FACT SHEET

Who is Vast Solar?
Vast Solar is an Australian company developing concentrating solar power (CSP) generation technology with integrated large-scale thermal energy storage.

Vast Solar has developed a low-cost concentrating solar power system to deliver CSP at a commercial cost, competitive with wind power, and with the additional flexibility and higher revenue generation capability available from integrated thermal energy storage.

Vast Solar has already constructed and operated three CSP research and demonstration facilities, and is currently constructing the ‘Jemalong Solar Thermal Pilot Plant’ – a 6MWth pilot CSP electricity generation plant, outside Forbes in Central Western NSW. The Pilot will be equipped with 3 hours’ thermal energy storage. It will be Australia’s only operating, grid-connected CSP plant with thermal energy storage.

Vast Solar has recently commenced planning for a commercial scale 30MWth CSP plant, with 4 hours’ thermal energy storage, also planned for a location near Forbes.

What is Concentrated Solar Power (CSP) Technology?
CSP technology produces electricity from the thermal energy of the sun, by making steam to drive a traditional steam turbine and electricity generator.

Solar energy is captured using heliostats (mirrors) that track the sun to reflect the sun’s rays onto a thermal receiver. In Vast Solar’s CSP system, there are multiple thermal receivers, connected via a system of pipes.

A heat transfer fluid is held in a storage tank from where it is pumped through the receivers, heated to very high temperatures (~600°C) and is then piped to a central thermal energy storage tank. When needed, the hot fluid is used to heat water to create steam in a boiler, and this steam then drives a traditional steam turbine and generator, which exports electricity to the grid.

What is thermal energy storage?
Thermal energy storage available with CSP systems captures solar power in the form of heat – a very efficient, large-scale and cost-effective storage method.

The sun’s thermal energy can be saved for days or weeks, to be released for use in electricity generation at times of highest market value, day or night. Thermal energy storage also enables CSP systems to provide stable, reliable solar power for mining and other large-scale industrial operations.

Because the thermal energy storage system is an integral part of the CSP system, there is no additional storage cost (such as the cost of batteries with a solar photovoltaic system). In fact, thermal storage available with CSP plants actually reduces the levelised cost of electricity, by making better use of capital items like the steam turbine and electricity generator.
This ability to store renewable energy at large scale will become increasingly important in coming years as electricity supply increasingly comes from distributed energy sources, rather than the huge centralised coal-fired power plants used over the past 80 years.

Electricity systems are likely to evolve as a combination of solar PV and CSP and wind power, complementing one another, and supported by a blend of storage methods – such as batteries and electric vehicles for solar PV, and large-scale thermal energy storage from CSP.

**What’s involved in the 6MWth Jemalong Solar Station Pilot, and what are the key timeframes for delivery?**

The 6MWth Jemalong Solar Thermal Station is a pilot demonstration facility and includes five solar array modules. Each module consists of one tower approximately 30 metres high, a thermal energy receiver and about 700 heliostats (mirrors) – there will be 3,500 heliostats in the completed Pilot plant.

Modules connect to a central energy storage tank, and from there the stored thermal energy is passed through a steam generator to make steam for a small (1.1MW<sub>e</sub>) turbine and electricity generator. Once complete, electricity generated from the facility will be delivered into the Essential Energy distribution system via the West Jemalong substation. The Jemalong Solar Station Pilot will include 3 hours’ thermal energy storage.

Construction of the Pilot commenced on site in mid-April 2014 and is due to be complete in the first quarter of 2015. A testing and data gathering program is scheduled to be completed in 2015. Once commissioned, the Jemalong Solar Station Pilot will continue to be used for research, development and demonstration purposes.

**What is Vast Solar’s 30MW Jemalong Solar Station?**

Vast Solar’s 30MW Jemalong Solar Station is planned to be a commercial scale solar thermal power generation facility, with four hours’ energy storage, giving the plant the ability to produce its full output of 30MW power at night in addition to operating all day.

The 30MW plant includes approximately 90 solar array modules containing around 65,000 heliostats, each module consisting of a heliostat field and an approximately 30 metre high tower with a thermal receiver. Each heliostat is about 2 metres high, located at a distance from 30 to 100 metres from the tower.

Other components of the 30MW Jemalong Solar Station include a 30MW steam turbine and electricity generator, thermal energy storage tanks, a 66KV overhead transmission line, and internal access tracks to allow for site maintenance, fencing and vegetation.

**Where is the Jemalong Solar Station proposed to be located?**

The proposed site is located within Jemalong Station, a private property owned by Twynam Agricultural Group and located off Lachlan Valley Way at Jemalong, 30kms outside Forbes in Central Western NSW.

**What determined the proposed location of the Jemalong Solar Station?**

While Vast Solar has been constructing the 6MWth Jemalong Pilot project, Vast Solar has also been developing the potential large-scale solar power generation in the Central West NSW region. The first stage of this vision is the proposed 30MW CSP plant at Jemalong, in a location relatively close to the existing Essential Energy substation but away from homes and main roads to protect the visual amenity of the area.
In Australia, Vast Solar is actively investigating project opportunities in South Australia, Western Australia and Queensland, as well as New South Wales. Vast Solar is also investigating project opportunities overseas, in regions such as in South America, the USA, Middle East, Africa, and India.

**Why does Vast Solar want to deliver this project in Australia?**
Vast Solar’s technology has global potential, and Vast Solar is establishing a business model to compete in the rapidly growing global CSP market. Demonstration of Vast Solar’s CSP system at increasing scale is a vital part of this business model.

The Jemalong solar thermal Pilot and Jemalong 30MW CSP project will demonstrate Vast Solar’s leading cost structure for large-scale CSP, and will ready the technology for deployment in the Australian and in international energy markets.

**What is the significance of the Jemalong Solar Station?**
This will be the first such project in Australia, and will provide a much-needed reference point for the role that large-scale CSP technology can, and should, play Australia’s energy system in the 21st century.

**What is the total project value of the Jemalong Solar Station?**
The total value of the project is about between $80 and $100 million. This includes all construction costs as well as commissioning and testing costs.

**What are the timeframes for building the Jemalong Solar Station?**
Given the level of investment, the project must be assessed in NSW as a State Significant Site. All State Significant Sites must be assessed by the NSW Department of Planning and Environment. Vast Solar initiated this planning approval process in June 2014 by submitting a Preliminary Planning Review report, prepared by ngh environmental on Vast Solar’s behalf.

The planning approval process involves the preparation and public exhibition of an Environmental Impact Statement which could take up to one year to complete. Upon receipt of planning approval, construction could commence and would take about 18 months, with the site likely to be completed by 2016-17.

**What sort of storage capacity does the Jemalong Solar Station include?**
The 30MW Jemalong Solar Station will generate about 75,000MW hours per annum of electricity supplied into the Essential Energy network.

It has sufficient capacity to store around 4 hours of energy with a capacity factor of 30%.

**What are the expected number of jobs during construction and operation of the Jemalong Solar Station?**
During construction of the Pilot project, Vast Solar will employ up to 45 people. Construction of the 30MW project is expected to generate peak jobs of around 100 during construction. The two projects will provide ongoing jobs in research, operations and maintenance.

**How many households could be powered by the Jemalong Solar Station?**
The 30MW Jemalong Solar Station will have enough capacity to power around 15,000 average homes (the average home in the area uses about 5,000kWh per year).

**How does Vast Solar’s design impact on flora and fauna?**
Vast Solar’s CSP system is sensitive to native habitat, birdlife and animal life. Vast Solar’s design uses low-profile towers – much like the typical lattice-steel frame towers used across Australia, small heliostats (mirrors) and small, compact arrays with a single and easily installed foundation system.

This design approach means that very little civil works are needed, ground-cover is mostly preserved, towers and receivers are much smaller (significantly reducing risks for birdlife), and disruption to local fauna is minimised.

The modular design allows greater flexibility in plant layout; sensitive cultural and conservation values can be accommodated by adjusting the layout of the solar arrays.