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New approach to interactive use of energy system models for policy support

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Abstract:
A typical approach of producing a handful of energy scenarios with energy system models is limited because these scenarios cover only patches of the vast uncertainties and complexities inherent in the energy transition. Such a handful of scenarios is inflexible to serve the needs of the variety of policy makers and stakeholders in a rapidly changing policy arena. Interactive use of energy system models has proved effective for enabling users to browse through many scenarios for insight. Existing interactive tools, such as UK DECC2050 Calculator or Swiss Energyscope, ask users to choose one or several preferred energy scenarios. However, focus on selecting several scenarios only again misses the opportunity of learning from the rest of possible scenarios. We propose a new approach to interactive use of energy system models. Bottom-up energy system model EXPANSE (EXploration of PAtterns in Near-optimal energy ScEnarios) is used to generate a large ensemble of energy scenarios (N=10'000) by combining Monte Carlo runs and Modelling-to-Generate Alternatives technique. An interactive interface is created where the users can explore this large scenario ensemble themselves. The users are first asked to give their preferences based on multiple criteria, such as technology choices, costs, risks to human health, safety, and environment, as well as on qualitative criteria, such as expert confidence about risks. The users express their preferences in terms of preferred, acceptable, indifferent, ambivalent, and unacceptable criteria values rather than preferred ones only. We present the prototype and ongoing work on such an interactive tool for the Swiss electricity sector. Social science methods are used to guarantee that the tool is useful and accessible to its intended users.