



Press Release

28 April 2016

eStorage Study Shows Huge Potential Capacity of Exploitable Pumped Hydro Energy Storage Sites in Europe

The eStorage Project, a European Commission-funded consortium of major European stakeholders from the entire electric power value chain, today announced the publication of a study that identifies a massive 2291 GWh of development-ready sites with existing reservoirs for new pumped hydro energy storage plants in the EU-15, Norway and Switzerland.

Southern Norway is the region with the most potential feasible pumped storage capacity with 1242 GWh or 54% of the study's total followed by the Alps with 303 GWh or 13% of the study's total (primarily Austria, France, Italy and Switzerland with 9 GWh in the German Alps). The Pyrenees in France and Spain have 118 GWh of feasible potential or five percent of the total realisable capacity in the study area.

The eStorage project has been tasked by the European Commission under its FP7 program to develop cost-effective solutions for the widespread deployment of flexible, reliable, GWh-scale energy storage across the EU and to enhance grid management systems to allow the integration of a large share of renewable energies. The 2291 GWh identified in the study is over seven times the current installed capacity of pumped hydro energy storage in Europe and more than enough to supply Malta's electricity consumption for a year.¹ It would require 95 million lithium-ion batteries of the type found in most electric cars to provide equivalent energy storage.

Consortium partner DNV GL conducted the study, with the support of the eStorage members, and focused exclusively on existing water body pairs because of the cost advantages of connecting existing water bodies rather than building new reservoirs. This study is unique because it complemented multiple sources of quantitative data with a qualitative review by leading national hydro industry experts.

DNV GL developed a Geographic Information System (GIS) model using high-level non-country/region specific selection criteria to identify potential locations for new pumped storage plants. The potential locations from the model were further refined by national hydro experts using regional or country specific selection criteria. Following the national hydro expert review, DNV GL prepared a ranked list of potential sites by country with the total theoretical and realisable storage potential (TW, TWh) of each site, providing political and business leaders valuable information about the development of new potentially exploitable pumped storage plants.

"The qualitative review by leading national hydro experts is what really sets our study apart," said Haike van de Vegte, Senior Consultant at DNV GL. "For example, our Norwegian hydro expert called any reservoir below 2.5 GWh a low priority for Norway whereas for the rest of the study area, experts found reservoirs larger than 1 GWh very interesting. Also, the experts were able to provide country-specific requirements on usage of the water or environmental regulations, which could not have been integrated in the case of a desk study only. Consequently, the resulting database of pairs can be considered potentially realisable."

1. eStorage research and The World Factbook <<https://www.cia.gov/library/publications/resources/the-world-factbook/rankorder/2233rank.html>>

“eStorage is an ambitious project and these are some of the first results made public by the consortium,” commented Maryse François, Technology Leader of GE’s Hydro solutions. “Political and business leaders will be able to make better and more accurate decisions regarding the cost-effective implementation of energy storage in their countries or markets.”

Pumped hydro energy storage plants are the only mature cost-effective and flexible means for GWh capacity storage of electricity. By transferring water between two reservoirs at different elevations, they can deliver electricity when the system needs it (for example on a calm day when there is little electricity produced from wind generation) and they can store electricity from excess generation of wind and solar plants.

Pumped storage also plays an essential role in power regulation which is the capability for generating units to rapidly adapt their output to keep generation and consumption balanced at all times. Electrical production and consumption need to be balanced to ensure the stability and continuous operation of electrical networks. Variable speed pumped storage units offer the added advantage of providing power regulation in generation *and* pump mode, e.g. 24 hours per day.

To download the complete report, visit www.estorage-project.eu/document-library

About eStorage

eStorage is a European Commission-backed consortium dedicated to developing a solution for cost-effective integration of intermittent renewable energies, such as wind, into the electrical grid. It includes major European players from the entire electric power “ecosystem,” including Algoé, a management consultancy; DNV GL, a business and technical consultancy for the energy market; EDF, an energy company, active in all major electricity businesses; Elia, one of Europe’s leading transmission system operators; GE, a leading power generation and distribution equipment and solution provider and Imperial College London, a science, engineering and business university, consistently ranked amongst the world’s best.

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