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PART OF BURNS & McDONNELL

CASE STUDY

Exploring the Feasibility of Using Floating Solar for Innovative Ends

A Colorado water district wanted to look into the cost-effectiveness of using floating solar panels for renewable energy, water conservation and other objectives. Alongside potential benefits, a study highlighted challenges that temper the project's prospects for economic viability.

Challenge

A water district in Colorado's Front Range had a largely unused water reservoir and an unusual idea about how renewable energy might be leveraged to accomplish several objectives. The district decided to explore the feasibility of installing floating solar photovoltaic (PV) panels on the reservoir to provide renewable power, mitigate water evaporation and address water quality concerns.

This region has very high water costs, so any reduction in evaporation could play an important role in the cost-benefit calculations.

Project Stats

Client
Confidential

Location
Colorado

$145K
REGIONAL WATER VALUE PER ACRE-FOOT

5%
PROJECTED REDUCTION IN WATER EVAPORATION

10MW
LIMIT ON SOLAR CAPACITY IF CONNECTED TO LOCAL CO-OP

The water district, which services nearly 10,000 customers, also wanted to consider the potential to use solar generation to support green hydrogen production as an additional revenue stream. Green hydrogen is hydrogen gas produced through electrolysis of water, powered by renewable electricity.

The utility needed a partner to study the holistic feasibility of such a solar installation within the context of issues including environmental permitting, interconnection limitations and economic impacts.

Solution

The water district selected 1898 & Co., a part of Burns & McDonnell, to study the options and make recommendations. Our renewable energy development consultants collaborated with water and environmental specialists inside Burns & McDonnell to evaluate the costs and possibilities thoroughly.

The team began by examining the feasibility of installing floating solar, an application that involves mounting PV panels on buoyant structures that float on calm waters. Although it is less common than ground-mounted solar, it is gaining traction as an option. We found that the reservoir could support a decent amount of solar production, and the cost would not be much higher than putting in ground-mounted panels. We calculated the reservoir could support up to 73.3 MWdc of floating solar capacity.

Even more significant, the study found that the panels could reduce water evaporation by a fairly substantial amount. Evaporation reduction from a 10-MW floating array was estimated to save up to 47 acre-feet of water annually. These savings could serve as a counterbalance to the cost of installing the system.

The green hydrogen initiative was found to be not feasible. The overall cost for an electrolyzer and a water treatment plant to prepare the reservoir water would be too high and would require too long of a payback period. It also would defeat the purpose of saving water through evaporation mitigation to use water for green hydrogen production.

One of the most significant factors in the team's evaluation was whether and where the floating PV system would interconnect with the grid. The water district had two options, both entailing additional expenses that would be likely to impact feasibility negatively:

- If it interconnected with the local co-operative utility, the floating PV system would need to stay under 10 MWac because of the co-op's capacity limitations. Installation and surrounding system upgrades would increase costs.
- The water district could pursue a system as large as 20 MW by interconnecting with a nearby transmission provider through a Small Generator Interconnection Agreement, but this would require additional studies and upgrades, impacting the economics of the arrangement.

The local co-op requires any project over 25 kW that is looking to interconnect to the grid to either use all of the power it generates or to sell it all back. With relatively little power demand from the water district, the floating PV system would generate more power than the district could offset. Electricity payback rates in the area are too low to sell back excess capacity feasibly.

Results

The study was completed less than four months after it was awarded. The final report summarized our team's findings. These included cost estimates, schedules, and calculations for return on investment and net present values.

Because of the specific limitations on the size of the system that could be installed, as well as options for managing excess power, the economic feasibility of the project was limited. However, it also identified strong potential for other floating solar projects. The similar cost of installation compared to ground-based solar — after combining with the significant value of reduced evaporation losses — presents water utilities with fresh opportunities to drive cost savings and potentially generate revenues.

About 1898 & Co.

1898 & Co. is a business, technology and cybersecurity consulting firm serving the industries that keep our world in motion. As part of Burns & McDonnell, our consultants leverage global experience in critical infrastructure assets to innovate practical solutions grounded in your operational realities. For more information, visit **1898andCo.com**.