

**TOSHIBA**



**JCCS**

December 2 2020

Toshiba Energy Systems & Solutions Corporation

Toshiba Corporation

Toyo Engineering Corporation

Idemitsu Kosan Co.,Ltd.

All Nippon Airways Co., Ltd.

Japan CCS Co., Ltd.

### Six Companies to Start Studying Carbon Recycling Business Models

- Converting CO<sub>2</sub> from Sources such as Exhaust Gases into Sustainable Aviation Fuel -

Toshiba Energy Systems & Solutions Corporation, Toshiba Corporation, Toyo Engineering Corporation, Idemitsu Kosan Co.,Ltd., All Nippon Airways Co., Ltd. and Japan CCS Co., Ltd. have reached an agreement to begin reviewing recycling business models for reuse of CO<sub>2</sub> from sources such as exhaust gases into Sustainable Aviation Fuel (SAF<sup>\*1</sup>) via Power-to-Chemicals (P2C<sup>\*2</sup>) processes, using technologies developed by Toshiba Corporate Research & Development Center which convert carbon dioxide (CO<sub>2</sub>) to carbon monoxide (CO) through electrolysis<sup>\*3</sup>.

These reviews will identify challenges and future business models leveraging each company's expertise, technologies, and plant facilities for supply chains that will deliver SAF. Specifically, the companies will review the possibilities for streamlined SAF supply chains from upstream to downstream, using renewable energy and hydrogen to produce SAF out of CO<sub>2</sub> which is separated and captured from sources such as exhaust gases of industrial emitters, and subsequently supply this fuel for flights in aviation.

Various eco-friendly innovations will be needed to achieve the CO<sub>2</sub> emissions reduction targets indicated in Japan's Nationally Determined Contribution<sup>\*4</sup> for the Paris Agreement. These include separation, storing and recycling CO<sub>2</sub>, making renewable energies into mainstream power sources, expanding the use of hydrogen, and decarbonization of fuels. In the aviation industry, the International Civil Aviation Organization (ICAO) has also defined CO<sub>2</sub> emissions reduction targets in its Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), and strongly urges stable production and supply of SAF since using it in aviation is one effective means of meeting these targets. With its high CO<sub>2</sub> emissions reduction capability, the P2C process offers great potential as a next-generation technology for producing SAF out of CO<sub>2</sub>.

These companies will be jointly reviewing future SAF supply chain business models, with the aim of realizing a sustainable society.

\*1 SAF: Sustainable Aviation Fuel (jet fuel produced from sustainable supply sources with low-CO<sub>2</sub> emissions in the process from the production and sourcing to the combustion of materials and substances)

\*2: P2C: Power-to-Chemicals is a carbon capture and utilization (CCU) and carbon recycling technology that uses renewable energy and renewable hydrogen energy to recycle CO<sub>2</sub> by converting it into resources with high environmental value. P2C significantly contributes to the spread of renewable energy in addition to reducing CO<sub>2</sub> emissions.

\*3: News release by Toshiba Corporation

[http://www.toshiba.co.jp/rdc/rd/detail\\_e/e1903\\_02.html](http://www.toshiba.co.jp/rdc/rd/detail_e/e1903_02.html)

\*4: Nationally Determined Contribution (NDC): Greenhouse gas emissions reduction targets determined by each country, and mitigation efforts to achieve those targets. Japan submitted its NDC to the United Nations Framework Convention on Climate Change (UNFCCC) in March 2020.

**Illustration of the P2C process**

