Solar Impulse: ready for take-off

Imagine an airplane that runs on solar power alone – in the light of day and in the dark of night. Bertrand Piccard and his Solar Impulse team are turning that vision into reality, one solar panel at a time.

By Susan Vogel-Misicka | "Yesterday it was a dream; today it is a plane; tomorrow it will be an ambassador of renewable energy," says Bertrand Piccard, the initiator of the Solar Impulse challenge. The 52-year-old Swiss adventurer and psychiatrist launched the project in 2003, just a few years after his round-the-world balloon trip with British balloonist Brian Jones. For the Solar Impulse venture, Piccard has partnered with Swiss pilot and engineer André Borschberg, 57. The two men share the workload according to their areas of expertise.

"André, as an engineer, was primarily involved in setting up and leading the technical team needed to construct the aircraft. From my side I was responsible for funding the project and promoting it in the world of politics, business and media as a symbol of how new technologies can contribute to sustainable development," Piccard says. Meanwhile, a team of 70 people has spent years helping to develop and build the Solar Impulse HB-SIA – the first aircraft designed to fly both day and night without using fossil fuel or creating pollution.

Vital stats

With the wingspan of a Boeing 747-400 (63.4 metres) and the weight of a typical family car (1,600 kg), the Solar Impulse will run solely on solar energy. Its wings are covered with nearly 12,000 small solar cells that will power the plane's four electric motors. During the day, those cells will also charge the 400-kilo pack of lithium-polymer batteries, enabling the Solar Impulse to fly through the night.

Because the horsepower is comparable to that of a scooter, the average speed will be just 70km per hour. For that reason, it will take three to four weeks to travel around the world. The exact route has yet to be determined, but the plane will stay near the equator to collect the maximum amount of sunlight. Meanwhile, the same meteorologist who guided Piccard's balloon trip around the globe in the Breitling Orbiter 3 will help the Solar Impulse team to avoid stormy weather. The plane's slender cockpit can accommodate one pilot, but no passengers, so the intrepid Piccard and Borschberg will take turns flying solo for up to five days (!) at a time – meeting at pre-arranged locations to hand over the helm.

"We won't get much sleep, but we'll use resting techniques like meditation," says Borschberg, who has experience flying military aircraft and helicopters. While flying, he and Piccard will wear high-tech vests that will alert them should the aircraft need immediate attention. Meanwhile, part of the cockpit's

Co-pilots André Borschberg and Bertrand Piccard

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Borschberg and Piccard with test pilot Markus Scherdel in April

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precious space is allocated to a parachute in case the pilot needs to bail out.

As for provisions, the menu for the 36-hour flight involves lots of water and fairly normal food. What's almost more important is what the pilots *don't* eat – no fibre allowed in the few days leading up to the flight; otherwise, elimination could be a problem. In the first aircraft, an empty bottle or perhaps a removable diaper should do the trick. However, the second aircraft may have a seat fitted with a hole in it.

Wings of tomorrow

In June 2009, about 1,000 people gathered at the military airbase in Dübendorf, Canton Zurich for the unveiling of the project's prototype plane, the HB-SIA. Less than six months later, the plane passed its first major test: a "flea hop" of about 350 metres at an altitude of around one metre.

"It was an unbelievable and unforgettable moment! But I remain humble in the face of the difficult journey still to be accomplished – it's a long way between these initial tests and a circumnavigation of the world," Piccard notes.

In early 2010, the plane was dismantled and transferred to the airbase in Payerne, Canton Vaud. Here it was rebuilt in preparation for its next phase of testing. The quick flight in Dübendorf was made without solar panels, but the longer flights in Payerne must rely on solar power.

The first 90-minute flight using solar power took place in early April. Following the successful landing, ecstatic test pilot Markus Scherdel exclaimed: "The HB-SIA behaved just as the flight simulator told us! Despite its immense size and feather weight, the aircraft's controllability matches our expectations!"

This current series of tests is to culminate in a 36-hour flight in the airspace above lakes Neuchatel, Morat and Bienne – starting and landing in Payerne. This flight is planned for mid-2010.

Asked about his greatest fear during this stage, Borschberg says, "My biggest worry is to damage or destroy the first prototype without understanding why and before being able to record sufficient data for use in any modifications and optimisation."

Yet he and Piccard are optimistic that they're on the right track. A second plane – the Solar Impulse HB-SIB – will be built in 2011 based on the results of the upcoming 36-hour overnight flight tests. That aircraft is the one slated to circumnavigate the globe in 2013, but the long fuel-free journey isn't the primary goal of the project.

"The success of the Solar Impulse isn't just to fly around the world. Rather, the success will be if enough people enjoy taking up the challenge to save energy and the natural resources of our planet," Piccard states.

Overwhelming support

So far, the Solar Impulse project has received enthusiastic support from all corners of the world. A number of corporate sponsors – including Solvay, Omega and Deutsche Bank – provide major

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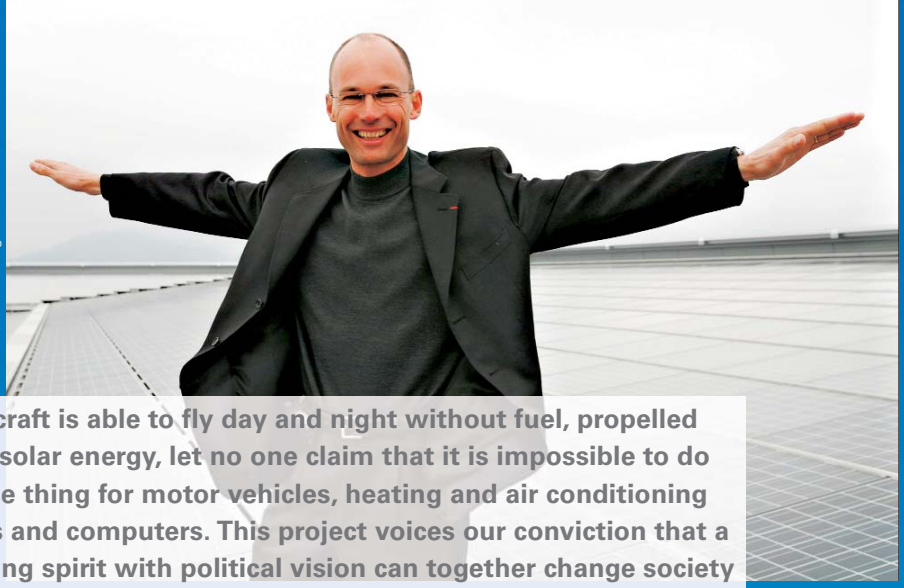

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> **If an aircraft is able to fly day and night without fuel, propelled only by solar energy, let no one claim that it is impossible to do the same thing for motor vehicles, heating and air conditioning systems and computers. This project voices our conviction that a pioneering spirit with political vision can together change society and bring about an end to fossil fuel dependency.**
>
> *– Bertrand Piccard*

financial and material aid, while individuals contribute in a number of ways. For example, you can adopt a solar cell for SFr 200, or have your name inscribed in the fuselage for SFr 10,000.

Additional support comes regularly in the form of public praise. In recognition of his pioneering spirit, Piccard was nominated for the SwissAward 2009 in the community category. In February 2010, Piccard won the Prix NATURE award for his role as a "Beacon of Hope" for a sustainable Switzerland.

"I feel very encouraged to get a prize before we've even finished," says Piccard, who is always quick to point out that there's a large team backing the Solar Impulse.

At the award ceremony, the audience was highly optimistic regarding the project. In a live poll, 86 per cent of the audience members said "yes, they can", while just 14 per cent said it would be better – or perhaps safer – for Piccard and his crew to stay on the ground.

Federal Councillor Moritz Leuenberger, head of the Federal Department of Environment, Transport, Energy and Communications, also endorses the project.

"These are the wings of hope. They are immense, as is the challenge we have to meet in climate protection. These wings should give us courage," says Leuenberger, who was on hand to congratulate the team at the unveiling of the HB-SIA prototype in Dübendorf.

More than just a plane

When the time comes for the Solar Impulse to circle the globe, Piccard and Borschberg will touch down at regular intervals to show off the plane and to generate additional excitement – not to mention get some rest after those three-to-five-day cockpit shifts.

In addition, the Solar Impulse team expects the project to spark developments in the following areas: weight and energy saving, component efficiency, electrical engine reliability, solar cell output, energy storage and improvements in cabin pressurisation systems.

While it may never be possible for a large passenger jet to run on solar power alone, Piccard believes the project will be a success if it inspires people to think differently about energy consumption and climate protection.

"It's not just an airplane but a message – please take this message home and spread it as far as you can," urges Piccard, his eyes as blue as the sky.

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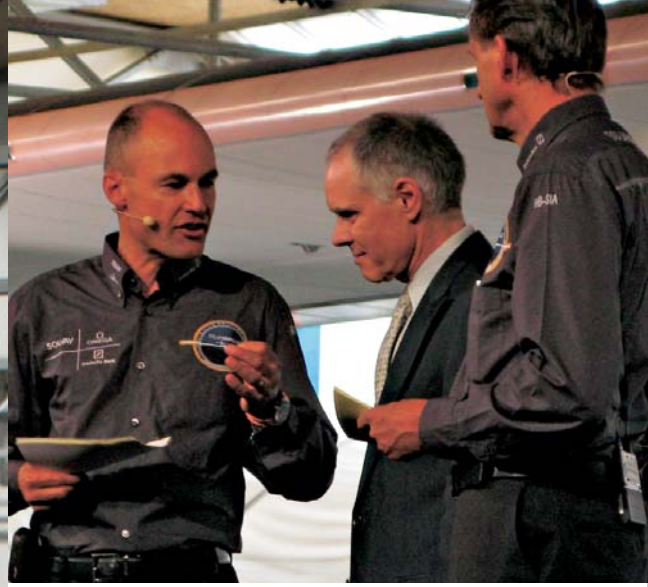

Federal Councillor Moritz Leuenberger at the HB-SIA unveiling

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Three generations of pioneering Piccards

The Piccard family has been making headlines for three generations. In the 1930s, scientist Auguste Piccard broke a number of altitude records during a series of European balloon flights. With the help of the French Navy, he later adapted the balloon's pressurised capsule to enable deep-sea exploration.

Meanwhile, Auguste's twin Jean Piccard was also a scientist and high-altitude balloonist. Jean and his wife Jeannette invented a number of balloons, and in 1934, she broke the women's altitude record by flying 17,550 metres over Lake Erie in the United States.

In the 1950s, Auguste Piccard and his son Jacques built the Trieste, a bathyscaphe. Together with American Don Walsh, Jacques Piccard reached a record-breaking depth of 10,900 metres in the Pacific Ocean's Mariana Trench. In 1963, Don Piccard, the son of Jean and Jeannette, was the first to cross the English Channel using a hot air balloon.

By 1999, it was time for Bertrand Piccard – the son of Jacques – to break a record. A professional psychiatrist and hobby hang-glider pilot, Bertrand teamed up with balloonist Brian Jones of Great Britain. Together they were the first to circle the globe in a balloon. Their journey in the Breitling Orbiter 3 took just under 20 days. A decade later, Bertrand and André Borschberg are poised to make history with the Solar Impulse.

Bertrand Piccard is the father of three, so there's no telling what might happen in the years to come. No pressure!

Three generations: Auguste, Jacques and Bertrand

© Archives Piccard Family

More info

The multi-lingual Solar Impulse website is updated regularly with the latest news, photos and videos: **www.solarimpulse.com**

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