

Review of Existing Pumped Storage Technologies and their Application in the Case of Bistrica Pump Storage Plant

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Abstract : In an era of ever-growing electricity generation from renewable energy sources, namely wind and solar, a need for reliable energy storage and intensive balancing of the electric power system gains significance. For decades, pump storage hydroelectric power plants have proven to be an important asset regarding the storage of generated electricity. However, with the increasing overall share of wind and solar in electric systems at large, the importance of electric grid stability keeps growing. A large pump storage project, the Bistrica Pump Storage Plant (PSP), is currently under development in Serbia. The Bistrica PSP will be designed as a 600+ MW power plant, which is envisaged as a significant contributor to the Serbian power grid stability as more and more renewable energy sources are implemented over time. PSP Bistrica is seen as a strategically important project on the green agenda path of the Electric Power Industry of Serbia as a necessary pre-condition for the safe implementation of other renewable energy sources. The importance of such a plant would also play an important role in reducing the electricity production from coal, i.e., thermoelectric power plants. During the project's development, various techniques and technologies are evaluated for the purpose of determining the optimum (the most profitable) solution. Over the course of this paper, these technologies - such as frequency-regulated pump turbines and ternary sets will be presented, with a detailed explanation of their possible application within the Bistrica PSP project and their relative advantages/disadvantages in this particular case.

Keywords : hydraulic turbines, pumped storage, renewable energy, competing technologies

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