

**Title:**

Development of an integrated simulation-optimization energy model – A case study of China

**Abstract:**

Currently, accompanying the profound adjustment of global economy as well as the increasing competition of energy resources, contradictions among economic development, energy consumption, and environmental protection are forcing China to confront with one of the most serious problems. It is therefore essential to scientifically planning for development of various energy technologies at all levels to achieve success in energy technology progress of China. Energy models are capable of understanding the linkage between energy exploitation/generation/utilization, economic sustainable growth, as well as environment/climate change impact mitigation. In this research, an integrated simulation-optimization energy model is developed and the software technology gets further implemented based on analysis and prediction of energy demand in China. The system integrates simulation, optimization and software implementation, which could offer support in making strategic plans for national energy and power industries. First, various end-use and service demands for energy under baseline scenario and green scenario are predicted according to the national long-term socio-economic development goal, which lays a foundation for the optimization of energy system. Second, an optimization model is formulated with a number of constraints such as fuel prices, energy process/generation technologies, energy supply/demand, environmental capacity, conversion efficiency, and clean energy development. The energy system software is consequently developed on the basis of previous work in consideration of analysis on details as project design, database design, man-machine interaction design as well as operation and maintenance design. Users could predict both energy service demand and end-use energy demand, optimize the energy system, and obtain the final optimization program through the software integrating prediction and optimization algorithms and various statistical approaches.