



Knowledge Co-Creation Program (Group & Region Focus)

GENERAL INFORMATION ON

RENEWABLE ENERGY IN GRID

-MAINLY ON PHOTOVOLTAIC- (A)

課題別研修「再生可能エネルギー導入計画

-太陽光発電を例として-(A)」

JFY 2018

NO. J1804017 / ID. 1884603

Course Period in Japan: From June 26, 2018 to August 8, 2018

This information pertains to one of the JICA Knowledge Co-Creation Program (Group & Region Focus) of the Japan International Cooperation Agency (JICA), which shall be 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)’ as a New Start

In the Development Cooperation Charter which was released from the Japanese Cabinet on February 2015, it is clearly pointed out that *“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.”* We believe that this ‘Knowledge Co-Creation Program’ will serve as a center of mutual learning process.

I. Concept

Background

In combating global environmental problems, effective use of natural energy in line with the promotion of renewable energy use is becoming increasingly significant. Among renewable energy sources, solar power generation is expected to be a promising growth industry in a low carbon society, and its demand is expanding as performance is improved and price is declined by recent technological developments.

Whereas solar power can be generated directly from **Photovoltaic** (PV) or indirectly using **Concentrated Solar Power** (CSP), this course places an emphasis on PV. PV generation system consists of solar panels, controllers, and storage batteries, and it generates electric power from photovoltaic energy. Since the technology is relatively simple to handle, photovoltaic generation is widely prevailing.

On the other hand, problems related to inadequate installment, maintenance and management are growing, thus it is important that government and related institutions provide sufficient guidance.

Japanese resources depend heavily on imports and the nation has been making efforts to develop alternative energy. Japan started the development of renewable energy a quarter of century ago and it has now become one of the world leaders in the field of PV generation through collaborations between industry, government and academia.

Based on Japanese PV generation technology, this program offers a place of mutual study among participants engaged in electrification based mainly on PV generation.

For what?

This program aims at learning necessary knowledge technologies, and policies to adequately introduce, promote, maintain and manage PV generation for the effective use of solar energy, especially local grid system and local or national grid connected system for power source diversity.

For whom?

This program is intended for officials who develop and manage PV generation projects at central/rural governmental organization and electric power generation public corporation.

How?

Participants will have the opportunity to attend lectures, participate in experiments, practical training, visits to and training at private enterprises, discussions and presentations on the technology of photovoltaic generation, storage, control, electricity consumption, etc. In this program, not only will participants learn Japanese technology in this field, but learn from each other's experiences. Through these activities, participants will acquire systematic technologies for photovoltaic generation as well as an understanding of the prospects and issues concerning the effective use of photovoltaic energy in ones' own countries.

II. Description

1. Title (J-No.):

Renewable Energy in Grid -Mainly on Photovoltaic- (A) (J1804017)

2. Course Period in Japan

From June 26, 2018 to August 8, 2018

3. Target Countries: 9 countries

Afghanistan, Algeria, Bangladesh, Brazil, Egypt, Georgia, Myanmar, Sri Lanka, Uzbekistan

4. Eligible / Target Organization

This program is intended for Energy policy departments or the Power Authority of the central and local government in charge of introduction, promotion, maintenance and management of PV generation.

5. Course Capacity (Upper limit of Participants):

10 participants

6. Language to be used in this program:

English

7. Overall Goal

Photovoltaic generation will be adequately introduced, promoted, maintained and managed for the effective use of solar energy.

8. Course Objective

Participants will be able to understand the theory and practice of photovoltaic generation and apply them to business for the introduction, promotion, maintenance and management of photovoltaic generation systems.

9. Expected Module Output and Contents:

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

Objective	Subject	Contents	Methodology
To be able to explain basics of PV generation technology	Part I PV generation technology	(1) Outline of photovoltaic generation technology (2) Current situation and issues of PV generation systems in developing countries (3) Four key points for sustainable PV generation systems (4) Sunlight & generation quantities calculation (5) Fundamentals of renewable energy technology (6) Maintenance for PV array & system (7) Maintenance technology of lead storage battery (8) PV system designing (9) Verification test results in mega solar project (10) Visit to Large scale Mega sola generation plant	Lectures, Field Study
To be able to explain grid system technology	Part II Power system technology	(11) Basics of grid & grid connection (12) Outlines of Japanese grid-interconnection code (13) Practice for understanding power grid (14) Countermeasure for a large amount of installation of solar photovoltaic (15) Design for PV storage system (16) Design for grid with renewable energy (17) Example of micro grid projects (18) Visit to <ul style="list-style-type: none"> •Akagi Laboratory for Grid of Central Research Institute of Electric Power Industry •NAS Battery •Local power control center •Demonstration system for voltage management equipment 	Lectures, Practice, Field Study
To be able to explain policy and operation of renewable energy, especially photovoltaic generation	Part III Japan's policy & measures on renewable energy	(19) Renewable energy policy in Japan (20) Policy for PV generation spread (21) Spread & sustainability of the PV system (22) Certification of equipment for PV system (23) Conditions for spread of PV generation & policy planning (24) PV generation spread activities & the training system for Installers (25) Construction quality management of PV system (26) Community energy development (27) Approaches to renewable energy by KEPCO (28) Visit to <ul style="list-style-type: none"> •Japan Electrical Safety & Environment Technology Laboratories (JET) •Japan Photovoltaic Energy Association (JPEA) 	Lectures, Practice, Field Study
To be able to make action plan and improve skills of policy planning	Part IV Practical training to draw up an action plan	(29) Presentation of job report (30) Guidance on recognition of issues (31) Review of lecture contents (32) Preparation of action plan (33) Presentation of action plan	Lectures, Practice

III. Conditions and Procedures for Application

1. Expectations from the Participating Organizations

- (1) This program is designed primarily for organizations that intend to address specific issues or problems identified in their operation. Participating organizations are expected to use the project for those specific purposes.
- (2) This program is enriched with contents and facilitation schemes specially developed in collaboration with relevant prominent organizations in Japan. These special features enable the project to meet specific requirements of applying organizations and effectively facilitate them toward solutions for the issues and problems.
- (3) Participating organizations are expected to make the best use of the results achieved by their participants in Japan by carrying out the activities of the Finalization Phase described in section II -9.

2. Nominee Qualifications

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

(1) Essential Qualifications

- 1) Current Duties: being in charge of policy for renewable energy-related central or local government, administrative organization, electric power generation public cooperation.
- 2) Engineering officers who are engaged in renewable energy related work for 2 years or more and plan to continuously work after the completion of the training course.
- 3) Education Background: be a graduate of university or equivalent level, must have a background of engineering.
- 4) Language: have a competent command of spoken and written English which is equal to TOEFL iBT 100 or more (This workshop includes active participation in discussions, which requires high competence of English ability. Please attach an official certificate for English ability such as TOEFL, TOEIC, etc, if possible).
- 5) Health: must be in good health, both physically and mentally, to participate in the Program in Japan. Pregnant applicants are not recommended to apply due to the potential risk of health and life issues of mother and fetus.

*Please note that this training course includes site visits, therefore a lot of physical exercises will be required.

(2) Recommendable Qualifications

- 1) Expectations for the participants: preferably be in relation with past or on-going JICA projects targeting energy efficiency and conservation.
- 2) Age: be between the ages of thirty (30) and fifty (50) years old.

3. Required Documents for Application

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

(2) **Job Report and Issue Analysis Sheet (IAS) (ANNEX I & III)**

- To be submitted with application form. Job Report and IAS are necessary documents for screening of applicants.
- Each participant will be required to present IAS in approx. 10 minutes in an early stage of the course. Visual materials such as PowerPoint and pictures may be helpful for your presentation if you bring them.
- When you use PowerPoint, it is preferable to use letters more than 24-point and not to use pictures on the background.
- **An applicant should submit an IAS with approval of his/her superior and an IAS without approval of an applicant's superior is not accepted.**
- The purpose of an IAS is to logically organize relationships between challenges of an applicant's organization and contents of fields to be covered in a training course.
- The sheet is to be utilized as a logical process control sheet to draw on improvement plans for challenges by filling out the sheet in phase from prior to a participant's arrival in Japan through the end of training.
- **Participants accepted to the course are requested to bring this IAS in electronic file when coming to Japan.**

(3) **Photocopy of passport:**

To be submitted with the application form, if you possess your passport which you will carry when entering Japan for this program. If not, you are requested to submit its photocopy as soon as you obtain it.

*Photocopy should include the followings:

Name, Date of birth, Nationality, Sex, Passport number and Expire date.

(4) **Nominee's English Score Sheet:**

To be submitted with the application form, if you have any official documentation of English ability. (e.g., TOEFL, TOEIC, IELTS)

4. Procedure for Application and Selection

(1) **Submitting the Application Documents**

Closing date for applications: **Please inquire to the JICA office (or the Embassy of Japan.)**

(After receiving applications, the JICA office (or the Embassy of Japan) will send them to **the JICA Center in JAPAN by April 26, 2018.**)

(2) Selection

After receiving the documents through proper channels from your government, the JICA office (or the embassy of Japan) will conduct screenings, and then forward the documents to the JICA Center in Japan. Selection will be made by the JICA Center in consultation with concerned organizations in Japan. The applying organization with the best intention to utilize the opportunity of this program will be highly valued in the selection.

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

(3) Notice of Acceptance

Notification of results will be made by the JICA office (or the Embassy of Japan) **not later than May 24, 2018**.

5. Conditions for Attendance

- (1) To strictly adhere to the program schedule.
- (2) Not to change the program topics.
- (3) Not to extend the period of stay in Japan.
- (4) Not to be accompanied by family members during the program.
- (5) To return to home countries at the end of the program in accordance with the travel schedule designated by JICA.
- (6) To refrain from engaging in any political activities, or any form of employment for profit or gain.
- (7) To observe Japanese laws and ordinances. If there is any violation of said laws and ordinances, participants may be required to return part or all of the training expenditure depending on the severity of said violation.
- (8) To observe the rules and regulations of the accommodation and not to change the accommodation designated by JICA.

IV. Administrative Arrangements

1. Organizer

(1) **Name:** JICA Kyushu International Center

(2) **Contact:** kictp@jica.go.jp

2. Implementing Partner

(1) **Name:** Kitakyushu International Techno-Cooperative Association (KITA)

(2) **URL:** http://www.kita.or.jp/english/e_index.html

3. Travel to Japan

(1) **Air Ticket:** The cost of a round-trip ticket between an international airport designated by JICA and Japan will be borne by JICA.

(2) **Travel Insurance:** Coverage is from time of arrival up to departure in Japan. Thus traveling time outside Japan will not be covered.

4. Accommodation in Japan

JICA will arrange the following accommodations for the participants in Japan:

JICA Kyushu International Center (JICA KYUSHU)
Address: 2-2-1, Hirano, Yahata-Higashiku, Kitakyushu-shi, Fukuoka 805-8505,
JAPAN
TEL: 81-93-671-6311 FAX: 81-93-671-0979
(where "81" is the country code for Japan, and "93" is the local area code)

If there is no vacancy at JICA KYUSHU, JICA will arrange alternative accommodations for the participants. Please refer to facility guide of JICA KYUSHU at its URL, <http://www.jica.go.jp/english/contact/domestic/>

5. Expenses

The following expenses will be provided for the participants by JICA:

- (1) Allowances for accommodation, living expenses, outfit and shipping
- (2) Expenses for study tours (basically in the form of train tickets)
- (3) Free medical care for participants who become ill after arriving in Japan (costs related to pre-existing illness, pregnancy or dental treatment are not included)
- (4) Expenses for program implementation, including materials

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.

6. Pre-departure Orientation

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

V. Other Information

The participants are kindly requested to bring their laptop computer and USB flash memory with them for making reports.

VI. ANNEX

- I. Job Report
- II. Issue Analysis Sheet (IAS) Guidelines
- III. Issue Analysis Sheet
- IV. Sample Training Schedule (for reference)

ANNEX I

Name of Training Course	RENEWABLE ENERGY IN GRID -MAINLY ON PHOTOVOLTAIC- (A)
Name of Applicant	
Name of Country	

Job Report

Remarks 1: The Report should be typewritten in English (12-point font, A4 size paper), and total pages of the report should be limited to 3 pages (not including organization chart).

Remarks 2: Each participant will have a meeting with course leader based on this Job Report and IAS at the early stage of the training in order to make training more effective and fruitful by comprehending each participant's situations and problems.

Remarks 3: Please itemize your answer and make them specific.

1. 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), Coke charge (for 350 ml can)
- Enactment & enforcement situation of renewable energy law &/or regulation

2. 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) Problems in your job

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

(1) Your purpose of participating in this course

- (2) Subjects of the course which you are interested in the most
- (3) How do you expect to apply skills and knowledge that you will gain through the module (refer to Annex III) to tackle problems in your home country?
- (4) Other matters which you are expecting to obtain from the course

4. Have you ever learned the following subjects in your work? We want to know your work experience. Please check either “Yes” or “No”.

If your answer is "Yes", please fill out the number of years you have engaged in the respective work under the item “Years”.

	Yes	No	Years
1) Energy policy, law, or regulation	()	()	()
2) Renewable energy without PV generation (()	()	()
3) PV system promotional activities	()	()	()
4) Installation of PV generation facilities.....	()	()	()
5) Electrical power network system and/or micro-grid	()	()	()
6) Others (), Years (()

If you check “6) Others”, please specify subject associated with solar power technology, not covered in items “1)” to “5)”.

Issue Analysis Sheet (IAS) Guidelines

1. What is IAS?

- (1) IAS is a tool to logically organize relationships between issues and contents of the training program in Japan.
- (2) IAS will help the nominee to clarify his/her challenges to be covered in each expected module output and to formulate solutions to them.
- (3) The sheet is to be utilized as a logical process control sheet to draw up improvement plans for the issues by filling out the sheet in phases from prior to the nominee's arrival through to the end of the training.
- (4) In addition, it is used for the course leader and lecturers to understand the issues that each participant is confronting, and provide him/her with technical advice, useful references and solutions through the training program in Japan.

2. How to fill out IAS?

- (1) Please describe the issues you (your organization) confront in column “ **【A】 : Issues that you (your organization) confront** ”.
* Prepare the separate rows for each problem; if necessary, please add new rows.
- (2) In column “ **【B】 : Actions that you (your organization) are (is) taking** ”, please describe actions that you (your organization) are taking to solve the issues shown in **Column 【A】** .
This information is very important to carry out the training course and also to make Action Plan as a fruit of the training.
- (3) It's not necessary to fill in column “ **【 I 】 : Task or the information that I need** ”, column “ **【 II 】 : Useful information that I obtained/found** ” and column “ **【 III 】 : Lecturer** ”. These columns shall be filled out during the training.
- (4) “**Column 【 I 】** ” shall be clarified and filled out in the subject “**Task extraction using IAS**” implemented at the earlier time in the training.
- (5) “**Column 【 II 】** ” and “**Column 【 III 】** ” shall be filled out during the training and you are required to present completed IAS in the subject “**Action Plan Presentation**”.

Issue Analysis Sheet (IAS)

Country _____ Name _____

No.	【A】Issues that you (your organization) confront(s).	【B】 Actions that you (your organization) are (is) taking.	
1			
	【 I 】 Task or The information that I need.	【 II 】 Useful information that I obtained /found.	【 III 】 Lecturer

No.	【A】Issues that you (your organization) confront(s).	【B】 Actions that you (your organization) are (is) taking.	
2			
	【 I 】 Task or The information that I need.	【 II 】 Useful information that I obtained /found.	【 III 】 Lecturer

No.	【A】Issues that you (your organization) confront(s).	【B】 Actions that you (your organization) are (is) taking.	
3			
	【 I 】 Task or The information that I need.	【 II 】 Useful information that I obtained /found.	【 III 】 Lecturer

【 I 】,【 II 】,【 III 】 These columns will be filled during the training course.

ANNEX IV**Sample Training Schedule**

*The schedule is subject to changes.

Days	Morning (9:30-12:30)	Afternoon (13:30-16:30)
1 Tue		Arrival to JICA Kyushu Center
2 Wed	9:40-12:30 JICA Briefing	14:00-16:00 Program Orientation
3 Thu	9:50- 11:40 General Orientation (Politics, Administration)	13:30 - 15:10 General Orientation(Economy)
4 Fri	8:50-12:15 Exchange program	13:30-16:30 Course orientation
5 Sat	8:30 -13:15 JICA Bus Tour	
6 Sun		
7 Mon	Fundamentals of Renewable Energy	Outline on PV Generation
8 Tue	Outline on PV Generation Technology	Visit : Kitakyushu Environment Museum
9 Wed	Policy for PV Generation Spread	Selection of Tasks by IAS (Issue Analysis Sheet)
10 Thu	PV Promotion & Policy Making	Examples of PV Promotion Activies in Developing Countries
11 Fri	Basics of Grid & Grid Interconnection	Job Report Presentation
12 Sat		
13 Sun		
14 Mon	Calculation of Solar Radiation & Power Quantities	Approaches to Renewable Energy by KEPCO 16:30 - 17:30 Review
15 Tue	Maintenance of Lead Storage Battery	Design for Power Storage System
16 Wed	Practice (Understanding Power Grid & Calculation of solar radiation & power quantities)	Practice (Understanding Power Grid & Calculation of solar radiation & power quantities)
17 Thu	Basics of Grid & Grid Interconnection 2	Calculation of Solar Radiation & PowerQuantities
18 Fri	9:00 - 12:00 Calculation of Solar Radiation & Power Quantities	Visit : Mega Sola Power plant
19 Sat		
20 Sun		
21 Mon	Maintenance for PV Array & System	Maintenance for PV Array & System
22 Tue	Guidance on Action Plan	Summary of PV Technologies 16:30 - 17:00 Review
23 Wed	Kitakyushu ⇒ Tokyo ⇒ Maebashi	
24 Thu	Outlines of Japanese Grid-Interconnection Code	Outlines of Japanese Grid-Interconnection Code
25 Fri	Design of PV system	Exercise on PV system Design
26 Sat		
27 Sun		
28 Mon	Present Situation & Issues on PV Technoligies in Developing Countries	Main Points for Sustainable PV System
29 Tue	Grid Control in Central Distribution Command Center & Grid Interconnection of PV	Construction Engineer Training System
30 Wed	Construction Quality Management of PV System	Verification Test Results in Mega Solar Project 16:30 - 17:00 Review
31 Thu	Tokyo Morning Bus Tour	
32 Fri	PV Power Generation & Promotion in the world	Certification of Equipment for PV System
33 Sat	Example of Micro Grid Systems Introduction	Tokyo ⇒ Kitkyushu
34 Sun		
35 Mon	PV System Economical Analysis	Visit : NAS Battery
36 Tue	Practice on Grid Optimization including RE	Guidance on Action Plan
37 Wed	Summary on PV Grid Interconnection	Guidance on Action Plan
38 Thu	Issues and Countermeasures on PV Grid Interconnection	Visit :Eco Town
39 Fri	Summary on PV Power Generation	Examples of PV System Introduction
40 Thu	10:00-11:30 Evaluation Meeting	Action Plan Presentation Closing Ceremony & Farewell Party
41 Fri	Departure from Japan	

For Your Reference

JICA and Capacity Development

The key concept underpinning JICA operations since its establishment in 1974 has been the conviction that “capacity development” is central to the socioeconomic development of any country, regardless of the specific operational scheme one may be undertaking, i.e. expert assignments, development projects, development study projects, training programs, JOCV programs, etc.

Within this wide range of programs, Training Programs have long occupied an important place in JICA operations. Conducted in Japan, they provide partner countries with opportunities to acquire practical knowledge accumulated in Japanese society. Participants dispatched by partner countries might find useful knowledge and re-create their own knowledge for enhancement of their own capacity or that of the organization and society to which they belong.

About 460 pre-organized programs 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 are being customized to address the specific needs of different target organizations, 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 was the first non-Western country to successfully modernize its society and industrialize its economy. At the core of this process, which started more than 140 years ago, was the “*adopt and adapt*” concept by which a wide range of appropriate skills and knowledge have been imported from developed countries; these skills and knowledge have been adapted and/or improved using local skills, knowledge and initiatives. They finally became internalized in Japanese society to suit its local needs and conditions.

From engineering technology to production management methods, most of the know-how that has enabled Japan to become what it is today has emanated from this “*adoption and adaptation*” process, which, of course, has been accompanied by countless failures and errors behind the success stories. We presume that such experiences, both successful and unsuccessful, will be useful to our partners who are trying to address the challenges currently faced by developing countries.

However, it is rather challenging to share with our partners this whole body of Japan’s developmental experience. This difficulty has to do, in part, with the challenge of explaining a body of “tacit knowledge,” a type of knowledge that cannot fully be expressed in words or numbers. Adding to this difficulty are the social and cultural systems of Japan that vastly differ from those of other Western industrialized countries, and hence still remain unfamiliar to many partner countries. Simply stated, coming to Japan might be one way of overcoming such a cultural gap.

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.



CORRESPONDENCE

For enquiries and further information, please contact the JICA office or the Embassy of Japan.

Further, address correspondence to:

JICA Kyushu International Center (JICA KYUSHU)

**Address: 2-2-1, Hirano, Yahata Higashiku, Kitakyushu-shi, Fukuoka,
805-8505, Japan**

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