Solar Impulse – Frequently Asked Questions

1. **What is the Solar Impulse project and what are the objectives of this operation?**

   The Solar Impulse programme started off with the aim of building an airplane capable of flying night and day without fuel, propelled solely by solar energy. The aim of Solar Impulse is to develop a symbol which will attractively promote a pioneering and innovative spirit, particularly in the field of energy saving and renewable energy. After the success of the first historical 26 hours flight in 2010, our goal is to cross the USA in 2013 and to fly around the world in 2015.

   Our success however will not only come from completing a round-the-world tour without fuel, but will also motivate everyone to implement the necessary measures to reduce our dependence on fossil fuels.

2. **What is the philosophy that underpins the project?**

   Solar Impulse is convinced that with a pioneering spirit, the use of Clean Technologies and political vision, we can stop the planet from wasting natural resources. With Solar Impulse, an airplane that does not consume any fuel, we are able to demonstrate the potential of new technologies in terms of saving energy and producing renewable energies. What we are able to achieve in the air, everybody can do on the ground in their everyday lives.

3. **How was the Solar Impulse project born?**

   Bertrand Piccard was inspired following the success of the first ever round-the-world balloon flight that he accomplished in 1999 with Brian Jones. They left with 3.7 tonnes / ~8.200 lbs. of propane. Upon arrival, they had just 40 kg / ~88 lbs. left. When he realised that their attempt could have failed for lack of fuel, he promised himself to fly around the world again, but next time without using any fossil fuels. The project

was officially launched in 2003 following a feasibility study carried out by the EPFL, the Swiss Federal Institute of Technology in Lausanne and was led by André Borschberg.

4. **What is the project's budget?**

The budget is 140 million Swiss Francs over 12 years, which includes the construction of two airplanes and the salaries of an eighty strong team. However, this budget does not include flight operations or technological developments made by our partners.

The Solar Impulse programme is entirely funded by private partners such as Solvay, Omega, Deutsche Bank and Schindler (Main Partners) and Altran, Bayer Material Science, SwissRe Corporate Solutions and Swisscom (Official Partners). We also benefit from the support of over 80 companies which are involved in the programme under different levels of partnership, as well as individuals who are part of the Supporters Programme.

5. **What are the respective roles of Bertrand Piccard and André Borschberg in the project?**

Bertrand Piccard is the Initiator and Chairman of Solar Impulse, as well as one of the two pilots; he carries the project's vision and message to the industrial, political and media world, especially through the numerous conferences that he gives around the world. Thanks to his contacts, he ensures the development of the partnerships that fund the adventure.

André Borschberg is the CEO of Solar Impulse; he put together the technical team and supervised the airplane's design and construction. Due to his extensive experience as a pilot, he first took control of Solar Impulse and completed the first night flight using solar energy back in July 2010.

6. **How many people worked on the production of the first prototype?**

   The Solar Impulse team is made up of around 80 people supported by around one hundred experts and advisors. We also have over 80 partners with whom we share expertise and technical abilities to develop the solutions we need.

7. **What effect can your project have on aviation?**

   Our primary purpose is not to revolutionise aviation, but the way in which people think about energy and clean technologies. If Solar Impulse technologies were used on a massive scale, the world would be able to save up to 50% of the current consumption of fossil energy and produce half of the rest with renewable energies. As for the aviation industry, it is well aware of its need to change. However, this cannot be done quite as drastically as with Solar Impulse. Our project involves zero fuel. Conventional aviation cannot switch straight to zero fuel. Intermediate steps are needed, such as using lighter materials, more direct routes or approaching airports through constant descent rather than performing level landings. Aviation will be the final area of transport able to stop using fuel.

8. **How does the plane work?**

   The airplane captures all the energy it needs from solar cells. These cells convert the sun's rays into electricity to be able to simultaneously power the engines and recharge the batteries so that the plane can fly throughout the night. The plane is therefore capable of flying day and night without fuel, thus making the concept of perpetual flight more realistic. The amount of energy collected is relatively modest and we had to carry out a lot of research to minimise energy consumption. The project is therefore primarily a demonstration of energy saving that can be achieved with currently available technologies.

9. **What were the biggest technical challenges involved in the design of Solar Impulse?**

   Firstly, not having any benchmark and having to start from scratch surrounded by a lot of people telling us it was impossible.

   In order to fly day and night powered by solar energy alone and to accomplish a round-the-world tour without fuel, we always knew that the plane would require a large wingspan to reduce drag and a large surface to insert enough solar cells and produce enough energy (200 m^2 / ~2152 ft^2).

   At the same time, we needed to build an ultra-light structure to save a maximum amount of energy and fly throughout the night on batteries. The team had to push back the limits of existing technology in all fields.

   The result is breathtaking: the wingspan of a Jumbo Jet (63.4 m / ~208'), the weight of a car (1600 kg / ~3527 lbs.) and the average power of 24 hours on a scooter.

10. **What are the critical points during the flight?**

    Mainly two points:

    - Turbulence: is difficult to counter on such a light plane with such a large wingspan. Solar Impulse is particularly sensitive to turbulence and wind during take-off and landing. To avoid turbulence caused by thermals, the aircraft must take off and land early in the morning or late in the afternoon. The surface wind must be less than 10 knots (~11.5 mph) and the crosswind 4 knots (~4.6 mph).
    - Energy management: for flying at night, the energy stored in the batteries throughout the day must be enough to last until the next morning, otherwise the plane would have to land before dawn. Therefore, the pilot must fly with utmost precision!

11. In relation to the first HB-SIA prototype, what else will the HB-SIB bring in the future?

Mainly four things:

- Firstly, we want improved performance, that is to say we want to reduce our energy consumption and have more reserves.
- Then, we're modifying the cockpit to improve ergonomics.
- In addition, we need a more reliable aircraft with redundant safety systems and leak-proof electrical circuits in order to fly in humid conditions.
- Finally, we will have a form of autopilot, that we call Stability Augmentation System (SAS) which will maintain flight attitude and a directional heading so that the pilot will be allowed to rest.

12. What are the next steps for Solar Impulse?

In 2013, we aim to cross the USA from west to east in several stages, taking off from San Francisco and reaching Washington and New York. At the same time, we're also building the second plane, the HB-SIB which should be ready for its first test flights in summer 2014. Meanwhile, the round-the-world tour is planned for 2015.

13. How do you envision your round-the-world tour? How will it happen?

The World Tour will take place over several stages with 2-3 day flights over the continents and 4-6 days over the oceans. Bertrand Piccard and André Borschberg will take turns at each stop. The route is not fully defined yet. It is now studied using simulation models developed by our partner Altran and our meteorologists. The main stages will include Europe, a country in the Gulf, India, China, Hawaii, and the USA returning via Europe or North Africa.