Hydropower flexibility and transmission expansion to support integration of offshore wind

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In 2013, offshore wind grew over 50%. This increase, concentrated in a relatively small geographical area, can lead to an increased variability of the power produced by offshore wind. The variability is one of the key issues, along transmission, in integrating offshore wind power. Hydro power is one of the fast responding sources of electricity, thus power systems with considerable amounts of flexible hydro power can potentially offer easier integration of offshore wind power. The interaction between offshore wind and hydro power can be benificial, especially when looking at how the flexibility of hydro generation can match the variability of offshore wind, allowing for larger shares of variable generation to be integrated in the power systems without decreasing its stability. The analysis includes two interrelated models, a market model and a flow-based model. The results show that hydropower systems are a very good option for balancing the natural variability of wind power production, especially when installed offshore. The flexibility of hydropower systems allows power systems with a high share of RES to maintain stability. The analysis presented indicates that the value of hydropower flexibility to the European power system is significant, consequently justifying the investment costs for transmission expansion.

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