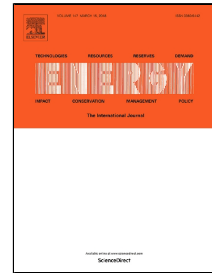


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1 Long-term modelling and assessment of the energy-economy 2 decoupling in Spain

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7

8 **Abstract**

9 *Over the past few years, a decoupling effect between economic growth and energy*
10 *consumption has been detected in many countries. Albeit this fact may be understood*
11 *as positive, it supposes a concern for energy systems modellers since assumption-*
12 *making process, especially concerning the linkage of the socio-economic drivers with*
13 *energy demand, cannot be founded on simplistic relationships any longer. Accordingly,*
14 *this article develops a double assessment to solve that problem. It proposes the use of*
15 *econometric models as suitable tools to project the electricity demand in Spain, and*
16 *besides, it introduces those refined energy demand projections as input for the Spanish*
17 *energy system model, created using the LEAP framework. The results show substantial*
18 *deviations (up to 18% by 2050) in the electricity production required and, to some extent,*
19 *such divergences involve changes in the electricity production technology mix. Besides,*
20 *from the electricity demand side, the use of refined demand projections has a significant*
21 *effect on the sectoral behaviour, proving that –with respect to a simplistic set of*
22 *projections– industry demand is overestimated, whereas residential demand is*
23 *undervalued. In summary, due to the existence of a decoupling effect, energy systems*
24 *modellers should avoid making simplistic assumptions when taking exogenous demand*
25 *projections.*

26 **Keywords**

27 Decoupling; Demand projection; Econometric model; Energy systems; Energy
28 model; LEAP

29 **1. Introduction**

30 In the recent years, the European Union has developed important initiatives
31 focused on the supply side of the energy system which aims at increasing
32 efficiency, diminishing energy demand, and decoupling energy consumption from
33 economic growth [1]. Among all these measures, the promotion of energy
34 labelling schemes in residential sectors (domestic appliances, for instance),
35 financial incentives to co-generation processes, and energy efficiency in
36 buildings, both for existing and new designs, are significantly relevant.

37 Energy Systems Models (ESM) are useful tools to design energy plans and assist
38 policymakers in decision-making processes. Those tools, ESM, are founded on
39 scenario narratives, rationales which usually answer 'what if' questions regarding

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