

Basic Plan for the "Moonshot Research and Development Program"

Innovation Promotion Department

1. Objectives, goals, and content of the program

(1) Objectives of the program

(i) Political importance

Considering that Japan faces many difficult issues today, science and technology is expected to boldly try to solve these issues, and develop prospects for the society of the future.

(ii) Situations of R&D in Japan

In Japan, many ingenious technical results that have the potential to innovate future industries and society (creation of disruptive innovation) are being produced in the area of fundamental research. However, the research and development systems for sufficiently rapid realization of technical results in industries and society, and for deploying them on a global basis, have not been established.

(iii) R&D efforts in the world

With the aim of creating disruptive innovation, Europe, America and China are trying to realize ambitious ideas, and trying to solve difficult social issues which are far beyond the mere extension of traditional technologies, through the aggressive promotion of challenging research and development with high risk and high impact, based on an extraordinary scale of investment, compared to that of Japan.

(iv) The aim of this program

In light of these situations, the Council for Science, Technology and Innovation (hereinafter referred to as "CSTI") decided to promote challenging research and development ("Moonshot") based on bolder ideas that are far beyond the mere extension of traditional technologies, with the aim of creating disruptive innovation from Japan. This program, which is designed to:

- 1) View future society and set ambitious goals ("Moonshot Goals", hereinafter referred to as "MS Goals") and ideas which will fascinate people in connection with social

issues and others, which are difficult to solve, but if solved, are expected to have a great impact, and to bring together the wisdom of researchers from throughout the world under the supervision of the best researchers who can lead state-of-the-art research, and to realize MS Goals.

- 2) Aggressively promote challenging research and development, which will exert Japan's ability for fundamental research to the maximum, and discover and develop innovative technical results while accepting failure at times, given today's situation where a variety of insights and ideas in the fundamental research phase are being applied to industries and society at a remarkable pace, and disruptive innovation is being generated in various fields.
- 3) Renew the method of managing such research and development so that the entire picture of related research and development can be seen, and the strategy and content of the research can be flexibly reviewed, with the focus being placed always on the trend of research and development advancing in the world, and establish the most current research support system; to provide an opportunity for discussion with a variety kinds of persons from the standpoint of smooth implementation of technical results, and establish a research system in which ethical and social issues, as well as issues concerning the legal system, may be examined by researchers in various disciplines, including the humanities; and to make efforts for the complete implementation of an open/closed strategy, with future commercialization taken into consideration.

These will be promoted through the combined efforts of relevant government offices under the direction of the controllers: CSTI, and the Headquarters for Healthcare Policy.

The National Research and Development Agency New Energy and Industrial Technology Development Organization (hereinafter referred to as "NEDO") will, as the research promotion agencies (funding agencies, hereinafter referred to as FAs) responsible for the work related to research and development, establish a fund and promote challenging research and development based on this Basic Plan, in order to realize the MS Goals. The program will be executed in accordance with the "Basic Ideas on the Moonshot Research and Development Program" (Decision of The Council for Science, Technology and Innovation, as of December 20, 2018), and the "Guidelines for Operation and Evaluation of the Moonshot R&D Program".

(2) Targets of the program

(i) Output Targets

Specific targets and others are described as MS Goals, which were determined by CSTI, and for each R&D concept, which was established by the Ministry of Economy, Trade and Industry. In addition, for each individual project that is adopted, the interim target and the final target will be established for the evaluation.

(ii) Outcome Targets

CSTI and the Ministry of Economy, Trade and Industry present MS Goals, and the R&D concept (hereinafter referred to as the concept), which will be fascinating to people, with a vision of future society, and from the standpoint of finding solutions to the domestic and international social issues that are likely to become obvious in the future.

(iii) Efforts for achievement of Outcome Targets

Information on the trends of domestic and overseas research development and on the issues concerning social implementation of the technical results of research and development, including efforts necessary for the realization of MS Goals, will be collected and analyzed. Collection and analysis of such information will include the opinions of outside experts, such as humanities and social science researchers. In addition, for the purpose of the strategic promotion of research and development, acceleration of commercialization of the technical results of the research and development, and effective collaboration and adjustment amongst relevant government offices and FAs, the program will be promoted on the basis of approval and advice on the concept of the project structure, and the policy for allotment of funds from the Strategy Council (tentative name) which will be established by the Cabinet Secretariat and the Cabinet Office, and will be comprised of the industry, researchers, and relevant government offices.

(3) The details, and execution style of the program

For this program, NEDO will appoint Project Managers who will be responsible for managing research and development (hereinafter referred to as "PMs"), and research and development implementers, through Public Call to execute research and development, taking into consideration the MS Goals which were determined by CSTI, and the concept, which was established by the Ministry of Economy, Trade and Industry. Although the PM's nationality is irrelevant, the PM is basically expected to be based in Japan. The research and development implementers will be multiple research institutes, including domestic and overseas companies and universities (hereinafter referred to as "Organizations"), which will

participate in research and development as an optimal research and development system for realizing the MS Goals, and the concept. Overseas Organizations will be selected for participation based on the conditions that will be set forth separately. However, from the perspectives of national security and trade control, if the system described in a proposal includes any companies and organizations (hereinafter referred to as "Companies, etc.") that are listed in the End Users List prepared by the Ministry of Economy, Trade and Industry in connection with the trends of development of nuclear weapons and others set forth in Item (iii)(a) of Paragraph 1, Article 4 of the Export Trade Control Order or Companies, etc., which belong to countries to which the export of weapons and their related products is prohibited by the resolution of the UN Security Council (countries and regions to which weapons exports are banned by U.N. resolutions)(Appended Table 3-2 of the Export Trade Control Order), and the three countries of particular concern (Appended Table 4 of the Export Trade Control Order), that proposal would be ineligible.

The program will be executed as an entrusted program.

Support will be granted for a maximum period of ten years, from the time of the commencement of the research (when the first project is started from amongst the multiple projects in one Moonshot Goal).

2. Method for executing the program

(1) Execution system of the program

NEDO will appoint a Program Director (hereinafter referred to as the "PD") for NEDO's MS Goal which was determined by CSTI, and for each R&D concept, which was established by the Ministry of Economy, Trade and Industry. The PD will establish a portfolio for strategically realizing NEDO's MS Goal (a management plan that organizes the project structure [combination] and the policy for allotment of funds, etc., hereinafter referred to as the "Portfolio") and integrally direct and supervise projects promoted by the PM.

NEDO will appoint the PMs responsible for the management of research and development and the research and development implementers through Public Call in consultation with the PD, and execute research and development. Under the direction of the PD, the PM will establish project plan (setting goals of the project, preparation of the execution plan, establishment of system for execution, and drafting of the allotment plan of research fund to participating research and development organizations within the project) and strategically execute the project. In addition, the PM will make any turnaround in a flexible and swift manner, including changes in the project and spin-out of part of the research results. NEDO will support the PM's management activities, and the PM will be

authorized to spend the project expenses required for management, such as management of industrial property rights, international standardization, public relations, and surveys of technical trends.

(2) Operation and management of the program

NEDO will in a timely manner endeavor to understand changes in the external environment, as well as the progress of research and development, and take necessary measures. For the purpose of operation and management, efficient and effective means should be adopted, and the following matters should be executed.

(i) Management of the progress of research and development

NEDO will endeavor to understand the progress of research and development, in close collaboration with the PMs and the relevant research and development implementers. In addition, NEDO will organize as necessary a Technical Investigation Committee composed of external experts to receive a technical evaluation on a regular basis, thereby having a constant understanding of the prospects of realization of the targets.

With the discussion at the Strategy Council taken into consideration, in collaboration with the Ministry of Economy, Trade and Industry and relevant government offices, the progress of research and development will be managed, including strategy, integral promotion of the related research and development, and interim and post evaluations.

(ii) Analysis of trends in technical areas

NEDO will perform survey and analysis activities necessary for the management of research and development, thereby supporting management by the PD and the PMs. The PD and PMs will always strive to understand the trends of domestic and overseas research and development, and swiftly review the portfolio and project, depending on the status of the progress of research and development. In particular, they will endeavor to understand the trends of similar research and development overseas, and aggressively promote recruitment of leading researchers overseas for international joint research.

(iii) Responses to "Scientific and Technical Dialogue with the People"

The PD and PMs will promote two-way communication activities for explaining the details of research activities to society in an easy-to-understand manner, so as to obtain citizen understanding and support, and NEDO will support such activities.

(iv) Interdisciplinary efforts

Because interdisciplinary efforts such as Ethical, Legal and Social Issues (ELSI) and mathematical sciences are also important for the acceleration and social implementation of research and development, NEDO will offer opportunities for the exchange of opinions between the PD and interdisciplinary researchers, and establish a system in which the PMs can obtain support from interdisciplinary researchers, if the PD determines that support for the PMs from the interdisciplinary researchers is necessary, and that the PMs require such support.

(v) Evaluation of research and development projects

NEDO will have outside experts perform an interim evaluation and a post evaluation of individual projects, on the basis of the “Guidelines for Operation and Evaluation of Moonshot R&D Program”, and the “Regulations for Execution of Technical Evaluation”. The interim evaluations will be performed in FY2022, FY2024, and FY2027, while the post evaluations will be performed in FY2029. If NEDO determines that any evaluation should be performed earlier, the appropriate timing will be determined in advance. As for projects that are scheduled to end in the fifth year, the evaluation performed in the fifth year will serve as the final evaluation. NEDO will report the results of the evaluations of outside experts and of its own to the Strategy Council, and to the Ministry of Economy, Trade and Industry, and decide whether to continue, accelerate/decelerate, modify, or discontinue the projects (including amendment of the Portfolio) in consultation with the PD, taking into consideration the results of the evaluations, and advice from the Committee.

If all or part of a project is discontinued as a result of the revision of the Portfolio, NEDO, the PD and the PM will provide support so that derivative research results that have been obtained may be utilized for other programs, or research and development projects.

The manner in which the results of external evaluations and self-evaluations are reflected on continuation, acceleration/deceleration, modification and termination, etc., of projects (such as revision of the Portfolio) will be externally published.

3. Execution period of the program

This program will be executed from FY2020, for a maximum period of ten years.

4. Matters concerning the evaluation

NEDO will have outside experts perform a systemic evaluation of the entire program on the basis of the “Guidelines for Operation and Evaluation of Moonshot R&D Program”, and the “Regulations for Execution of Technical Evaluation”. Interim evaluations will be

performed in FY2022, FY2024, and FY2027, while the post evaluations will be performed in FY2029.

In the fiscal years when no external evaluation is performed, self-evaluation will be performed.

5. Other important matters

(1) Handling of technical results of research and development

(i) Dissemination of technical results

With the focus being put on future social implementation, an open/closed strategy engaging the industrial world will be introduced, commencing with the research and development phase. In addition, spin-off of the research results that are derived will be actively encouraged.

(ii) Efforts for standardization

The interim evaluations will make clear whether future international standardization should be proposed or not.

(iii) Policy for handling (affiliation, management, etc.) of intellectual property rights

In principle, all of the intellectual property rights concerning the technical results of research and development will belong to the Entrustee, under the provisions of Article 25 of the Statement of Operational Procedures for New Energy and Industrial Technology of the New Energy and Industrial Technology Development Organization. As for overseas organizations, 50 percent or more of the shares of intellectual property rights obtained through execution of the research shall belong to NEDO. The PMs will establish a policy for utilization of intellectual property rights, focusing on utilization towards the realization of NEDO's MS Goal.

(iv) Operations on IPR management

The Basic Policy for IPR Management in NEDO Moonshot Research and Development Programs will apply to this program.

(v) Operation on data management

The Basic Policy for Data Management in NEDO Moonshot Research and Development Programs will apply to this program. In addition, the PD and the PMs will promote advanced data management, including promotion of the exchange of

information amongst researchers, and the storage, sharing, and publication of research data.

(2) Amendment of the Basic Plan and Policy for amending the Basic Plan

While comprehensively considering changes in situations both within and outside of the projects, such as the status of the progress and the results of evaluations of the research and development, social and economic situations, domestic and overseas trends of research and development, trends of policies, and the situation of procurement of research and development expenses, etc., NEDO will take measures as necessary, including revision of the project basic plan.

(3) Basis law

This program will be executed in accordance with Item 2, Article 15 of the Act on the New Energy and Industrial Technology Development Organization.

6. Revision history of the Basic Plan

Established in February, 2020