

CO₂-cost Compensation Should Reflect the Emission Intensity of Actually Price-Setting Plants

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Background

The purpose of the ETS State aid Guidelines is to address the risk of carbon leakage due to indirect ETS costs for electricity consuming industries. To this end, member states are allowed to compensate indirect emission allowance costs faced by certain industrial sectors. The calculation for the maximum compensation level involves *"differentiated regional 'CO₂ emission factors', which reflect the CO₂ intensity of electricity produced from fossils fuels in a given geographic area"*¹. Equivalent CO₂ emission factors had already been implemented under the 2012 ETS Guidelines.

Aim of this contribution

This contribution argues that these emission factors are fundamentally flawed with regard to the declared aim of the Guidelines as they do not reflect the emission factor of the marginal plant. The current draft Guidelines therefore risk to perpetuate over and/or undercompensation of actual emission costs, depending on the geographic area and the regional structure of the electricity producing sector. Better methods for the calculation of appropriate emission factors are available and easy to implement.

The current draft Guidelines

The emission factor should measure – at least approximately – the share of emission allowance costs that is passed on by the generating industry to electric power prices. Cost pass-through of input prices is an economic phenomenon that has triggered numerous research articles. The rate of pass-through will always depend on the specific economic circumstances. Nevertheless, general economic reasoning does provide a number of insights, which allow a reasonable, theoretically and empirically grounded, yet easy to implement approximation of the prevailing rate of emission cost pass-through in power markets. In this regard, the 2012 ETS Guidelines and the draft Guidelines ignore such fundamental economic arguments.

¹Cited from "Explanatory note accompanying the proposal for the revision of the Emission Trading System Guidelines, OJ C 158, 5.6.2012, p. 4–22", page 4.

Sketch of the economic fundamentals

Power production is always based on a mix of different technologies with varying emission intensity (i.e. coal, gas, nuclear, renewables). Usually, various technologies provide power at the same time. Market mechanisms, however, do not compensate different producers each at their specific cost, nor do they price production at some average cost. Instead, the prevailing market price will typically be the price necessary to get the very last power plant running that is needed to cover market demand. This last plant is selected among those remaining, once all cheaper plants have already been engaged. This so-called ‘marginal plant’ is therefore said to be price-setting. With varying demand, the type of the price-setting plant is likely to vary substantially throughout the year and these different plants can have very different emission intensities. Thus, the amount of CO₂ cost that is embodied in the power price will depend on the type(s) of the marginal plant(s) in a given market.

Application to CO₂ cost compensation

The current differentiated regional ‘CO₂ emission factors’ are based on the average CO₂ intensity of electricity produced only from fossil fuels in a given geographic area. That is, it does not accurately take into account the concept of the marginal plant. Moreover, large parts of power production are (locally) CO₂ free, namely renewable and nuclear power. These plants can be marginal, too.

To illustrate the bias that is introduced by taking the average emission intensity of fossil plants, consider the German market. Germany still has substantial capacities of lignite fueled power plants. These plants are heavily CO₂ intensive and contribute to the average emission intensity of the Central Western Europe (CWE) region. Lignite plants, however, are characterised by low marginal costs and high inflexibility. This causes lignite to be a typical base load technology, which is hardly price-setting. Thus, there is a substantial deviation between the importance of lignite contributing to the average CO₂ intensity of all fossil plants and its relevance for actual indirect emission costs. Our research article cited below illustrates and quantifies this discrepancy.

As another relevant case, consider France. In 2016, only 16.7 percent of installed capacities were fossil fuel fired. The remaining 83.3 percent were nuclear or renewable, thus not affected by ETS costs.² The French system is also characterised by heavy demand shifts varying up to a factor of two. It is therefore very likely that non-ETS-affected technologies are price-setting in several hours throughout the year.

²Source: ministère de la Transition écologique et solidaire, <https://www.ecologique-solidaire.gouv.fr/production-deelectricite>

Alternative proposition

Sensible emission factors should be based on the emission intensities of marginal plants. The identification of marginal plants is not unambiguous. However, there are economically grounded approaches available that are straight forward to implement and allow for a transparent evaluation of marginal technologies from observed data. We have outlined two possible approaches in a contribution cited here below, where one of the approaches is based on marginal cost and one on residual demand. Both approaches use publicly available data and easy to implement methods. Details can be found in a publicly available discussion paper, currently undergoing the review process for publication in a scientific journal. Our approaches are designed to be transparent, to be easily understandable, and allow for a continued updating of the emission factors under varying economic conditions within a fixed set of rules.

Conclusion

An appropriate compensation for indirect CO₂ cost needs to account correctly for the actual indirect costs incurred by the power consuming industries. Failure to do so will imply failure for the declared goal of the draft Guidelines to address the risk of carbon leakage due to indirect ETS costs while minimizing competition distortions and maintaining the incentives for a cost-effective decarbonisation of the economy. The current definition of regional CO₂ emission factors ignore – to a large extent – fundamental economic insights about the functioning of power markets, and therefore mismeasure actual indirect CO₂ costs. Better approaches are available, easy to implement, and straight-forward to update along a predetermined set of transparently stated rules. We therefore urge the European Commission and the European Parliament to revise the draft Guidelines to implement appropriate, rule-based, and (dynamically) adjustable CO₂ emission factors.

Reference

Germeshausen, Robert and Nikolas Wölfing, *How Marginal is Lignite? Two Simple Approaches to Determine Price-Setting Technologies in Power Markets*, ZEW Discussion Paper No. 19-031, Mannheim; first published 2019, latest version: March 2020. Available at: <http://ftp.zew.de/pub/zew-docs/dp/dp19031.pdf>

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