

HydroBalance – A research project on the use of the Norwegian hydro reservoirs for large scale balancing of future wind power development in NE Europe

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According to preliminary studies, future installed wind power development may reach a capacity of 100 000 MW or more in and around the North Sea within the next 20 years. Analysis based on measured and modeled wind data indicates that the output from the combined wind power system will be highly variable, and may be as low as 10 % of the capacity or less over periods lasting several days and up to a week or two.

The research centre CEDREN (Centre for Environmental Design of Renewable Energy) in Norway was established to conduct long-term research for tomorrow's energy system, focusing on technical, environmental and social sciences for hydropower and environmental impacts of wind power and transmission lines. A new project within CEDREN (HydroBalance) is focusing on opportunities and challenges for using existing Norwegian hydro reservoirs to balance intermittent energy sources in the Nordic and European grid, with special focus on wind power.

Results from the first phase of HydroBalance shows draft technical solutions for developing 20 000 MW of new pumped storage hydropower capacity only using only existing reservoirs. Environmental impacts considering water level variations, erosion, ice conditions, water temperature and current velocities will also be studied, as well as potential impacts on fish, ecosystems and biodiversity. Preliminary results regarding market design, business development, grid integration, policy and regulatory frameworks and local and social acceptance will also be presented.

The presentation will contain an overview of the total potential for development in Norway, and a few detailed case studies with a detailed analysis of technical solutions, economic parameters and environmental consequences.

Keywords: Hydropower, reservoir balancing, wind-hydro integration

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