How can ESA help Europe achieve space-based solar power (SBSP)?

ESA is targeting both ambitions by enabling European academia and industryto take further steps towards space-based solar power (SBSP). For satellites orbiting high above Earth,outside the atmosphere,sunlight is on average more than 10 times more intense than on the ground in Europe.

Could space-based solar power deliver cost-competitive electricity generation?

While requiring substantial development,space-based solar power (SBSP) could deliver cost-competitive electricity generation,de-risking the path by providing a future source of clean,base-load energy by 2040 or earlier.

Could space-based solar power be a working reality?

Space-based solar power,seen here being transmitted wirelessly down to Earth to wherever it is needed,is an area of investigation by ESA through its SOLARIS initiative. Solar power gathered far away in space is credited to Airbus.

Can space-based solar power be used for terrestrial energy needs?

ESA commissioned in early 2022, two independent cost benefit studies of Space Based Solar Power for terrestrial energy needs from Frazer-Nash in the UK and Roland Berger in Germany. The studies concluded that:

Should Europe start a space-based solar power program?

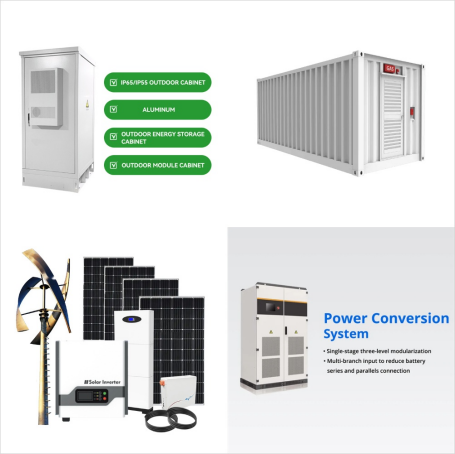
Results from the SOLARIS project should help Europe make an informed decision by the end of 2025 on initiating a full development program for commercial-scale Space-based Solar Power. This would begin with a subscale in-orbit demonstrator to beam power from space to Earth.

Is space solar power a good idea?

"The more we learn about space solar power, the more it appears to be a credible way to provide large-scale, clean and dispatchable energy for our future needs on Earth," said ESA researcher Angeliki Kapoglou, who was involved in planning the workshop.

ESA SPACE SOLAR POWER

Space-based solar power is a potential source of clean, affordable, continuous, abundant, and secure energy. Credit: ESA ??? European Space Agency. The system studies'' blank sheet approach extends to the methodology of beaming down solar power from orbit, Sanjay explains: "The studies will look at as wide a range of options as possible



ESA has signed contracts for two parallel concept studies for commercial-scale Space-Based Solar Power plants, representing a crucial step in the Agency's new SOLARIS initiative ??? maturing the feasibility of gathering ???

ESA, through a proposed new programme called SOLARIS, will take the next step in pursuit of space contributions to this vision, as it explores the feasibility and potential of Space-Based Solar Power ??? providing Earth with clean energy from space.

ESA SPACE SOLAR POWER

The underlying concept of Space-Based Solar Power dates back to the prehistory of the Space Age. In 1923 Russian theorist Konstantin Tsiolkovsky, one of the original prophets of space travel, proposed deploying a system of mirrors in space to concentrate a strong beam of sunlight down to Earth. He calculated the heat gathered using a 10 sq. m absorbing area might boil ten big ???

SOLARIS is a space-based solar power (SBSP) proposal of the European Space Agency (ESA). The proposal calls for an in-orbit demonstration in approximately 2030, the first operational station in geostationary orbit by 2040 with subsequent stations added afterwards. Each modular solar panel would be almost one 1km wide, with ground receiving antennas about 6km wide each, generating up to a petawatt of power. The program is estimated to be able to supply between a 7???

It has become clear how vital energy resilience is for Europe. In this context, Roland Berger, in partnership with OHB System AG, has conducted a comprehensive cost-benefit study and impact analysis of a space-based solar power (SBSP) program conducted for the European Space Agency (ESA) between February and July 2022.

ESA SPACE SOLAR POWER

In December 2021, ESA hosted an international workshop on Space-based Solar Power for Net Zero by 2050, which attracted more than 360 people from both the space and non-space sectors. The goal was to explore the vital role that SBSP could have in the fight against climate change, and how it could help shape ESA's future programmes.

Space-based solar power (SBSP or SSP) is the concept of collecting solar power in outer space with solar power satellites (SPS) and distributing it to Earth. European Space Agency (ESA) ??? Advanced Concepts Team, Space-based ???

Rosetta deep space selfie showing its solar panels. It was possible in theory. In the previous decade, ESA's solar-powered Rosetta mission had ventured out to the distance of Jupiter orbit on its mission to rendezvous with a comet ??? but it had to enter almost total hibernation over 31 months to conserve scarce power.

ESA SPACE SOLAR POWER

The Space Option Star is one of the designs for space-based solar power selected by the ESA from 200 public submissions. (Supplied: ESA / Arthur R. Woods, International Academy of Astronautics

Space-Based Solar Power . Purpose of the Study . This study evaluates the potential benefits, challenges, and options for NASA to engage with growing global interest in space-based solar power (SBSP). Utilizing SBSP entails in-space collection of solar energy, transmission of that energy to one or more stations on Earth,

While requiring substantial development, space-based solar power (SBSP) could deliver cost-competitive electricity generation, de-risking the path by providing a future source of clean, base-load energy by 2040 or earlier.

ESA SPACE SOLAR POWER

ESA has signed contracts for two parallel concept studies for commercial-scale, space-based, solar power plants, representing a crucial step in the agency's new SOLARIS initiative ??? maturing the feasibility of gathering solar energy from space for terrestrial clean energy needs.. Due to be completed before the end of 2023, the parallel contracts are being ???

For ESA Official Use Only ???ESA Unclassified 4 Space-Based Solar Power Delivers solar energy from space to Earth Green, 24/7, affordable, scalable, secure and available to everyone. For ESA Official Use Only ???ESA Unclassified 5 1. Incident Solar Radiation 2. Solar Energy Capture & Regulation 3. Power Beaming

To prepare Europe for future decision making on Space-Based Solar Power, ESA has proposed a preparatory programme for Europe, initially named SOLARIS, for the upcoming ESA Council at Ministerial Level in November 2022. Space-based solar power is a ???

ESA SPACE SOLAR POWER

In operation since the 1970s, the ESA Space Power Laboratory is among Europe's leading facilities of this kind. The ESPL performs tests related to all aspects of satellite power systems and equipment, including power conditioning to manage and convert onboard electricity, solar generators based on photovoltaic cells converting sunlight into electrical power as well as ???

Decades of research has led to a diversity of concepts using different forms of power generation, conversion and transmission principles. The so-called reference design transforms solar power into electricity via photovoltaic cells in geostationary orbit around Earth.

The biggest challenge is that ??? in order to generate optimal, economically-viable levels of solar power ??? the required structures need to be very large, both on Earth and in space. A single solar power satellite at geostationary orbit might extend more than a kilometre across, with the receiver station on the ground needing a footprint more

ESA SPACE SOLAR POWER

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A decision they took there could help wean Europe off fossil fuels and provide ESA's member states, which includes the UK, with their own secure source of energy in the future. The item ???

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