R&D Evaluations

R&D evaluations are extremely important for improving the efficiency and vitality of R&D activities, promoting acquisition of outstanding results and training of researchers, and thus returning benefits to society and further for fulfilling the government's accountability to the public.

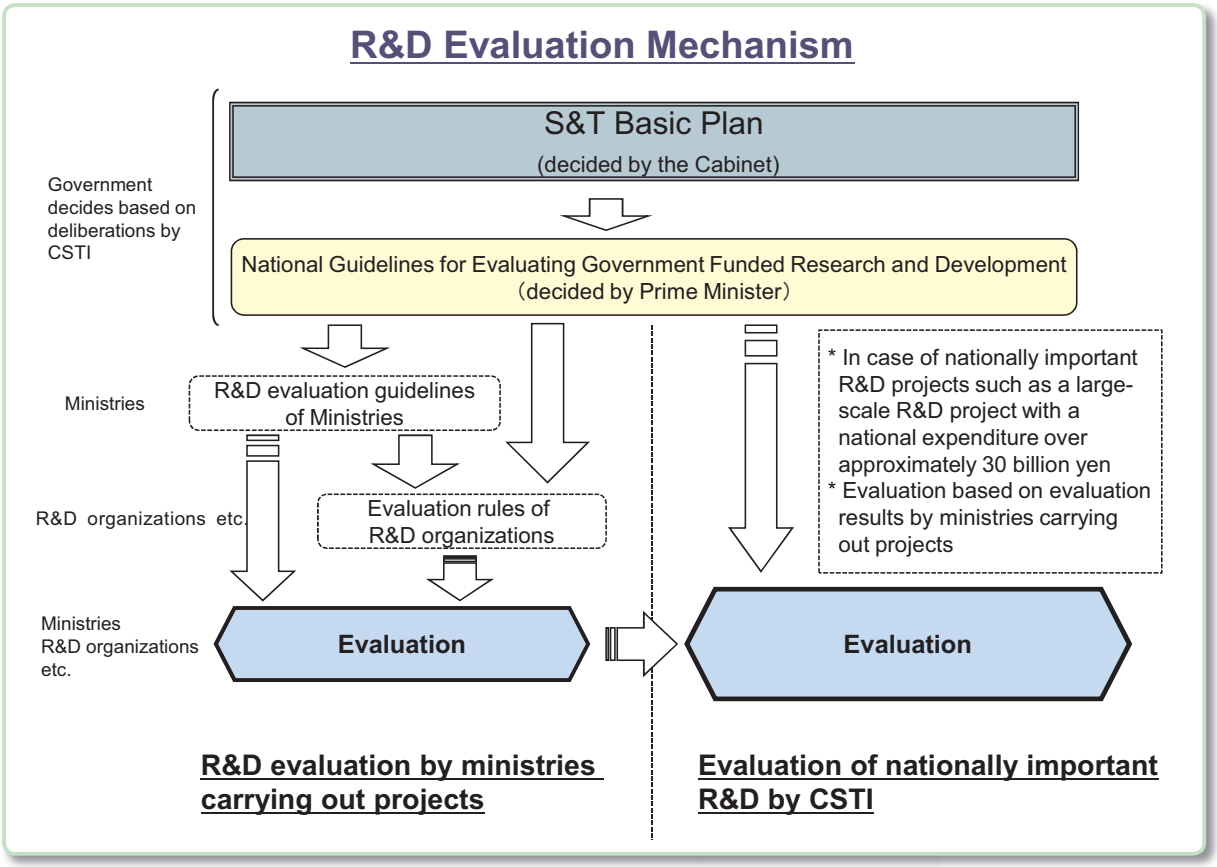
Evaluation of Nationally Important R&D

In accordance with the Act for Establishment of the Cabinet Office, to ensure that the science and technology policies in Japan are promoted in a comprehensive and organized manner, the Council for Science, Technology and Innovation conducts its own evaluation of nationally important R&D project, including large-scale projects to be implemented by the ministries with respective national expenditure over approximately 30 billion yen. The evaluation results are used in the budget formulation process and reflected in the contents of R&D implementation. As of January 2015, 24 pre-evaluations and eight post-evaluations have been conducted.

Formulation of National Guidelines for Evaluating Government Funded Research and Development

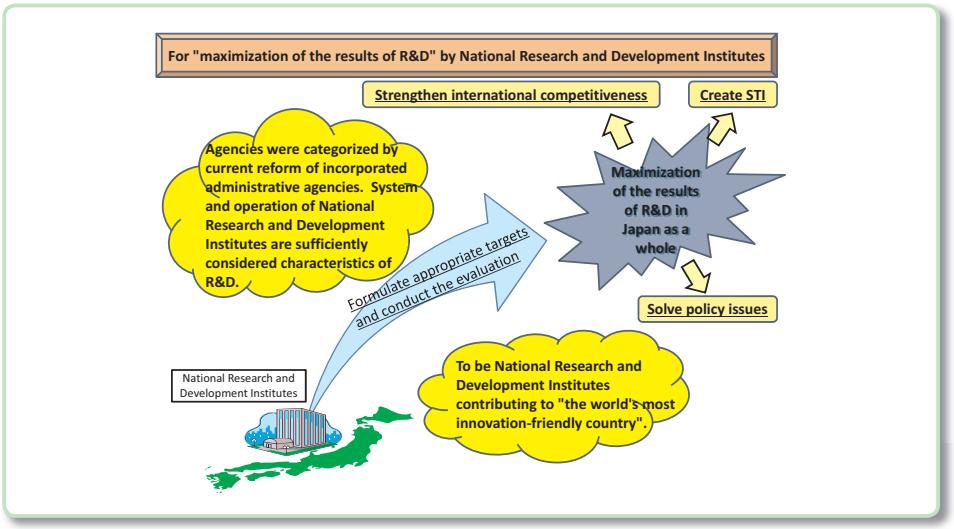
To create rules for evaluating government-funded research and development, the Council for Science, Technology and Innovation (Expert Panel on Evaluation) conducted investigation and study, and formulated the "National Guidelines for Evaluating Government Funded Research and Development (Decided by the Prime Minister)," which serve as guidelines for R&D evaluation conducted by the ministries and national R&D corporations etc. In accordance with the above guidelines, the ministries respectively develop guidelines determining specific evaluation methods and conduct R&D evaluations.

In December 2012, in accordance with the 4th S&T Basic Plan, revisions were made to the guidelines to establish a PDCA cycle to further promote STI, such as introduction of R&D program evaluations and promotion of the use of "outcome indicators" for setting targets.



Formulation of Draft Guidelines on Establishing the Medium to Long-term Objectives and Conducting the Evaluation for the National Research and Development Institutes

When the Act on General Rules for Incorporated Administrative Agencies was revised, it was decided that regarding formulation of medium to long-term objectives for the National Research and Development Institutes, which aims to maximize the results of R&D, and guidelines for conducting the evaluation, the Council for Science, Technology and Innovation should prepare a draft and that they should be properly reflected in the guidelines for all incorporated administrative agencies formulated by Minister of Internal Affairs and Communications. Decided in July 2014 in response to the above were draft guidelines for the National Research and Development Institutes—which undertakes such tasks as creating STI, solving policy issues in Japan, etc.—to formulate proper targets for maximization of the results of R&D and conduct the evaluation.



Investigation and Study relating to Bioethics

Establishment of Expert Panel on Bioethics

To smoothly promote life science research and its industrial application, it is necessary to form a national consensus or make rules for bioethics issues. For that reason, "Expert Panel on Bioethics," consisting of experts in a wide range of fields—not only natural sciences, but also jurisprudence and the humanities— was established in the Council for Science and Technology Policy in January 2001.

Roles of Expert Panel on Bioethics

To respond to the rapid development of life sciences, Expert Panel on Bioethics conducts investigation and study of bioethics regarding the formulation of guidelines on the handling of Specified Embryos (the Guidelines on Specified Embryos) in accordance with Article 4 (3) of the Act on Regulation of Human Cloning Techniques (the Cloning Techniques Regulation Law) and the formulation of the related guidelines on the establishment, distribution and use of human ES cells.

Recent activities

(1) In August 2013, Expert Panel on Bioethics prepared and published "Handling of Research using an Animal-Human Chimeric Embryo."

An Animal-Human Chimeric Embryo is one of the nine Specified Embryos defined in the Act on Regulation of Human Cloning Techniques. It is produced as a result of aggregation of one or more Animal Embryos only for "basic research on the production of organs made from human cells and transferable to humans." Using an Animal-Human Chimeric Embryo, research is now being

conducted on the production of human organs in the body of an animal. However, it is prohibited now to transfer an Animal-Human Chimeric Embryo into an animal uterus because there is a risk that an individual the distinction between a human and an animal of which is not clear could be produced, posing a bioethical problem.

Concluded in the above report are as follows: It is useful to develop techniques for performing differential control only on target organs, and it is still useful to study production of human organs in the body of an animal. Moreover, given the importance of scientific knowledge that could be obtained by conducting the transfer of an Animal-Human Chimeric Embryo into an animal uterus, it is appropriate to approve it only when certain requirements for scientific rationality and social validity are defined and only when they are satisfied, so that human dignity is not violated by producing an individual the distinction between a human and an animal of which is not clear. The report also indicated matters requiring careful consideration when considering certain requirements mentioned above.

Based on this, the Ministry of Education, Culture, Sports, Science and Technology considers reviewing the Guidelines on Specified Embryos.

(2) In April 2014, the Expert Panel on Bioethics prepared and published "Advice in Considering Ethical Matters related to Establishment of Human ES Cells for Smoothly Promoting Use in Basic Research and Clinical Use of ES Cells."

Human ES cells are produced by destroying Human Fertilized Embryos—the emerging potential of human life; they have a bioethical issue and must be therefore treated carefully. The Ministry of Education, Culture, Sports, Science and Technology provides two sets of guidelines specifying the items to be observed from the viewpoint of establishing bioethics regarding the derivation of human ES cells and their utilization. When under consideration, these guidelines allowed derivation of human ES cells and their utilization for basic research purposes only.

The above report streamlined the direction of way of thinking in considering matters regarding bioethics such as (i) expansion of the purpose of the derivation of human ES cells from utilization in basic research to clinical use, (ii) requirements for Human Fertilized Embryos used to derive human ES cells for clinical use, and (iii) handling of personal information about people providing Human Fertilized Embryos, with clinical use in perspective.

(3) Based on the report in (2), the related guidelines regarding human ES cells were reviewed by the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Health, Labour and Welfare. In October 2014, Request for Advice No. 3 "Guidelines on the Derivation of Human ES Cells" and Request for Advice No. 4 "Guidelines on Distribution and Utilizations of Human ES Cells" were submitted for deliberation to the Council for Science, Technology and Innovation.

The draft guidelines submitted for deliberation mainly contained the following: (i) derivation of human ES cells in Japan with use for clinical use in perspective to be made possible, and (ii) Human ES cells to be provided by organizations in charge of basic research to institutions that actually use such cells for clinical use.

The Expert Panel on Bioethics studied these draft guidelines submitted for deliberation and prepared a draft report indicating that they were valid. In November 2014, the Council for Science, Technology and Innovation decided on that draft report.

(4) By responding to the recent development of life sciences, investigation and study are now conducted on new bioethical issues such as research related to production of human embryos using germ cells produced from human ES cells or human iPS cells.

New Low Carbon Technology Plan

What is the New Low Carbon Technology Plan?

Japan will contribute to reduce the emission of greenhouse gas by half in 2050 (80% reduction for developed countries) and to overcome the environment and energy issues hindering the economic growth of developing countries. To accomplish this contribution, CSTP revised the Innovation Plan for Environment and Energy Technology in September 2013. This revision aims that steady development and diffusion of innovative technologies will solve the issues such as global warming and energy scarcity.

The revised plan summarizes strategies necessary to achieve the aims: (1) Identification of innovative technologies that should be developed in the short-to-medium and medium-to-long terms, (2) Reinforcement of policies to promote development of the innovative technologies, and (3) Expansion and diffusion of the innovative technologies to the world.

Realizing steady development and diffusion of innovative technologies

(1) Identification of innovative technologies that should be developed in the short-to-medium and medium-to-long terms

This item identified 37 technologies as "innovative technologies" required for solving global environmental and energy constraints and economic growth of various countries. Specifically, the identified technologies that should be developed in short-to-medium term (by 2030 or so) are technologies in the Production and Supply sector, such as high-efficiency coal-fired power generation, high-efficiency natural gas-fired power generation; those in the Consumption and Demand sector, such as next-generation automobiles and innovative structural materials; and those in the Distribution and Supply/Demand Integration sector such as fuel cells and high-performance electricity storage. The identified technologies that should be developed in medium-to-long-term (to be put into practical use after 2030 or so) are technologies such as CO_2 Capture and Storage and artificial photosynthesis. Moreover, roadmaps toward 2050 have been formulated along a time axis to indicate by when and to what technological level these technologies are to be developed.

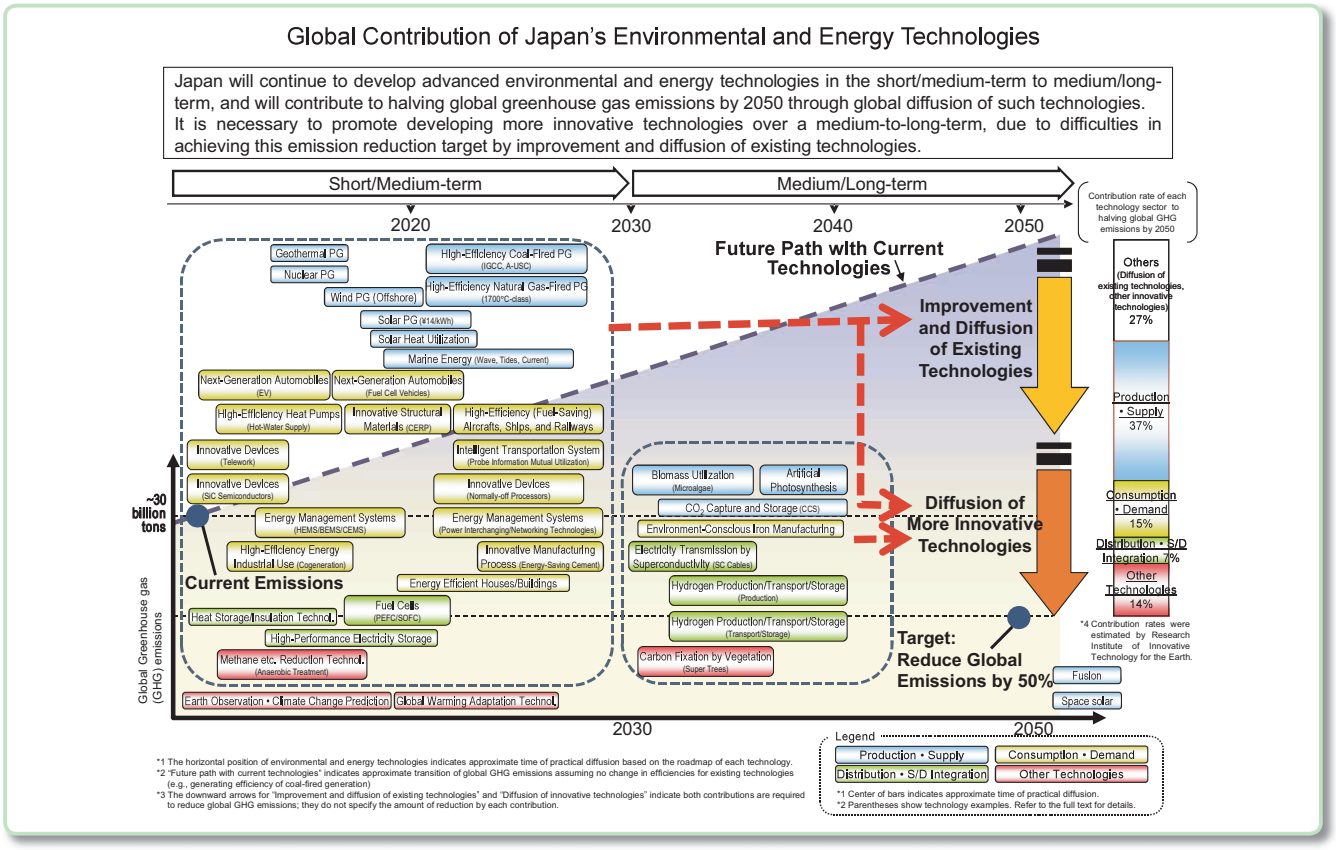
For these technologies, it is important to pursue global deployment through the development of technologies that meet the needs of target countries, product optimization, and combination of multiple technologies.

(2) Reinforcement of policies for promoting technology development

This item summarizes the promotion of investment in research and development and the cultivation of seeds of innovative technologies. Specifically, it pointed out the necessity of such measures as the preparation of an investment environment for the private sector through utilization of R&D taxation systems. and the initiative taken by the Government in R&D of technologies with high risk and high return, etc.

(3) Measures required for global expansion and diffusion of innovative technologies

This item summarizes the measures necessary for globally spreading Japan's advanced low-carbon technologies and products to take the initiative in tackling global warming technologically and for contributing to achieving both economic growth and overcoming the environmental and energy restrictions in emerging countries especially in Asia. Specifically, it points out that Japan should radically strengthen and carry out diffusion measures and clarify international contribution through the advanced technologies and products. The measures include the promotion of projects by utilizing Joint Crediting Mechanism, the formation of markets via system establishment support in the emerging countries and the international standardization, and the assistance through strategic utilization of public funds and demonstrations.



Promotion of Proactive Science and Technology Diplomacy

What is Science and Technology Diplomacy?

"Science and Technology Diplomacy" is an idea that the international competitiveness of science and technology systems is improved by using science and technology for diplomacy and using diplomacy for science and technology promotion to contribute to solving common global issues to all mankind and at the same time to increase the wealth and power of the nation.

Conducting Science and Technology Diplomacy activities

Mankind is confronted with diverse global-scale problems such as global warming, energy, food, and infectious diseases. No country can solve these problems alone; they must be dealt with through coordination and cooperation by countries, as well as Japan also must take part in.

While each country is promoting STI policies as their national strategies and globally competing for "knowledge," Japan, too, must strategically implement international activities related to STI.

Under these circumstances, from the viewpoint of promoting Science and Technology Diplomacy, Japan is not only promoting international cooperation with developed countries related to cutting-edge science and technology, but also promoting international cooperation with developing countries in such areas as Asia, Africa, and Latin America to contribute to the development of science and technology and human resources in these countries.

Policy Dialogs with Foreign Governments

The Cabinet Office and the Council for Science, Technology and Innovation aim to create a global network and expand cooperation through policy dialog with related countries at various levels such as ministerial and expert levels.

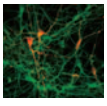
- Science & Technology Ministers' Roundtable (since 2004, annually)
- Carnegie Group Meeting (since 1991, annually)
- G8 Science and Technology Ministers' Meeting (2008, 2013)

Business-Academia-Government Collaboration

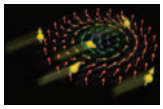
For a further advance in Business-Academia-Government collaboration in Japan, achievements of individuals and groups who contributed strongly to promote collaboration between enterprises, universities, and public research organizations in successful activities which produced significant results and took a leading role in each field have been awarded annually since 2003.

Materials for cover images

Andromeda Galaxy captured by Hyper Supreme-Cam (HSC)
Photo by: HSC Collaboration / Kavli IPMU



Human iPS cell-derived dopaminergic neurons
Photo by: Asuka Morizane, Center for iPS Cell Research and Application, Kyoto University



Driving a spin-vortex "skyrmion" with a minute electric current
Photo by: Center for Emergent Matter Science, RIKEN