

# Modelling Renewable Energy Integration Technologies in the EnergyPLAN Tool

---

## Exercise D: Heat pumps in buildings and district heating (~45 minutes)

In this exercise we will add heat pumps in both the individual buildings and the district heating systems. First we will add the individual heat pumps by replacing all of the individual oil boilers.

- Open the file “Energyland\_step2\_districtheating.txt” from Exercise C.
- Then go to File->Save As and save a new file called “Energyland\_step3\_heatpumps.txt”

For the individual heating section, you should replace all of the oil boilers with individual heat pumps. Note that you should have enough power plant capacity to meet the peak electricity consumption when you add the heat pumps.

In the district heating networks, you should add heat pumps to the system by assuming that the heat pump capacity is 10% of the CHP capacity (in both group 2 and 3).

Here are the results:

Wind Power	Wind Power	Wind	CEEP	CEEP	Fuel	CO2	2020 Total Costs
%	TWh/year	MW	TWh/year	(% of Demand)	TWh/year	Mt/year	M€/year
0%	0.00	0	0.0	0%	177.5	44.04	16,122
9%	3.11	1,500	0.0	0%	173.6	42.63	16,045
17%	6.22	3,000	0.0	0%	170.0	41.25	15,972
26%	9.34	4,500	0.6	2%	167.6	40.13	15,940
35%	12.45	6,000	2.1	6%	167.3	39.45	15,982
44%	15.56	7,500	4.3	12%	168.6	39.11	16,087
52%	18.67	9,000	7.0	20%	171.1	38.99	16,235
61%	21.78	10,500	10.1	28%	174.3	39.01	16,414
70%	24.90	12,000	13.5	38%	178.1	39.16	16,613
79%	28.01	13,500	17.0	48%	182.2	39.37	16,828
87%	31.12	15,000	20.6	58%	186.6	39.64	17,053