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## International Energy Outlook 2019—Fact Sheet

### International Electricity Market Model

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The International Electricity Market Model (IEMM) is a new module within EIA’s World Energy Projection System Plus (WEPS+) and was introduced in the *International Energy Outlook 2019* (IEO2019). As one of the energy transformation models within WEPS+, IEMM is critical to EIA’s ability to model and project international electricity capacity planning and dispatch in both the mid and long term.

IEMM receives regional electricity demands and fuel prices as inputs from WEPS+ and provides WEPS+ with regional projections of power sector fuel consumption, electricity capacity additions by technology, and generation by fuel or resource. IEMM is a least cost linear program that uses an economic model to optimize capacity planning and dispatch. IEMM was built from the TIMES modeling framework—an engineering-economic energy systems model generator developed by the International Energy Agency’s Energy Technology Systems Analysis Program<sup>1</sup> (ETSAP), a consortium of nearly 20 national labs and research institutions. Through an innovative approach, IEMM links the electricity sector of the TIMES framework to the WEPS+ global energy model. IEMM enables iterative passing of variables shared between the two models until convergence is met, which balances the economic equilibrium between supply and demand and accounts for non-economic requirements such as renewable policies.

New capabilities in IEO2019 that are implemented with IEMM include the following:

- The modeling of electricity capacity planning and dispatch (including nuclear and renewable technologies) as economic decisions
- Extreme regional and temporal flexibility
- The accommodation of differing data availability, including flexible regional data aggregations
- Endogenous response to a wide range of power sector policies

To accomplish these goals, IEMM’s design was based on the following design principles:

- Data is maintained independently of the model at the most detailed level of granularity possible.
- The model has a flexible, parameter-driven structure.
- A model instance generator (MIG) and data post-processor interface between the data and model.

IEO2019 reflects the first step in building out the modeling structure and data. IEO2019 is slated to include an *Issue in Focus* paper that explores some of IEMM’s analytic capabilities.

- IEMM can be downloaded as part of the IEO2019 WEPS+ source package. IEMM is a TIMES model written in GAMS coupled with python-based WEPS+ integration code and Excel input files. It requires a GAMS solver to run. EIA does not provide user support; however, many users obtain the model for the data in its input files or for the source code.

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<sup>1</sup> <http://iea-etsap.org/>