Which non-fossil fuel energy technology will have the best price in the future?

Introduction

To give an answer to the question, “Which non-fossil fuel energy technology will have the best price in the future?” research is done to calculate the expected future price in $ per kilowatt-hour per non-fossil energy technology. For this research one dataset is used:

- Levelized cost of energy by technology, World (*link 1*)

In this research, the future price is calculated for seven different energy technologies.

- Bioenergy.
- Geothermal energy.
- Offshore wind energy.
- Solar photovoltaic.
- Concentrated solar power.
- Hydropower.
- Onshore wind energy.

From the above seven technology’s the linear regression in the costs per kilowatt-hour is calculated, concluding that three technologies have an increasing price (bioenergy, geothermal energy and hydropower) and the other for are decreasing, where solar photovoltaic and concentrated solar power appear to decrease the fastest of them all.

Linear regression over onshore wind energy

To predict the price in the future, first the linear regression was calculated with the historical data. The data for the onshore wind energy goes back to 1983. In the next figure the measurements per year are shown, as well as the linear regression, calculated form these measurements. The OLS-method (Ordinary Least Squares) was used for this calculation. (*link 2*)

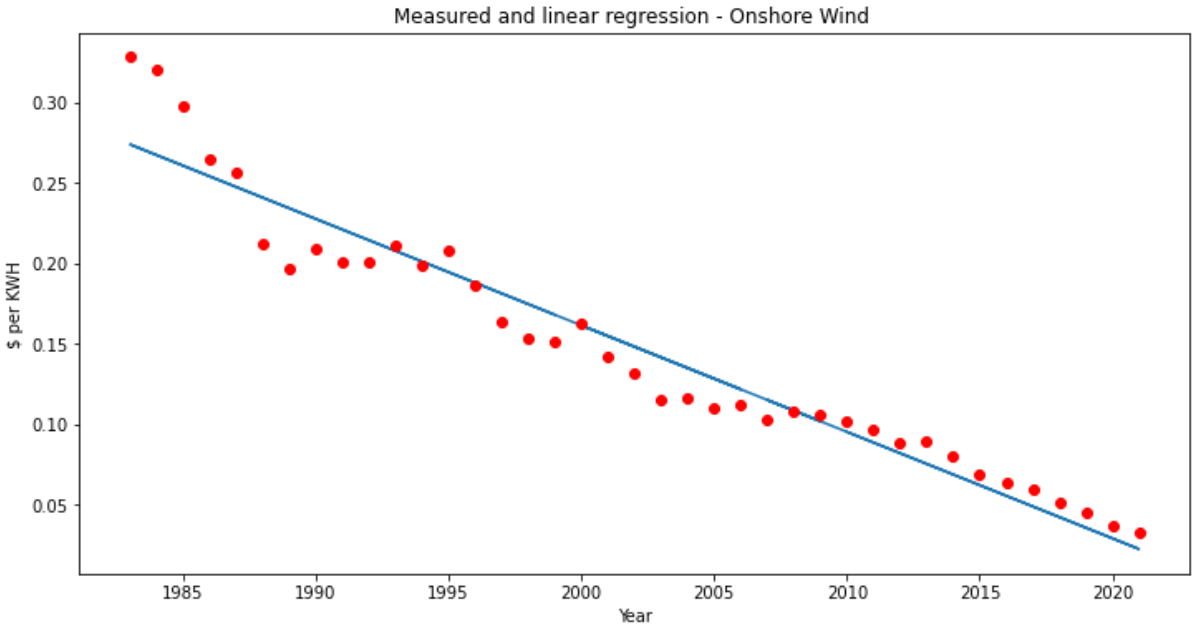

Figure 1: Costs per kwh and linear regression of onshore wind energy worldwide (1983 – 2021)

Overall linear regression

For each of the seven technologies the linear regression was calculated, which gave a predictor value for each of them. Because the historical data of most of the technologies do not go further back than 2010, the timeframe 2010 – 2021 is used to make an equal comparing. The historical linear regression is plotted in the next figure.

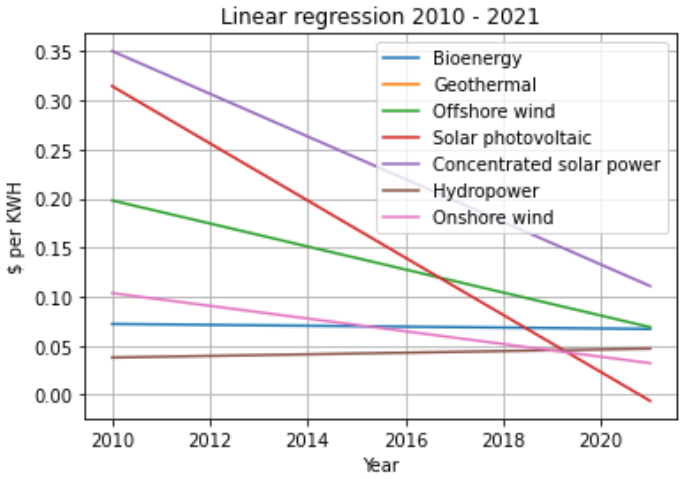

Figure 2: Linear regression for the seven technologies 2010 – 2021

Future price prediction

Using the predictor value, the expected future price is calculated for the different technologies. This gives the next figure, calculated for the time period 2010 – 2050.

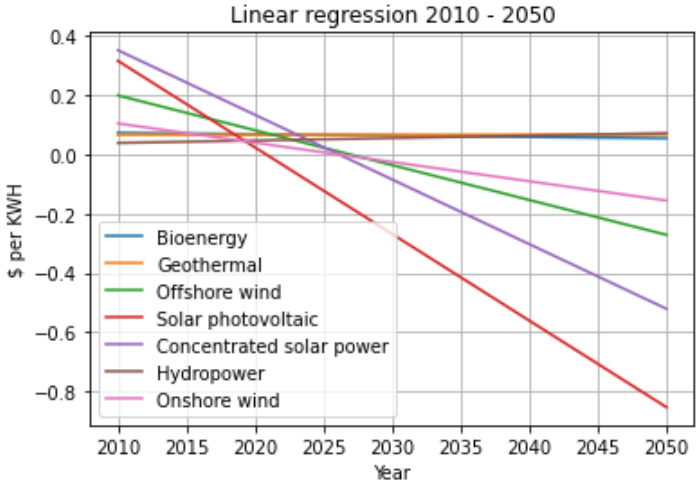

Figure 3: Linear regression for the seven technologies 2010 – 2050

Conclusion

From the seven technologies there are three where the price increases, the other four are decreasing.

Increasing prices
- Bioenergy
- Geothermal energy
- Hydropower

Decreasing prices
- Offshore wind energy
- Solar photovoltaic energy
- Concentrated solar power
- Onshore wind energy

As seen in the figure (3) the price of the four decreasing technologies will come below $ 0,00 which in fact will not happen because there always be costs to produce the energy. The solar power energy sources are both decreasing fast and therefor will have the best price in the near future.

Appendix

Links to data sources:

1. https://ourworldindata.org/grapher/levelized-cost-of-energy
2. https://towardsdatascience.com/introduction-to-linear-regression-in-python-c12a072bedf0