

# Using solar power to desalinate water

What is a solar-powered desalination system?

MIT engineers built a solar-powered desalination system that produces large quantities of clean water despite variations in sunlight throughout the day. Because it requires no extra batteries, it offers a much more affordable way to produce drinking water, compared to other solar-driven designs.

How much water does a solar-powered desalination system produce?

The system delivered pure water that exceeded city drinking water standards, at a rate of 5.78 liters per square meter (about 1.52 gallons per 11 square feet) of solar collecting area. This is more than two times as much as the record amount previously produced by any such passive solar-powered desalination system, Wang says.

Could a solar desalination system turn seawater into drinking water?

Engineers at MIT and in China are aiming to turn seawater into drinking water with a completely passive device that is inspired by the ocean, and powered by the sun. In a paper appearing today in the journal *Joule*, the team outlines the design for a new solar desalination system that takes in saltwater and heats it with natural sunlight.

Can solar desalination provide stable water production?

This leads to an important hurdle when integrated with desalination technologies as intermittent energy generation cannot provide stable water production. To overcome it and introduce flexibility into solar desalination, battery storage systems and water storage tanks are employed [5].

Could a solar desalination system make water cheaper than tap water?

A new solar desalination system takes in saltwater and heats it with natural sunlight. The system flushes out accumulated salt, so replacement parts aren't needed often, meaning the system could potentially produce drinking water that is cheaper than tap water.

Can a solar desalination system heat saltwater?

In a paper appearing today in the journal *Joule*, the team outlines the design for a new solar desalination system that takes in saltwater and heats it with natural sunlight. The configuration of the device allows water to circulate in swirling eddies, in a manner similar to the much larger "thermohaline" circulation of the ocean.

"For the first time, it is possible for water, produced by sunlight, to be even cheaper than tap water," says Lenan Zhang, a research scientist in MIT's Device Research Laboratory. Outdoor test of the prototype solar-powered desalination device that can convert seawater into potable water under natural sunlight.

Historically, seawater desalination has been the most expensive way to produce drinking water at the commercial scale because of the high capital and energy costs [1], [2], [3]. However, desalination is increasingly recognized as a needed and viable option due to the rapid increase of the world population [4] is



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projected that close to 70% of the world ...

Discover the revolutionary idea of using solar power for water purification, transforming access to clean water worldwide with renewable energy. ... The innovation lies in creating a fully solar-powered desalination system that doesn't need computer systems or heavy batteries to operate. This system can provide clean water even in the ...

By minimizing the use of fossil fuels, solar desalination reduces the pollution and environmental degradation associated with fossil fuel extraction and combustion. Challenges and Limitations. Despite its potential, solar-powered desalination faces several challenges and limitations. The initial setup costs for solar desalination plants can be ...

Desalination systems remove salt from seawater to make it drinkable, but the process is expensive and energy intensive. Also, the desalination technique has seen little innovation in the 50 years since its inception, said Jeff Urban, a staff scientist at the Lawrence Berkeley National Laboratory.

The solar-powered system removes salt from water at a pace that closely follows changes in solar energy. As sunlight increases through the day, the system ramps up its desalting process and automatically adjusts to any sudden variation in sunlight, for example by dialing down in response to a passing cloud or revving up as the skies clear.

Water Desalination using Renewable Energy | Technology Brief 1 ... heat from concentrated solar power (CSP) for thermal desalination and electricity from solar photovoltaic and CSP for membrane desalination - is a key solution in arid regions (e.g. the MENA region) with extensive solar energy potentials, whilst ...

Addressing water scarcity worldwide. Fresh water accounts for only around one percent of the water on the planet. This precious supply is under increasing stress due to a range of factors, such as population growth, urbanisation in coastal areas, desertification, and overuse of existing water aquifers and reservoirs.

In the coastal region of Kenya, the solar-powered desalination plant in the town of Kiunga has been providing clean drinking water to thousands of residents. This project, ...

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In an attempt to lower carbon footprint resulting from high-energy consuming desalination processes, attention has shifted to using renewable energy sources to power desalination. With solar irradiation ample in regions that heavily rely on desalination, solar powered desalination provides a sustainable solution to meeting water needs.

Solar desalination offers a promising solution to the global water shortage, yet it is underutilized compared to



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traditional fossil fuel-driven methods. Past solar desalination research ...

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AlKhafji Desalination Plant, the world's largest solar-powered water desalination project that meets the region's water needs in an innovative, sustainable way. Launched in 2018 by His Royal Highness Prince Mohammed bin Salman bin Abdulaziz, Crown Prince and Prime Minister, the AlKhafji Desalination Plant is a revolutionary system that turns ...

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Scientists may have found a more efficient way to desalinate water using solar power, according to new research, offering a solution for global water scarcity through the use of renewable energy.

This paper aims to introduce thermal energy storage technology into a solar-powered dual-packed bed desalination system. By preheating and reserving seawater during the daytime and utilizing it at night, the integrated desalination system with innovative configuration can achieve freshwater and electricity combined generation and particularly ...

Water scarcity is a growing challenge across the globe, affecting over 2 billion people who lack access to safe drinking water. As climate change exacerbates this crisis, there is an urgent need for innovative, sustainable solutions. Solar-powered desalination and water purification projects are emerging as viable options to address water scarcity in arid and semi ...

You can build a solar-powered water desalination device with this engaging science kit based on an award-winning state science fair project. It is sure to provide hours of fun and experimentation. Need it fast? See delivery options in the cart.

In the direct (distillation) method, a solar collector is coupled with a distilling mechanism. [9] Solar stills of this type are described in survival guides, provided in marine survival kits, and employed in many small desalination and distillation plants.. Water production is proportional to the area of the solar surface and solar incidence angle and has an average estimated value of 3-4 ...

Solar-powered water desalination isn't just about environmental stewardship--it's a smart investment. Reduced operational costs driven by solar energy lead to significant long-term savings. Moreover, government incentives and grants supporting renewable energy installations can sweeten the deal for both residential and commercial adopters.



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India installed over 1,250 solar PV powered desalination plants from 2014-2020 under its National Mission for Clean Ganga project. ... Globally over 16 million cubic meters of desalinated water ...

In 2019, researchers began to examine a light-absorbing hydrogel for use in solar desalination, and outlined pathways and challenges for solar desalination, according to recent papers. "With the further development of automated DNA synthesis and other technologies, the system demonstrated in this study is expected to show potential in the development of smart ...

Solar-powered desalination unit, device that transforms salt water into drinking water by converting the Sun's energy to heat to drive the desalination process. Solar desalination mimics Earth's natural water cycle and has been practiced by humans since ancient times.

Its Aqua4 "concentrated solar still" (CSS) uses a concentrated solar thermal collector to compress heat, create steam and distill water at 30 times the efficiency of natural evaporation. It...

Scientists may have found a more efficient water to desalinate water using solar power, according to new research, offering a solution for global water scarcity through the use ...

Prof. Jongyoon Han and research scientist Junghyo Yoon have developed a new portable desalination device that can deliver safe drinking water at the push of a button, reports Meghan Gunn and Kerri Anne Renzulli for Newsweek. The device "requires less power than a cell phone charger to run and produces clean drinking water that exceeds World Health ...

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