

# **Economic effects of forecasting inaccuracies in the automatic frequency restoration service for the day-ahead energy and reserve scheduling of pumped storage plants**

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## **Abstract-**

The economic effects of forecasting inaccuracies in the automatic frequency restoration service is analyzed in the context of the operation of a closed-loop and daily-cycle pumped-storage hydropower plant. The uncertainties when scheduling the automatic frequency restoration service are composed by the residual demand curves of the day-ahead reserve market, the upward and downward energy prices due to the activation of the reserves, and the percentages of the upward and downward real-time use of the committed reserves. The plant participates in the day-ahead energy market as a price-taker and in the reserve market as a price-maker, in the context of the Iberian electricity system. In addition, the energy due to the real-time use of the committed reserves is also considered. Results show that the profit is significantly more sensitive to forecast inaccuracies of the day-ahead energy market prices than of the prices and real-time use of reserves from the automatic frequency restoration service.

**Index Terms-** Pumped-storage plant; Automatic frequency restoration service; Residual reserve curve forecasting; Real-time use of reserves; Value of perfect Information

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