

Huge solar powered plane takes to the air (w/ Video)

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HB-SIA / Solar Impulse

(PhysOrg.com) -- A huge airplane using solar cells as its only power source is being tested in Switzerland. In its first successful test flight last December, the plane flew only 350 meters at a height of just one meter above the ground, but by mid 2010 it is expected to make a non-stop test flight of 36 hours, and to make the first ever night flights by a plane powered only by solar panels.

The single-seater plane, the HB-SIA, was built by [Solar Impulse](#) SA of Switzerland after a successful prototype was launched by adventurer Bertrand Piccard in 2003. The wingspan of the HB-SIA (63.4 m) is almost as wide as a Boeing 747 or [Airbus A340](#) wingspan, and it is 21.85 meters long and 6.4 meters high. Unlike a [Boeing 747](#), which has a

maximum takeoff weight of over 333 tonne, the HB-SIA tips the scales at only 1.6 tonne. The construction includes a customized honeycomb sandwich structure made of carbon fiber to keep the weight as low as possible.

The plane is powered by four electric engines, with electricity provided by 11,628 SunPower Corporation photovoltaic (PV) cells mounted on the wings and horizontal tail area, giving a coverage of 200 square meters. The cells are 150 micrometers thick and have a conversion efficiency of 22%. The average output of the engines is 6 kW (maximum 7.5 kW, or 10 hp), which is around the same as the power used by the Wright Flyer flown by Wilbur and Orville Wright in 1903. The average flight speed of the HB-SIA is only 70 kilometers per hour.

To enable the plane to fly at night, the electricity generated by the PV cells is stored in a series of lithium polymer rechargeable batteries, weighing a total of 0.4 tonne. The energy density of the batteries is around 220 Wh/kg.



Test pilot Markus Scherdel will carry out the first test flights to confirm the plane can be controlled, and to test its behavior in the air. Risks are being minimized by a team of air controllers, meteorologists and other specialists, but the tests are unavoidably difficult and risky because the behavior in the air of such a lightweight but large plane is completely unknown. After these tests two of the promoters, André Borschberg and Bertrand Piccard, will also fly the plane to familiarize themselves with the aircraft. Bertrand Piccard was the first to circle the globe non-stop in a balloon, beating Virgin founder Sir Richard Branson in the quest.

A larger [plane](#), the HB-SIB, with a wingspan of 80 meters, is planned for either 2011 or 2012, and will aim to circumnavigate the globe in 2013 using only solar power. The trip is expected to take up to 25 days and include five stops.

More information: Solar Impulse: www.solarimpulse.com

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