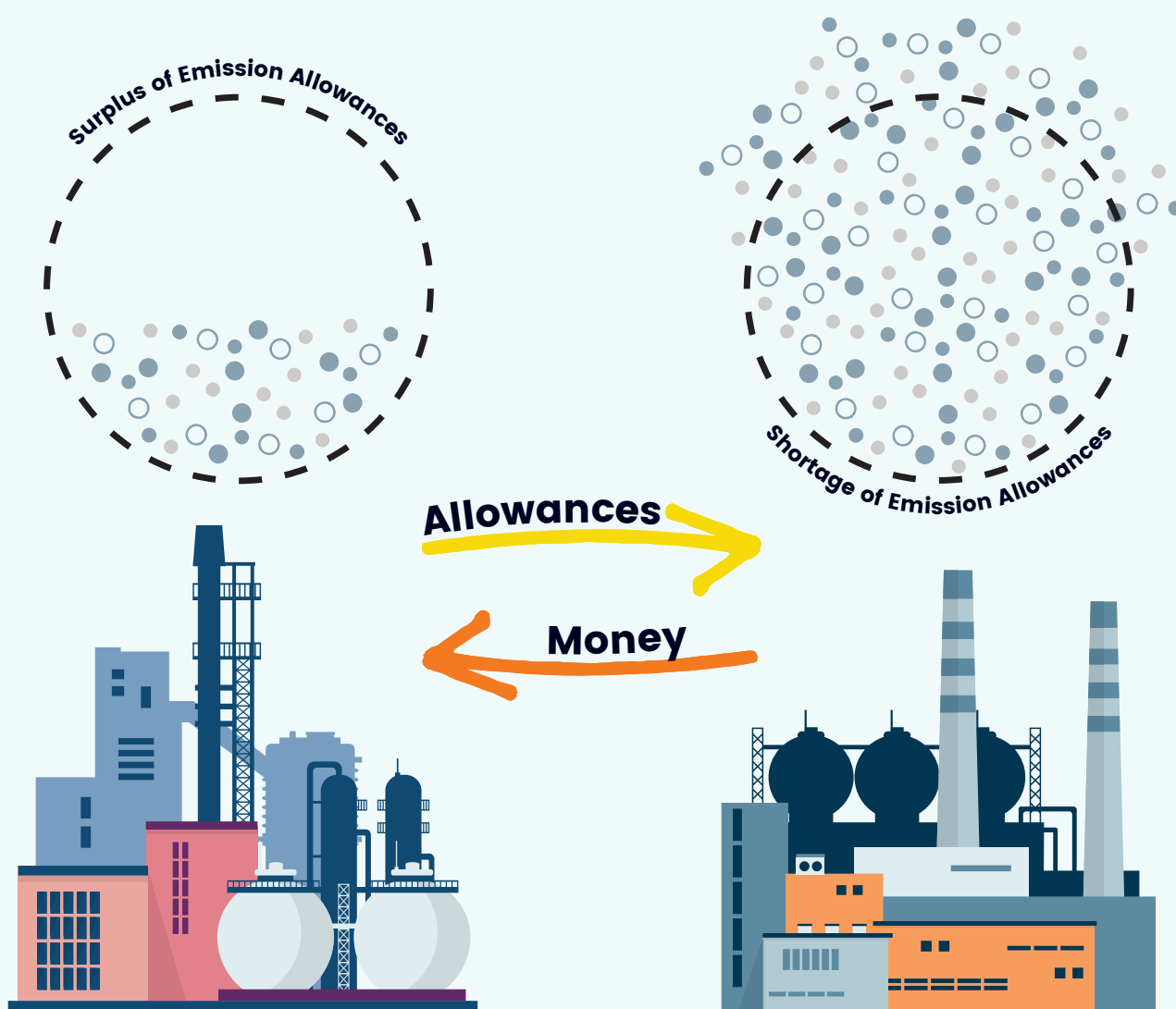


Empirical Basis of Economic Impacts ETS Price Effect



Executive summary



Within MICAT, this indicator describes the effect of energy efficiency measures on the ETS prices, both ETS I and ETS II.

Being an EU wide scheme the ETS prices are only relevant for EU wide considerations and not for national or local level evaluations.

Based on the findings energy efficiency measures have limited direct impact on the ETS I price formation; changes in overall legislation have a higher and more significant impact on the price formation.

Future analysis will look into the price formation for the ETS II and its relation to EU wide energy efficiency policies, once the details of the ETS II market functioning become clear.



Scope of MI indicator



Definition

The EU Emissions Trading Scheme (EU-ETS) is a cap and trade system for emissions within the EU, which gives a price tag to emissions. The indicator is based on the elasticity of the ETS price to changes in the emissions of the energy system derived from the energy efficiency measures.

Relevance on EU, national and/or local level

The EU-ETS is an EU wide scheme therefore changes at local or national level will not have an effect on the resulting ETS price. The ETS price will only change due to EU wide applications of policies or bundles of policies. Fuel shifting policies (e.g. the RED) can have a direct influence on the ETS prices; energy efficiency policies (EED, EPBD, etc.) have an indirect effect as through the reduction of consumption and through induced fuel shifts emissions decrease.

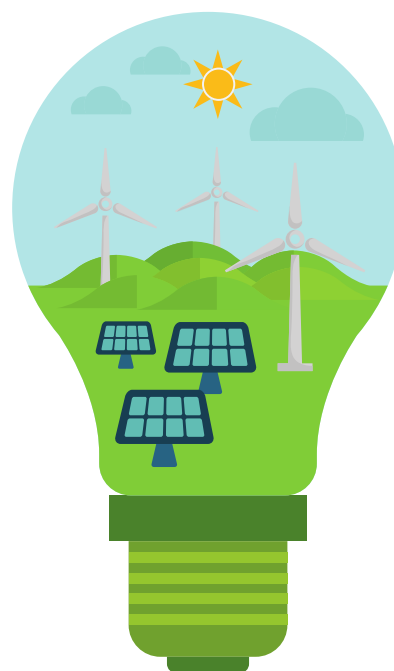
The ETS, as it is currently implemented, effects the power and steam generation sectors as well as energy intensive industries, with additional measures to aid industries which face international competition. The current legislation is under revision, since the Commission proposal on July 14, 2021 within the context of the "Fit for 55" package. The legislative proposal is currently under dialogue discussion with a political agreement reached in December 2022. The new proposal foresees the extension of the "old" ETS 1 to the maritime sector, and further the development of a second emissions trading scheme "ETS2" to the buildings, road transport and non-ETS industrial sectors. The ETS2 is planned to be effective as of 2027 and a decision on the merging of the two trading schemes is planned to take place in 2031.

National and local level sectoral policies are not expected to have sufficient weight to modify the ETS prices in any significant manner. Only the EU level is therefore considered for this indicator.

Overlaps with other MI indicators and potential risk of double-counting

This indicator is linked to emission reductions in the ETS sectors and indirectly to changes in electricity demand which can derive from changes in efficiency and fuel shifting.

As this indicator shows potential changes in ETS prices there is no double counting with other indicators evaluated in the context of MICAT.





Impact figure

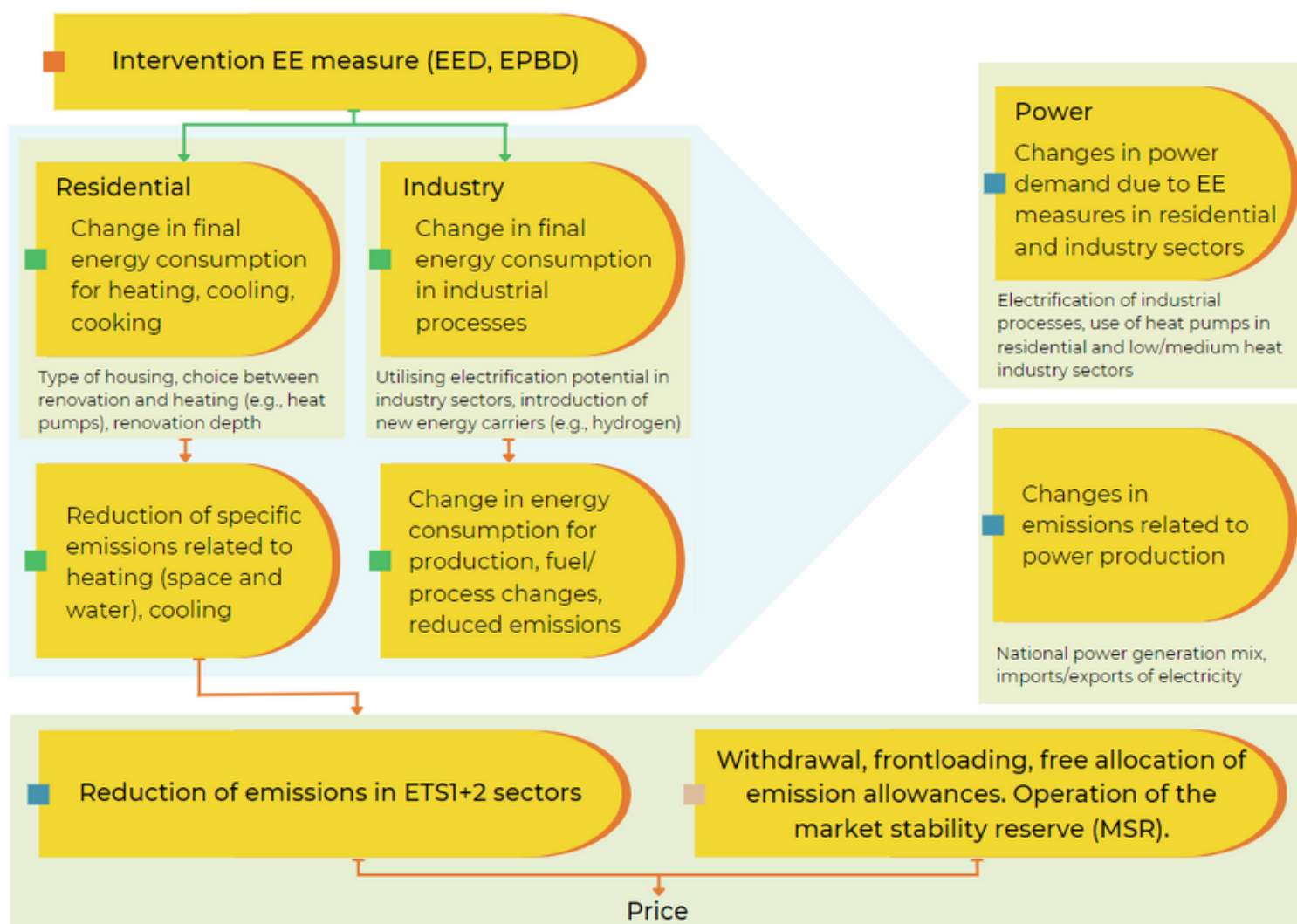


Figure 1: Possible impacts of EE measures on the ETS price



Quantification method



Description

The quantification of the ETS price effect relies on the estimation of elasticities of the change in prices of the ETS relative to emission changes induced by an energy efficiency measure.

Historically, ETS prices have been very low until the last 2/3 years, with prices recently hitting the 100€/tCO₂ mark, which was not previously expected until the most recent reforms.[2] In MICAT, the focus is on energy efficiency measures none of which are expected to have by themselves sufficient leverage to have an effect on the ETS price.

Methodological challenges

The current ETS covers approx. 40% of EU GHG emissions primarily in power generation and in industry. In power and steam generation the majority of power plants are included and fully subject to the ETS.[1] For the industrial sectors, those industries which are subject to international competition and could therefore be at risk of "carbon leakage" receive free allowances, based on a benchmarking system. In the first phases of the ETS (until 2012) the large majority of emission allowances were provided for free; additionally, there was an economic crisis in 2008 leading to a high surplus in the ETS and very low prices for the ETS.

Below we explain the potential effects of energy efficiency policies on the ETS I price. Further, we make a small discussion on the potential effects of policies on the forthcoming ETS II price, although this is speculative as the final ETS II legislative text is not fully agreed but is a very interesting new field of study.

ETS I

The ETS I covers primarily power and steam generation as well as energy intensive industry; in total it covers approx. 40% of EU GHG emissions. The ETS I is regulated through the ETS directive which includes also the Market Stability Reserve (MSR).

In phase 3 (2013–2020), the free allocations were reduced, however, the high pre-existing surplus continued to keep very low prices.

Energy Efficiency Measures in industry

» **Energy efficiency in the overall process:** e.g. waste heat recovery, which has the potential to improve overall system efficiency and reduce the overall heat production needs.

Since 2020 the prices of the ETS have been increasing, this has been attributed to two elements the entering into force of the Market Stability Reserve mechanism and an overall strengthening of the ETS and the overall policy framework including the introduction of the EU Climate Law.

» **Energy Efficiency in the individual processes:** such elements include the improvement of equipment. The modification of equipment can either be a shift towards the best available technology (BAT) of the same equipment, or can result in using a slightly different equipment or process which may lead to a fuel shift. Examples of the latter are shifting from an oil or solid boiler to a gas boiler, or even shift to a heat pump which allows both for energy savings as well as significant emissions savings.

Due to the market size (40% of total EU GHG emissions), there are very few single measures which can trigger changes in the ETS price, as only large-scale changes in emission triggered by EU wide policies have sufficient scale to affect the ETS price from a policy perspective.

[1] Over time exemptions for selected power plants have been decreasing.

[2] https://www.washingtonpost.com/business/eu-carbon-price-passes-symbolic-100-euros-as-reforms-bite/2023/02/22/0ce8423e-b2c0-11ed-94a0-512954d75716_story.html



Further **overall process changes**, such as shifting from blast furnaces to DRI processes in the Iron and Steel industry can take place in industry, however such a change is not strictly speaking an energy efficiency measure. Also, **circular economy** measures are expected to affect both energy savings and emissions, but are strictly speaking not energy efficiency measures. All the changes above will lead to energy savings and ultimately emission savings, however individually (undertaken by one industrial complex at a time) none of these elements will be large enough to trigger a change in emissions large enough to affect the ETS price.

Energy Efficiency Measures in buildings

Energy efficiency measures in residential and tertiary buildings have the potential to induce significant energy and emission savings. For the purpose of the ETS I sectors this will only be relevant when the changes increase or decrease electricity and/or heat/steam consumption in significant quantities. In the short term and because of individual measures this is unlikely to occur.

However, from a systems perspective a gradual change towards higher electrification rates in stationary (domestic and industry) and mobility (transport electrification) will lead to transformations in the power sector and therefore in the ETS I.

Although individual measures will not have an effect on the ETS I price, the carbon price can help ensure that the additional electricity needs of the demand side sectors will be met by low emission technologies with high shares of renewable energy.

ETS II

The extension of the ETS to cover the buildings and the road transport sector was included in the ETS revision published by the Commission in July 2021.[3] A political agreement has been reached

on the ETS legislation in December 2022: this additional ETS system "ETS II" will include the buildings sector and the road transport sector, as well as the industrial sectors currently not included in the ETS.

The political agreement includes a linear reduction factor (LRF) for these sectors, as well as regulations for a Market Stability Mechanism (MSR) for the system and other provisions which may apply under different circumstances, particularly when the prices rise at a very fast pace. The full details of the agreement are not yet in the public domain, however a number of summaries of the agreement are available.[4]

Due to the political agreement being so recent, and a final agreement not being yet reached there are few if any studies yet on the developments of the ETS II prices: in this case the relationship between energy efficiency policies and measures with the ETS II price is potentially expected to be significant; the effectiveness of "bottom-up" energy efficiency measures is expected to influence the levels of the CO2 prices, together with the behaviour of actors hedging, banking and the relationship between the end-users and the fuel suppliers on whom the obligation to submit allowances lies.

Data requirements

The starting point of the analysis is the latest available Symmetric Input Output tables (SIOT) by EU Member State, which are available in Eurostat for year 2015. The sectoral resolution adopted in our analysis is the 65 sectors in NACE rev2. 2-digit, in line with the CPA resolution. Additionally, the sectoral demand contributions should be assumed.



[3] The ETS I will also be extended to cover the maritime sector, but this is not relevant for the current document.

[4] Among others: <https://ercst.org/eu-ets-review-political-agreement-after-trilogues/>

<https://michaelbloss.eu/de/presse/themenhintergrund/eu-co2-handel-einigung-ueber-europas-groessten-klimahebel>

Impact factor/functional relationship



The quantification could follow the following equation:

$$\frac{P_i^1 - P_i^0}{P_i^0} = \mu_i \frac{Q_i^1 - Q_i^0}{Q_i^0}$$

where, Q_i^0 and Q_i^1 are the emission quantities in baseline and with intervention of EE measures, respectively. P_i^0 and P_i^1 are ETS prices in the base scenario and intervention scenario.[5]



Monetisation

The ETS price indicator is a price indicator and therefore directly expressed as €/tCO₂. The change in emission amounts can provide directly the monetisation.

Aggregation

This indicator could provide meaningful results at EU level for different energy efficiency policy strengths for the ETSII. E.g. a higher or lower stringency/effectiveness of the EED implementation at EU level will most likely lead to different levels of ETS II prices. As the ETS I and II cover the entire EU, a quantification below EU level does not have a meaning.

Conclusion

The ETS scheme is an EU wide scheme which can be evaluated only for the EU as a whole; individual energy efficiency measures are not expected to have a significant impact on the ETS prices.

In ETS I, the effect of energy efficiency measures is very limited, as with few exceptions it is only indirectly impacted.

The effectiveness/strictness of EU-wide energy efficiency measures has the potential to significantly impact the price formation in the ETS II sectors; however, the details of the price formation and the behaviour of actors is not yet fully analysed.

The ETS price effect is therefore included in this document, but not implemented in the MICAT tool, due to its limited effect. In future, an analysis of the EU ETS II prices and its relation to energy efficiency measures will be highly relevant.