Electric Boiler Operation Optimization

The project is intended to understand the optimization of electric boiler operation based on the electricity prices. The prices vary during the day based on the demand. The optimal operation of the boiler should be to compromise the consumer comfort at the least possible cost. The boiler should operate on the low prices time period to reduce the cost of boiler operation.

Files information

The files used as input are:

load.csv

prices.csv

The load file contains the information about the present boiler operation which varies for different consumers. The consumers will never want to reduce the comfort level for the optimization; therefore, this information is contained in this file. The total energy consumed by the boiler has to be a constraint so that energy delivered to the consumer remains the maximum.

The prices file contains the information about the electricity prices and the optimization requires that boiler should operate only during the low-price periods.

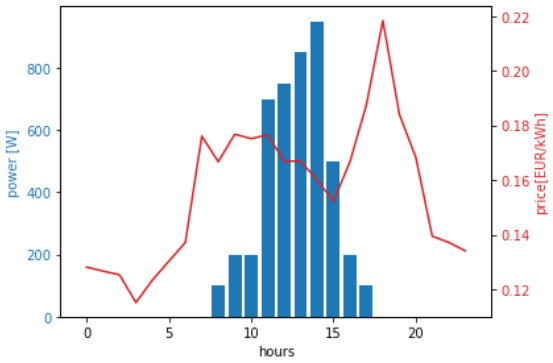
Scenarios

The following table shows the different scenarios that were created for the project.

Scenarios	Total consumption	Cost	Discussion
0	4550	0.7578928	
1	4550	0.554	Compare with 0: The cost is lower
2	5400	0.66207	Compare with 1: The cost is higher because it is consuming 1350W.
3	4800.0	0.6120	Compare with 1:

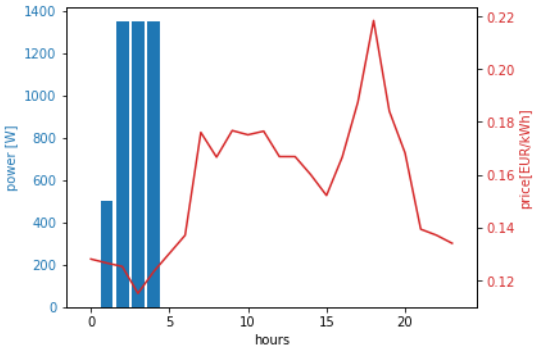
			Consumption is still higher because it works on either 600W or it is off
4	4550.0	0.57771885	Compare with 2: Cost and consumption have lowered.

Case 0: Without Demand Response



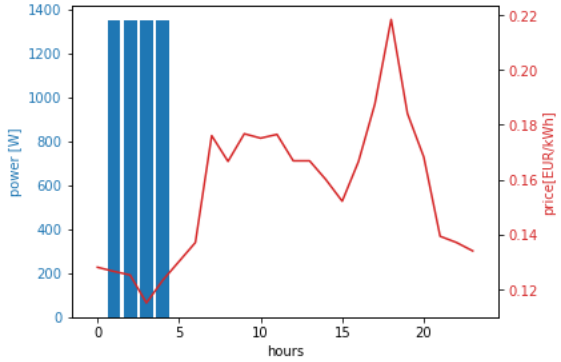
Case 1: With Demand Response and Continuous variable till 1350W

Boiler can work on any level below than 1350 W.

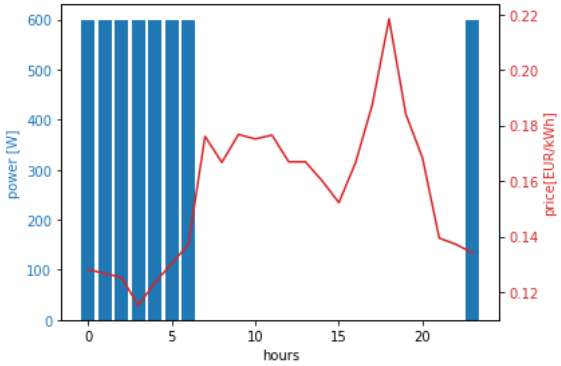


Case 2: Demand Response with binary operation of boiler (1350W)

Binary response means that boiler will either operate or remain off. There is no in between levels of power where boiler will be operating.



Case 3: Demand Response with binary operation of boiler (600W)



Case 4: Demand Response with variable operation till 600W