Electric Power Development Company's Okinawa Yanbaru Seawater Pumped Storage Power Station, Okinawa Japan *(Image: J-Power)* 

# Pumped hydro storage fact sheet

Today, the question isn't whether we transition to cleaner forms of energy, it's how, and how quickly.

Renewable energy is an obvious contributor to filling the gap left by the retirement of coal power plants, but it has to be available when it's needed, even when it's cloudy and windless. That's where storage comes into its own.

This fact sheet provides an overview of EnergyAustralia's pumped hydro project and its potential to store energy for quick release, keeping the lights on and costs down.

## Pumped hydro at Cultana

Pumped hydroelectric storage plants, commonly referred to as "pumped hydro storage", work like giant batteries; they store energy for use when demand for electricity is high. It's a form of hydroelectricity that doesn't need a river.

EnergyAustralia and partner, Arup Group, are investigating a pumped hydro project using seawater at Cultana in South Australia. This follows funding awarded by the Australian Renewable Energy Agency and the South Australian Government under its Renewable Technology Fund.

The technology has been used for decades in countries including the United States, Japan and China, but hasn't been applied extensively in Australia – yet.

The facility at Cultana would be capable of producing 225 megawatts (MW) of electricity with around eight hours of storage. That's the equivalent of installing 126,000 home battery storage systems, but at a third of the cost.

#### How pumped hydro storage works

Pumped hydro works by using two bodies or reservoirs of water, one at a high elevation, at the top of a hill, and another at a lower elevation, at the bottom. For seawater pumped hydro, the lower reservoir can be the sea itself.

When demand for power is lower and electricity is cheap, at night, for example, the plant uses energy to pump water from the lower reservoir to the upper reservoir. Energy is stored there in the gravitational potential of water.

Then when demand rises, as it does on hot days during summer, the process is reversed.

Water from the upper reservoir is released back into the lower reservoir through the same system of pipes, except this time the turbines act as they would in a traditional hydroelectric plant. The turbines generate electricity which is sent to the grid for use in homes and businesses.

It's potentially a great, cost-effective way of integrating renewable power and ensuring energy is reliable and affordable.





## **Benefits**

The work we've done to date indicates pumped hydro storage has potential benefits including:

- It's reliable pumped hydro doesn't rely on seasonal water flows like traditional hydroelectricity. Once the reservoir is filled, only small top-ups are needed to cover for evaporation.
- It supports renewable energy storing energy provides cover when it's cloudy or windless and renewables aren't available. When demand for power rises, pumped hydro storage plants can begin producing in minutes, keeping the lights on.
- It's cost-effective pumped hydro plants are cheaper to operate than other forms of peak generation, like gas-fired power stations.
- It can help stabilise the grid a large generator in the north of South Australia can provide muchneeded grid and system stability for the region.
  EnergyAustralia's proposed project would connect to the electricity grid at the same point as the Northern power station, now closed.
- It's long-life while current battery technology has a useful life around 10 years, pumped hydro facilities can operate for decades.

### **Next steps**

There's a lot of work to do before we can make a final investment decision on a seawater pumped hydro project at Cultana, scheduled for 2019. Assessments we have planned or in progress include engineering design, environmental impacts, planning approvals and more detailed financial modelling.

We're also consulting with the community to understand their views on the project. Ultimately any project we do must be good for the environment and good for people.

If the project proceeds, we expect construction to take around three years. That means a seawater pumped hydro facility at Cultana could be operating by 2023.

It's early days but we're optimistic. We think the technology has great potential to help deliver cleaner, reliable and affordable supplies of electricity in a modern Australian energy system.

