

[Online] Knowledge Co-Creation Program (Group & Region Focus)

General Information on

Power Grid Planning and Operation (A) 課題別研修 電力系統計画・運用技術研修 (A)

JFY 2021

Course No. 202003155J001
Online Course Period: From October 8, 2021 to November 8, 2021

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

Our everyday lives depend on stable power supply, which supports growth in all sectors as well as human and economic development. In some developing countries, the power sector has been developing to meet rapidly growing power demand. However, some countries still have room for improvement in terms of the quality of power supply, which represents stability, efficiency, optimization of power transmission.

For what?

This program aims to support the organizations in their attempt to their quality issues in power transmission. In this course, participants will learn power grid planning, designing, operation and maintenance, through Japan's experience in power transmission, which is regarded as one of the most stable and efficient systems in the world. The course offers lectures and interactive sessions. Participants are expected to build networks through various formats of online discussion.

For whom?

This program is designed for electrical power engineers working in electric power <u>transmission</u> sector of the national grid operators or government-owned power companies. In some countries, non-governmental institutions can be included.

The engineers in charge of technical training in their workplace are also encouraged to participate in the program to disseminate knowledge and transfer skills acquired through this course.

How?

Through self-study and online interactive Q&A sessions, participants shall gain insight to the principle of planning of reliable power transmission network and tips for operational efficiency based on Japan's experience. Participants are expected to formulate an "Action Plan" with ideas to address relevant issues in participants' country.

Sustainable Development Goals (SDGs)

JICA is committed to achieving the SDGs. This program is to contribute to following goals.









II. Description

1. Title (Course No.) Power Grid Planning and Operation (A) 202003155J001

2. Course Period

From October 8, 2021 to November 8, 2021

During the period, online interactive sessions (web conference by Zoom) will be organized 6 times in 2 groups at JST (Japan Standard Time) 13:00 - 16:00 (UTC/GMT 04:00 - 07:00) and JST 16:00 - 21:00 (UTC/GMT 09:00 -12:00) (Tentative).

Tentative Program: Fixed schedule will be shared to the accepted participants with the Notice of Acceptance.

Date	Time	
October, 1 (Fri) 2021	-	Submission & sharing of Inception Report
October, 1 (Fri)	UTC/GMT 03:00-	Downloading & Reading Lecture Materials
October, 8 (Fri)	UTC/GMT 04:00 - 07:00, 09:00 - 12:00	Orientation, Q&A session
October, 11 (Mon)	UTC/GMT 04:00 - 07:00, 09:00 - 12:00	Discussion on Inception Reports
October, 12 (Tue)	UTC/GMT 04:00 - 07:00, 09:00 - 12:00	Q&A session
October, 15 (Fri)	UTC/GMT 04:00 - 07:00, 09:00 - 12:00	Homeroom, Q&A session
October, 20 (Wed)	UTC/GMT 04:00 - 07:00, 09:00 - 12:00	Q&A session
October, 22 (Fri)	UTC/GMT 05:00 - 10:00	Individual Consultation
October, 26 (Tue)		Submission of Action Plan

<Important Note>

In the context of the COVID-19 pandemic, please note that there is a possibility the course period may be changed, shortened, or the course itself cancelled.

3. Target Regions or Countries

Egypt, Guyana, India, Iraq, Jordan, Laos, Nepal, Pakistan, Palestinian Authority, Papua New Guinea, Sri Lanka

4. Eligible / Target Organization

This program is offered to senior electrical engineers working in national grid operators or equivalent governmental organizations in power sector.

5. Capacity (Upper limit of Participants)

13 participants

6. Language

English

7. Objective(s)

- Participants gain knowledge related to power grid system planning and operation.
- Participants formulate an Action Plan to address relevant issues in each country.

8. Overall Goal

Capacity of planning and operation in national power grid is improved in participating organizations.

9. Output and Contents
This course consists of the following components. (Subject to minor change.)

Expected Module Output	Subjects/Agendas	Methodology
To clarify issues and opportunities concerning the power system in home country.	Inception Report preparation, sharing and discussion	✓ Preparing an Inception Report✓ Online discussion
To be able to share the knowledge on the grid system and operation practices in Japan.	Overview of power grid system operation in Japan, including power system reform	✓ Reading Lecture Materials✓ Online Q&A Consultation
To be able to share the knowledge and technology of power system planning.	 (1) System planning (e.g. transition of power system expansion in electric company) (2) Function of engineering department and system operation department. Allocation of roles between utility company and contractor 	✓ Reading Lecture Materials
To be able to share the knowledge and technology of power system operation.	 (1) System reliability (e.g. supply-demand control, voltage regulation, mitigation of cascading blackout, trans-regional operation) (2) Role of power system division and affiliated company in power system operation and maintenance 	✓ Online Q&A Consultation

	(3) Challenges and opportunities on interconnection of renewable energy.	
To be able to share the knowledge and technology of	(1) System reliability (e.g. supply-demand control, voltage regulation, mitigation of cascading blackout, trans-regional operation)	
operation and maintenance for power system	(2) Quality Control of equipment	
equipment.	(3) Quality Control of power transmission facilities	
	(4) Substations	
To formulate Action Plan formulation on planning, designing,	(1) Guidance for creating the Action Plan	✓ Online guidance
operation and maintenance of power system in each home country	(2) Preparation and submission of the Action Plan	✓ Writing an Action Plan✓ Feedback via E-mail

- During this three-week program, you are supposed to:
 - prepare an Inception Report before the commencement of the program;
 - read 12 sets of lecture material;
 - participate in 6 online discussion / Q&A sessions (the length of each session can vary); and
 - develop an Action Plan.

You are responsible for time management. Please make sure that you discuss this with your supervisor in your organization so that you have enough time to focus on your course work.

 Participants who have successfully completed the program will be awarded a certificate by JICA.

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 program is enriched with contents and facilitation schemes specially developed in collaboration with relevant prominent organizations in Japan. These special features enable the program 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

- Current Duties: Engineers in national grid operators or relevant governmental organizations in charge of planning and designing of transmission and substation equipment.
- 2) Experience in the relevant field: Have <u>at least 5 years of experience</u> in the field of power transmission.
- 3) Educational Background: Graduates of engineering faculty of university or equivalent.
- 4) Language: Smooth communication in English.
- 5) Technical Requirements for the Online Course (Computer)

Technology Proficiency:

- -Basic computer skills such as sending/receiving email with attachments, and using a web browser.
- -Online course may be delivered using the services including web conferences (Zoom), Cloud Storage and You Tube.
- *JICA's technical support and online tutorials are limited. The ability to be self-directed in learning new technology skills is required.

Internet Connection:

- -High speed broadband connection (at least 2Mbps).
- * Internet connection charges incurred for your program participation shall be borne by you/your organization.

Hardware (minimum requirements):

- Regular access to a computer, either at home or in your office.

- Operating System: Windows or Mac OS (an updated version of OS is preferred).
- -Processor: Intel Core 2 Duo or higher; 2GHz or higher
- Memory: 4GB of RAM or higher
- Hard Drive Space: 5GB free disk space
- Browser: Google Chrome is preferred browser. (Edge, Firefox, Safari can be used)
- Others: Webcam microphone, and audio output device (speaker or headset)

Software (which may be required):

- -Zoom Client for Meeting (https://zoom.us/download)
- *If you are using your office computer and use of Zoom is not authorized by your IT administrator, please notify JICA at the time of application.
- 6) Health: must be in good health to participate in the program.
- 7) Attendance Requirement: Participation in the program and submission of reports are essential requirements for the completion of the course.

(2) Recommended Qualifications

- 1) Age: Between the ages of thirty (30) and fifty (50) years
- 2) Gender Consideration: JICA promotes 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)
- **(2) Photocopy of Passport or ID**: The photocopy should include name, date of birth, nationality, sex, ID number and Expire date.
- (3) English Score Sheet (Photocopy): To be submitted with the Application Form, if the nominees have any official English examination scores. (e.g., TOEFL, TOEIC, IELTS)
- **(4) Country Report** (V. ANNEX): To be submitted with the Application Form. Typewritten in English in double spacing (about 6 to 9 pages of A-4 size). The latest annual report published by the applicant's organization should also be attached, only if and when available in English.
 - * Note: Applicants are strongly expected to typewrite the documents. There are many applications disqualified from the selection because of the illegible letter

in those documents.

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 **September 15**, **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 September 24, 2021.

5. Additional Document(s) to be submitted by Accepted Participants

(1) Inception Report -- to be submitted by October 1, 2021.

Before the commencement of this course, accepted participants are required to prepare an Inception Report. Detailed information is provided in the VI. ANNEX "Inception Report". The report should be uploaded to a designated folder on GIGAPOD of JICA Kansai Center by October 1, 2021. The URL of the GIGAPOD will be notified with acceptance notice.

The report should be prepared using the Microsoft Power Point (PPT) and include the following information. You will not be requested to present your report during the course, so your report needs to be self-explanatory. To this end, please make sure that you supplement the contents with additional information using the note function.

- 1) Key Statistical profiles of your country
- 2) The organization of the electric power sector and role of your organization and the

- nature of your duty
- 3) Current situation of electric power and transmission facilities (a summary the information presented in your Country Report)
- 4) Current issues identified in electric power transmission in your country and the analysis of the possible causes
- 5) What you wish to gain from this program
- **(2) Action Plan:** Participants are expected to submit an Action Plan towards the end of the program. The guidance on how to develop an Action Plan will be organized during the program. Upon submission, the lecturers will provide feedback on your Action Plan for further improvement.

6. Conditions for Participation

The participants of KCCP are required

- (1) to strictly observe the course schedule
- (2) not to change the program topics
- (3) not to record or share the online contents without JICA's permission

IV. Administrative Arrangements

1. Organizer (JICA Center in Japan)

JICA Kansai Center (JICA Kansai)
Program Officer
Ms. Ol Yoshiko (Oi.Yoshiko@jica.go.jp)



Logistic Officer

Ms. KONO Yukiko (Kono.Yukiko@jica.go.jp)



2. Implementing Partner

 Japan Electric Power Information Center (JEPIC) https://www.jepic.or.jp/en/

Mr. TAKAHASHI Hideo Deputy Director, Electric Power Cooperation Department



 Kansai Electric Power Co., Inc.(KEPCO) <u>https://www.kepco.co.jp/english/</u>

Mr. INOUE Akira, Lecturer Kansai Transmission and Distribution Inc. Kansai Electric Power Group



Mr. MATSUSHITA Kazunori, Lecturer Kansai Electric Power Co. Ltd. International Business and Cooperation Division



Ms. SEKIODA Akari, Lecturer Kansai Electric Power Co. Ltd. International Business and Cooperation Division



V. Annex

Country:

Country Report Information and Data on Basic Energy and Power of your Country

<u>All applicants</u> are expected to fill the form and submit it <u>with the Application</u> <u>Form</u> to JICA office in your country.

-		
Name:		
1. Utility		
(a) Major Electric Pov	ver Utilities (Public or Private)	
(b) System of Electric	: Power Utilities	
Situation of dereg	<u>ulation</u>	
Situation of unbur	ndling the transmission and distrib	ution sectors
2. Availability of Ene	rgy Resources	
(a) Reserve of fossil e	energy (if endowed) in Year 20??	(Specify the year of data)
Fossil Energy	Estimated Amount of Reserve	Unit
Coal		Ton
Oil		Barrel
Natural Gas		m³

Estimated Amount of Potential

Unit

Ton or m³

MW

(b) Potential of Renewable Energy

Forms of Renewable Energy

Biomass in Year 20??

(Specify the year of data) Hydropower in Year 20??

(Specify the year of data)

	e Energy	Annuai Ave	erage Irradiation	Unit
Photovoltaic				kWh/m²/day
		Annual Averaç	ge Wind Speed wi	th
Form of Renewable	e Energy	Specific	Site Names	Unit
		(Please	select several	
		represe	ntative sites)	
Wind Pow	er			meter/Second
3. Annual Product	ion of Fossi	I Energy (if pro	duced)	
Annual Product Forms of Fossil	1	I Energy (if pro	duced) Year of	Unit
	Amou		,	Unit
Forms of Fossil	Amou	nt of Annual	Year of	Unit Ton
Forms of Fossil Energy	Amou	nt of Annual	Year of	

of data)

Unit: Joule or specify unit

	Forms of Energy	Primary Energy Supplied	Percentage
Fossil	Coal		
Energy	Oil		
	Natural Gas		
	Sub-Total		
	Hydro		

¹ Primary energy is the energy that exists in nature without processing for or converting to secondary energy. Primary energy can be divided into three categories, fossil energy, natural energy and nuclear energy. Primary energy supply is the total amount of energy supplied to a nation.

Natural Energy	Biomass	
	Solar	
	Wind	
	Geothermal	
	Sub-Total	
	Nuclear	
	Total	100 %

5. Final Energy Consumption² by Sectors in Year 20?? (Specify the year of data)

Unit: Joule or specify unit

Sectors	Final Energy Consumption	Percentage
Industry Sector		
Social and Household Sector		
Transportation Sector		
Total		100 %

6. Installed Capacity of Power Generation Facilities (National Grid Connected) in a year of 20?? (Specify the year)

² Final energy consumption is a total amount of energy actuary consumed by the industry sector, the social and household sector, and the transportation sector in a nation as the form of primary energy, or the form of secondary energy that was converted or processed from primary energy. Secondary energy includes petroleum products such as petrol and kerosene, and electricity generated by thermal power.

Generation Facilities	Installed Capacity (MW or kW)	Share (%)
Hydropower ³ in Total		
Conventional Hydropower over 10 MW		
Small Hydropower between 10 MW and 1 MW		
Mini Hydropower between 999 kW and 100 kW		
Micro Hydropower less than 99kW		
Thermal Power in Total		
Diesel Power		
Coal fired Steam Turbine		
Oil fired Steam Turbine		
Gas fired Steam Turbine		
Gas Turbine (Single Cycle)		
Gas Turbine (Combined Cycle)		
Denovelle France constitution business in Tatal		
Renewable Energy except for hydropower in Total		
Grid connected Photovoltaic Systems		
Grid connected Wind Power		
Grid connected Biomass Generation		
Other forms of grid connected renewable energy (Please specify)		
Overall Total		

Generating Capacity per Capita (kW/Capita)	
--	--

7. Electricity Generated by Grid Connected Generation Facilities in Year 20?? (Specify the year of data)

Generation Facilities	Electricity Generated (MWh)	Share (%)
Hydropower		
Thermal Power		
Renewable Energy except for		
Hydropower		
Total		100 %

8. Electricity Consumed by Sectors in Year 20?? (Specify the year of data)

³ Different countries use different definition to categorize hydropower. If your county has its own definition, you can use it and specify the definition in the table.

Sectors	Electricity Consumed	Percentage
	(MWh)	(%)
General Household		
Commercial		
Industry		
Agriculture		
Government		
Total		100 %

- 9. Structure of Power System Supervision and Control
- (a) Frequency Control

Centralized Operation at CLDC (Central Load Dispatching Center) or Not?

(b) Power System Control

Supervised voltage level and Control center supervising

- (c) Manufacturer of SCADA System
- 10. Combined Power System Losses in Year 20?? (Specify the year of data)

(A) Annual Total Electricity generated at generation end by	
all Power Stations on National Grid	MWh
(B) Annual Total Electricity sent out to National Grid	
	MWh
(C) Annual Total Electricity consumed by all Power Stations	
[Power Station Own Use] $(A) - (B) = (C)$	MWh
Power Station own use Rate (C) / (A) X 100	
	%
(D) Annual Total Electricity sold	
	N 4\ A / I=
	MWh
(E) Annual Total of Transmission and Distribution Loss	IVIVVN
(E) Annual Total of Transmission and Distribution Loss [Transmission & Distribution Loss] (B) $-$ (D) = (E)	MWh

(a) Classification of Voltage for Interconnection (Transmission and Distribution)

(b) Transmission Line Route Length (km)

200kV or over	
Under	
total	

(c) Distribution Line Route Length (km)

High Voltage	
Low Voltage	
total	

12. Household Electrification Rate

National Average of Household Electrification Rate (=Connected Households / Total Number of Households)	%
Rural Electrification Rate (=Connected Households in Rural Area / Total Number of Households in Rural Area)	%
Urban Electrification Rate (=Connected Households in Urban Area / Total Number of Households in Urban Area)	%

VI. ANNEX:

Inception Report

<u>Accepted participants</u> are requested to prepare an Inception Report, referring to the following format (Microsoft Power Point) as an example.

- > Detailed explanation for each slide should be written on the NOTE of PPT.
- ➤ The Report should be uploaded to dedicated GIGAPOD of JICA Kansai Center by October 1, 2021. The URL of the GIGAPOD will be notified with acceptance notice.
- ➤ Online discussion (Zoom) will be organized on October 11, 2021, in order to discuss the issues of each country.



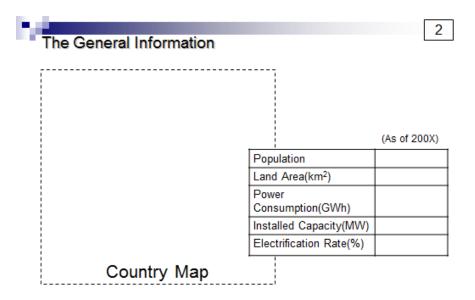
Part 1 Country Report

[Format] Presentation time :20min (including Q&A)

◇Country Report
P1-5 :General Information (Power condition)
P6-9:Transmission condition

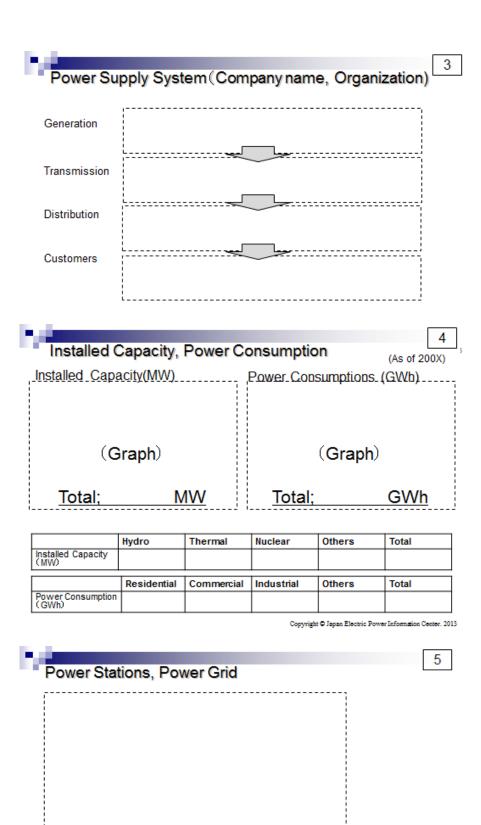
◇Issue Analysis Report
P10-14: Facing issues and analysis of the causes
P15:Expectation for this training course

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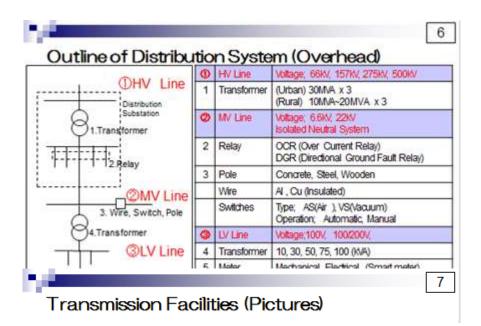
Source: Google Map

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Grid Map



Equipment	Number	
Tower		units
Circuit Length	000kV	circuit-km
Lengin	000 kV	circuit-km
	000 kV	circuit-km
Transformer	000 kV	MVA
	000kV	MVA
	000kV	MVA

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Transmission Loss

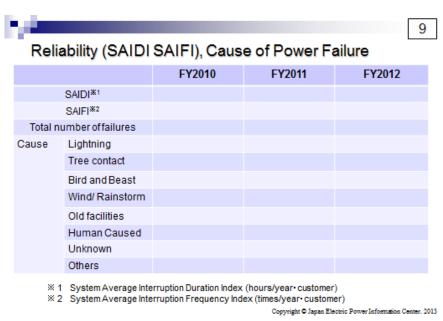
(1) Historical Data

Year	FY2007	FY2008	FY2009	FY2010	FY2011
Distribution Loss (%)					

(2)Detail of Loss

Technical approx. %
Non Technical approx. %

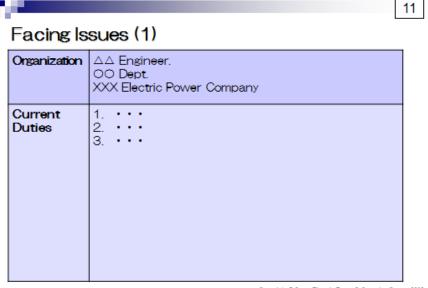
(3)Measure for Loss Reduction



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Part 2 Issue Analysis Report

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<u>Issue</u>	
<u>Causes</u>	1.
	2.
	3.
Countermeasure	1.
	2.
	4.

Facing Issue (2)

<u>Issue</u>	
<u>Causes</u>	1.
	2.
	3.
Countermeasure	1.
	2.

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Expectation for this Training Course

Topic	Detail
	Topic

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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 developing countries; the other is domestic cooperation by inviting participants from partner countries to Japan. The latter method is the Knowledge Co-Creation Program, formerly called a 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 the 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 enquiries and further information, please contact the JICA overseas office or the Embassy of Japan. Further, address correspondence to:

JICA Kansai Center (JICA Kansai)

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