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Model-based energy planning: a methodology to choose and combine models to support policy decisions

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Abstract-

Long-term energy planning is becoming increasingly reliant on mathematical models, which offer quantitative insight to support complex policy decisions. However, the increase in their use has meant the proliferation of tools developed at different institutions, with have a variety of scopes, dealing with specific aspects of the economy, the power sector, or the climate, with mismatches in temporal or geographic resolution. All this creates a need for using several models concurrently, integrating them to generate a complete perspective on the entire implications of policy decisions on the energy transition. This article proposes a methodology to categorize and combine energy models and develop a manipulation strategy to answer a target research question. Thus, it gives a formal structure to tasks that are being carried out informally -and suboptimally- in virtually any energy planning project. This methodology is based on structured modeling, a formal mathematical theory that was conceived for representing and manipulating models. It assumes a soft-linking approach, which means that the models share information without a need to integrate them within the same platform or code. This framework was developed within the European project openENTRANCE, which will develop, use, and disseminate an open, transparent, and integrated modeling platform for assessing low-carbon transition pathways in Europe.

Index Terms- Energy Models, Soft-linking, Energy Planning;

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