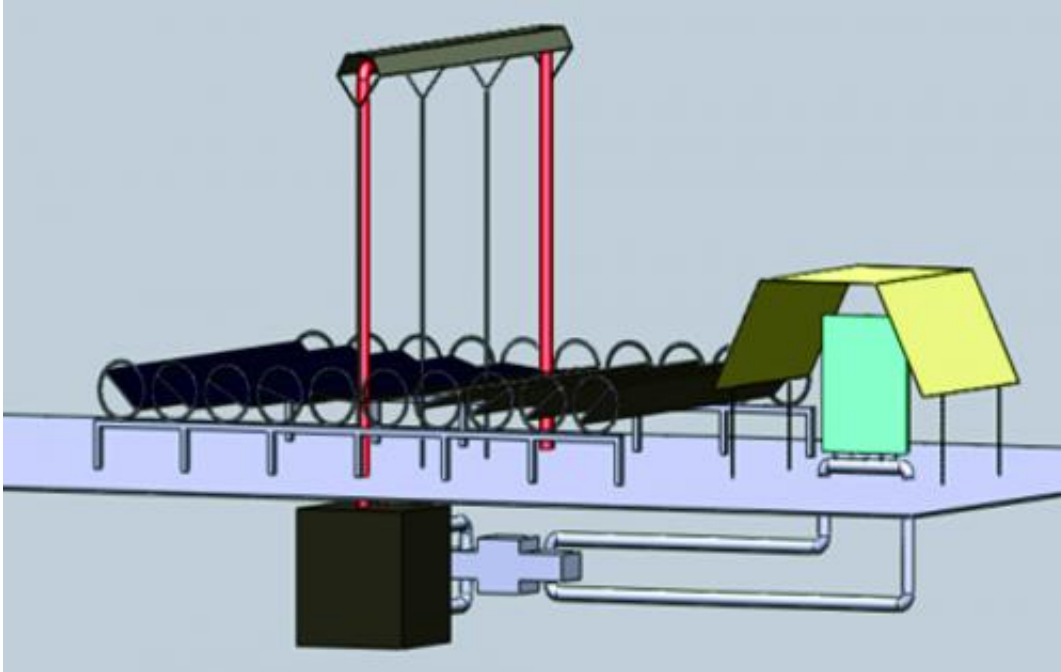


# Producing electricity on the moon at night

December 20 2013

---



System for producing electricity on the Moon using reflective mirrors and a thermal engine. Fresnel reflectors (dark blue and grey mirrors) will concentrate solar rays into the elongated collector above. Beneath, there is a tube filled with fluid that transforms into a gas when heated. This heats the thermal mass or reservoir (grey box), which can transfer this heat to a Stirling engine (cross-shaped object) to produce electricity during the long lunar night. The radiator (blue) can heat rovers and crew. The yellow cover is a protector that prevents the heat from rapidly dissipating. / Credit: Blai Climent et al.

Scientists from the Polytechnic University of Catalonia and other international collaborators have proposed a system of mirrors, processed

lunar soil and a heat engine to provide energy to vehicles and crew during the lunar night. This would preclude the need for batteries and nuclear power sources such as those used by the Chinese rover that recently landed on the moon.

The lunar night lasts approximately 14 days, during which temperatures as low as  $-150^{\circ}\text{C}$  have been recorded. This complicates vehicle movement and equipment functioning on the [lunar surface](#), requiring the transport of heavy batteries from Earth or the use of [nuclear energy](#), as exemplified by the Chinese rover Yutu.

Now, a team of researchers from the Polytechnic University of Catalonia, along with collaborators from the USA, have studied two options for storing energy on the Moon during the day for use at night. The details have been published in the journal *Acta Astronautica*, in an article featuring the participation of former NASA administrator, Michael Griffin.

"The first system consists of modifying fragments of regolith or [lunar soil](#), incorporating elements such as aluminium, for example, such that it becomes a thermal mass," Ricard Gonzalez-Cinca, a physics researcher at the Polytechnic University of Catalonia and co-author of the study, explains to SINC.

"When the Sun's rays hit the surface, a system of mirrors reflects the light to [heat](#) the thermal mass, which later," he adds, "can transmit heat during the night to rovers and other lunar equipment."

The second system is similar, but incorporates a more sophisticated series of mirrors and a [heat engine](#). The mirrors are Fresnel reflectors, such as those used in some solar energy technologies on Earth, which concentrate solar rays upon a fluid-filled tube.

This heat converts the liquid into a gas, which in turn heats the thermal mass. Afterwards, during the long lunar night, the heat is transferred to a Stirling engine to produce electricity.

"This system is better equipped than the previous model for lunar projects with greater [energy](#) needs, such as a manned mission spending the night on the moon," reports Gonzalez-Cinca.

Starting in 2020, the world's major space agencies, including NASA, the European Space Agency (ESA) and the China National Space Administration, are planning their first manned missions to our satellite. Other countries, such as India and Japan, have also voiced their interest to send their own missions from that date onwards.

**More information:** Blai Climent, Oscar Torroba, Ricard Gonzalez-Cinca, Narayanan Ramachandran, Michael D. Griffin. "Heat storage and electricity generation in the Moon during the lunar night". *Acta Astronautica* 93: 352-358, January 2014. (Invited paper). [DOI: 10.1016/j.actaastro.2013.07.024](#)

Provided by Plataforma SINC, Spain

Citation: Producing electricity on the moon at night (2013, December 20) retrieved 26 April 2024 from <https://phys.org/news/2013-12-electricity-moon-night.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.