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## Understanding the Dependence of CO<sub>2</sub> Emissions from Different Energy Sources in the Context of EU Taxonomy: Regression Clustering Panel Data Models

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### Abstract

This research paper investigates the impact of various energy sources on carbon dioxide (CO<sub>2</sub>) emissions in two distinct clusters of European Union (EU) countries. Utilizing a panel dataset spanning the years 1992-2019, we employ regression clustering panel data models to analyse the relationships between CO<sub>2</sub> emissions, renewable energy sources (Solar, Hydro, Biofuel), conventional energy sources (Coal), and transitional energy source (nuclear) across these clusters. The findings reveal substantial variations in the impact of energy sources on CO<sub>2</sub> abatement between the two clusters. Particularly noteworthy is the unexpected positive effect of Nuclear in the second cluster, prompting a detailed exploration into the contributing factors and policy implications. A comparative analysis between the two clusters highlights distinct patterns: Solar, Hydro, and Nuclear in the first cluster exhibit considerably higher regression coefficients, signifying a more substantial impact on CO<sub>2</sub> abatement compared to the second cluster. Conversely, the regression coefficient for the Coal variable in the second cluster is twice the value observed in the first cluster. We discuss these results in the context of the EU taxonomy and its objectives for sustainable finance and environmental goals.

**Keywords:** EU taxonomy, CO<sub>2</sub> emissions, energy sources, regression clustering panel data models, energy transition