

## Guideline to EnergyPLAN Exercise 5:

### Advanced Energy System Analysis: Feasibility Studies and Market Exchange Studies

In Exercise 5, you are asked to conduct Feasibility Studies and Market Exchange Studies of pre-defined energy systems.

#### Exercise 5.1: Make a Feasibility Study of the IDA Energy plan 2030

Open the EnergyPLAN model. Load the input data set "Denmark2030Alternative.txt", which is a model of the IDA Energy Plan 2030 system also used in exercise 4.

Calculate the socioeconomic costs of the system without any electricity exchange for the three fuel price alternatives already loaded into the model. Use a CO<sub>2</sub> cost of 150 DKK/ton.

#### Exercise 5.2: Do a market exchange analysis of exercise 5.1

Open Denmark2030Alternative and conduct a market exchange analysis. Use the same input as in exercise 5.1, i.e. the three fuel prices already loaded into the model and a CO<sub>2</sub> cost of 150 DKK/ton. Open the system to the external market by setting the import/export transmission capacity to 2500 MW.

Design an external market with an average price of 349 DKK/MWh using the distribution file "Price\_DKV\_2005.txt" (The Nord Pool spot market prices of year 2005). The 349 DKK/MWh can be identified by using an addition factor of 60 DKK/MWh and the multiplication factor 1.043.

Calculate the new socioeconomic costs of all three fuel price alternatives.

#### Exercise 5.3: Do an advanced market exchange analysis of exercise 5.1

Repeat the analysis of exercise 5.2 for a 7-year period of 3 normal, 3 wet and 1 dry year using the following data:

DKK/MWh	Weight	Constant	Variable	Total
Wet year	3	60	170	230
Normal year	3	60	315	374
Dry year	1	60	572	632
7 years average				349

Compare the results to the results of exercises 5.1 and 5.2

#### Exercise 5.4: Optimise the wind power capacity

Use the input data set of exercise 5.1, and identify the optimal offshore wind power capacity given an onshore capacity of 3000 MW. Use "Basic" fuel prices.