HYDRO STORAGE AS ENABLER OF ENERGY TRANSITION

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Abstract

Energy transition is speeding up. Europe's economy is about to be decarbonized until 2040. Carbonless electricity generation is expected to have large shares of energy procurement, while endenergy consumption will be provided by electricity directly and sector coupling products as well. Thanks to hydropower, Austria starts from a 74 % RESE-share today and national energy policy claims a 100 % RESE target until 2030.
Hydropower, windpower, PV and to a small extent biomass will have to match the game.

Extreme high shares of highly intermittent generation of windpower and PV will disproportionately increase Austria's flexibility needs in all timeframes up to seasonal dimensions, when system stability and security of supply shall be kept at today's level.

The given study analyses residual load parameters of Austria's electricity system up to 2050, estimates flexibility demand and discusses the central role of highly efficient hydropower to meet these challenges. Furtheron it discusses how reliable imported flexibility could be, when neighbouring countries implement thermal drop off.

With it's ambitous decarbonisation targets Austria develops a field test for flexibility needs at times of highly intermittent RESE shares. Basic conclusions on residual load development and the role of hydropower in particular to match ramping needs may be generalised for other regions. The ability of modern hydropower designs in the Alps to provide also seasonal flexibility is underlined.

Keywords

energy transition, hydropower, storage, decentralized storage, pumped hydro, flexibility, system stability, security of supply, residual load, ramping, sector coupling, intermittent renewables, windpower, photovoltaics

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