Projects | briefing

STILLWATER HYBRID POWER PLANT, NEVADA, US

Project: Stillwater hybrid power plant
Location: Nevada, US
Project capacity: 26MW PV, 33MW geothermal, 2MW CSP

Nearing completion this quarter is the world's first integrated geothermal-solar hybrid power plant. The hybrid power station integrates solar photovoltaic, geothermal and concentrating solar power (CSP) across a 240-acre site in Nevada, USA.

Construction of the 2MW CSP part of the plant began April 2014, in Fallon, Nevada to join the 33MW Stillwater Geothermal Project built in 2009 and the 26MW of solar PV completed in 2012.

The hybrid power station has more than 89,000 polycrystalline silicon PV panels installed across 110 acres, generating 40 million kWh of clean energy per year, enough power for 15,000 American households. Last year the 26MW of PV and 33MW of geothermal together generated 200GWh of energy. With the completion of the CSP plant, 3,000MWh a year is to be added to the plant's total generation capacity.

Named the 'Stillwater Hybrid Project', the project was developed, financed and constructed by Italian renewable energy corporation Enel Green Power's North American subsidiary, EGP NA, which will now own and operate it.

Bill Price, the head of engineering and construction at Enel Green Power North America, explains that Stillwater is the world's first hybrid project that combines "the continuous generation capacity of binary-cycle, medium-enthalpy [heat content] geothermal power with solar photovoltaic and solar thermodynamic".

To achieve a level of integration never before attempted was no easy feat, says Price, as the main driving factor in determining the design of the new plant was to make sure the solar additions were "harmoniously integrated" with the already operating, commercial geothermal facility.

Price explains blending the energy sources means that "precisely when the thermal efficiency in the geothermal unit is lower – generally during the hottest and sunniest times of the day or year – the solar PV is at its most productive, contributing to stabilise production hence further improving plant performance".

While the average daily generation during peak hours is significantly enhanced by the PV system, the geothermal plant returns to its best generation levels later on, "when solar generation ramps down", says Price.

The integration of the solar CSP thermodynamic facility is expected to further enhance the plant's smooth production.

A mix of benefits

The benefits of this cocktail of various renewable generation sources has so far proved beneficial in the generation measurements to date, as well as saving on cost, and environmental impacts, Price claims.

Using multiple renewable technologies not only increases the generation of zero-emission energy, but also makes it possible to use the same infrastructure, such as, for instance, electrical interconnection lines, thereby saving costs and further reducing environmental impact, explains Price.

Also due to the hybridisation and stable load all year around, the plant does not need any battery storage technology, adds Price.

To keep track of the multiple forms of generation, Enel Green Power has an on-site control room, and is responsible for all operations and maintenance.

Price reveals an ambitious vision for future renewable energy generation and hybrid power plants should the project prove successful.

Source: EGP

Source: EGP.

At the global level "we record a sizeable overlap in the resource areas of geothermal and solar, which suggests the possibility of a scaled application of solar and geothermal solutions", he explains.

In these cross-over areas, "hybrid projects that enable both base-load and peak power delivery will be more attractive to utilities serving load with similar consumption patterns", predicts Price.

In some cases, hybridisation may also allow renewable energy projects that were previously deemed unfeasible – stand-alone geothermal or solar projects – "to become more economically and technologically viable", adds Price.

Research and development

To explore the potential of hybrid renewable power plants better, EGP NA earlier this year embarked on a research project with the US National Renewable Energy Laboratory (NREL), and Idaho National Laboratory (INL).

Under the oversight of the US Department of Energy Geothermal Technologies Office (GTO), EGP NA will work with NREL and INL to model the combination of geothermal and solar systems, validating simulated results with real-world data from the Stillwater facility.

The study is ongoing this year. "We look forward to digging into what we believe will be a fruitful hybridisation and we will disclose results when they become available," says Price.

"The fruits of this work will be used to explore and quantify the potential benefits of different operating strategies and integration schemes, with the goal of opening doors for the development of future hybrid renewable energy facilities."

Hybrid future

EGP NA hopes to continue its research and development of hybrid renewable power, owning and operating over 90 plants across 21 US states, and two Canadian provinces, with a total installed capacity of around 2GW, working in solar, wind, geothermal and hydro.

EGP's subsidiary in Chile is also constructing a hybrid project which combines PV power, a mini-wind turbine generator and a co-generation system for electricity and hot water, coupled with a storage system. It is hoped this hybrid will be capable of meeting most of the annual energy needs of the village of Ollagüe, with an expected installed capacity of 232kW, as well as generating approximately 460MWh a year, equivalent to the electricity consumption of 150 households. ■

By Lucy Woods, Solar Media

Source: EGP.