
Serbia: Analysis of possible wind farms participation in frequency regulation

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Installed capacity of wind farms are increasing daily inside the power systems around the world, which raises the question of their possible participation in frequency regulation. During power system disturbances, caused by active power imbalance, the system may be permanently supported by employing wind farms, however, only by reserving their power. Furthermore, the wind farm has the possibility to inject additional active power into the power system within a short time period and thus reduce frequency deviation at the expense of rotor curtailment/feathering. To include a wind farm into frequency regulation, the entire active output power system regulation needs to be altered, by adding an additional regulation loop between frequency deviation measurements and released active power.

Wind speed considered is lower than the nominal wind speed, securing an active power reserve which may be activated during frequency changes. Positive effects of including a wind turbine into frequency regulation are reflected in the reduction of maximum short-term frequency deviation during large disturbances.

Wind farms have a potential to contribute significantly to the recovery of frequency at almost all wind speeds (higher than minimum operating speed, and lower than the limit wind speed). When the frequency falls, a wind turbine can inject a certain amount of energy from wind turbines rotating masses and contribute to its recovery. At wind speeds, lower than the value taken in the case referred to in the paper, but higher than the minimum wind speed, injection time of additional active power will be shorter for the same wind turbine statism value. For this reason, the participation of a wind farm in frequency regulation may be limited.

One option of potential wind farm participation in frequency regulation, relying on international research trends of this issue. The model created for the purpose of this paper is implemented on the basis of previous authors' research in the field of frequency regulation of wind turbines. Area of research related to renewable energy is developing daily, while new technologies provide new opportunities for their participation in system services. All this requires unconventional approaches in the implementation of control systems, transmits [Serbia-energy.eu](https://serbia-energy.eu)