# *SPATIAL INEQUALITY IN THE EUROPEAN ETS-2 MARKET*

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## Overview

There is a broad consensus that energy policies impact sectors, household groups, and geographical regions differently. It is also well-documented that the energy transition can increase regional inequality and intensify opposition against European policies and EU construction (Rodríguez-Pose (2018)). Within the Fit for 55 package, the European Commission has decided to implement a carbon price signal in sectors not covered by the existing EU ETS regulation. This carbon price would be implemented within a new ETS market called ETS-2. Household heating and transportation expenditures will now be covered by a new carbon price equal to this ETS-2 price. In this paper, we study the impact of the new ETS-2 price on household expenditure at the regional level by differentiating 1'160 regions. This work complements recent existing studies that have focused their analysis on the distributional impact of the ETS-2 price using income decile or quintile at the Member States' level (Görlach et al. (2022), Held et al. (2022). We highlight the regions that will be most impacted and analyse how the Social Climate Fund created alongside the ETS-2 can be used to alleviate regional inequality.

## Methods

The methodology is built on a combination of a household survey, econometric estimates, and a geographic information system. Based on a literature survey, we assume that the ETS-2 price will equal 100€ per ton of $CO_2$ in 2030. We compute the price increase in heating and transport fuels for the 27 European Member States using the IEA statistics on household energy prices. These price increases are then implemented into a European Household Survey that distinguishes 60 household types for each European Member State by combining the following three dimensions:

- Five income groups based on a quintile decomposition,
- Urban versus rural, where an urban area is characterized by at least 500 inhabitants per square kilometer;
- Six household types relative to the family composition,

We derive the expenditure increase for heating and transport purposes for these 60 different types of households. Then, we perform several econometric estimations that allow us to estimate the impact of these household characteristics on these expenditure increases. By combining these econometric estimations with a geographic information system at the NUTS-3 level derived from the Eurostat database, we can compute the impact of the ETS-2 price on 1'160 European regions. The analysis studies several indicators, the increase in heating and transport expenditure, and defines an exposure index to highlight the most exposed regions. This exposure index is computed from the variable ($E$) defined as the expenditure increase in € divided by the disposable income of households living in the region and the exposure index is equal to $I = \frac{E - E_{Min}}{E_{Max} - E_{Min}}$. We visualize the impacts on 1'160 European regions using the NUTS-3 level.

## Results

Our results from the household budget survey show that the ETS-2 regulation is highly regressive (see Figure 1). The econometric estimations indicate that households living in rural areas are more impacted and that the larger the family, the more negatively the household budget is impacted. The regional analysis shows that, on average, the increase in heating expenditure is equal to 130€ and the increase in transportation is equal to 190€.

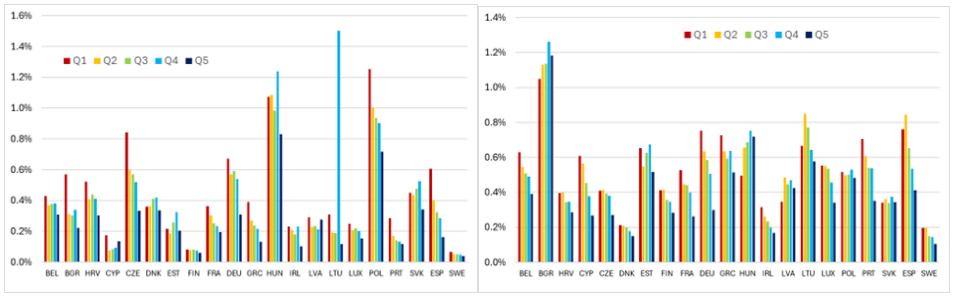


Figure 1: Increase in expenditure in % of disposable income by quintile (left: heating expenditure, right: transport expenditure)

These results align with former evaluations (see Keliauskaite et al. (2025)). The increase in additional expenditure for people living in rural areas is estimated at €70, mainly due to additional transport costs. Figure 2 maps the exposure index. The countries with the most impacted regions are Poland, Bulgaria, Hungary, and Slovenia.

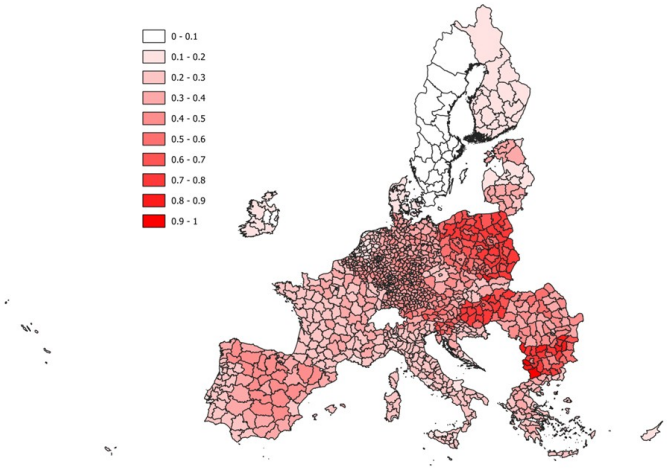


Figure 2: Impact of ETS-2 price on EU region using - Exposure Index [0: region not exposed, 1: region highly exposed]

## Conclusions

Our paper studies the impact of the European ETS-2 regulation on 1'160 European regions. We can compute the most exposed regions by combining a household budget survey, econometric estimations, and a geographical information system. The countries whose regions are most affected are those belonging to Central and Eastern Europe, recently integrated into the European Union, and also the poorest in terms of GDP per capita. Without additional compensation measures, the acceptability of ETS-2 could be severely compromised. The European Union has already integrated these support instruments through the Social Climate Fund. Our analysis shows that this fund will have to consider, at the very least, the environment in which the household lives (rural or urban) and the family composition.

## References

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