

Hydropower market dynamics in Norway: Assessing the market value and volatility

Kyriaki Tselika, SINTEF

Abstract

Energy markets are evolving to meet environmental challenges, such as the European Union's (EU) ambition to become the first net-zero continent by 2050. A critical component in this transition is the decarbonization of the electricity sector, which requires a significant shift towards renewable energy sources. Hydropower stands out among these sources due to its flexibility and storage capabilities, which can mitigate the intermittency of wind and solar power.

This paper examines the market value and market value volatility of hydropower in Norway, a country where hydropower plays an important role in electricity generation and is a significant contributor to Europe's reservoir storage capacity. We use linear regression models to understand the relationships of various energy sources on hydropower market value and volatility, followed by a quantile regression to explore effects under different market conditions.

Our findings reveal that Run-of-River and water reservoir hydropower have different impacts on market value. Run-of-River negatively affects market value in both regions, while water reservoirs positively impact NO2 and negatively impact NO1. When it comes to the volatility of hydropower in both regions, we find that almost all generation sources reduce market value volatility, including variable sources, such as wind generation.

Additionally, the quantile regression analysis highlights that the different hydropower sources have varying impacts on the hydropower distribution. Despite the different generation mixes and market dynamics in the two regions, it seems that the electricity systems remain reliable due to the availability and complementarity of various sources in the electricity system.

Market participants can utilize this information in developing profitable strategies that can enhance their overall market performance. On the other hand, the results can guide policy makers in designing regulations that support hydropower producers while including higher renewable generation in the electricity mix in Europe.