Sustainify Report

Model Brief:

A .csv file was made by integrating data from 2010 - 2017 for the daily electricity average prices
The model was made using Neural Networks and Long-Short Term Memory. The code explains how the model works.
The data was cleaned by fixing missing values. Values greater than 100 were truncated to 100 (outliers).
The value of R-squared is: 0.903 (from the python notebook)
Unfortunately, the prediction of prices for 2018 after a certain initial period became stagnant giving incorrect prices. The issue could not be solved due to the constraint of price.
For the sake of optimization, the price for 1st Jan 2018 is assumed to be correct.

Optimization:

Exchange Price = 9.7 (EUR/MWh)
Electricity Grid Price = 57.62 (EUR/MWh)
Renewable Electricity = Minimum 20% of net Energy

Renewable Energy = 15% of Electricity Grid + 5% of Power Exchange + 100% Solar Plant
Total Energy = 1200 MWh
Solar Plant = 150 MWh

Renewable Energy = Q_exch*0.05 + Q-grid*0.15 + 150

Q_grid = y Axis
Q-exch = x Axis

Z = 57.62*Q_grid + 9.7*Q_exch

Constraints:
x + y + 150 = 1200
0.15*y + 0.05*x + 150 >= 0.2*(x+y+150)

Solving and minimizing Z, we have
x = 675
y = 375

Z = 28155 EUR

a) Optimized Percentage of Total Renewable Electricity of Total Electricity =
(0.15*Q_grid + 0.05*Q_exch + 150)/(Q_grid + Q_exch + 150) * 100
= 240/1200*100 = 20%
In order to optimize costs, the optimized percentage of total renewable energy is minimum

b) Optimized Quantity of Electricity drawn from State Electricity Grid (Q_Grid) = y = 375 MWh

c) Optimized Quantity of Electricity drawn from Power Exchange (Q_Exch) = x = 675 MWh