

SOLAR PANELS INSTALLED OVER THE IRRIGATION CANALS TO REDUCE LAND USE AND WATER LOSS IN INDIA

In India the practice to install solar panels over irrigation canals is being adopted to generate clean electricity while help conserve land and reduce water evaporation.

[This innovative solution was designed by Indian engineers](#) and the first 750m pilot solar canal stretch (1 MW) was built in the Gujarat State in 2014 with the support of *Sardar Sarovar Narmada Nigam* (SSNNL), the Gujarat government agency which owns and maintains the canals network.

The solution of the solar panels installed on the irrigation canals has shown that it can bring multiple benefits, documented in the projects carried out in India:

- The first advantage is that it allows to reduce the growing use of land to install on-ground solar panels. In all countries the current solar parks bring important benefits in terms of renewable energy production while generating problems for agriculture, forests, landscapes and local community's activities.
- Thanks to the reduction of the water temperature, the panels installed above the channels are more efficient than those installed on the ground. The energy generated from the solar canal can provide electricity for farmers during the energy-intensive irrigation season, and out of season the electricity can be fed into the state grid, sold to distribution companies or used by the canal authority.
- The solar panels provide shade for the water flowing into irrigation canals. They prevent evaporation from the canals which are passing through a dry and sun-baked region. Covering the canal saves water, creating a more efficient irrigation system and improving water security for farming communities that rely on the canal.
- Another advantage of the panels' shade is curbing algal blooms in the canals. Algae growth can clog water pumps and cause toxicity and with the installation of the solar panels and absence of direct sunlight, algae growth is drastically minimized.

In 2015, [the results obtained from the pilot project](#) led to design and build the first large-scale canal-top solar power plant on the outskirts of Vadodara city (Vadodara District of Gujarat). The 10 MW plant was built across 3.6 km of irrigation canal, and has 33,800 solar panels mounted on steel scaffolding. Connected to the state grid, its output is intended mainly to meet demand from irrigation pumping stations. Completed in under six months, the plant's cost, including 25 years of operation and maintenance, was



planned to be recoverable in 13 years, according to the [Sardar Sarovar Narmada Nigam Ltd](#) (SSNNL), the Gujarat government agency that administers this facility.

In 2015 this Canal Top Solar Power Plant in Vadodara [was inaugurated by at the time UN Secretary-General Ban Ki-moon and the Prime Minister of India](#). The UN Secretary-General recognized India's bright creativity, ingenuity and cutting-edge technology and declared this innovative solution useful for the world.

Since then, a number of other projects have been designed and built in the Gujarat State and working in partnership with different private investors, the government has planned to cover more than 19,000 kilometers of canals with solar panels. They estimated that assuming a utilization of only 10% of the existing canal network of 19,000 kilometers, 2,200 MW of solar power generating capacity could be installed by covering the canals with solar panels. This also implies that 11,000 acres (45 km²) of land can be potentially conserved along with about 20 billion liters of water saved per year. In 2019 a [100 MW canal solar power project atop the branch canals of the Narmada River](#) was designed and more initiatives will be planned in a territory which has over 458 kilometres of main canals and thousands more in smaller branches.

After the success of the canal-top solar plants in Gujarat, more states have planned and installed similar projects. Designed taking into account the specific characteristics of the territories, [new solar canals have been implemented in eight Indian States](#), with capacities ranging from a minimum of 1 MW to a maximum of 10 MW. All these projects are part of the Ministry of New and Renewable Energy Government of India (MINRE) plans and the Indian Government's policy of intensifying the production of renewable energies to meet the needs of the country. The funds are provided both by the National Government and the individual States to carry out the works and ensure their maintenance. The Ministry subsidizes 30% of estimated expenditure to construct facilities and both the national and local governments are developing a campaign to involve private companies on this innovative way of producing renewable energy.

In January 2022, [MINRE signed a strategic partnership agreement with IRENA](#) (*International Renewable Energy Agency*) during its 12th general assembly, to further strengthen its collaboration in the field of Renewable Energy. India installed 13 gigawatts (GW) of renewables in 2021 and has grown its capacity by over 53 GW in the last five years, positioning it as one of the fastest growing renewable energy adopters in the world. With massive renewable energy potential, India has the objective to become a major producer of green hydrogen to support the decarbonization of its industrial economy.

In a global context that makes a transition to renewable energy increasingly urgent to reduce the disastrous effects of climate change, many countries have been inspired by the innovative solution implemented in India and are carrying out specific studies to adopt it. When placed over a canal, in fact, solar arrays do more than producing electricity in land-constrained areas. They also keep cool, and thus operate more efficiently, thanks to the water down below. Shade from the panels, meanwhile, can reduce evaporation and limit harmful algae growth in the waterway. With these basic characteristics, the solar canals currently designed in



India and in other countries are adapting the technology to specific contexts by improving the efficiency of the plants.

Extensive documentation on the projects carried out or planned is available in specialized journals and highlighted by articles published in prestigious international journals.

To know more

[Canal Top Solar Power Plant Inauguration 2015](#)

[Canal Top Solar Power Plant 2016 in WFEO website](#)

[Article in mercomindia.com](#)

[Article in indiaspend.com](#)

[Gujarat Narmada canals solar panels in archive.org](#)

[Article in indiatimes.com](#)

[India - IRENA in irena.org](#)

[Article in investindia.gov.in](#)

[Article in BBC Future](#)

[Article in Reuters](#)

[Article in designboom.com](#)

[Article in The Earthbound Report](#)

[Article 2021 in Nature Sustainability website](#)

[Article Solar arrays on canals in pv-magazine.com](#)

[Article in theconversation.com](#)

[Article in anthropocenemagazine.org](#)

[Costa Rica solar canal in centralamericaink.com](#)

