



PUMPED HYDRO ENERGY STORAGE



With the continued growth of variable renewable technologies in Australia, the need for sufficient storage to maintain a secure and reliable network becomes increasingly vital. ARENA has funded a series of projects aimed at exploring storage options. Pumped hydro energy is one of Australia's oldest forms of energy storage and it offers a pathway to significantly increase the amount of solar and wind energy feeding into the electricity system while keeping it stable.

Pumped hydro energy has a rapid response capability, making it possible to meet peaks in consumer demand for electricity or maintain energy supply when the wind drops or a cloud passes across the sun. It is also a way to store excess energy for later use. Pumped hydro energy storage (PHES) currently accounts for 97 per cent of global energy storage, with three pumped hydro facilities in Australia (Tumut 3, Wivenhoe Dam and Shoalhaven) providing stability support to the National Electricity Market.

ARENA has supported the ANU to develop an Atlas of Pumped Hydro Energy Storage. The study aims to assess the potential for Short Term Off-River pumped hydro Energy Storage (STORES) to provide cost-effective storage on a large scale in Australia. STORES

sites typically involve a pair of reservoirs, with one located at a higher elevation to the other. When joined by a pipeline, the water can be released from the upper reservoir, running down to the lower reservoir through turbines in order to generate electricity. The water can then be pumped back up to the higher reservoir, using solar or wind power.

Researchers at ANU located 22,000 potential pumped hydro sites with the potential to provide up to 67,000 gigawatt hours of energy storage. Further, ANU estimates Australia only requires 450 gigawatt hours of energy storage to support a 100 per cent renewable electricity system. The number of potential sites enables great flexibility in the location of storage sites that would best support the network and create renewable energy zones. The abundance of sites generated significant interest including from energy companies, government and the community. The work has greatly increased confidence that a future low emissions energy system can be affordable. ANU is in the process of finalising a cost model to assist developers to obtain pre-feasibility cost estimates prior to expenditure of funds for detailed feasibility studies. This aims to substantially lower the barriers to mass deployment of pumped hydro, photovoltaics and wind.