

Illustration : a photo of Solar Impulse

The Solar Airplane, Featherweight World Champion

Between 2015 and 2016, the Solar Impulse 2 aircraft completed a round-the-world trip in 17 stages, with a pilot on board, and no fuel – in other words, using only the electricity generated by the solar panels on its wings. See the PE feature report:

<https://www.planete-energies.com/en/medias/feature-reports/solar-airplane-technological-adventure>

Below are the main specifications provided by the project leaders, Bertrand Piccard and André Borschberg. Visit their website: <https://aroundtheworld.solarimpulse.com/adventure>

Wingspan	72 m
Weight	2.3 metric tons
Number of solar cells	17,248
Number of propellers and batteries	4
Total energy produced	11,655 kWh
Maximum flight time	117 hours 52 minutes
Maximum altitude	8,500 m
Maximum ground speed	216 km/h
Fuel consumption	0 L

Solar Impulse is a magnificent demonstration and a great human adventure, but not a prototype aircraft that could carry passengers and freight. There are electric airplanes in development, but they have batteries that are recharged on land, via the power grid. *Solar Impulse* recharges its batteries in flight, using the sun.

With more than 17,000 solar cells spread across its 270-square-meter (sq.m) wings (a wingspan equal to an airliner), *Solar Impulse* generated a maximum of 340 kilowatt-hours (kWh) per day. For an airplane to take off and fly using such little energy, it has to be very light. *Solar Impulse* weighs the same as a van. A small aircraft like a “Piper Cub” is admittedly lighter, coming in at 300 kilograms (kg), but its wings are too small to be solar-powered!

Of the cumulative 550 hours flown over the 17 stages, total power generation was nearly 12,000 kWh.

Question

Given that a high-speed train, which carries 350 passengers, consumes an average of 20 kWh per kilometer, how far could it travel with the same amount of electricity that allowed Solar Impulse to fly around the world?

- 1) 300 km
- 2) 600 km
- 3) 900 km

Answer

Answer 2. With 12,000 kWh, a high-speed train could travel approximately 600 km. That’s roughly the distance between Paris and Geneva. The featherweight *Solar Impulse* traveled exactly 43,000 km using the same amount of energy.