Homework 2

June 11, 2020

Task 1 Commercial Exchange

The goal of this task is to discuss some theoretical background to commercial exchange in electricity markets.

1. In the lecture we discussed three types of pricing mechanisms in electricity markets. Name all three, state an example where markets are designed with this pricing mechanism and name at least two advantages and disadvantages for each.

2. Zonal pricing with implicit auctioning is used across Europe. Describe what this means in terms of balancing load and generation, exchange between market areas and the concept of an Energy-only-market.

Task 2 Data preprocessing

Keep the answers concise with only a **few sentences**.

1. In contrast to our previous examples, in the provided template all data are loaded from files instead of hard coding them in the script. Why is it usefull to seperate the input data from the script?

2. What do the functions ‘dictzip‘ and ‘coldict‘ do? Why is it efficient to define a custom function here?

3. Why does the net transfer capacity between zones need to be limited in both directions?

4. Based on the given program it is possible to change the topology solely by changing the data. List the steps necessary to extend to problem to three zones and state what additional information/data is needed.

Task 3 Expand the model

The template is misses the correct implementation of exchange between zones. The variable *FLOW* is already declared with a lower and upper bound. Your task is to add the *FLOW* variable to the electricity balance. After you run the optimization with this change, you will need to modify the post processing accordingly.

1. Before you start take a look at the DataFrames.jl documentary.
2. Both DataFrames *result_generation* and *result_demand* have the columns: zone, technology, hour, and value. Create two DataFrames which contain the import and export values with the same format as *result_generation* and *result_demand*. Use the *vcat* function to concatenate these new DataFrames accordingly. Hint: Insert "import" and "export" as technology in the respective column.
3. Add the color *:purple* to the *colordict*. Create a plot for each zone with the predefined function and save them as a files. When you submit your homework, send us the plots.
4. Describe the resulting exchange between the two zones. What is the direction of the commercial exchange, what is the resulting average load of the interconnector and how often is the interconnector fully utilized.

Please sent your results to riw@wip.tu-berlin.de until June 25th 2020.