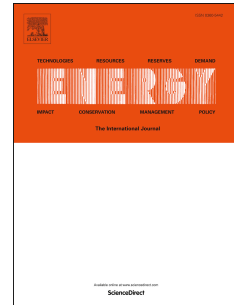


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Analyzing the energy performance of manufacturing across levels using the end-use matrix

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1 **Analyzing the energy performance of manufacturing across levels**
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11

12 **Abstract**

13 Within the context of the controversial use of the concept energy intensity to assess
14 national energy performance, this paper proposes an innovative accounting framework:
15 the energy end-use matrix. This tool integrates quantitative assessments of energy use of
16 the various constituent compartments of socio-economic systems. More specifically it
17 identifies, moving across levels of analysis, what compartments (or sub-compartments)
18 are using what type of energy carriers for what type of end-use. This analysis is
19 integrated with an assessment of labor requirements and the associated flows of value
20 added. The end-use matrix thus integrates in a coherent way quantitative assessments
21 across different dimensions and hierarchical scales and facilitates the development of
22 integrated sets of indicators. In this way it contributes to a multi-criteria characterization
23 of national or sectoral energy performance. The tool is illustrated with an analysis of
24 three EU countries: Bulgaria, Finland and Spain. Challenges to improving the
25 usefulness of biophysical analysis of the efficiency of the industrial sector are identified
26 and discussed. Increasing the discriminatory power of quantitative analysis through
27 better data standardization by statistical offices is the major challenge.

28

29 **Key Words:** Energy intensity, energy efficiency, end-use matrix, industrial sector,
30 manufacturing, MuSIASEM

31

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