

YOSHINOBU NOZAKI / KAZUKO MATSUMOTO / ALASTAIR GRAHAM-MARR / KEVIN CLEARY

SCIENCE MATTERS!

KINSEIDO

Contents

Unit 1	Solar Impulse	大空を駆けるテクノロジー	11
Unit 2	The Lyrebird	美しいものまねの達人	16
Unit 3	Busy Bees	身近な働き者——ミツバチ	21
Unit 4	Biometric Data	「私」を証明するためのリスク	26
Unit 5	Rare Earth	可能性を秘めた注目の資源	31
Unit 6	Herd Immunity	集団感染のリスクを減らすには	36
Unit 7	Geothermal Energy	安定した電力源としての可能性	41
Unit 8	Insects for Food	豊富で栄養価の高い身近な食材	46
Unit 9	Ivory	象牙取引の現実	51
Unit 10	Maglev Train	疾走する未来のトレイン	56
Unit 11	Robots	活躍の場を広げるロボット	61
Unit 12	International Space Station	約 400 キロ上空の実験施設	66
Unit 13	Pipe Organ	技術が生み出す多彩な音色	71
Unit 14	Earthquake and Detection Systems	命を守るテクノロジー	76
Unit 15	Abyss	生命を育む熱水噴出孔	81

Solar Impulse

大空を駆けるテクノロジー



太陽光エネルギーだけで飛ぶソーラーインパルスは、開発から約10年でアメリカ横断飛行を達成しました。各航空会社が飛行時間短縮に目の色を変える中、ソーラーインパルスはスピードを度外視し、再生可能エネルギーを活用したクリーンなフライトの実現に力を注ぎます。太陽電池の改良や機体デザイン of 工夫といったテクノロジー面でのチャレンジと、パイロットの冒険精神が呼応した同機は航空業界に革命を起こすかもしれません。

Pre-Exercises

Focus on Words



日本語の意味に合うように a～f、g～l の各語群から適切な語を選びましょう。

- | | |
|----------------|--------------------------|
| 1. 夜間飛行を楽しむ | enjoy a night () |
| 2. 大気汚染に苦しむ | suffer from air () |
| 3. 生物学的特徴を分析する | analyze a biological () |
| 4. 燃料不足に直面する | face a () shortage |
| 5. ある装置を操作する | operate a () |

a. feature b. flight c. fuel
d. pollution e. device f. satellite

- | | |
|---------------------|----------------------------------|
| 6. 太陽熱暖房を利用する | use () heating |
| 7. 人を奮い立たせるスピーチをする | make an () speech |
| 8. 高度情報システムに頼る | rely on () information systems |
| 9. 効率的なエネルギー技術を開発する | develop an () energy technology |
| 10. 曇り空を見る | look at a () sky |

g. advanced h. cloudy i. efficient
j. inspiring k. solar l. angled

Reading

Part I



Using a jet, people can go from San Francisco to New York City in about six hours. So what could be so exciting about a new plane, Solar Impulse, that took over two months to fly between those two cities? Two words: clean energy. By using solar energy, the flight required no fuel, and it produced no pollution. But the cross-country flight did create a lot of excitement.

Swiss pioneers Bertrand Piccard, a psychiatrist and balloonist and André Borschberg, an engineer, entrepreneur and professional pilot started working on Solar Impulse in 2003. A team of about 50 experts brought the plane to the point where it could successfully fly, for the first time in history, day and night powered only by the sun and across the USA in 2013. As the plane carries only one person—the pilot—it is not meant to replace a passenger jet aircraft.

Instead, it is intended to show a new way of using renewable energy. The cross-country trip took two months because Solar Impulse visited many cities on the way from the West Coast to the East Coast. Many people were excited to get a close look at the inspiring plane that flies for free, and perhaps they caught a glimpse of a brighter future, too.

Part II



The elegant plane's wings are nearly three times as long as its body. One reason for its 63.4 meter wingspan is to give the plane enough surface area to capture the necessary amount of sunlight.

Another reason for the long wings is to give the airplane

Notes

clean energy

電気や熱に変えても有害物質を出さないエネルギー
clean=free from harmful or unpleasant substances

cross-country flight

国土横断飛行

a psychiatrist and balloonist

精神科医で気球操縦者

brought the plane to the point where ~

その飛行機を~(の)レベルに至らせた

passenger jet aircraft

ジェット旅客機

from the West Coast to the East Coast

アメリカ西海岸から東海岸へ

get a close look at ~

~をまじかに見る

caught a glimpse of ~

~を垣間見た

wingspan 翼長

surface area 表面積

enough “lift” to fly. Although it goes only 70 km/h, the amount of air going under the long, angled wings pushes up on them enough to keep the airplane aloft.

A key feature of the high-tech plane is its energy storage system, which consists of extremely advanced lithium-polymer batteries. These batteries are charged up by the solar panels that cover Solar Impulse's wings and convert sunlight to electricity.

As you may imagine, the plane's battery-powered engines are very efficient. Amazingly, Solar Impulse produces more energy than it uses. Thus, the plane can keep flying even when it is cloudy or dark.

The combination of technologies that allows Solar Impulse to travel without stopping for fuel has great promise. For example, low-flying satellites, weather monitoring devices, and perhaps flying electricity generators will use the technology that the Solar Impulse team has developed. Solar Impulse won't set any speed records and yet, of course, it will help accelerate us into an age of clean energy.

(423 words)

“lift”

「揚力」浮き上がる力のこと

angled 斜めの

aloft 空中に

energy storage system

エネルギー貯蔵システム

lithium-polymer batteries

リチウムポリマー電池
リチウムイオン電池の電解質にゲル状のポリマー(高分子)を利用した充電可能な電池。高容量、高電圧、軽量を特徴とする。

convert sunlight to electricity

太陽光を電気に変える

promise 将来の見込み

low-flying 低高度の

weather monitoring devices

気象観測装置

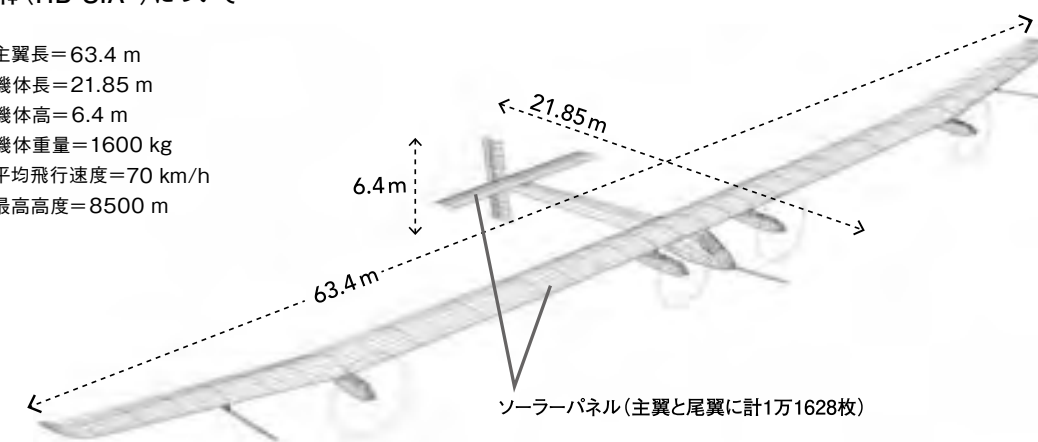
flying electricity generators

飛行発電機

accelerate us into ~
私たちが~に入ることを早める

■機体(HB-SIA*)について

- 主翼長=63.4 m
- 機体長=21.85 m
- 機体高=6.4 m
- 機体重量=1600 kg
- 平均飛行速度=70 km/h
- 最高高度=8500 m



※最初の試作機であり、これで米国主要都市訪問や大陸横断飛行に成功した。より長距離・長時間の飛行が可能な改良版、HB-SIBも開発された。

Exercises

Focus on Phrases

語群から () に適切な語を入れて英文を完成させましょう。
その際、必要に応じて語形は変えること。

- The newly-formed team of engineers started to () on a secret project.
- While I was hiking in the forest, I () a glimpse of an unusual bird.
- The function of a battery is to () chemical energy into electrical energy.
- The committee will () of five members at first, but more people may be added later.
- A Swiss swimmer () the world record yesterday.

catch consist convert set work

Focus on Contents

本文の内容に合うように () に適切な語句を選びましょう。



Part I

- Solar Impulse is a success story for () engineering.
a. cross-country b. jet-propelled c. pollution-free
- The importance of Solar Impulse is that it ().
a. carries many passengers b. uses a newly developed fuel
c. uses renewable energy

Part II

- () are needed to keep a solar plane in the air when it is dark or cloudy.
a. Cloth-covered wings b. Super-efficient batteries
c. Highly-reflective panels
- Solar Impulse has long wings so that it can ().
a. capture enough sunlight b. ensure a non-stop flight
c. resist strong winds

Summary



() に a ~ e から適切な語を選び、それぞれの Part の要約文を作りましょう。

Part I



Solar Impulse does not create pollution, but it does (1·) a great deal of excitement. On its first trip (2·) the United States it stopped at many cities. Crowds (3·) to see the plane. They understood that the plane was meant to (4·) a message about clean energy, not passengers.

a. across b. between c. carry d. cause e. gathered

Part II



Solar Impulse has extremely long wings. They are covered with solar panels, which (1·) sunlight into electricity. The electricity is used to (2·) the plane's batteries, which power the plane's engines. As a result, Solar Impulse can fly when it is cloudy or dark. In fact, Solar Impulse (3·) more energy than it uses. The technology (4·) for the plane will help us move away from using fossil fuels for energy.

a. advanced b. charge c. convert d. creates e. developed

Writing Practice

日本語の意味に合った英文になるように、[] 内の語句を並べかえましょう。

- ソーラーインパルスは、なぜ胴体の3倍もの長さの翼をもっているのだろうか。
Why does Solar Impulse have wings [are / as long as / its body / three times / that]?

- 一つの理由は、翼長が、低速でも機体を飛行させるのに十分な揚力を生み出すからだ。
One reason is that the wingspan [allows / enough lift / to create / to fly / the plane] in spite of its low speed.