Switch Power System Planning Model

Switch is an open-source power system planning model that is uniquely suited for designing and studying future power systems that may have large shares of renewable energy, storage and/or demand response. It optimizes investment decisions for renewable and conventional generation, battery or hydrogen storage, hydro and other assets, based on how they would be used during a collection of sample days in many future years. This allows it to identify the least-cost system design to meet policy goals such as carbon or renewable energy targets while maintaining a reliable supply of power. It is an ideal choice for "what if" analyses of the cost of decarbonization or the appropriate role of new technologies.

Switch uses a state-of-the mathematical formulation that considers multiple investment periods and chronologically sequences of hours, enabling optimization and assessment of a long-term renewable transition based on a direct consideration of how these resources would be used hour-by-hour.

The Switch platform is also highly modular, allowing easy selection between prewritten components or addition of custom components as first-class elements in the model.

You can find documentation and downloads for Switch at the following locations:

- Our open-access paper on Switch 2.0 in *SoftwareX* gives an overview of Switch, and the accompanying Supplementary material gives a complete mathematical description of the model.
- A list of papers and studies written using Switch. These can give you an idea of work that others have done—possibly in your area—and may point you toward data sources, collaborators, advisors or shared code.
- The Global PST and openmod initiative portals summarize Switch's capabilities and list studies it has been used for. They are also good places to compare Switch to other models.
- **Switch tutorial**: This gives a fast-paced, hands-on introduction to installing, using and customizing Switch. It also provides simple documentation of the most common input files. First follow the pre-tutorial instructions to install Switch and set it up for the tutorial. Then follow the tutorial itself.
- **Switch repository**: https://github.com/switch-model/switch. This contains the generic Switch model, which can be used to create models for new power systems. It also contains data and configuration files for a number of example models to help you get started. This repository contains some general documentation for modeling with Switch, which will be helpful if you need to customize any Switch-based models. Scroll down to the "README" document on the first page to get started.
- **Switch-USA-PG repository**: https://github.com/switch-model/Switch-USA-PG/. This contains everything you need to setup and run models for the United States or sub-regions using the PowerGenome data pipeline.
- **Switch-Hawaii repository**: https://github.com/switch-hawaii/. This contains data and model configuration files for the Switch-Hawaii model. Most users will want to use the "main" repository, which is the version of the model used for most studies by Matthias Fripp at the University of Hawaii. This fairly closely matches the data included in Hawaiian Electric's Power Supply Improvement Plans. This repository includes instructions for downloading and installing the Switch-Hawaii data along with a matching version of the main Switch model. Scroll down to the "readme.txt" file on the first page of the "main" repository to get started.

Please send a message to the Switch Model Google group (switch-model@googlegroups.com or https://groups.google.com/forum/#!forum/switch-model) or contact Matthias Fripp at mfripp@edf.org if you have questions or need help installing and running Switch.