

In the third of a series of four blogs, solar pioneer Philip Wolfe list the world's largest solar power plants. In these articles, a 'solar plant' is defined as an individual generating station.

The world's largest solar power stations

The biggest 'solar parks' now have around 2 GW (2,000 MW) of generating capacity and are expanding towards 5 GW. But, as described in [last week's blog](#), this power output is supplied by several – often dozens – of separate solar plants, typically of 10 to 250 MW each.

A solar plant is an individual generating station, designed by a single developer (or consortium) and usually with a single export connection to the grid. It may in some cases be configured on several nearby plots of land, and large solar power plants are often built in phases. This blog looks at the largest of these individual solar power stations, highlighting those over 500 MW.



Sweihan Independent Power Project

This plant in Abu Dhabi in the UAE is still under construction but at 938 MW_{AC} is expected to become the world's largest plant, when commissioned later this year.

The development led by Marubeni and JinkoSolar adopts shallow tilt angles with the arrays (totalling 1,177 MW_P) oriented towards east and west. As this aerial view of the plant under construction shows, this configuration achieves a very high packing density on the 800 Ha site.

#1. Yanchi Solar Park

China hosts the largest plants currently operating; led by the so-called [Yanchi Solar Park](#) just south of Gaoshawo in Ninxia's Yanchi district. It's 1 GW_P solar arrays give it an output of about 820 MW. The plant has been operational since 2016. Despite the name, it is not a 'solar park', as we would define it below.

#2. Datong 'Front Runner'

Further east, in Shanxi Province, another 800 MW (1 GW_P) project has been installed in [Datong district](#), as part of China's demonstration programme for projects at this scale. The solar array is distributed on hilltops over a wide area, making them hard to see on satellite images (even when bordered in white as on this partial view).

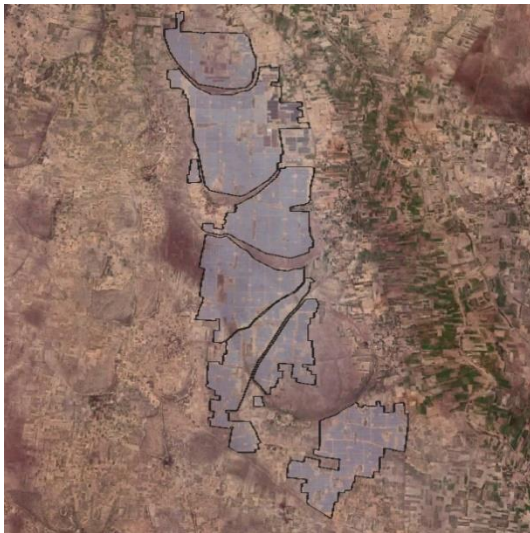
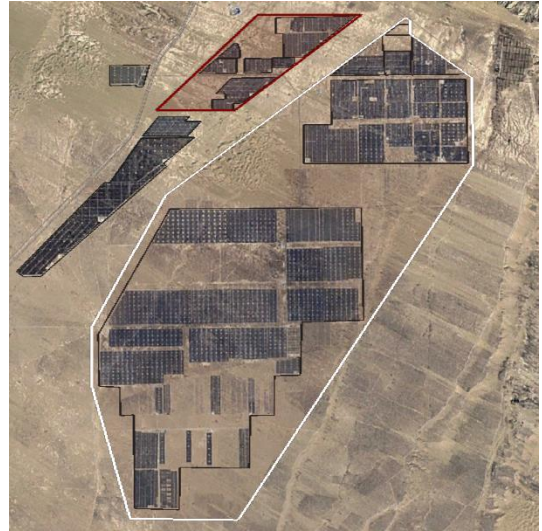
Another project of similar size is located around [Liji in Xinjiang](#), but is spread over such a wide area, we have not included it as a single plant in this list. Nor do we include a further GW_P around [Alashan in Inner Mongolia](#).



#3. Longyangxia Solar-Hydro

In Qinghai Province, the 697 MW [Longyangxia Solar-Hydro](#) attained its name because it is connected to the hydro station at the dam on nearby Longyangxia Lake. It became the largest in the world when the second phase was connected in 2014 by China Power Investment (now called the State Power Investment Corporation).

The plant is bordered in white on this view, with other projects visible to the north west.



#4. Kamuthi Solar Power Project

India's largest solar power station was built by Adani in the State of Tamil Nadu in 2016.

[Kamuthi Solar Power Plant](#) covers nearly 1,200 hectares and has an AC capacity of 648 MW.

#5. Villanueva

Mexico stole the mantle for America's largest solar project, when phase III of the [Villanueva plant](#) was completed last November. It now has an operational capacity of 640 MW. The plant is still being expanded in Coahuila state by Italy's ENEL Green Power.



#6. Solar Star

The USA's largest solar plant is in Antelope Valley in California, alongside several other PV plants, so is edged in white to distinguish it on this view.

[Solar Star](#) was constructed in two phases in 2013-2014 using Sunpower Corporation modules. It has a total capacity of 579 MW and is owned by Warren Buffett's Berkshire Hathaway group.

#7. Hongshagang

Back to China for no. 7, this [multi-phase plant](#) is clustered around Hongshagangzhen in Gansu province.

It is built by China Singyes, with at least 574 MW operational, and an eventual capacity of 820 MW.



#8. Topaz

At 550 MW, First Solar's [Topaz project](#) was briefly the USA's largest plant when commissioned in 2014.

It is built on Carrizo Plain in central California, and coincidentally incorporates the site where the world's first multi-megawatt solar project was built in the 1980's.

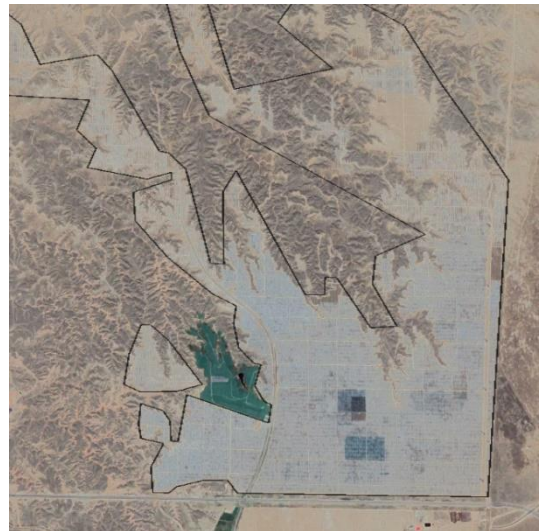
#9. Yinchuan Xingqing

In the valleys to the east of Ninxia's capital Yinchuan (and partly shown on this satellite image) is another conglomeration of hillside arrays.

The [Yinchuan Xingqing project](#) has a total capacity just over 500 MW, and was installed in mid-2018.

#10. NP Kunta Greenko

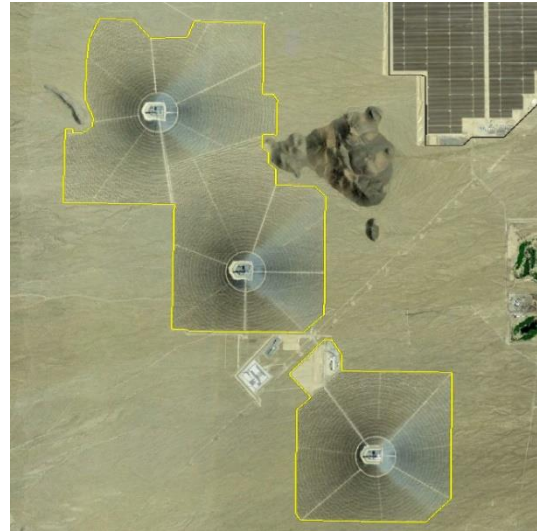
The largest PV plant in one of the solar parks listed last week is the 500 MW station built in 2017 for [Greenko Energy](#) in the Anantapur Solar Park.



Largest CSP plants

No operational concentrated solar power (CSP) plant is over 500 MW – the largest currently in service is the [Ivanpah plant](#) in eastern California near the border with Nevada. Its three concentrator towers give it a nameplate capacity of 377 MW. Part of the neighbouring Stateline PV plant can also be seen on this view.

The Middle East hosts the largest under-construction CSP plant, as it does for PV. The Miraah plant being built for PDO in Oman, using concentrator trough technology, currently has 113 MW operational and will have a capacity of 1,021 MW, when complete.



Terminology and acknowledgements

The term 'solar **plant**' is used for an individual project that has been developed by a single developer or consortium, even if it is spread over several geographical plots or built in various phases. Where multiple plants are co-located in a discrete area under the coordination of an identified agency, this is called a '**solar park**'. And I use the word **cluster** where multiple solar farms are co-located in an area without formal coordination.

Image Credits: The satellite views are from Google Earth, using imagery from Airbus, CNES, Copernicus, Digital Globe and Landsat. In these shots, individual PV **plants** are outlined in white or dark grey and CSP plants in yellow, while **solar parks** are outlined in red. Colour coding on [Wiki-Solar's maps](#) is different, with operational PV plants highlighted in blue, CSP plants in red and solar parks in green.

For consistency, all capacities are quoted in MW_{AC} (unless specifically stated as MW_P) to allow direct comparison between PV and CSP plants (and other forms of generation). Readers will be aware that the DC peak capacity of PV plants is typically about 20% higher than the rated AC capacity, quoted here.

The final blog next week will identify the world's biggest **clusters**.



Philip Wolfe has been active in the renewables arena since the 1970s and is the founder of Wiki-Solar. His [book on utility-scale solar](#) was published in 2012 and one on [the early years of the terrestrial PV sector](#) was published last year.