transition will be unaffected. However, considering that the ban aims to speed up the phasing out of ICEs, it will likely come with a cost without a further decrease in GHG emissions. This will increase the total cost of the green transition.

The same mechanism applies to the remaining sectors that are covered by the ETS. Sector-specific targets are not technology-neutral, and so may hinder the identification of the cheapest emissions reductions under the ETS. The ideal EU climate policy would thus include the phase-out of sector-specific targets to ensure cost-effectiveness.

Due to the market stability reserve (MSR), the leakage rate is not always 100 per cent in ETS I. The MSR cancels allowances if there is a large surplus of allowances on the market; and it releases additional allowances if the total number of allowances falls below a certain threshold. This means that the leakage rate can be below 100 per cent, implying that emissions reductions within the ETS may have an ambiguous impact on global emissions – which may or may not be reduced. Beck, KruseAndersen, and Stewart (2023) and Silbye and Sørensen (2023) estimate that the surplus of allowances will be reduced to the point that the leakage rate will be close to 100 per cent from the beginning of the 2030s. Silbye and Sørensen (2023) predict that given current regulations, the leakage will be below 100 per cent up until 2032, whereafter it will be 100 per cent. The MSR creates uncertainty within the ETS because it makes it difficult to estimate present and future leakage rates. Cancelling allowances poses challenges for member states pursuing a more ambitious climate policy than EU climate targets, as cancelling them might lead to the release of additional allowances, making the national reductions irrelevant.

ETS II has a price stability mechanism[14] that will be activated if the carbon price exceeds €45, which will trigger the sale of a given number of additional allowances. Similarly, if the price of allowances increases too rapidly, additional allowances may be released from the reserve. The price stability mechanism acts as a soft price ceiling and, in this instance, the price on emissions can be understood as a tax, as the price rather than the amount of allowances is somewhat fixed. An ETS without price controls would be more reliable in meeting quantitative targets. However, price controls can serve as insurance against uncertainty; besides, a price cap may be required to ensure the political feasibility of the scheme. If the EU's ambitious climate targets prove to be very difficult to meet, the carbon price increases above the value of externalities, and the EU is on track to meet the commitments of the Paris Agreement, a price control in the ETS can keep the carbon price below a certain threshold. However, if the price control is activated, then climate targets should be adjusted accordingly. This is because if reductions are to be achieved through measures other than the ETS, they are likely more costly, which would counteract the purpose of price control.

In the future, the revenue from the ETS should flow to each member state, but there is no need to earmark the revenue for promoting climate-friendly technologies. As we described previously, the price on emissions works as an indirect 'subsidy' – e.g. to green technologies – and public spending

[14] 'ETS2: buildings, road transport and additional sectors', European Commission.

could raise the cost of the green transition. Earmarking revenue for specific green investments imposes non-uniform shadow prices on GHGs, which could counteract cost-effectiveness. If the revenue is to be earmarked, then the framework should be designed to ensure that shadow prices on GHGs are uniform. However, some of the ETS revenues (below a certain, reasonable threshold) might be used to partly finance EU-wide infrastructure deemed by the EU Commission as being of common interest. Broadly speaking, however, ETS revenues should be used to reduce other taxes in member states in order to contain the fiscal impact of climate policies.

Therefore, significant reform of the current climate policy is necessary. A short-term improvement would be to eliminate double regulation by removing sector-specific emissions reduction targets for sectors covered by ETS II. In the long term, all emissions within the EU should be uniformly priced – which is not the case today. To impose uniform pricing, ETS I and II should be combined into a single ETS that also covers sectors not yet included in either existing ETS. This single ETS should also incorporate negative emissions, which would promote cost-effectiveness. In addition, under a fully efficient ETS, sector-specific targets will not promote faster emission reductions, which is why these targets should be repealed under an ideal EU climate policy. Such a reform of the ETS would ensure that the EU climate policy cost-effectively achieves the set climate targets.

References

Beck, U.R., Kruse-Andersen P.K. and Stewart, L.B. (2023): Carbon leakage in a small open economy: The importance of international climate policies. *Energy Economics 117*: 106447.

Hassler, J., Krussel, P. and Olovsson, C. (2024) *The macroeconomics of climate change: Starting points, tentative results, and a way forward*. Peterson Institute for International Economics Working Papers 24-8. Available at https://www.piie.com/publications/working-papers/2024/macroeconomics-climate-change-starting-points-tentative-results (Accessed: 28 October 2024)

Hayek, F. A. (1945) The use of knowledge in society. *American Economic Review* 35(4): 519–30.

Herby, J. (2023) EMISSION POSSIBLE How a consolidated emissions trading system would dramatically reduce costs in the EU. EPICENTER report. Available at https://www.epicenternetwork.eu/wp-content/uploads/2023/12/Epicenter_Emission-possible_web-1.pdf (Accessed: 31 October 2024)

Mankiw, N. G. (2008) *Smart Taxes: An Open Invitation to Join the Pigou Club.* Harvard Institute of Economic Research Discussion Paper No. #2163, Available at http://dx.doi.org/10.2139/ssrn.1268325

Pigou, A. (1920) *The economics of welfare*. Macmillan.

Silbye, F. and Sørensen P.B. (2023) National Climate Policies and the European Emissions Trading System. In Flam, H. and Hassler J. (red.): *Nordic Economic Policy Review 2023: EU versus National Climate Policies in the Nordics*. Nordic Council of Ministers.

Tiebout, M. C. (1956) A Pure Theory of Local Expenditures. *The Journal of Political Economy:* 64(5): 516-424

Tirole, J. (2017) *Economics for the Common Good*. Princeton, New Jersey: Princeton University Press.