



## LSA SYNERGY WITH HYDROPOWER

Liquid Solar Array (LSA) is designed to be scaled up for industrial applications and in fact this is a key strategy to drive the manufactured cost per watt down, through economies of scale of mass production. Ideal industrial applications are hydropower dams as they have both large areas of water and grid connection.

The dual use of water eliminates the need, costs and problems associated with land acquisition to set up regular land based concentrated PV systems.

There are some very interesting opportunities that arise when a large scale solar power generator such as Sunengy's LSA is combined with a hydropower plant (as illustrated below).

Hydropower's assets are in the volume and head of water it contains and this determines the power output achievable, but LSA gives the dam an asset in its water surface area as well and the opportunity for supplementary power.

If the solar generation capacity equals or exceeds the maximum hydroelectric output, we could expect that almost no water need be consumed from 8am to 4pm on most days, as all the power could be supplied from the solar component; but with the hydro-generator always being available to fill in through cloudy periods and night-time.

For instance, a study of three hydropower dams privately owned in India showed the following:

- There is a total power generation 447 MW.
- To generate 447 MW of power with LSA would require only 9.3sq km of water area using 3,724,851 LSA (125W) units @ 2.5sq m per unit.
- The total water surface area of these dams is 250sq km so only 3.7% of this is required to match the hydropower output.



Statistically most power is consumed in the 8am to 8pm period with local variations of course. If the solar system is able to take nearly all the load from 8am to 4pm most days (8hrs) this leaves only four hours where full power is likely to be needed from the hydro generator on average days. Hence we might expect a potential reduction in water consumption of 66% if no changes are made to the hydro generator.

An interesting opportunity then arises to perhaps triple the turbine and generator capacity while overall using the same amount of water, going for instance from 500MW to 1500MW hydro capacity. As long as the solar component matches the increased peak hydro capacity, the peak capacity of the whole system is effectively tripled; though specific details depend on the daily load profile. This is a relatively economical option as no major changes need to be done to the dam and thus suits existing hydro installations. Beyond this, it is possible to install very large LSA solar capacity on some dams at 25 sq km of water surface area per Gigawatt.

LSA can contribute significantly to water conservation and this allows the surplus water to be used strategically for increased power output (thus increased revenue) or other benefits for the surrounding environment.

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