An Open Energy Outlook for the United States

Openmod Lightening Talk

Via Zoom

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Open Energy Outlook for the United States

New 3-year effort funded by the Sloan Foundation to create an Open Energy Outlook for the United States

Key features:

- Focus on deep decarbonization in the United States
- Utilize open source tools, models, and data
- Maximize transparency
- Assess model sensitivities and future uncertainty
- Promote community involvement

A Whole Energy System View Is Important

- Deep decarbonization requires a view of the whole energy system
- Many policy proposals target the entire energy system; thus important to know where reductions are possible
- Important system-wide pathways to consider (power-to-X)
- Modeling the whole energy system allows us to explore system-wide changes and interaction effects endogenously

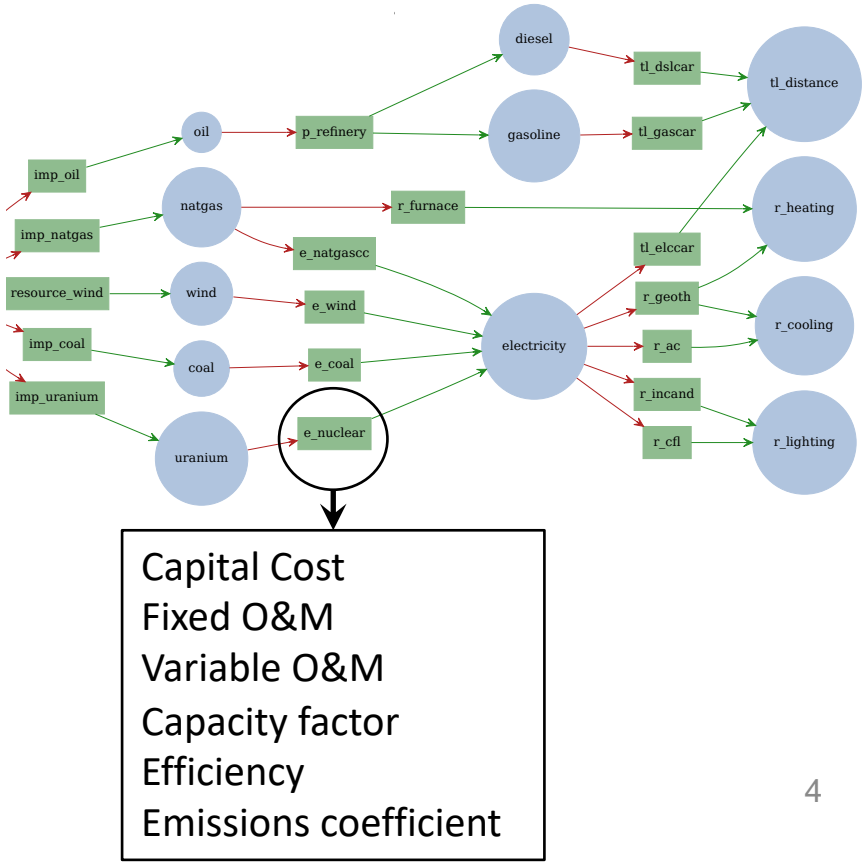
Temoa

Tools for Energy Model Optimization and Analysis

Temoa is an open source energy system optimization model

- **Objective:** Minimize the present cost of energy supply over the model time horizon
- Ensure energy balance globally and at the process level
- Perform capacity expansion across a set of user-defined time periods

- Model assumes all years within a time period are identical
- Representative year per time period further disaggregated into user-defined time slices over which supply and demand balanced



Temoa Development

Objectives

1. Enable repeatable analysis
2. Focus on uncertainty quantification

Software

- Source code (GPLv2) and data (CCO-1.0) on Github
- Open source software stack (Python, Pyomo, SQLite, Graphviz)
- Draws on a rich Python ecosystem
- Data stored in a relational database system (SQLite)
- Utilizes multi-core and compute cluster environments
- Capability to run on the cloud using a web-based interface

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Planned Outcomes

- Attract an array of scholars who can improve the model-based analysis.
- Increase the coverage of energy technologies and sectors represented in energy system models.
- Provide public access to the model's revision control system via GitHub, which gives users provenance over data and code
- Provide a platform to test hypotheses and resolve debates over data and model dynamics.
- Issue an annual report that can be used to inform energy and climate decision-making.

Key Links

Project website: https://openenergyoutlook.org/

Model Website: http://temoacloud.com

GitHub Repos: https://github.com/TemoaProject/

Zenodo snapshots: https://zenodo.org/communities/temoa/

Cloud-based version: http://model.temoacloud.com/

Interactive Documentation?

- We currently use Sphinx to generate Temoa documentation
- Considering Jupyter books to document the input data:
  - Allows us to use markdown and dynamically generated database tables
  - Perhaps have users use GitHub “Issues” to make comments and suggestions?
- For other documents, how best to share?
  - Google Docs
  - Github markdown docs
- Are there other options?