SCIENCESPRINGDAY

FCT FACULDADE DE CIÊNCIAS E TECNOLOGIA UNIVERSIDADE NOVA DE LISBOA

Department of Environmental Sciences and Engineering (DCEA)

Long term scenarios for energy and environment

Hybrid modelling approach

CENSE: Climate Change and Sustainable Energy

CENSE

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Patrícia is a PhD student at UNL/FCT. She has join several national and EU research projects on energy modelling and was involved in the development of *Portuguese Low Carbon Roadmap 2050* and *New Energy Technologies: Roadmap Portugal 2050*

Objectives

Economic top-down (TD) and technology bottom-up (BU) models are used to design energy and emissions scenarios, outlining how the transition to a low-carbon economy can be achieved. Decision makers need information about the economic impact of such low carbon future and the technology portfolio to achieve it. Separate use of the models do not address all these aspects and they tend to generate divergent mitigations strategies. The main objectives of this PhD research are:

i) Advance on modelling to reduce uncertainty and improve low carbon scenarios design by building an hybrid model sustain by a soft-link between TD and BU models;

ii) Developing long term, low carbon energy scenarios for Portugal and assess its impacts on the economy, which is of utmost relevance to support national policy decisions within climate negotiations.

Methodology

i) Defining the problem supported by the assessment of the extent of different abatement strategies from the separate use of BU TIMES and the TD GEM-E3 models, applied to Portugal (Fig. 1);

ii) Developing a group of long term socio-economic scenarios for Portugal, and link them with energy modelling. These scenarios define the contextual frames to explore different evolutions of the energy system, namely technology development;

iii) Building HybTEP (Hybrid technological economic platform) sustain by the soft link between GEM-E3_PT and TIMES_PT models. This hybrid approach allows to capture the full complexity of the energy system, including its technological configuration and evaluate the interactions between energy and economy;

iv) Model long term, low carbon scenarios in HybTEP (Fig. 2).

Expected Results

This research will deliver an hybrid modelling tool (HybTEP), that is simultaneously: technological detailed (it defines the most cost effective technological configuration of the energy system compatible with a low carbon future) and economic explicit (it considers the feedback of the energy profile and investment choices in the economy). Supported by HybTEP this research will develop low carbon scenarios for Portugal up to 2050, analyse their impact on the energy system and national economy and assess the role of technological development and behaviour change.

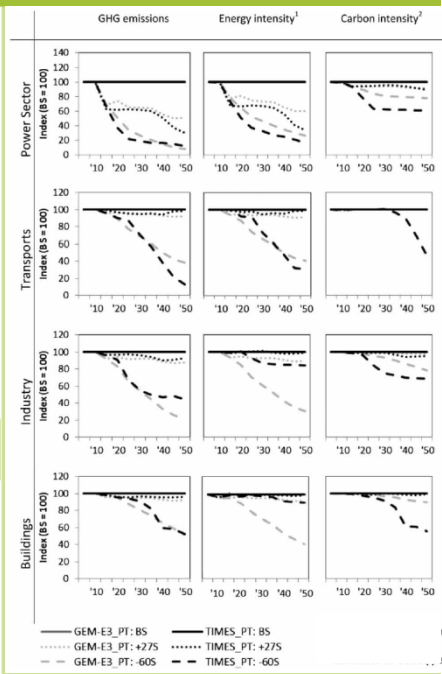
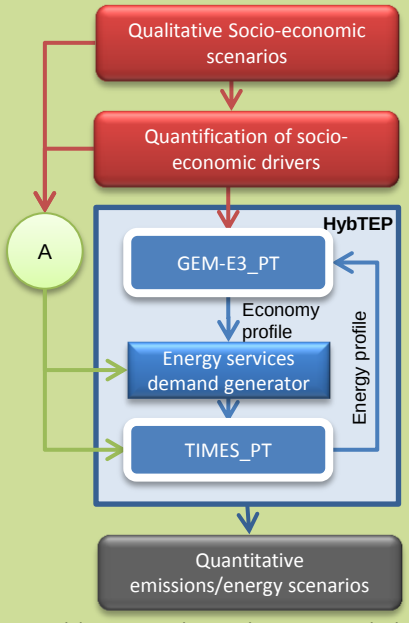


Fig 1. Comparison between GEM-E3_PT and TIMES_PT abatement strategies (Source: Fortes et al., 2013)



A: Link contextual narratives to quantitative modeling assumptions

Fig 2. Simplified scheme of the PhD research methodology

Funding: The present research is funded by the Portuguese Science and Technology Foundation (FCT) trough Patrícia Fortes PhD scholarship (SFRH / BD / 27549 / 2006) and the national project HybCO2 (PTDC/AAC-CLI/105164/2008).

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