

DEVELOPING AND USING A MULTI-MODEL APPROACH – ONE SIZE FITS ALL DOES NOT WORK

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Soft-linking Energy System models such as TIMES in a multi model approach with carefully selected complementary models can provide useful additional insights into model results. Part of the motivation for a multi model approach is derived from a view that ‘one size fits all’ does not work and one specific energy modelling tool cannot address all aspects of the full energy system in great detail, therefore greater insights and progress can be gained by leveraging the strengths of multiple modelling tools rather than trying to incorporate them all into one comprehensive model. A further motivation for soft-linking with sectoral models arises from the additional insights that may be gained regarding the timing for individual policy measures, thus facilitating a transition from technology roadmaps to policy roadmaps.

A number of specific examples are given in this presentation; firstly the soft-linking of TIMES to a power system model to investigate result from TIMES and provide additional insights into power system flexibility, reliability and market issues. In the case of the electrical power system, both TIMES and power systems models address the modelling of complex systems, even though they are fundamentally different in their focus and application. Power systems models focus solely on the electrical power system and sometimes the gas network but do not consider the rest of the energy system. The primary inputs are generally exogenous in nature, including electricity load, fuel prices and power plant technical limits. Energy systems models examine the full energy system and in this case the electrical power system is by contrast completely endogenous and driven by the combined behaviour of supply sectors that provide primary fuels and end-use sectors driven by exogenous energy service demands. The focus is typically to provide a technology rich basis for estimating energy dynamics over a medium and long-term, multiple period time horizon. Because of the exclusive focus on electricity generation within power systems models, the problem description can be at a higher resolution, i.e. higher temporal resolution and with increased technical power plant operational detail (including ramp rates, minimum stable level, cold starts etc.) when compared to full energy systems model, which have to handle a much broader range of problems and sub-systems. Typically a power systems model can model from hourly to 5-minute or higher resolution while energy systems models may have a limited number of temporally-independent “timeslices”, which can be a limitation when looking at power systems with levels of fluctuating renewable energy.

The same applies in soft-linking with other model types. Regarding sectoral models, for example a dedicated housing stock model tends to have a focussed and detailed representation of housing stock in the residential sector while TIMES captures the housing stock in a more simplified manner. Soft-linking results from TIMES to a housing stock model can allow for results (in terms of energy) to be further scrutinised and translated into more meaningful units such as number of particular houses effected by a technology or policy.