

For solar pilot, human endurance is the sky's limit

June 14 2013, by Kerry Sheridan

Pilot Andre Borschberg oversaw the construction of a solar plane that can fly through the night, but these days the entrepreneur is more concerned with the limits of man than of technology.

The [Solar Impulse](#) HB-SIA combines the [wingspan](#) of a [passenger plane](#) with the weight of a small car, but it can only hold one person, so the pilot must remain awake and alert for its record-setting day-long flights.

"Energy is not a question anymore," the 60-year-old told AFP while flying the experimental airplane he helped conceive, at a height of 5,000 feet (1,500 meters) over a wildlife preserve in Illinois as part of a US tour.

"The pilot is becoming the weak part of the chain."

Staying awake at the controls for 24 hours is a recurring test for Borschberg and his business partner, Solar Impulse chairman and fellow pilot Bertrand Piccard, who are taking turns flying solo on the multi-leg US journey.

"We are limited by our own personal [endurance](#)," said Borschberg, who uses [meditation techniques](#) to maintain his concentration and practices yoga breathing to sustain his awareness on long flights.

"We are so enthusiastic about what we are doing and so happy to be in the airplane that it carries us really, from the morning to the evening," he

said.

"But of course we are all human. We have our moments when the energy is high and we have moments when it is more difficult."

The [cockpit](#) of the prototype HB-SIA is narrow, cramped and, by Borschberg's own admission, "not very comfortable, so that is something we are working on for the second airplane," the HB-SIB, due to start [flight tests](#) next year.

Another uneasy prospect has been how the pilot relieves himself during flight, since there is no bathroom and he cannot get up and walk around.

So many people posed this question that the team made a [YouTube video](#) called "Solar Impulse Behind The Scenes: Bathroom."

"Yeah, he's got a bottle," a spokesman confirmed to AFP.

Despite the physical challenges, Borschberg smashed a series of records aboard the plane three years ago, including the longest-ever flight in the history of solar aviation, which lasted 26 hours, 10 minutes and 19 seconds.

He proved the plane could fly in the dark on that same July 7, 2010 venture, which established the first ever nighttime flight and the highest altitude (9,235 meters) ever flown by a solar airplane.

The wingspan of a jumbo jet, the weight of a compact car

The plane itself is a marvel, and has drawn enthusiastic crowds at each US stopover since taking off May 3 from northern California toward a

final destination of New York City in July.

The aircraft will land in the US capital, Washington, this weekend, and will be on public view at the Smithsonian National Air and Space Museum's branch in Chantilly, Virginia, alongside the Enola Gay and space shuttle Discovery.

It flies without fuel, powered by 12,000 solar cells on wings that reach as wide as a Boeing 747's—a total of 63.4 meters (208 feet).

The rest of the plane is narrow and light, about as hefty as a compact car (1,600 kilograms, or 3,527 pounds).

The solar cells power the plane's electric motors. By day, they recharge the 400 kilogram (881 pound) lithium batteries on board so that the plane can fly at night.

The pilots make the most of the plane's batteries by reaching high elevations during the day and gently gliding downward over long distances at night.

On a calm, clear morning, Borschberg admitted he was flying one-handed but said that would not be the case if the plane were to encounter turbulence, which the pilots and mission control do all they can to avoid.

Managing the plane under turbulent conditions "is a heavy workload. It requires full concentration, full attention, the use of all the flight controls, strength," he said.

"Now I can fly with really one hand—two fingers—but when there is turbulence, I cannot really do that. I could not talk to you."

The Solar Impulse project was envisioned by Piccard in 1999 and the

[plane](#) was first unveiled in 2009. Its corporate partners include Omega, Deutsche Bank, Solvay, Schindler, and Bayer Material Science.

But even as the trip showcases the new frontier of what is possible with renewable energy, it also reveals the many obstacles to providing long distance airline transit to the masses via solar power.

The days when travelers board a solar [airplane](#) for a cross-continental trip may be far off, but according to Borschberg, aviation has always been an industry built on innovations that take place over time.

And if people simply incorporated renewable energy into their daily lives, a lot of damage to the environment could be avoided, he said.

"If we use these technologies, we can reduce our energy consumption by 50 percent," he said.

Borschberg, a married father of three who has built his own home using environmentally friendly materials, said that his perspective as a pilot helped shape his world view.

"When you fly over this beautiful Earth, you create a relationship that is different," he said.

"It is almost a living creature. It is very complex, when you see it from above," he added. "We should protect it for future generations."

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