

Energy system modeling with sector coupling

Time	Mon 11.10	Tue 12.10	Wed 13.10	Thu 14.10	Fri 15.10
9:00 - 10:30		Code along Parameters, variables, and constraints in bottom-up planning models	Code along Storage, multi-temporal capacity expansion and time-series representation		Group Work
11:00 – 12: 30	Welcome	Integrated session Project and paper discussion	Group Work	Integrated session Project and paper discussion	Group Work
13:30 – 15:00	Lecture Introduction to graph-based bottom-up planning	Lecture Overview of exemplary applications for graph-based bottom-up planning	Lecture Advanced features based on interests (e.g. retrofitting, stochastic optimization, technology deployment, solution algorithm)	Group Work	Final presentations
15:30 – 17:00	Code along Program setup, data files and plotting with AnyMOD.jl	Guest lecture	Group Work	Group Work	Final presentations
Evening	Integrated session Software Troubleshooting		Fun Evening		

Recommended literature:

[1] DeCarolis, Joseph F. et al. “Leveraging Open-Source Tools for Collaborative Macro-energy System Modeling Efforts.” Joule 4 (2020): 2523-2526.

[2] Göke, Leonard. “A graph-based formulation for modeling macro-energy systems.” Applied Energy 301 (2021): 117377. (available on <https://arxiv.org/abs/2004.10184>)

[3] Göke, Leonard. “AnyMOD.jl: A Julia package for creating energy system models.” Preprint (2021). (available on <https://arxiv.org/abs/2011.00895>)

[4] AnyMOD.jl online documentation: <https://leonardgoeke.github.io/AnyMOD.jl/stable/>

Installing Julia

1. Download and install [Julia 1.3.1](#) and [VS Code](#) as an editor. If you got a newer Julia version or use a different editor (e.g. Atom) things should work as well.
2. Start VS Code and install the Julia extension by navigating to *File* → *Preferences* → *Extensions* and search for Julia.
3. The Julia installation should be recognized automatically. Otherwise navigate to *File* → *Preferences* → *Settings* → *Extensions* → *Julia* and manually specify the “Executable path”.

For instance, in my case this path looks like this: C:\Users\lgo\AppData\Local\Julia-1.3.1\bin\julia.exe

4. Start a new Julia REPL by opening the Command Palette (*Go* → *Command Palette*) and search for “Start REPL”. The “Julia: Start REPL” command will appear and can be executed pressing Enter.

Installing and running AnyMOD

1. First, we need to install AnyMOD and a solver package for Julia. For this purpose, type **J** into the Julia terminal to switch to the package mode. Then, **add AnyMOD** and **add Gurobi** will install the corresponding packages.
2. To use Gurobi you need to sign up on their homepage [here](#) and follow the instructions to get a free academic license. If you are not eligible for a free Gurobi license, you can use the Open Source solver Cbc. You can install it with **add Cbc** in package mode.
3. Open the folder (*File* → *Open Folder*) that contains the files I've with this mail and open **test.jl**. You can now either run the script by clicking on the Play symbol on the upper right. Alternatively, you can also execute the code by selecting a few lines and pressing *Alt + Enter*. Thanks to the comments the code should be self-explanatory for now.