

Modeling low-carbon energy transition in the territories: a TIMES-SUDPACA model to assess a long-term decarbonization strategy for the south-east region of France

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Abstract

The SUD Provence-Alpes-Côte d'Azur Region (Region SUD) in southern France recently redefined its objectives concerning the decarbonization of its territory and especially of its energy system as a response to guidelines specified in different national climate-energy laws and plans, which establish targets to reach a low-carbon scenario by 2050. In addition, the NOTRe law (Nouvelle Organisation Territoriale par la république) gives the French regions the necessary competences to develop their own energy system and policies related to other climate topics. Thus, a TIMES-SUDPACA bottom-up optimization model representing the energy sector of Région SUD was developed in order to analyze the impact that these policies might have, and to propose alternative policies that might lead the region to achieving its energy transition. The decarbonization of Région SUD presents different challenges than for the rest of France, such as risks to the electricity supply due to a non-looped electricity grid that affects the east of the region, concentrated consumption in the coast of the Région SUD and a high level of renewable potential, but low local energy production. In addition, the Région SUD is composed by six departments that show different characteristics regarding its energy system. One particular difference is that the departments situated at the coast (Alpes-Maritimes, Var and Bouches-du-Rhône) have their energy consumption concentrated in the areas next to the sea. In order to, better study the possible evolution of their system, this departments have been divided in two zones, high consumption zones and low consumption zones, getting in total nine study zones and nine energy systems. In this way, this model analyses the energy transition of each of the energy systems of Région SUD through three different scenarios. The first scenario is the "Reference scenario" which analyses the possible evolution of the energy system of the region without including further policies that would affect the evolution of the energy system. Through a second scenario, it is analyzed the

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application of the current policies proposed by the region to reach a carbon neutral scenario, and identify if these policies are sufficient enough to reach an energy transition. In a third scenario it is analyzed what are the necessary developments to reach a carbon free scenario in 2050. The first results from the model show that with the use of available local renewable resources and a reduction in demand, decarbonization of Région SUD might be possible for some sectors, such as residential and commercial, but that the energy transition of the transport sector will require more accurate policies.

Keywords:

Regional energy system, Long-term modelling, TIMES-SUDPACA, Low carbon transition