

A New Photovoltaic Pumped-hydro Energy Storage Technology

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Abstract Photovoltaic pumps are more and more popular for these water shortage regions which help to solve high operation cost for normal pumps. The early PV pumps were mini or small scale and main for drinking water and systems had to be run for all time. There are more and more PV pumps for irrigating now. These systems usually run only for dry season and stop for other time. For most situation the PV pumps are stand along systems. How to utilize these systems fully is a problem. One solution for these problem will be given in this presentation. A normal pumped energy storage system has to be built the upper, low reservoir, pump and hydro-generator which depended terrain specially. There are all ready in the most PV pump systems except hydro-generator. Of course electric grid is needed for electricity transportation. With grid PV pumps can run not only under sunshine but also on cloudy or in the evening which help to increase pump water volume greatly for urgent needs. By added hydro-generators, related control equipment and connected with grid a new PV pumped-hydro energy storage technology has been developed. The system can pump water during dry season and can transfer a unstable PV power into a stable hydro power for not irrigating usage time. Some people will ask that PV systems can send electricity to grid by normal grid-connected inverters and why to use complicated hydro generator and loss some electricity. Recently there are more and more normal PV systems in China with carbon peaking and carbon neutrality goals and many counties have to forbid to build more PV systems now because there have been already too many PV systems which surpassed upper limitation of local grid. The new technology will not be forbid because it is a long time cheap energy storage and can supply stable power which is very important for balance of the grid. The new technology has been patented and will be welcomed for these regions with affluent solar energy resource and suitable terrain.

Keyword(s)

PV pumps, Pumped-hydro energy storage, Unstable PV power, Stable hydropower, Long time cheap energy storage

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