Energy Transition Models and Modelling Tools

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ABSTRACT

Energy modelling has become important because of the global concern over greenhouse gas emissions. Governments use energy-economy models to develop climate policy. Models vary in methodology and purpose. The design of the energy transition pathways for sustainable electricity requires modelling tools that can accommodate high penetration of renewable energy sources while considering the evolution of fossil fuel sources, the cost of technology, natural dynamics of renewable sources and inherent benefits of low carbon sources like nuclear and cleaner fossil fuel technologies and other sources of energy for power generation. The study identified a wide range of models and tools with long range, short term and real time planning and decision-making capabilities. Various tools and software for modeling and optimization of grid electricity but, Green Smith Energy Management System (GEMS), Modelling Energy and Grid Services (MEGS), Wien Automatic System Planning Package (WASP), Home energy management system (HEMS) showed promise for optimized real time as well as middle range grid connected energy system with a mix of renewable, variable energy sources and thermal electricity/energy sources. For use in middle as well as long range energy modeling, identified models include Energy PLAN, Model for Analysis of Energy Demand (MAED), Model for Energy Supply Strategy Alternatives and their General Environmental Impact (MESSAGE)and LEAP (Long range Energy Alternatives Planning System**).**

Key Words: Energy modelling, bottom-up, top-down, hybrid energy system modelling, Energy models, Forecasting model, Optimization model