

Swiss Adventurer Launches Quest to 'Fly Forever'

By Neil Shea, for National Geographic

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ABU DHABI, United Arab Emirates—Early on Monday, if the desert wind rushing toward the Strait of Hormuz lays down and dawn comes in clear and bright, a very large and odd-looking experimental aircraft will lift off from a military airport in Abu Dhabi, turn east toward the rising sun, and take a run at history.

From below, his aircraft will resemble a toy, with enormous, stiff wings jutting out of a short, thin fuselage, and stabilizers at the tail that are as blunt as pegs on a pogo stick. And the reasons for the craft's oddity become clear: Nearly every sun-facing surface, from wingtips to rudder, gleams with blue-black photovoltaic cells. The plane is called the Solar Impulse 2, and the Swiss explorers who built it, Bertrand Piccard and André Borschberg, intend to be the first to fly around the world propelled only by the power of light.

The goal, though, is not speed or risk but technological and entrepreneurial statement. Built almost entirely of custom-made, ultralight carbon, with advanced batteries, solar cells, and electric motors, the Solar Impulse 2 will be able to do what has never been done by a piloted, light-powered craft—stay aloft through the night, across vast distances over land and sea. It is, in theory, a plane that might fly forever.

"The airplane is special not because it is solar, but because it is efficient," Piccard told me recently in a cavernous hangar on Abu Dhabi's Al Bateen airfield. "It is efficient at harnessing energy, at storing energy, and at using energy."

in 1999, he and co-pilot Brian Jones floated around the globe in 19 days aboard a custom-built craft called the Breitling Orbiter 3. Their balloon was kept aloft by propane and helium, and though the men brought with them some four tons of gas, suspended from their craft in long, silver cylinders, it almost wasn't enough. Stressed and weary near the finish, with his previous ditches haunting him and all but one gas tank empty, Piccard feared he'd fail again. He became obsessed with fuel. "Fuel is limitation," he said. "I don't like limitations. I wanted to be able to fly forever."

At the time, solar cells, ultralight airplanes, large-capacity batteries, and electric motors were well established, if not yet widely used. Several solar aircraft had been built and flown successfully, including manned and unmanned models—some of them massive—designed by MacCready's company, AeroVironment. But they were all extremely fragile, and none of them achieved flight for days with a pilot onboard, or faced down the many hazards of crossing oceans.

Currently the Solar Impulse 2 weighs about 5,071 pounds (2,300 kilograms), similar to some large SUVs. Hardly weightless, though still very good, Borschberg said, considering the second important design variable: surface area. All of this surface area—and more along the stabilizers and spine of the craft—is given over to 17,248 solar cells made of monocrystalline silicon, each as thick as a human hair. They're less efficient than top-of-the-line cells used in satellites, but, crucially, they're less expensive and lighter. Together the cells, batteries, wings, and onboard computers embody what Borschberg said was the best possible outcome of an engineering tug-of-war.

During 12 years of testing and searching, more improvements became possible. Battery storage capability, long a hindrance to the evolution of electric vehicles, significantly improved. So did photovoltaics, engine efficiency, and the carbon-fiber nanotechnology that keeps the plane light but strong, so it's less likely to crack under stress.

The Solar Impulse 2 can fly through rain, and its solar cells harvest power even on cloudy days. During the voyage, a mission control team headquartered in Monaco will track the plane and provide the pilot with weather forecasts and options for avoiding turbulence and storms. They have chosen the plane's path carefully, planning the route for maximum summer sunshine, short nights, and shiny, happy weather.

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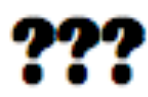


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