Online

Knowledge Co-Creation Program (Group and Region Focus)

Stabilizing Power Systems to Introduce Various Kinds of Renewable Energy (B)

Course Period:

August 23- September 3, 2021

課題別研修「多様な再生可能エネルギー導入時の系統安定化（B）」／JICA北陸

How do you introduce renewable energy to your country?

Gain insight to an essence of
impact of variable renewable energy (VRE)
on the stability of the power system
and
the specific measures
to stabilize the power system
more practical, more interactive,
more inspirational
from the experiences of Japan.

Outline

This program is designed for the engineers of leading organizations in charge of electric power system to learn about the impact of variable renewable energy (VRE) on the stability of the power system and the specific measures to stabilize the power system.

The sessions will be held online and will include self-study and discussion with web conference.

All sessions are carried out in English.

The period of the program is from August 23 to September 3, 2021.

Course Capacity:

9 participants

JICA Knowledge Co-Creation Program (KCCP)

The Japanese Cabinet released the Development Cooperation Charter in February 2015, stated 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 foundation of mutual learning process.

Table of Contents

For What?

Background

Recently, against the backdrop of global initiative to limit carbon emissions and as a result of dramatic decline in costs of variable renewable energy (VRE), many countries are accelerating to introduce VRE. However, it is not easy for the electric power system to be ready for accommodating large amounts of VRE. This program will show the impact of VRE on the stability of the power system and the specific measures to stabilize the power system.

Objectives

Participants obtain skills and knowledge on planning and designing the electric power system to stably accommodate large amounts of VRE based on the understanding of the characteristics and challenges of VRE and electric power system in each country.

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To Whom?

Job Areas and Organizations

This program is designed for the Engineers in charge of planning / designing electric power system (e.g. transmission and substation facilities) of leading organizations in charge of electric power system.

The applying organization with the best intention to utilize the opportunity of this program will be highly valued in the selection.

Targeted Countries

[Group A]
Laos, Samoa, Sri Lanka, Thailand, Vietnam

[Group B]
Brazil, Jamaica, Serbia

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

When?

Online Program Period

From August 23
to September 3, 2021

You are expected to finish “Online Self-Study” before the online program period as shown above. During the program, you will deepen your knowledge through “Online Interactive Q&A Session” and “Lectures” by Japanese lecturers.

Online Q&A Session and Lectures

All participants will be connected via Zoom in following time zones.
[Group A]
- Japan: 0000PM and 0230PM
- Laos : 1000AM and 0030PM
- Myanmar: 0930AM and 0000PM
- Samoa: 0500PM and 0730PM
- Sri Lanka: 0830PM and 1100PM
- Thailand: 1000AM and 0030PM
- Vietnam: 1000AM and 0030PM

[Group B]
- Japan: 0900PM and 1130PM
- Brazil: 0900AM and 1130AM (@Brasilia)
- Jamaica: 0700AM and 0930PM
- Serbia: 0100PM and 0330PM

Where?

This course is carried out totally online, organized by JICA Hokuriku Center. You will receive essential reading materials for your self-study at your office or home. As the online homeroom and Q&A sessions are held to support your learning process, you are required to have a certain IT environment. For detail, see page 13.

How?

How to Learn

- Online Self-Study
- Online Interactive Q&A Session
- Lectures
- Workshops
- Discussions
- Presentations

Language

English

Commitment to the SDGs

Program Structure

Expected Module Output	Subjects/Agendas	Methodology
1. Participants are able to understand the impacts and difficulties when various kinds of VRE are massively introduced.	1-1. Policy, institutional arrangements and organization for introducing RE 1-2. Basic technology and equipment for RE power generation system 1-3. Challenges on introducing high penetration VRE	Online Self-Study Online Interactive Q&A Session

2. Participants are able to understand Japan's situation of the electric industry, as well as its experience in introduction of renewable energy and the measures for stabilization of power systems.	2-2. Power system planning and operation 2-3. Challenges on introducing high penetration VRE 2-4. Technical investigation for RE grid-interconnection (Grid Code)	Presentation Lectures Exercise and issue analysis Discussion
3. Participants are able to identify the technology of Battery Energy Storage System (BESS) and hydro (pumped storage) generation as measures for system operation (supply & demand balance, grid operation).	3-1. Power system planning and operation 3-2. Challenges on introducing high penetration VRE	Presentation Lectures Exercise and issue analysis Discussion
4. Participants are able to understand the know-how of power system planning and operation to keep quality and reliability of power supply when various kinds of VRE are massively introduced.	4-1. Technical investigation for RE grid-interconnection (Grid Code) 4-2. Grid stabilization measures for RE interconnection such as mitigation for voltage /frequency fluctuation, excess energy, insufficient grid capacity 4-3. Exercise and issue analysis	Presentation Lectures Exercise and issue analysis Discussion
5. Participants are able to formulate an Action Plan describing measures to share the knowledge acquired during this program.	5-1. Guidance (Online Guidance) 5-2. Presentation of the Action Plan (Online discussion)	Presentation Lectures Exercise and issue analysis Discussion

Program Schedule (Lecture titles are tentative)

Day 1 (Mon., August 23)

- Opening Ceremony / Program orientation
- Q & A Discussion on “Outline of Electric Power Industry in Japan”

Day 2 (Tue., August 24)

- Inception Report Discussion

Day 3 (Wed., August 25)

- Action Plan Guidance

Day 4 (Tue., August 26)

- Q & A discussions on
  - “Outline of Hokuriku Electric Power Transmission & Distribution Co. and Renewable Energy”
  - “Fundamentals of Renewable Energy”
  - “Grid Code and Access Review on Power Distribution System”
  - “Planning & Operation of Power Distribution System”
  - “Issues and Countermeasures on Power Distribution System”

Day5 (Fri., August 27)

- Day for studying materials

Day6 (Mon., August 30)

- Q & A Discussions on
  - “Grid Code and Access Review on Trunk Power System”
  - “Planning of Trunk Power System”
  - “Issues and Countermeasures in Planning on Trunk Power System”

Day7 (Tue., August 31)

- Q & A Discussions on
  - “Operation of Trunk Power System”
  - “Issues and Countermeasures in Operation on Trunk Power System”
  - “Countermeasures against Surplus Power”

Day8 (Wed., September 1)

- Day for making Action Plan Report

Day9 (Thu., September 2)

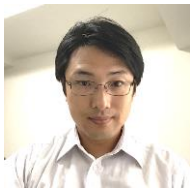
- Exercises of
  - “Access Review Practice”
  - “Power System Analysis”

Day10 (Fri., September 3)

- Action Plan Presentation & Discussion

Implementing Partner

[Course Leader]
Mr. TSURUI Toshihiro
Japan Electric Power Information Center, Inc.
Electric Power Cooperation Dept.



Mr. YAMAGUCHI Takumi
Hokuriku Electric Power Transmission & Distribution Co., Inc.
Corporate Planning Dept.

Mr. Yamaguchi Hiroyuki
Hokuriku Electric Power Transmission & Distribution Co., Inc.
Corporate Planning Dept.

Japan International Cooperation Agency (JICA)

Senior Advisor

Mr. OGAWA Tadayuki

Program Officer

Mr. NAITO Takeshi
Energy and Mining Group, Infrastructure Management Department

Deputy Director

Ms. YAGO Naoko
Hokuriku Center

Staff

Ms. SAKAMOTO Megumi
Hokuriku Center

Eligibility and Procedures

1. Expectations to the Applying Organizations

This course is designed primarily for organizations that intend to address specific issues or problems identified in their operations. Applying organizations are expected to use the program for those specific purposes.

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.

In this connection, applying organizations are expected to nominate the most qualified candidates to address the said issues or problems, carefully referring to the qualifications described in section 2 below.

Applying organizations are also expected to be prepared to make use of knowledge acquired by the nominees for the said purpose.

2. Nominee Qualifications

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

Essential Qualifications

1) Attendance: the training course participants are required to attend Online Q&A Session and Lectures at designated time on page 7.
2) Engineers in charge of planning / designing electric power system (transmission and substation facilities)
3) At least 5 years' working experience in the relevant field

4) Educational Background: be a graduate of university or equivalent
5) Language Proficiency: a competent command of spoken and written English proficiency - active participation in discussions, which requires high competence in English. Please attach an official certificate for English ability such as TOEFL, TOEIC etc, if possible.
6) Technical Requirements:
   a. Technology Proficiency
      - Basic computer skills such as, sending/receiving email with attachments, and using a web browser.
      - Online course is delivered using the following services, Web Conferences (Zoom), Cloud Storage (GIGAPOD), YouTube and other online platforms. Online tutorial and support by JICA will be limited. The ability to be self-directed in learning new technology skills are required.
   b. Internet Connection
      - High Speed Broadband Connection (at least 2Mbps).

      * Internet access charge incurred for this course shall be borne by your organization.
   c. Hardware (Minimum Requirement)
      - Regular access to a computer, either from your home or from your office.
      - Operating System: Windows or Mac OS (Updated version 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)
   d. Software (which may be required)
      - Zoom Client for Meeting (https://zoom.us/download)

      * In case 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.
7) Health: must be in good health to participate in the program.

Recommended Qualifications

Age: between the ages of twenty-five (25) and fifty (50) years

Gender Consideration: JICA promotes gender equality. Women are encouraged to apply for the program.

Difficulties/Disabilities: The participation of person with difficulties/disabilities is welcomed. Reasonable accommodation for persons with difficulties/disabilities will be made. Please write your situation in the Questionnaire on medical status restriction of the Application form. (Japan ratified the Convention on the Rights of Persons with Disabilities in January 2014 and JICA has observed it.)

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 Official ID**: You should submit it with the application form.
*The following information should be included in the photocopy:
Name, Date of Birth, Nationality, Sex, (Passport Number and Expiry Date, in case of passport)

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

(4) **Questionnaire**: to be submitted with the application form. Fill in Annex II of this General Information.

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 July 19, 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 July 30, 2021**.

5. Additional Document(s) to Be Submitted by Accepted Candidates

Inception Report -- to be submitted by August 6, 2021
Accepted candidates are required to prepare an Inception Report (Please read Annex III "Inception Report" for detailed information.) with Microsoft PowerPoint format. The Inception Report should be sent to JICA by August 6, 2021, via GIGAPOD as data storage system.
JICA will inform you of GIGAPOD URL with acceptance notice of your participation to the training course. After you store the data, please email to Ms.YAGO, JICA Program Officer (Yago.Naoko@jica.go.jp), to notify it.

Action Plan -- to be submitted by September 1, 2021 (during the course)
Participants are required to prepare Action Plan and to make presentation at the last day of the course. Detailed information is to be announced during the course.

6. Conditions for Participation

The participants of KCCP are required
(1) to strictly observe the course schedule,
(2) not to change the program topics, and
(3) not to record or share the online training program without permission of JICA.

Administrative Arrangements

1. Organizer (JICA Center in Japan)

(1) **Center**: JICA Hokuriku Center (JICA HOKURIKU)
(2) **Program Officer**: Ms. YAGO Naoko (Yago.Naoko@jica.go.jp)

2. Implementing Partner

(1) **Name: Japan Electric Power Information Center, Inc.**
(2) **URL**: https://www.jepic.or.jp/en/
(3) **Remark**: Japan Electric Power Information Center (JEPIC) is an organization established in 1958 to conduct research and exchange information with electric utilities worldwide, and cooperate with developing countries to help build out their electric power infrastructures.

(1) Name: Hokuriku Electric Power Transmission & Distribution Co., Inc.
(2) **URL**: http://www.rikuden.co.jp/english/
Hokuriku Electric Power Transmission & Distribution Co. is a subsidiary of the above URL company.
(3) **Remark**:Hokuriku Electric Power Transmission & Distribution Co. works to ensure the neutrality and fairness of our power transmission and distribution, delivers a stable electricity, and contributes the development of Hokuriku region in Japan.

3. Reference

*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=v2yU9lSYcTY
Spanish ver.	https://www.youtube.com/watch?v=m7l-WlQSDjI
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 Hokuriku	https://www.jica.go.jp/hokuriku/english/office/index.html

Annex I

Country Report

Basic Information and Data on Energy Situation in Your Country

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

Country: _____

Name: _____

General Information	Population	
	Area	
	Language	
	Major Industries and their shares (%)	
	GNP(most recent year)	
	GDP (most recent year)	
	Major Exporting Products and their shares (%)	
	Major Importing Products and their shares (%)	
Energy Situation	Policy, laws, acts, regulations, tariff, grid code	Regulations for interconnection of RE in the grid system
	Primary Energy Consumption	In total and its breakdown

	Total Installed Capacity of Power Generation, and its breakdown	
	Electricity Tariff by category	
	Fuel unit price	
	Potential of Renewable Energy and status of development	Micro-hydro, wind power, biomass, solar energy, and others
	Renewable energy basic data and information	Amount of monthly irradiation for one year at different geographical areas. Hours of sunshine in a year. 1 Annual wind data. Annual water flow data (if a small hydro power plant is available).
	RE installation	Total capacity and breakdown of RE generation systems. Total capacity and breakdown of private sector, IPP RE facilities. Penetration of RE in terms of installed capacity and generated energy. Average cost of RE installation per kW.
Energy Situation	Situation of RE Industry	(1) Overview of RE products, components market ・ Origin of the products(country), prices. (2) Government subsidy. (3) Amount of companies dedicated to RE installations. (4) Training institutions for RE technology for technicians and engineers
	Pattern of Power Demand on	(1) Power Demand Load Curve on average week day. (2) Power Demand Load Curve on average week end

	National Grid and electrification rate	(3) Electrification Rates (Urban & Rural) (4) Average and Peak load (5) Issues in power generation due to RE penetration
	Disposition of used batteries	Recycling, Reusing, or just left out?
	Financial Assistant Scheme and its delivery system	Micro-Credit and its delivery system, if any; Revolving fund and its delivery system, if any; other schemes, if any.
	Technical and financial assistance by donors	What kind of assistance by which donors?
	People's awareness and knowledge about RE systems	Many people understand what RE systems are, and what does government or other stakeholders do for information spread for RE systems?

Annex II

Questionnaire

1. Internet Environment

(1) Please describe your internet environment at office and home. (Ex. no internet at home, 5GB only at home, etc)

(2) Please also describe your devices on attending on-line course. (Ex. PC at office and/or home).

2. Support of your supervisor

JICA expects your supervisor (boss) at your workplace to support you during this training course and to observe your Action Plan presentation at the last day of the course. **Please secure his/her attendance on the day**.

After the course, JICA also expects you and your supervisor to implement your Action Plan together with your colleagues. JICA will request you and your supervisor to fill in the monitoring sheet for follow-up of your Action Plan one (1) month after the course.

Information of Your Supervisor

Name	
Position	Organization: Department/Division: Position:

Office	Address:	
	TEL:	Mobile (Cell Phone):
	FAX:	E-mail:
Message to JICA		
Signature		

Annex III

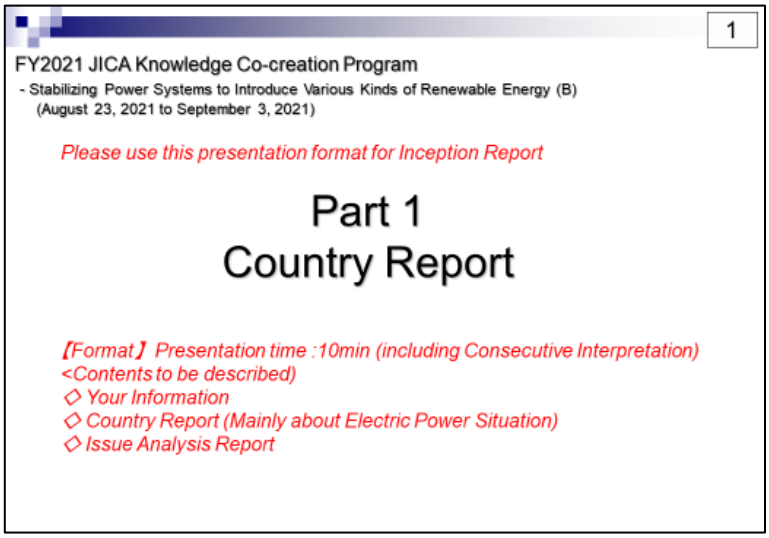
Inception Report

Accepted participants 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 designated GIGAPOD of JICA Hokuriku Center by August 6 2021. The URL of the GIGAPOD will be notified with acceptance notice.

> Online discussion (Zoom) will be organized on August 24th, 2021, in order to discuss the issues of each country.



3 Organization Chart

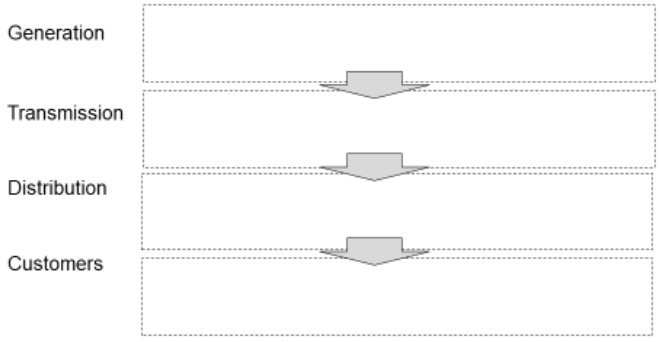
4 The General Information

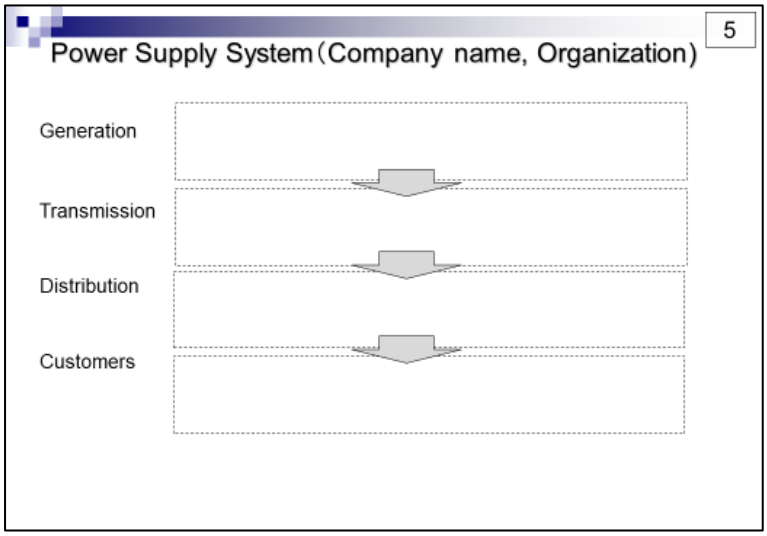
(As of 20XX)

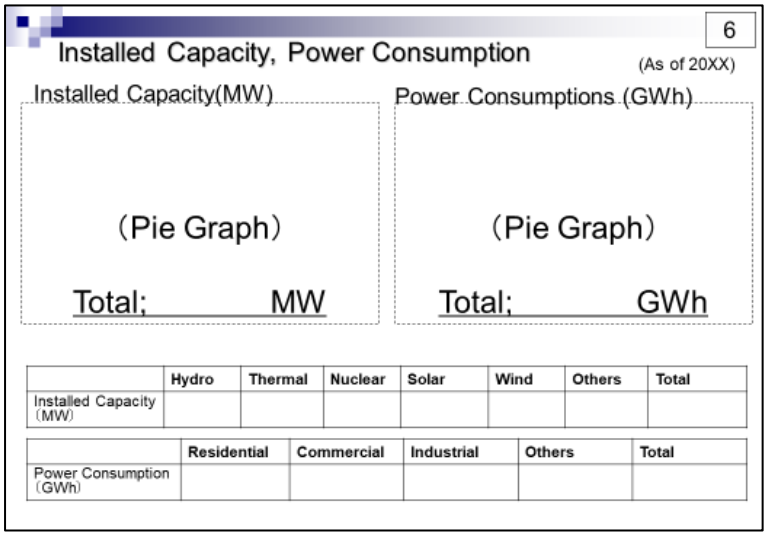
Population	
Land Area(km^2)	
Language	
Political System	
Major Industries and their shares (%)	
GNP	
GDP	
Major Exporting Products and their share (%)	
Major Importing Products and their shares (%)	

Country Map

5 Power Supply System (Company name, Organization)

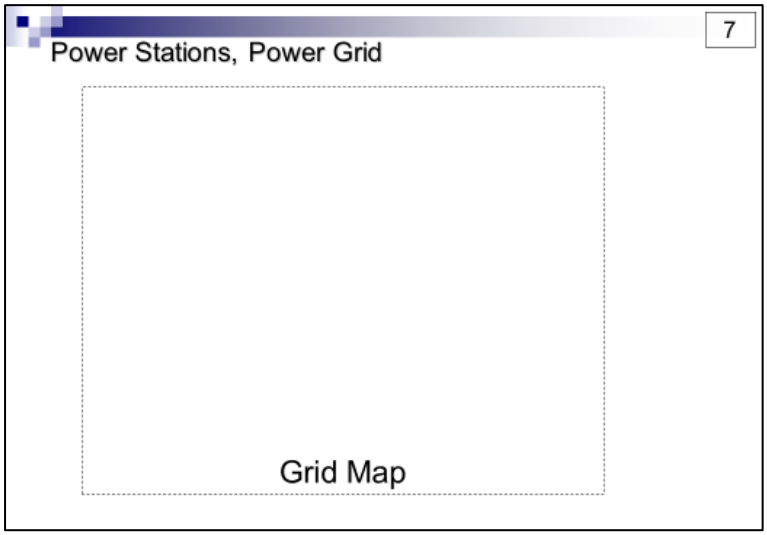




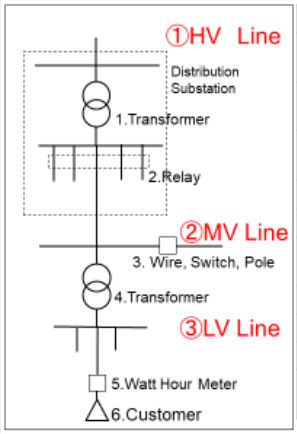


	Hydro	Thermal	Nuclear	Solar	Wind	Others	Total
Installed Capacity (MW)							

	Residential	Commercial	Industrial	Others	Total
Power Consumption (GWh)					



8 Outline of Power System (Overhead)



①	HV Line	Voltage; 66kV, 157kV, 275kV, 500kV
1	Transformer	(Urban) 30MVA x 3 (Rural) 10MVA~20MVA x 3
②	MV Line	Voltage; 6.6kV, 22kV Isolated Neutral System
2	Relay	OCR (Over Current Relay) DGR (Directional Ground Fault Relay)
3	Pole	Concrete, Steel, Wooden
	Wire	Al , Cu (Insulated)
	Switches	Type; AS(Air), VS(Vacuum) Operation; Automatic, Manual
③	LV Line	Voltage;100V, 100/200V,
4	Transformer	10, 30, 50, 75, 100 (kVA)
5	Meter	Mechanical, Electrical, (Smart meter)
6	Supply System	1φ3w 200/100V, 1φ2w 100V, 3φ3w 200V

9 Transmission Facilities (Pictures)

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

10 Distribution Facilities (Pictures)

Equipment	Number	
Pole	units	
Circuit Length	MV	circuit-km
	LV	circuit-km
Transformer	MVA	

11

Transmission & Distribution Loss

(1) Historical Data

Year	FY2016	FY2017	FY2018	FY2019	FY2020
Transmission & Distribution Loss (%)					

(2)Detail of Loss

Technical ‥ approx. %
Non Technical‥‥ approx. %

(3)Measure for Loss Reduction

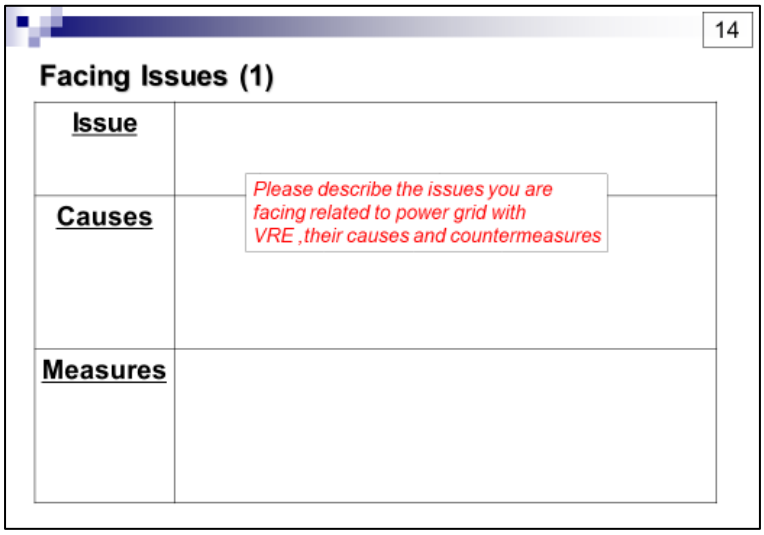
12

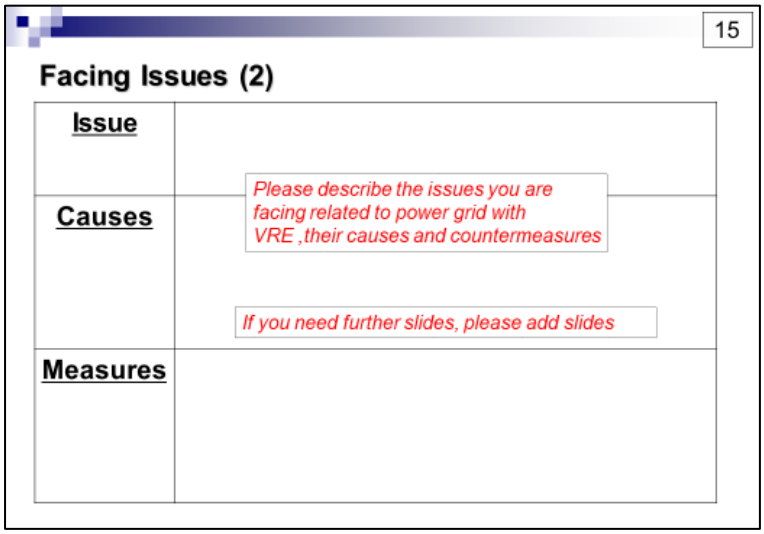
Future Development Plan (Especially Renewable Energy Relations)

Please describe briefly the overview of the future development plan on power sector, especially on renewable energy relations here.

13

Part 2
Issue Analysis Report


14
Facing Issues (1)
Issue
Causes
Measures
Please describe the issues you are facing related to power grid with VRE ,their causes and countermeasures


15
Facing Issues (2)
Issue
Causes
Measures
Please describe the issues you are facing related to power grid with VRE ,their causes and countermeasures
If you need further slides, please add slides

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 course 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 from a process of adoption and adaptation, 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.

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.

Correspondence

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

Further, address correspondence to:

JICA Hokuriku Center (JICA HOKURIKU)

Address: 4th Floor, Rifare (Office Tower) 1-5-2, Hon-machi, Kanazawa-shi, Ishikawa-ken, 920-0853, Japan

TEL: +81-76-233-5931　FAX: +81-76-233-5959

("81" is the country code for Japan, and "78" is the local area code)