DEVELOPMENT AND INTEGRATION OF RENEWABLE ENERGY SOURCES: PROGRESS AND LESSONS LEARNED FROM THE STATE OF CALIFORNIA

SRA Research Project

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RESEARCH HIGHLIGHTS

This project analyzed the economic significance of renewable energy sources (in text: RES) in the state of California. Major environmental policy changes related to energy efficiency and affect of RES on electricity reliability and rates were researched. Fiscally responsible stewardship was reviewed in accordance with Renewable Portfolio Standard (RPS) and other energy policy goals. The cap-and-trade program included in enacted Californian energy models AB-32 and the Global Warming Solutions Act has been observed as a oversight commitment to develop a comprehensive energy strategy. Complex set of subsidies, project finance mechanism and environmental studies contribute to advance the governance structure of a rapidly evolving, technology-driven Californian energy system.

First part of research was based on an extensive theoretical framework for a comprehensive array of approaches to mitigate climate change factors and promote renewable energy sources. Several relevant conclusions have been made, starting from the importance of models for macroeconomic forecasts and the simulation of the composition change. It is indicated that with "Energy 2020" energy end-use and supply level are dynamically calculated by fast advanced derating, chronological-probabilistic, linear programming methods. Developed as a disaggregate model, "Energy 2020" is excellent for DSM (demand savings multiplied) policy testing because it has a causal direction. As stated, not only is the change in energy demand simulated with a causal model, but the composition of the change is simulated as well. Special focus is on strategic value analysis, as a RES "hot spots", in order to prevent future grid problems. The combine use of "EDRAM" and "Energy 2020" provides a precise economic growth outlook resulting from $C0_2$ price reduction. First stage modeling results prove that policies such as 33% Renewable Portfolio Standard, the Low-Carbon Fuel Standard and the Combined Heat and Power policy achieve expected net savings.

The research project results have proven evidence of advance integration of renewable energy sources in the state of California. Microeconomic analysis and causal modeling provided options for further research in this scientific area and the possibility to transfer obtained knowledge to less developed economies with high energy dependence and intensive hydrocarbon import. Structural models and environmental economics methodology revealed updated scoping plan for RES grid integration and strategy evaluation in terms of feasibility study. Sources of financial support and public incentive suggest long-term clean energy perspective and decarbonization of system with forward driven technology. 3-month ahead forecasts and magnitude of the change assumptions indicate strong leadership of California for deep GHG reductions. Loan assistance and technical co-operation for small businesses looks affirmative and reliable, according to medium term economic modeling projections. Innovation diffusion proves California's forceful leadership in RES field and defines explicit regulatory process for their implementation.