



Knowledge Co-Creation Program (Group & Region Focus)

**General information on
INTENSIVE TRAINING FOR GEOTHERMAL RESOURCE ENGINEERS
課題別研修「地熱資源エンジニア」
JFY 2021**

Course No.: 201902113J001 and 202003165J001

Course Period in Japan: From June 14, 2021 to December 17, 2021

***In the context of the COVID-19 pandemic, please note that there is still a possibility the course period will be changed.**

This information pertains to one of the JICA Knowledge Co-Creation Programs (Group & Region Focus) of the Japan International Cooperation Agency (JICA) implemented as part of the Official Development Assistance of the Government of Japan based on bilateral agreement between both Governments.

JICA Knowledge Co-Creation Program (KCCP)

The Japanese Cabinet released the Development Cooperation Charter in February 2015, which stated, *“In its development cooperation, Japan has maintained the spirit of jointly creating things that suit partner countries while respecting ownership, intentions and intrinsic characteristics of the country concerned based on a field-oriented approach through dialogue and collaboration. It has also maintained the approach of building reciprocal relationships with developing countries in which both sides learn from each other and grow and develop together.”* JICA believes that this ‘Knowledge Co-Creation Program’ will serve as a foundation of mutual learning process.

I. Concept

Background

The program is an intensive six (6) months practice-based geothermal engineer program. It has more than 30 years of history since 1970. After experiencing 15 years of break, the program was revived in 2016 as a response to numerous requests from countries with geothermal resources potential.

In order to promote geothermal development in each country, developing human resources is of the utmost importance. Improving the reliability of geothermal exploration and analysis is especially important in order to mitigate development risk and improve success rate.

The first three months of the program will be dedicated to classroom-based training. During the next three months, trainees are expected to conduct hands-on research on specific topics as Project Study (hereinafter referred to as “Project Study”). At the end of the course, they are to present their findings and write a report on scientific paper format.

For what?

The program is designed to develop the capacity of engineers in geothermal resource development.

For whom?

This program is offered to experienced engineers who are currently engaged in geothermal resource development.

How?

Participants will receive classroom-based lectures for the first three months. (Due to the COVID-19, participants are likely to stay at a private hotel for the first 2 weeks of quarantine period after arrival to Japan. However, we also are planning to deliver lectures at online during that period in order to efficiently use your time in Japan). After that, participants will carry out Project Study, which is a practical training. Participants need to choose one of the courses for their Project Study based on their expertise from six specific engineering fields: Geothermics, Geothermal geology, Geochemistry, Exploration geophysics, Reservoir engineering and Geothermal energy utilization. And participants will deliver a presentation and submit a report as an output of their Project Study. To make the Project Study effectively, participants are strongly recommended to have enough discussion with their organizations to make this training program efficiently before the arrival in Japan. At the end of the program, participants will develop an Action Plan (hereinafter referred to as “Action Plan”) that describes what the participant will do after they go back to their home countries. The participants are expected to apply the knowledge and ideas they acquired in Japan in their Action Plan.

II. Description

1. Title (Course No.)

Intensive Training for Geothermal Resource Engineers (201902113J001 and 202003165J001)

2. Course Duration in Japan

June 14 to December 17, 2021

3. Target Regions or Countries

Chile, Djibouti, El Salvador, Ethiopia, Honduras, Indonesia, Kenya, Malawi, Nicaragua, Saint Vincent and the Grenadines, and Tanzania

4. Eligible / Target Organization

This program is offered to governmental and/or public organizations in charge of geothermal development

5. Capacity (Upper Limit of Participants)

18 participants

6. Language

English

7. Objective(s)

The program will train engineers to lead geothermal resources development in their own countries. In order to achieve this objective, participants are expected to achieve the followings in Japan;

- (1) To acquire theoretical and practical methods for geothermal development through lectures and Project Study.
- (2) To understand current situations of geothermal development in other participants' countries and in Japan.
- (3) To carry out the Project Study and summarize and write findings and achievements in the report.
- (4) To prepare Action Plan

*Project Study report is the final output of the 3 months Project Study which is a sort of academic report. The reports are to be compiled and published in the academic research report.

*Action Plan should describe specific activities that the participants will undertake in order to put their knowledge into practice after returning to their home countries. When they return to their countries, they are expected to submit/present their Action Plan as well as Project Study Report to their host organizations.

8. Overall Goal

This program will improve reliability and efficiency of national geothermal resources development.

9. Output and Contents

This program consists of the following components. Details on each component are given below:

Expected Module Output	Subjects/Agendas	Methodology
1-1) To acquire theoretical and practical method of geothermal development through <u>lectures</u> .	<ul style="list-style-type: none"> -Energy Demand and Supply in Japan and in the World -Geothermal Development in the World - -Project Management -Hydrothermal Systems -Geothermal Geology -Hydrothermal Geochemistry -Exploration Geophysics -JICA's assistance for geothermal development -Fluid Inclusion Studies -Geochemical Exploration -Isotope Geochemistry -Chemistry of Silica -Chemical Analysis and Its Interpretation -Environmental assessment -Electrical Resistivity Survey -MT survey -Seismic Prospecting -Gravity Prospecting -Geothermal Reservoir Engineering -Vapor-Dominated Geothermal Systems -Water-Dominated Geothermal Systems -Numerical Simulation of Geothermal Reservoir -Assessment of Geothermal Resources -Geothermal Monitoring Systems -Effects of Geothermal Development on Environment -Steam and Water Measurement Methods -Steam-Water Two-Phase Flow in Geothermal Production Well -Drilling Engineering -Geo-Heat Pump System -GIS -Thermodynamics -Energy and Exergy Analysis 	Lectures and site visits

	-Geothermal Power Plant Engineering -Policy Making on Geothermal Development -Fundamentals of Corrosion -Field Visits to Geothermal Field, Turbine Plant, Hot Spring Area -Social science -Geothermal law -Plant operation	
1-2) To acquire theoretical and practical methods of geothermal development through <u>Project Study</u> .	-Geothermics -Geothermal Geology -Geochemistry -Exploration geophysics -Reservoir engineering -Geothermal energy utilization	Practical training
2) To understand current situations of geothermal development in participants' countries and in Japan.	-Country Report	Presentation
3) To prepare the Project Study Report and Action Plan	-Reports Formulation -Presentation	Research & Discussion Presentation

<Structure of the Course>

1. Preliminary phase (activities in your home country):
 - (1) Preparation of Country Reports
 - (2) Consideration of topics of Project Study
2. Core Phase (activities in Japan): ※The tentative schedule is as next page
 - (1) Lectures on theoretical and practical methods of geology, geochemistry, geophysics, reservoir engineering etc.
 - (2) Field trips to geothermal related sites
 - (3) Country report presentation
 - (4) Project Study on specific research topics
 - (5) Poster presentation on country report in International Symposium on Earth Science and Technology (CINEST) held at Kyushu University
 - (6) Presentation and writing report on the results of Project Study
 - (7) Action Plan making and presentation
3. Final Phase in home country
 - (1) Sharing and dissemination of the reports and learning with the stakeholders in the home countries
 - (2) Implementation of the Action Plan

<Japanese Language class>

Several Japanese language classes will be given in the early stage of the program.

<Outline of tentative schedule>

- (1) 1st and 2nd week (mid to late June): 2 weeks quarantine at a private hotel. Orientation and lectures at online will be delivered.
- (2) 3rd week (end of June to beginning of July): Opening ceremony at the Kyushu University
- (3) 3rd – 25th week (until November):
1st half: mainly Lectures and Field Trips
2nd half: mainly Project Study
- (4) 26th week(early December) : Presentation of the result of Project Study and formulation of Action Plan
- (5) 27th week(mid December): Presentation of Action Plan, Closing Ceremony

※For your information, the below website will provide information of the previous years' program.

<http://mine.kyushu-u.ac.jp/jicatc/index.html>

III. Eligibility and Procedures

1. Expectations to the Applying Organizations:

- (1) This course is designed primarily for organizations that intend to address specific issues or problems identified in their operation. Applying organizations are expected to use the program for those specific purposes.
- (2) This course is enriched with contents and facilitation schemes specially developed in collaboration with relevant prominent organizations in Japan. These special features enable the course to meet specific requirements of applying organizations and effectively facilitate them toward solutions for the issues and problems.

2. Nominee Qualifications:

Applying organizations are expected to select nominees who meet the following qualifications.

(1) Essential Qualifications

- 1) Current duties and experience in the relevant field: be currently engaged in geothermal development or related project, and have about 3 years of work experience in the relevant engineering field/project.
- 2) Educational background: be a graduate of university or equivalent level, preferably with a background of engineering or science.
- 3) Language: have a competent command of spoken and written English proficiency equivalent to TOEFL iBT 100 or more (Course activities include active participation in discussions, which requires high competence of English ability. Please attach an official certificate for English ability such as TOEFL, TOEIC, IELTS etc, if possible). Especially, enough capacity to write essay and report is necessary.
- 4) Health: must be in good health to participate in the program in Japan. To reduce the risk of worsening symptoms associated with respiratory tract infection, please be honest to declare in the Medical History (QUESTIONNAIRE ON MEDICAL STATUS RESTRICTION of the application form) if you have been a patient of following illnesses; Hypertension / Diabetes / Cardiovascular illness / Heart failure / Chronic respiratory illness. Pregnant applicants are not recommended to apply due to the potential risk of health and life issues of mother and fetus.
- 5) Others: This course is very long and participants have to manage the dining by themselves. It is highly recommended to have/get the habit and ability to cook by themselves to keep good health.

(2) Recommended Qualifications

- 1) Age: Below the age of forty (40) years
- 2) Gender Consideration: JICA is promoting Gender equality. Women are encouraged to apply for the program.

3. Required Documents for Application

(1) Application Form: The Application Form is available at **the JICA overseas office (or the Embassy of Japan).**

* If you have any difficulties/disabilities which require assistance, please specify necessary assistances in the QUESTIONNAIRE ON MEDICAL STATUS RESTRICTION (1-(c)) of the application form. Information will be reviewed and used for reasonable accommodation.

(2) Selection of Project Study (ANNEX I):

to be submitted with the application form.

(3) Country Report (ANNEX II): to be submitted with the application form.

(Please refer to “V. Other Information, 1. Reports and presentation: (1) Country Report on geothermal energy development” for details)

(4) Photocopy of passport: to be submitted with the application form, if you already possess a passport that you will carry when entering Japan for this program. If not, you are requested to submit its photocopy as soon as you obtain it.

* The following information should be included in the photocopy:

Name, Date of Birth, Nationality, Sex, Passport Number and Expiry Date

(5) English Score Sheet: to be submitted with the application form. If nominees have any official English examination scores. (e.g., TOEFL, TOEIC, IELTS)

4. Procedures for Application and Selection :

(1) Submission of the Application Documents:

Closing date for applications: **Please confirm the local deadline with the JICA overseas office (or the Embassy of Japan).**

(All required material must arrive at JICA Center in Japan by **April 8, 2021.**)

(2) Selection:

Primary screening is conducted at the JICA overseas office (or the embassy of Japan) after receiving official documents from your government. JICA Center will consult with concerned organizations in Japan in the process of final selection. Applying organizations with the best intentions to utilize the opportunity will be highly valued.

The Government of Japan will examine applicants who belong to the military or other military-related organizations and/or who are enlisted in the military, taking into consideration of their duties, positions in the organization and other relevant information in a comprehensive manner to be consistent with the Development Cooperation Charter of Japan.

(3) Notice of Acceptance:

The JICA overseas office (or the Embassy of Japan) will notify the results **not later than May 7, 2021.**

5. Additional Document(s) to be submitted by accepted candidates:

Soft (data) and hard copy of Country Report should be brought to Japan along with participants.

6. Conditions for Participation

The participants of KCCP are required

- (1) to strictly observe the course schedule,
- (2) not to change the air ticket (and flight class and flight schedule arranged by JICA) and lodging by the participants themselves,
- (3) to understand that leaving Japan during the course period (to return to home country, etc.) is not allowed (except for programs longer than one year),
- (4) not to bring or invite any family members (except for programs longer than one year),
- (5) to carry out such instructions and abide by such conditions as may be stipulated by both the nominating Government and the Japanese Government in respect of the course,
- (6) to observe the rules and regulations of the program implementing partners to provide the program or establishments,
- (7) not to engage in political activities, or any form of employment for profit,
- (8) not to quit the program, should the participants violate the Japanese laws or JICA's regulations, or the participants commit illegal or immoral conduct, or get critical illness or serious injury and be considered unable to continue the course. The participants shall be responsible for paying any cost for treatment of the said health conditions except for the medical care stipulated in (3) of "5. Expenses", "IV. Administrative Arrangements",
- (9) to return the total amount or a part of the expenditure for the KCCP depending on the severity of such violation, should the participants violate the laws and ordinances,
- (10) not to drive a car or motorbike, regardless of an international driving license possessed,
- (11) to observe the rules and regulations at the place of the participants' accommodation, and
- (12) to refund allowances or other benefits paid by JICA in the case of a change in schedule.

IV. Administrative Arrangements

1. Organizer (JICA Center in Japan)

(1) Responsible JICA domestic office: JICA Kyushu center

Address: 2-2-1 Hirano, Yahatahigashi-ku, Kitakyushu-shi, Fukuoka, 805-8505, Japan

TEL: +81-93-671-6311 FAX: +81-93-671-0979

URL: <https://www.jica.go.jp/kyushu/english/office/index.html>

(2) Program Officer: ARAKI Yutaka(Mr.) (kictp@jica.go.jp)

2. Implementing Partner

(1) Name: Kyushu University

(2) URL: <http://mine.kyushu-u.ac.jp/english/> <http://mine.kyushu-u.ac.jp/jicac/index.html>

3. Travel to Japan

(1) Air Ticket: In principle, JICA will arrange an economy-class round-trip ticket between an international airport designated by JICA and Japan.

(2) Travel Insurance: Coverage is from time of arrival up to departure in Japan. Thus traveling time outside Japan (include damaged baggage during the arrival flight to Japan) will not be covered.

4. Accommodation in Japan

JICA will arrange appropriate accommodations in Japan for the participants:

※Participants will stay at a private hotel for the first 2 weeks of quarantine period in accordance with the border measures of the Japanese government against the COVID-19. After that, participants will move to Fukuoka-city where the Kyushu University is located. JICA will arrange accommodation with the kitchen facility in the center of Fukuoka City for the participants.

※Meal will not be served(except for the first 2 weeks of quarantine period) at the accommodation, therefore participants need to cook yourself in the room. There are canteens at the university and restaurants and shops are available around the accommodation. So highly self-disciplined candidates are expected to be selected.

※Please note that it is difficult to obtain halal food around university. There is a restaurant in canteen where halal meal is served, and halal lunch box is available at the University Co-op store .

5. Expenses

The following expenses in Japan will be provided by JICA

(1) Allowances for meals, living expenses, outfits, and shipping and stopover.

(2) Expenses for study tours (basically in the form of train tickets).

(3) Medical care for participants who become ill after arriving in Japan (the costs related to pre-existing illness, pregnancy, or dental treatment are not included).

- (4) Expenses for program implementation, including materials.
- (5) For more details, please see “III. ALLOWANCES” of the brochure for participants titled “KENSU-IN GUIDE BOOK,” which will be given before departure for Japan.

*Link to JICA HP (English/French/Spanish/Russian):

https://www.jica.go.jp/english/our_work/types_of_assistance/tech/acceptance/training/index.html

6. Pre-departure Orientation

A pre-departure orientation will be held at respective country's JICA office (or the Japanese Embassy), to provide Participants with details on travel to Japan, conditions of the course, and other matters.

*YouTube of “Knowledge Co-Creation Program and Life in Japan” and “Introduction of JICA Center” are viewable from the link below.

Image videos of 'Introduction of JICA Center (YouTube)' show the following information of JICA Centers: Location, Building, Entrance, Reception(Front desk), Lobby, Office, Accommodation(Room), Amenities(Hand dryer), Bathroom(Shower and Toilet), Toiletries, Restaurant, Laundry Room(Washing machine, Iron), ICT Room(Computer for participants), Clinic, Cash dispenser, Gym, Neighborhood

Part I: Knowledge Co-Creation Program and Life in Japan	
English ver.	https://www.youtube.com/watch?v=SLurfKugrEw
French ver.	https://www.youtube.com/watch?v=v2yU9ISYcTY
Spanish ver.	https://www.youtube.com/watch?v=m7l-WIQSDjI
Russian ver.	https://www.youtube.com/watch?v=P7_ujz37AQc
Arabic ver.	https://www.youtube.com/watch?v=1iBQqdpXQb4
Part II: Introduction of JICA Centers in Japan	
JICA Kyushu	https://www.jica.go.jp/kyushu/english/office/index.html

V. Other Information

1. Reports and presentation:

(1) Country Report on geothermal energy development

As written in the previous page, each applicant is required to submit his/her own Country Report. Participants will have a presentation of his/her Country Report which includes characteristics of geothermal resources and present status of geothermal development in each participant's countries for 15 minutes at the middle stage of the training in order to share knowledge and background with other participants as well as lecturers. Participants also have poster presentation on the country report in International Symposium on Earth Science and Technology (CINEST) held at Kyushu University.

(2) Presentation and reports at the end of program in Japan

Participants are required to write a Project Study report and an Action Plan as output of your training. Each participant will also have oral presentation of the report and the plan at the end of the program. Instructions will be given during the program.

(3) Laptop PC

Participants are strongly recommended to bring their own laptop and USB flash memory with them. They are necessary to write and edit reports, and to make presentation materials.

AC plug adapter is necessary to use electric devices in Japan.

2. International Exchange Program with Local Communities:

JICA encourages international exchange between JICA participants and local communities. Participants will have a chance to visit a school to have interaction with students. Therefore, participants are recommended to bring their national costumes or crafts and small gifts that can introduce your country in order to make the exchange program more fruitful.

3. Remarks:

JICA KCCP is implemented for the purpose of development of human resources that will promote development of the countries, and not for the enrichment of private companies. Matters of a trade secret and patent techniques will remain confidential and inaccessible during the training.

Annex I

NOTE>>> After the lecture period, you will start Project Study in which you carry out research work on specific topics under guidance of professors for 3 months. Please select two out of six courses by putting priority number: 1 for the first choice and 2 for the second choice. Each course can accept up to three participants.

1) Please select the course and write the priority number 1 and 2 for the course you want to join (required)

Priority no.	Course	About course
	Geothermics	1. Geothermal reservoir monitoring and survey using precise gravity measurement to understand the theory, data processing, modeling and survey method by field survey practice. 2. Heat discharge observation using remote sensing and field measurement data.
	Geothermal geology	Field work and analyses for rock samples with XRD and XRF, fluid inclusion microthermometry and data interpretation for geothermal systems.
	Geochemistry	Field works for fluid sampling, laboratory analysis and data interpretation. Field works includes survey planning and sampling technique. Laboratory analysis for water and gas, and stable isotopes. Data interpretation for geothermometry and geochemical modeling.
	Exploration geophysics	To understand the fundamental theory of numerical simulation and inversion of geophysical data for geothermal exploration. Practical data analysis of geophysical methods, e.g. seismic/micro-seismic method gravity method, geomagnetic method, electrical methods, electromagnetic methods.
	Reservoir engineering	Numerical works using computer for reservoir simulation (natural state and history matching), tracer test analysis, pressure well test analysis and wellbore flow analysis.

	Geothermal energy utilization	Modeling and simulations for direct heat utilization, cascade use, power generation and optimization using energy and exergy analysis
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2) Please explain about your specialty (required)

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3) Please explain why you want to join the Project Study course which you selected (required)

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4) Please explain how you want to apply your knowledge which you have gained at this training course (required)

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Date	Signature
	Print Name

Annex II

Intensive Training for Geothermal Resource Engineers (JFY 2021)

Country Report (Job Report)

Name of applicant:

Country:

Organization and present post:

E-mail:

Remarks 1: The Report should be **typewritten in English (12-point font, A4 size paper)**, and total pages of the report must be **limited to 5 pages**.

Remarks 2: Each participant is required to have presentation in 15 minutes based on this Country Report for the purpose of making the training more effective and fruitful by comprehending the present situations and problems of the participants each other.

Remarks 3: At Country Report presentation, your explanations will preferably be designed with visual aids such as Power Point, slide films and other materials.

Remarks 4: Please itemize your answer and make them specific.

1. **Introduce general conditions of your country, i.e., population, climate, main products, national budget, and other important figures (in short).**
2. **Energy Situation in your country (up to 1 page)**
 - Primary energy consumption rate (circle graph)
 - Energy self-sufficient rate
 - Electric power consumption rate (circle graph)
 - Electrification cover rate
 - Gap between electric power supply & demand
 - Electricity charges (for residence & Industry)
 - Enactment & enforcement situation of geothermal development law and/or regulation
 - Situation of geothermal development
3. **Organization and main tasks (up to 1 page)**
 - (1) Main tasks of the organization

- (2) Organization chart:
Please draw a chart of your organization including the department (section) names with the number of staffs in it and mark where you are positioned.
(The chart should be attached and not be counted in this page limit.)
Please describe a duty of each department (section) briefly.
- (3) Brief description of your assignments.

4. Existing challenges in your section (up to 1 page)

- (1) Challenges you are facing in your section (Please describe concrete details)
- (2) Countermeasures for these challenges
- (3) Obstacles in the process of solving those challenges

5. Expectations for the training course (up to 1 page)

- (1) Most interesting subjects or topics in this training course and reasons why you pick up the subjects.
- (2) How do you expect to apply skills and knowledge according the listed items in curriculum after you return to your home country?
- (3) Other matters you are expecting for this course, if any.
(Basically this training program is fixed and cannot be changed upon your request.)

For Your Reference

JICA and Capacity Development

Technical cooperation is people-to-people cooperation that supports partner countries in enhancing their comprehensive capacities to address development challenges by their own efforts. Instead of applying Japanese technology per se to partner countries, JICA's technical cooperation provides solutions that best fit their needs by working with people living there. In the process, consideration is given to factors such as their regional characteristics, historical background, and languages. JICA does not limit its technical cooperation to human resources development; it offers multi-tiered assistance that also involves organizational strengthening, policy formulation, and institution building.

Implementation methods of JICA's technical cooperation can be divided into two approaches. One is overseas cooperation by dispatching experts and volunteers in various development sectors to partner countries; the other is domestic cooperation by inviting participants from developing countries to Japan. The latter method is the Knowledge Co-Creation Program, formerly called Training Program, and it is one of the core programs carried out in Japan. By inviting officials from partner countries and with cooperation from domestic partners, the Knowledge Co-Creation Program provides technical knowledge and practical solutions for development issues in participating countries.

The Knowledge Co-Creation Program (Group & Region Focus) has long occupied an important place in JICA operations. About 400 pre-organized courses cover a wide range of professional fields, ranging from education, health, infrastructure, energy, trade and finance, to agriculture, rural development, gender mainstreaming, and environmental protection. A variety of programs is being customized by the different target organizations to address the specific needs, such as policy-making organizations, service provision organizations, as well as research and academic institutions. Some programs are organized to target a certain group of countries with similar developmental challenges.

Japanese Development Experience

Japan, as the first non-Western nation to become a developed country, built itself into a country that is free, peaceful, prosperous and democratic while preserving its tradition. Japan will serve as one of the best examples for our partner countries to follow in their own development.

From engineering technology to production management methods, most of the know-how that has enabled Japan to become what it is today has emanated, of course, has been accompanied by countless failures and errors behind the success stories.

Through Japan's progressive adaptation and application of systems, methods and technologies from the West in a way that is suited to its own circumstances, Japan has developed a storehouse of knowledge not found elsewhere from unique systems of

organization, administration and personnel management to such social systems as the livelihood improvement approach and governmental organization. It is not easy to apply such experiences to other countries where the circumstances differ, but the experiences can provide ideas and clues useful when devising measures to solve problems.

JICA, therefore, would like to invite as many leaders of partner countries as possible to come and visit us, to mingle with the Japanese people, and witness the advantages as well as the disadvantages of Japanese systems, so that integration of their findings might help them reach their developmental objectives.



Contact Information for Inquiries

For inquiries and further information, please contact the JICA overseas office or the Embassy of Japan. Further, address correspondence to:

JICA Kyushu Center (JICA KYUSHU)

Address: 2-2-1 Hirano, Yahatahigashi-ku, Kitakyushu-shi, Fukuoka, 805-8505, Japan

TEL: +81-93-671-6311 FAX: +81-93-671-0979