

## European Solar and Energy Storage Solutions

# Can we use light and shadow solar power generation in the open sea



## Overview

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Several fiber-supercapacitors are integrated with the shadow-tribo-effect nanogenerator to form a self-charging power system. To capture and store wave/solar energy from oceans, an energy ball based on the self-charging power system is demonstrated. By harnessing the shadow-effect, i.e. the shadow of the moving object in the energy ball, the charging time shortens to 253.3 s to charge the fiber-supercapacitors to the same voltage (0.3 V) as using pure tribo-effect.

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Ubiquitous shadows cast from moving objects in hybrid energy-harvesting systems are undesirable as they degrade the performance of the photovoltaic cells. Here the authors report the shadow effect of moving objects on the performance of the photovoltaic cells.

A new device exploits the contrast between bright spots and shade to create a current that can power small electronics. "We can harvest energy anywhere on Earth, not just open spaces,".

In fact, the clearest waters of the world can transmit sufficient light to a depth of around 50 m (Fig. 1c), which can enable sufficient power generation to run basic appliances (>5 mW cm<sup>2</sup>).

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How to harvest solar energy from oceans?

Scavenging the illumination contrast that arises on the surface underneath and generating power from this effect is an effective solution to harvest solar energy. Harvesting the energy from oceans is challenging due to the dramatic changes in the environment which leads to a great deal of intermittency 18, 19.

Can floating solar systems be deployed in marine environments?

Currently there is momentum in the sector to develop floating solar systems to be deployed in marine environments. Experience from inland floating solar projects could open up possibilities to scale up and move to nearshore or even offshore conditions.

Can floating solar technology be used in rough offshore environments?

Taking floating solar technology into rough offshore environments requires that the existing solar PV modules can resist salty water and withstand strong currents and wave and wind loads. Additionally, a cost competitive concept for the floating structure needs to be developed.

Are solar cells a viable energy source for underwater power generation?

One of the most promising demonstrated technologies for onboard underwater power generation is solar cells. Solar energy is a consistent source of energy above the ocean surface, but also a surprisingly abundant and consistent source of energy below the ocean surface 9.

Can marine FPV be used in open seas?

Even though momentum in marine FPV can be observed, there is no commercially available technology yet available that can be employed in open seas. Taking floating solar technology into rough offshore environments requires that the existing solar PV modules can resist salty water and withstand strong currents and wave and wind loads.

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### Climate and land-use change impacts on potential solar photovoltaic

However, it is possible to conclude that land-use changes will have a significant impact on suitable sites for PV power generation, as suitable land is expected to increase in ...

### (PDF) Shadow enhanced self-charging power system for wave and solar

Characteristics of the shadow-effect. a Surface potential map with two light on/light off cycles and work function shift of the dark and illumination ( $20 \text{ mW cm}^{-2}$ ). b UV ...



### Power Generation Using Sea Tidal Waves

Power Generation Using Sea Tidal Waves. Authors: Nikhil Mangale, Rushikesh Jadhav, Meetkumar Kuvekar, Vikas Gupta, Abdul Bari so that the original average solar power levels of typically  $\sim 100 \text{ W/m}^2$  can be transformed into ...

### Energy-saving path planning navigation for solar-powered

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Shadows are cast by obstacles, such as buildings around urban roads, which can cover the upper surface of solar vehicles. Because such shadows have a significant impact on solar power ...



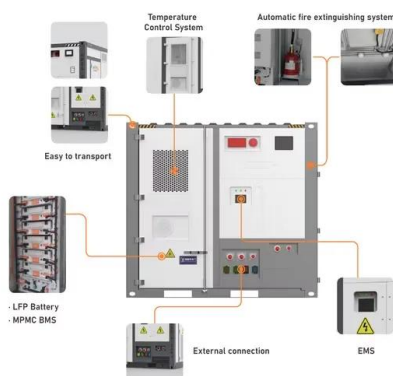
### 3D Solar Analytics

Gain true solar insights for PV installation on an interactive 3D map. 3D Solar Analytics can give easy, quick and accurate evaluation of solar irradiance and solar power yield. Especially when it comes to facade PV on vertical surfaces. ...



### (PDF) Solar power integration in Urban areas: A review of design

Tall buildings, trees, and other structures cast shadows that can diminish the output of solar panels, particularly during peak sunlight hours. This challenge is exacerbated ...



### Shadow enhanced self-charging power system for wave and ...

The S-TENG in the energy ball produces electricity by making use of shadow of moving object and the mechanical stimulation of wave. In a typical ocean under the sunshine condition, the S ...

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