

**Energy-Environment-Economy Interactions:  
An Input-Output Approach Applied to the Portuguese Case**

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**Abstract**

Several of the earth’s crucial environmental problems derive from the energy demand to sustain human needs and economic growth. Indeed, all goods and services produced in an economy are directly or indirectly associated with energy use and, as current energy production and use patterns rely heavily on the combustion of fossil fuels, also to carbon dioxide (CO<sub>2</sub>) emissions (which are the principal cause of the greenhouse effect and of the ‘resulting’ climate change problem).

In an input-output approach, the economic structure is defined in terms of sectors, and this provides a modelling framework for asking specific questions about the relationship between economic structure and economic action. Moreover, extensions of the traditional input-output model can be performed, making particularly explicit the link between the level of economic activity in a country, its corresponding impact on the environment, and/or the corresponding energy interactions. Thus, such an approach provides a consistent and systematic tool to evaluate impacts of measures regarding the achievement of both pollution control and sustainable development.

This paper presents an empirical input-output application of the energy-economy-environment interactions for Portugal, especially concerning the energy intensities and CO<sub>2</sub> emissions derived from fossil fuels use. More precisely, this paper presents a description of the appropriate modifications to the basic input-output model, followed by an outline of the data used. Finally, some results on (direct and indirect) energy requirements and CO<sub>2</sub> emissions are reported, the study’s main conclusions are presented, and the limitations and needs for future research discussed.

*Keywords: Input-output analysis; energy policy; energy intensities; CO<sub>2</sub> emissions; Portugal*