

Feature Promotion of SDGs (Sustainable Development Goals) and Science and Technology Innovation

At the United Nations Sustainable Development Summit that was held at the United Nations Headquarters in New York in September 2015, the 2030 Agenda for Sustainable Development (2030 Agenda) was officially adopted as new development goals to be achieved by 2030 with unanimous support from all member countries. The 17 Sustainable Development Goals (SDGs) that are included in the 2030 Agenda represent a global master plan intended to eradicate poverty in all its forms and dimensions and realize a sustainable society by 2030 while fighting against inequality and coping with climate change under the slogan of “no one will be left behind.” They represent common guiding principles for both developing and developed countries. After their adoption at the United Nations General Assembly in September 2015 with unanimous support from all member countries, the implementation of the goals started on January 1, 2016.

This feature column summarizes the background to the adoption of the SDGs at the United Nations and the specifics of the goals and explains Japanese initiatives to achieve the SDGs, mainly from the viewpoint of science and technology innovation.

1 What are the SDGs adopted at the United Nations?—The SDG’s Relationship with Science and Technology Innovation (STI) and Their Importance

(1) Background to the formulation of the SDGs at the United Nations and the specifics of the goals

In 2001, the United Nations formulated the Millennium Development Goals (MDGs), which set eight development goals for developing countries that should be achieved by 2015, including eradicating extreme poverty and hunger. While the MDGs produced some results by 2015, the target year for achievement, there remained challenges such as the failure to achieve some goals, such as universal primary education, improvement of maternal health, and sanitation, and lags in the achievement of the goals in some regions, such as sub-Saharan Africa. In addition, the international situation surrounding development has changed drastically from the time when the MDGs were formulated, as exemplified by the emergence of new challenges, including the need to take countermeasures against the increasingly serious environmental pollution and climate change and to respond to frequent natural disasters, and the diversification of players involved in development, including the private sector and non-governmental organizations (NGOs).

In light of these circumstances, the SDGs were adopted at the United Nations in September 2015. As was mentioned earlier, the SDGs represent a master plan that intended to eradicate poverty in all its forms and dimensions and realize a sustainable society by 2030 while fighting against inequality and coping with climate change under the slogan of “no one will be left behind. Although the SDGs are not legally binding, governments of individual countries are expected to establish domestic frameworks for achieving 17 goals and 169 targets with a sense of ownership.

Whereas the MDGs were goals for developing countries, the SDGs, which include goals related to challenges that must be tackled domestically by developed countries themselves, such as the problem of inequality, sustainable consumption and production, and countermeasures against climate change, are universal goals that are applied to all countries. The SDGs require the development of global partnership

whereby various stakeholders, including governments of individual countries, including both developed and developing countries, civil society and the private sector, cooperate with one another in utilizing various resources, including official development assistance (ODA) and private-sector funds.



Source: United Nations Information centre

(2) SDGs’ relationship with Science and Technology Innovation (STI) and their importance

Various initiatives are necessary for achieving the SDGs, but there are particularly high expectations for Science and Technology Innovation (STI). At the United Nations, the Technology Facilitation Mechanism (TFM) was established in September 2015 as a means to achieve the SDGs. The TFM is comprised of the United Nations Interagency Task Team on Science, Technology and Innovation for the SDGs (IATT) and the Multi-stakeholder Forum on Science, Technology and Innovation for the SDGs (STI Forum), among other organizations. In particular, the STI Forum has held a meeting once every year since June 2016, and various stakeholders have held thematic discussions concerning STI for achieving the SDGs. The results of the discussions have been reported to the United Nations High-Level Political Forum on Sustainable Development (HLPF).¹

In human history, STI has played a significant role in efforts to deal with nature, achieve economic and social development and enrich life. In particular, Japan has the experience of resolving challenges while making the most of STI mainly in the process of modernization. STI has the potential to contribute to the achievement of the SDGs as the “trump card” for optimizing and expanding limited resources, so it may be

¹ This is the forum that is considered to be the most important as an occasion for an international follow-up review of the Agenda 2030. It is held by the United Nations Economic and Social Council (ministerial-level, every year) and by the United Nations General Assembly (top-level, once four years; the next forum is scheduled for 2019). In fiscal 2017, a ministerial-level forum was held in New York from July 17-19. At the High-Level Political Forum, a voluntary national review, in which governments announce their countries’ initiatives related to Agenda 2030, is an event that attracts strong attention. In fiscal 2017, 43 countries, including Japan, participated in this event (in fiscal year 2016, 22 countries participated).

considered to be an essential cross-sectoral factor.

In other words, the achievement of the SDGs and social implementation of STI are two sides of the same coin. It is important to conduct initiatives to resolve various social challenges by linking together research results across the boundaries of various stakeholders, including universities, research institutions, the private sector and Non-Profit Organizations (NPOs).

As a pioneer in developing sustainable economy, society and environment—as an advanced problem-solving country, so to speak—Japan has made cumulative achievements whereby it sets an example for the international community in implementing the SDGs. During that process, Japan has realized solutions by making maximum use of STI. With the aim of serving as a global role model based on past experiences, the necessity will continue for Japan to conduct initiatives in terms of both domestic implementation and international cooperation.

Under these circumstances, the international community's expectations for Japan are growing, as shown by the appointment of the country as co-chair of the Third STI Forum, which is scheduled to be held in June 2018.

2 | Governmental Initiatives to Achieve the SDGs

(1) The government's eight priority areas concerning the SDGs

On May 20, 2016, Japan established the “Sustainable Development Goals (SDGs) Promotion Headquarters” within the cabinet as a new national organization responsible for government-wide implementation of initiatives to achieve the SDGs based on cooperation between relevant ministries and agencies. The headquarters, which is headed by the Prime Minister and is comprised of all cabinet ministers, functions as a command tower to oversee implementation of the Japanese government's initiatives to achieve the SDGs, monitor the progress status and make revisions as necessary. In addition, the government has established the “SDGs Promotion Roundtable Meeting,” where a broad range of stakeholders (administrative organizations, NGOs/NPOs, experts, the private sector, international organizations, and various other organizations) get together and exchange opinions.

On December 22, 2016, the SDGs Promotion Headquarters decided the “Sustainable Development Goals (SDGs) Implementation Guiding Principles” as a national strategy for Japan's implementation of the Agenda 2030. The guiding principles prescribe five major principles—(i) universality, (ii) inclusiveness, (iii) participatory approach, (iv) integrated approach, and (v) transparency and accountability—and eight priority areas (Feature Figure 1), which have been set by reconfiguring the 17 goals under the SDGs so as to suit the circumstances of Japan, under the vision of making Japan a “sustainable and resilient society in which no one is left behind” and a “leader in creating a better future, in which the three dimensions of sustainable development, namely, economic, social, and environmental are improved in an integrated manner. The guiding principles also prescribe 140 specific domestic and foreign measures, together with benchmarks. The first follow-up review is scheduled to be conducted by 2019.

Feature Figure 1

The government's eight priority areas concerning the SDGs



Source: "Sustainable Development Goals (SDGs) Implementation Guiding Principles," SDGs Promotion Headquarters (December 2016)

Moreover, in December 2017, the SDGs Promotion Headquarters adopted the "SDGs Action Plan 2018." This plan indicates that from the viewpoint of promoting "Society 5.0" in coordination with the SDGs, "Society 5.0" and "Productivity Revolution" should be realized through innovation so that social challenges targeted by the SDGs can be addressed and that "STI for SDGs" should be promoted. This means that importance is attached to the role of STI in implementation of the SDGs.

In consideration of the above, the Cabinet Office established the "STI for SDGs Task Force," which is comprised of relevant headquarters, ministries and agencies, and in January 2018, the first meeting was held with the participation of representatives from international organizations and the industrial and academic circles. As immediate goals, the task force aims to (i) formulate the STI for SDGs Roadmap, (ii) develop a "Society 5.0" model for Japan and internationally disseminate the model—in other words, develop a platform—and (iii) formulate an "integrated innovation strategy" (related to the SDGs), and it is conducting a study in close cooperation with various stakeholders.

(2) SDGs-related initiatives conducted by the government and individual ministries

The Ministry of Foreign Affairs has established the "Science and Technology Diplomacy Advisory Network" in order to collect expert knowledge in various science and technology fields under the Science and Technology Advisor to the Minister for Foreign Affairs and make use of the knowledge for the processes of planning and formulation of various foreign policies, including those related to Japan's top-level diplomacy and high-level international conferences. As part of this initiative, in December 2015, a meeting of the Advisory Board for the Promotion of Science and Technology Diplomacy, which is comprised of 17 academic experts in fields related to science and technology diplomacy, was held.

In a meeting of the Advisory Board for the Promotion of Science and Technology Diplomacy that was held in May 2017, the advisory board adopted the "Four Actions of Science and Technology Diplomacy to Implement the SDGs" as a "Recommendation for the Future" with respect to how to contribute to the

achievement of SDGs through STI. This recommendation describes how Japan should contribute to the achievement of SDGs in future international cooperation. Specifically, it recommends that Japan's diplomacy should vigorously play a leading role in implementing the SDGs across the world through STI in consideration of the government's SDGs Implementation Guiding Principles based on the following four actions: present a future vision of change through innovation; grasp and solve the challenges by use of global scientific data; link and unite across different sectors, regions and states to that end; and foster human resources to undertake initiatives of STI for SDGs.

Since August 2016, the Ministry of the Environment has held four meetings of SDGs stakeholders as opportunities for sharing and mutual recognition of past example cases from various standpoints, including the standpoint of private-sector companies, in order to promote the implementation of SDGs on the environmental front. The ministry announced pioneering example cases of initiatives to implement SDGs, focusing attention on SDGs-related international trends and movements and partnerships between local communities and companies toward achieving SDGs.

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) formulated the "Basic Policy on Promotion of Science, Technology and Innovation for Sustainable Development Goals (STI for SDGs)" in April 2018. This policy stipulates that as MEXT promotes R&D in all fields from natural sciences to humanities and social sciences, and is responsible for overseeing a variety of R&D institutions, funding agencies, universities, etc. and covers many of Japan's science and technology-related measures, the ministry needs to proactively engage in and contribute to government-wide initiatives for STI for SDGs.

3 Introduction of Examples of STI Contributions to the Achievement of SDGs in Japan

(1) Initiatives by universities and research institutions

Example
Case
1

Education and Research on Mechanism Analysis of Long-term Climate Change

Okayama University has proclaimed the following action guideline concerning the SDGs: "Based on its philosophy and objectives, Okayama University will work on activities that contribute to the achievement of SDGs (sustainable development goals) and will champion them to realize the sustainable society." Based on the guideline, Okayama University has conducted various initiatives and received a special award under the first Japan SDGs Award program implemented by the SDGs Promotion Headquarters in December 2017.

One of those initiatives is education and research on mechanism analysis of long-term climate change.

By identifying the cause and mechanism of various global and subcontinental-scale long-term climate changes, Okayama University aims to provide a scientific basis for the hypothesis that recent global warming is highly likely due to greenhouse gas emissions associated with human activities. Okayama University also aims to train general people, including university students, to recognize that remarkable global warming cannot be avoided in the future unless we immediately take fundamental mitigation and adaptation.

Okayama University also comprehensively analyzes the results of numerical simulations generated using various observational datasets and multiple models and will clarify how the Earth's climate can change and how much various climate forcing factors, such as changes in solar irradiance, volcanic eruptions, and human activities, will affect global warming in recent years. Based on the obtained scientific understanding, Okayama University is providing correct knowledge on the global warming to the people living in Okayama and other parts of the Chugoku and Shikoku districts.



Example Case
2

Valorization of Bio-resources based on Scientific Evidence in Semi- and Arid Land for Creation of New Industry

In this project, which was adopted under the Science and Technology Research Partnership for Sustainable Development (SATREPS), Tsukuba University, Kyoto University and Kyushu University, focusing on bioresources which exist in Tunisia and Morocco in abundance and whose medicinal effects have been recognized in oral traditions, are playing the leading role in implementing functional analysis and epidemiologic studies to develop seeds of technology for the development of food and cosmetic products, and technologies of authentication of origin of products and their type towards the development of new products.

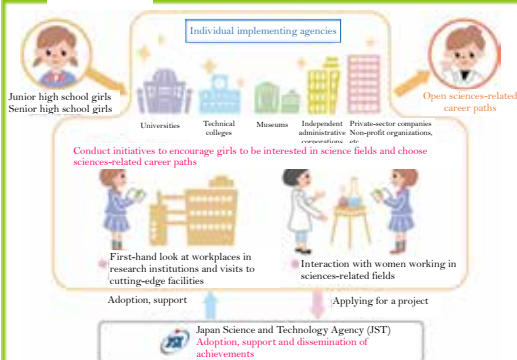
They are also conducting ecological studies and analysis of the production, export and consumption, i.e., value chain of local products, and are making efforts to solve problems in order to establish brands by investigating and analyzing the productivity and efficiency of various industries involved with functional materials, primary processed products and finished products and consumers' needs and preferences and consumer bases concerning functional foods and medicinal cosmetics.

The universities aim to create new industries producing materials for development of functional foods and medicinal cosmetics through collaboration with the private sector by developing seeds for technology for food and medicinal resources and development research on high value-added functional food and pharmaceutical products in an integrated manner based on scientific evidence, with the aim of contributing to the development of regional economies and resolving problems related to the aging society with a low birth rate faced by Japan.



Example Case
3

Support for Female Students in Choosing Science Courses



As part of the Fostering the Next-Generation Human Resources Project, the Japan Science & Technology Agency is operating the “Support for Female Students in Choosing Science Courses,” with universities and other organizations across Japan adopted through a public invitation scheme as implementing agencies. This project aims to ensure that next-generation women will play active roles with respect to STI by providing opportunities for interaction between female researchers and engineers working in science and engineering fields and female university and junior and senior high school students and by providing laboratory lessons and visiting lectures in order to encourage junior and senior high school girls to be interested in science fields and support them in choosing sciences-related career paths.



Courtesy of Japan Science & Technology Agency

Example Case
4

Towards an Energy Efficient Society beyond LED



Source: MEXT

The Ministry of Education, Culture, Sports and Science and Technology (MEXT) is promoting a research and development project with Nagoya University as the core hub. Specifically, in order to create next-generation power devices and laser devices using GaN that enable considerable improvement in energy consumption efficiency in order to accelerate the introduction of renewable energy and realize an energy-saving society, MEXT is promoting research and development related to next-generation semiconductors, ranging from creating materials based on theories and simulations, to turn them into devices and develop system applications, in an integrated manner.

The material of the blue LED, which offered a renewed supply of light and energy savings all over the world, is a semiconductor called “gallium nitride (GaN). GaN, with an energy conversion efficiency higher than other semiconductors, can thereby advance energy conservation in areas other than lighting, such as when used in power conversion in car motors, and when used in electronic components of communication equipment. What is required now is the technology to stably produce higher-quality GaN reliable enough for cars, illuminations and electronic components of communication equipment, etc.



(2) Initiatives by the private sector, etc.

Initiatives by the private sector are essential for achieving the SDGs, which are universal goals, and continuous research and development investment is necessary for the development of society.

In business circles, the Japan Business Federation (Keidanren) aims to realize “Society 5.0,” in which each and every person can lead a pleasant and vibrant life by simultaneously achieving economic growth and resolving social challenges through maximum use of innovative technologies, including IOT,¹ AI,² and robotics. Among social challenges to be resolved in “Society 5.0” are those related to health and medical care, agriculture, foods, the environment, climate change, energy, safety, disaster management, and human and gender equality, so “Society 5.0” is in line with the ideal of the SDGs. Keidanren revised the Charter of Corporate Behavior in November 2017 with the achievement of SDGs through the realization of “Society 5.0” serving as the pillar of the revision, and is calling for initiatives to achieve SDGs.

In order to promote these private-sector initiatives, it is desirable to enhance and expand incentives for research and development investment.

¹ Internet of Things
² Artificial Intelligence



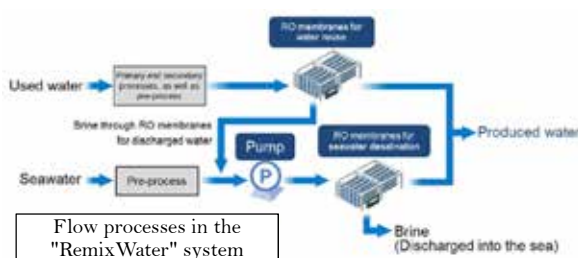
Courtesy of the Japan Business Federation (Keidanren)

Example Case
5

“Remix Water” Energy-Saving Seawater Desalination and Water Reuse Integrated System

Hitachi Ltd. is designing, constructing and operating facilities of “Remix Water,” a seawater desalination and water reuse integrated system featuring energy conservation and low environmental impact, in the City of Durban in the Republic of South Africa as a demonstration project for a water desalination and water reuse integrated system under the framework of the International Energy Consumption Efficiency Technology and System Demonstration Project initiated by the New Energy and Industrial Technology Development Organization.

“Remix Water” is a new water production system which has energy saving and low environmental impact specifications for industrial or domestic use, such as drinking water level quality, and which integrates seawater desalination and water reuse processes. By integrating seawater desalination and water reuse processes, this system achieves energy saving and low environmental impact simultaneously. Specifically, the system decreases reverse osmosis pressure in the filtering stage through RO¹ membranes and achieve a reduction of around 40% in the pumping pressure required for the desalination process by reducing the concentration of salt through the mixing of the water expelled through the RO membranes during the water reuse process with seawater, so it contributes to a significant improvement in energy saving. At the same time, it reduces salt concentration of brine discharged into the sea to approximately 3.5%, the same level as seawater.



RO membrane system used in the “RemixWater” system

Courtesy of Hitachi Ltd.

¹ Reverse Osmosis

Example
Case
6

STEM Education Programs to enhance problem solving skills

In 2015, Sony Corporation established Sony Global Education, Inc. in order to conduct education business. In addition to selling the KOOV robotic programming education kit, which is intended to enhance creative and logical thinking, Sony Global Education holds the Global Math Challenge, one of the largest online math competitions, and provides the “Think” series of training materials useful for this competition. In June 2017, Sony Global Education, Inc. started providing the STEM¹ education package service for educational institutions.



The STEM education package service, under which the learning environment is designed as a total concept with project-based learning as its core, aims to contribute to the training of next-generation leaders and innovators. This service, which is mainly targeted at primary and secondary school students, is comprised mainly of learning activity support: based on robotic programming and mathematical assessment, which assesses thinking skills.



Courtesy of Sony Corporation

(3) Regional initiatives

In order to implement SDGs nationwide, it is essential to promote proactive initiatives by stakeholders conducting activities at local governments and in local communities widely across Japan.

The 2017 revised version of the comprehensive strategy for overcoming population decline and vitalizing local economy (Cabinet decision on December 22, 2017) called for the promotion of initiatives to achieve SDGs by stipulating that factors such as comprehensive improvement related to the economy, society and the environment should be reflected in further promotion of the revitalization of local economies to a maximum possible extent by incorporating the viewpoint of achieving SDGs in order to mainstream SDGs. In addition, in February and March 2018, public invitation was made to solicit proposals from local governments (prefectural and municipal governments) for initiatives to achieve SDGs, and cities and regions that proposed excellent initiatives were selected as SDGs Future Cities. Pioneering initiatives among the selected initiatives were selected as “Local Government SDGs model programs” and financial support is scheduled to be provided for those initiatives. Moreover, the government will implement dissemination and promotion activities toward the goal of raising the ratio of prefectural and municipal governments engaging in initiatives to achieve SDGs to 30% by 2020.

¹ Science, Technology, Engineering, and Mathematics

Example
Case

7

Initiative by Shimokawa Town, Hokkaido

Shimokawa Town is a small depopulated region with an elderly population ratio of around 39% and a population of around 3,400 people. This town proclaimed the realization of a sustainable local community under the Shimokawa Town Basic Ordinance, and as a “frontier of challenges,” it is engaging in an initiative to achieve integrated resolution of challenges in the three fields of economy, society and the environment, an activity embodying the concept of the SDGs.

Specifically, Shimokawa Town has mitigated the population decline and realized an improvement in the local heat self-sufficiency rate through forest biomass energy by engaging in various initiatives centering on sustainable forest management, including appropriate production and sharing of wood and wooden products, usage of forests for health and education-related purposes, utilization of unused forest resources as renewable energy, and implementation of a compact town concept based on a renewable energy-derived heat supply system under the following three pillars: (i) development of a comprehensive forest industry (economy), (ii) regional energy self-sufficiency and a shift to low carbon (the environment), and (iii) creation of a society adapted to super-aging society (society).

In recognition of this initiative, the Chief's Award (Prime Minister Award) was given to Shimokawa Town in the first Japan SDGs Award program, which was held by the SDGs Promotion Headquarters in December 2017.

4 | Future Outlook

The Sustainable Development Goals (SDGs) Implementation Guiding Principles, decided by the SDGs Promotion Headquarters in December 2016, prescribe 140 domestic and foreign measures related to individual goals under the SDGs together with benchmarks. The first check and review of the implementation status of initiatives are scheduled to be conducted by 2019, when a summit meeting to conduct a follow-up review of SDGs is scheduled to be held.

It is not necessarily easy to achieve all those goals, but STI is the essential key to the achievement of the lofty goals, so it is important to promote STI for SDGs in an effective manner. To that end, it is necessary for the central government, research institutions, including universities, the private sector, local governments and other organizations not only to conduct initiatives individually but also to share, promote and utilize new ideas and scenarios as common knowledge by forming an open platform in which stakeholders can participate across the boundaries of fields and sectors and by holding open discussions involving a broad range of entities, including industry, universities, public research institutions, NPOs and international organizations. It is also important to foster and secure personnel capable of promoting STI for SDGs in an effective manner, including personnel capable of connecting stakeholders across the boundaries of fields and sectors.

Moreover, as the achievement of SDGs is realized as a result of interaction of various factors, including society, economy, institutional systems, everyday life, and values, collaboration between humanities/social sciences and natural sciences is important. In addition, from the viewpoint of local economy revitalization, it is important to develop regional systems that create innovations in an autonomous and sustainable manner in order to contribute to resolving challenges related to sustainability, such as a decline in the youth population.

Japan has already been implementing many STI measures that contribute to the SDGs. However, Japan is expected to promote co-creation through cooperation with the abovementioned open platform by promoting social implementation of the measures for the benefit of STI for SDGs in order to ensure that the measures lead to resolution of a variety of not only domestic but also international challenges. It is also expected that relevant government ministries, agencies, and organizations will deepen collaboration and cooperation in order to further enhance the measures.