Knowledge Co-Creation Program (Group & Region Focus)

GENERAL INFORMATION ON

Improvement of Maintenance Skills for Gas Turbine and Coal Fired Steam Turbine Power Engineering(A)

<<for Gas Turbine only>>

課題別研修「ガスタービン・石炭火力発電のメンテナンス技術向上（A）」

JFY 2017

NO. J17-04299/ ID. 1784588

Course Period in Japan
From June 5, 2017 to July 26, 2017

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.

Executive Summary of the General Information

Title	Improvement of Maintenance Skills for Gas Turbine and Coal Fired Steam Turbine Power Engineering(A) **(J17-04299)** **Note: This training program focuses only on Gas Turbine.**	
Program Objective	Knowledge for the improvement of efficient management and maintenance skills in each country are acquired by **thermal power** engineers and they will study necessary measures for dissemination in his/her county.	
Period	From June 5 to July 26, 2017 (Training in Japan)	
Target Organization	Management or maintenance section at a gas turbine power plant	
Target Countries	Iran, Mozambique, Myanmar, Papua New Guinea, Tanzania, Turkmenistan, Uzbekistan	
Total No. of Participants	Seven (7) participants	
Nominee Qualifications	Essential Qualifications; 1) Those nominated by their government in accordance with the proper application procedure; 2) Those who are senior mechanical engineers and leaders currently involved in the operational management and maintenance of **Gas Turbine power plants**. 3) Those who are university/college graduates or with equivalent academic backgrounds; 4) Those who have a sufficient command of English for listening to the lectures, reading the textbooks, discussing and writing in the above field; 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.	
Required Documents & Deadline	**Application Form** **Job / Country Report**	**April 7, 2017**
	Assignments for the Accepted Participants	Preparation for Presentation of Job /Country Report which is submitted at the application (**Making the presentation material using Microsoft Power Point**) **Submission Dead Line : May 26, 2017**
Notice of Acceptance	**April 21, 2017**	
JICA Center in Charge	JICA Chugoku International Center Ms. Kanae KIMURA (cicttp@jica.go.jp)	

I. Concept

Background

Stable electric power supplies are an essential condition for the industrial and economic advancement of developing countries and for improving the standard of living of their populations. This course was launched in 1963 and has been renewed several times to cope with these demands.

Today, in many developing countries, their economy is rapidly growing and electricity consumption is still increasing, or old facilities in many countries will be into the renewal time, it is necessary to create an infrastructure capable of coping with the growing demand for electric power in order for developing countries' economies to grow, and living standards to improve, in a sustainable manner. And other hand, the maintenance works for facilities is necessary to extend the operational lifetime.

In this connection, this course was revised and started as the new training program from 2013. This training program is divided into 2 courses, one is focused on gas turbine, and other is coal fired steam.

For what?

This program aims to provide knowledge and skills for management, maintenance which will be shared and promoted among his/her organizations.

For whom?

This program is offered to engineers who are in charge of management and maintenance at a **Gas Turbine power plant / station**.

How?

This program is implemented by Japan Electric Power Information Center, Inc. (JEPIC) and Power Engineering & Training Services, Inc. (PET).

Japan Electric Power Information Center, Inc. (JEPIC) was established as an association of Japan's major electric power companies. The purpose of the Center is to facilitate information exchange on activities of electric utilities with foreign counterparts and also to promote technical cooperation with developing countries.

Power Engineering & Training Services Inc. (PET) was established in April 1, 2002 as an affiliate company of The Chugoku Electric Power Co., Inc. (Chugoku EPCO.). (Chugoku EPCO.), one of Japan's ten regional electric power companies, supplies reliable and stable electricity to meet the demands of its more than 5.2 million customers in Chugoku, the south-west region of Japan's main island.

II. Description

1. **Title (J-No.):**
   Improvement of Maintenance Skills for Gas Turbine and Coal Fired Steam Turbine Power Engineering (A) (J17-04299)

2. **Course Period in JAPAN:**
   Training in Japan: From June 5, 2017 to July 26, 2017

3. **Target Regions or Countries:**
   Iran, Mozambique, Myanmar, Papua New Guinea, Tanzania, Turkmenistan, Uzbekistan

4. **Eligible / Target Organization:**
   Operational management/ maintenance section at **Gas Turbine power plant**

5. **Course Capacity (Upper limit of Participants):**
   7 participants

6. **Language to be used in this program:** English

7. **Program Objective:**
   Knowledge and skills for management, maintenance and environmental conservation are acquired and will be shared and promoted among his/her organization.

8. **Overall Goal:**
   Stable power supply will be achieved with appropriate measures for environmental conservation, through the improved operation and maintenance program at his/ her organization.

9. **Expected Module Outputs and Contents:**
   In this program, participants are expected to achieve these four (4) outputs;

(1) Participants will make a job/country report of their organizations before arriving at Japan.
(2) Participants will be able to analyze and assess similarities and/or differences between electric power industry in Japan and in their country.
(3) Participants will be able to analyze knowledge and information on effective techniques of maintenance and troubleshooting, advanced technologies for environmental conservation for thermal power plants.
(4) Participants will make an action plan on how to share and utilize the skills and knowledge gained from the training program in Japan.

Details on each outputs are given below:

Before arriving at Japan
Participating organizations make required preparation for the Program in the respective country.

Participants are expected to formulate and submit a Job/Country Report

Training in Japan
(June 5, 2017- July 26, 2017)
Participants dispatched by the organizations attend the Program implemented in Japan.

Units	Subjects	Aims	Time Allocation (days)
1. Program Orientation		To understand overall course objectives, goals, flows, and contents of each unit/subject.	0.5
2.Presentation of Job/Country Reports		To clarify the problems and difficulties of each participant's country. To understand the problems/subjects and circumstances in the power sector of other countries.	1.0
3. Technical Training			
(1) Outline of the Electric Power Industry in Japan	-Outline of the Electric Power Industry in Japan - Total Quality Management (TQM) activities - Policy for Saving Energy and its promotion - Visit Electric Power Historical Museum -Visit Thermal Power Plant	To enable the participants to gain an understanding of the organization and legal system regulating Japan's electric utility industry, as well as an understanding of electric power supply and power source development plans.	3.0
(2)Acquisition of management techniques	・ Human Resource Development at Thermal Power Plant	To lean about human resource development at thermal power plant.	1.0
	・Observation of thermal power station	To observe outline of facility, safety measures, environmental measures	0.5
	・ Observation of the central load dispatching office	To observe the central load dispatching systems	0.5
(3)Acquisition of maintenance techniques for a thermal power plant	・ Non-destructive inspection techniques	As non-destructive inspection techniques, to learn the basic knowledge and to acquire skills of PT (penetrate testing) and MT (magnetic testing) and UT (Ultrasonic Testing) through practice.	1.5
	・ Remaining life assessment and life extension measures	To assess remaining life of machine and equipment and deepen understanding of sustaining and extending their life.	2.5
	・ Basic knowledge of vibration	As vibration techniques, to learn the basic knowledge and to acquire skills of balancing through practice.	3.5
	・ Maintenance of steam turbine	・ Outline, Periodic inspection ・ Field Management ・ Overhaul Inspection	2.0

(4)Acquisition of working and maintenance techniques	・ Training at a gas turbine power plant	To learn the following issues. ・ Basics of combined generation ・ Gas Turbine Technology ・ Periodic inspection & combustor inspection ・ Basics of GT hot parts ・ Check and inspection of GT hot parts ・ Remaining life assessment of GT hot parts ・ Management method of GT hot parts ・ Control of Gas Turbine ・ Exhaust Heat Recovery Boiler Facility ・ Steam Turbine/Electrical Facilities ・ Observation of LNG facility ・ Cases of troubleshooting and remedies	6.0
(5)Acquisition of manufacturing techniques for a thermal power plant	・ Observation of power plant manufacturing and repair plant ・ Lecture on new manufacturing technology	To improve maintenance techniques by obtaining architecture and technical skills of gas turbine and boiler including Exhaust Heat Recovery Boiler.	4.0
(6)Acquisition of environmental conservation technologies for thermal power plants	・ Environmental situation and efforts in Japan ・ Environmental measures taken by a power company ・ Treatment technology of waste gas and water ・ Observation of a Waste Disposal Plant ・ Water quality management technology of boiler	To learn what environmental measures have been taken by the national government and by a power company and to increase awareness about environmental conservation.	2.0
4. Preparation & presentation of Action Plan	・ Preparation by the partici-pants and comments by the lecturer ・ Presentation of Action Plan	At the end of this program, participants will make an action plan on how to share and promote skills and knowledge gained from this program. Through this program, participants are expected not only to understand the experiences of Japan but also to implement the skills and knowledge gained in Japan after returning home.	2.5

The curriculum may be subject to minor change.

III. Conditions and Procedures for Application

1. Expectations for 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 this 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, which enables this program to meet specific requirements of applying organizations and effectively facilitate them toward solutions for the issues and problems.

(3) As this program is designed to facilitate organizations to come up with concrete solutions for their issues, participating organizations are expected to make due preparation before dispatching their participants to Japan by carrying out the activities of the Preliminary 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) Those nominated by their government in accordance with the proper application procedure;
2) Those who are senior mechanical engineers and leaders currently involved in the operational management and maintenance of **Gas Turbine power plants**.
3) Those who are university/college graduates or with equivalent academic backgrounds;
4) Those who have a sufficient command of English for listening to the lectures, reading the textbooks, discussing and writing in the above field;
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.

(2) Recommendable Qualifications

1) Age: Under fifty (50) in principal
2) Those who have practical job experiences of approximately three (3) years in the above field;

3. Required Documents for Application

(1) Application Form: The Application Form is available at the respective country's JICA office or the Embassy of Japan.

(2) 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.

(3) 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) Job/Country Report: These documents will be used both during selection process and the training period. The forms are attached to this General Information as ANNEX. Please fill out and submit them together with the Application Form mentioned above. (Handwriting is not recommended.)
Job/Country Report should be discussed among and authorized by the concerned officials in your organization prior to the submission, in order for the participant to prepare a feasible action plan as an output of the training program based on these documents.

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 7, 2017）

(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 shall be made by the respective country's JICA office (or Embassy of Japan) to the respective Government by **not later than April 21, 2017.**

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

Presentation Materials for Job/Country Report –**to be submitted by May 26, 2017**:

Before coming to Japan, only accepted candidates are required to prepare presentation materials by Power Point.

6. 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 Chugoku （JICA Chugoku International Center）

※ ”Chugoku” is the name of the region in western part of Japan’s main island. It is consisted of 5 prefectures and JICA Chugoku is in charge of the 5 prefectures

(2) Contact: Ms. Kanae KIMURA(cicttp@jica.go.jp)

2. Implementing Partner:

(1) Name: Japan Electric Power Information Center, Inc. (JEPIC),
Power Engineering & Training Services, Inc. (PET).

(2) URL: https://www.jepic.or.jp/en/
URL: http://www.energia-pet.co.jp/home_e/index.htm

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: Term of Insurance: From arrival to departure in Japan. *the traveling time outside Japan shall not be covered.

4. Accommodation in Japan:

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

At YOKOHAMA

JICA Yokohama International Center (JICA YOKOHAMA, YIC)
Address: 3-1, Shinko 3-chome, Naka-ku, Yokohama, Kanagawa 231-0001 Japan
Tel: 81-45-663-3251 Fax: 81-45-663-3265
(where “81” is the country code for Japan, and “45” is the local area code)

***At UBE** (where most of the technical training will be organized)*

International Hotel UBE
Address: 1-7-1 Shima, Ube, Yamaguchi 755-0047 Japan
TEL: 81-836-32-2323 FAX: 81-836-32-2316
(where “81” is the country code for Japan, and “836” is the local area code)

If there is no vacancy at the above accommodations, we arrange alternative accommodations for the participants. The information of other accommodation will be

informed later.

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 p. 9-16 of the brochure for participants titled "KENSHU-IN GUIDE BOOK," which will be given to the selected participants before (or at the time of) the pre-departure orientation.

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 training program, and other matters.

V. Other Information

1. Presentation of Job/Country Report

Participants are scheduled to make a presentation based on the Job/Country Report (which is supposed to be submitted by April 7, 2017) at the beginning of the training program. The main purpose of the presentation is to inform the Japanese lecturers of your needs and issues, which could be the basic information for the training. Therefore, the submission and presentation of these documents are regarded as the most important for inception of the training program. And participants are required to prepare for Presentation of the Reports (**Making the presentation material using Microsoft Power Point**) and submit it by May 26, 2017.

2. Other materials to supplement the reports

It would be appreciated if participants could bring materials, in addition to the reports, that show the situation of thermal electric power engineering in their countries such as annual report. These are expected to be used as materials for presentation and discussions during the course period.

3. Action Plan

Participants are supposed to make a presentation at the end of the training program based on an action plan which describes how to share and promote the skills and knowledge gained from the training program in Japan.

ANNEX 1

Tentative Schedule for the Training Program
"Improvement of Maintenance Skills for Gas Turbine and Coal Fired Steam Turbine Power Engineering(A)"

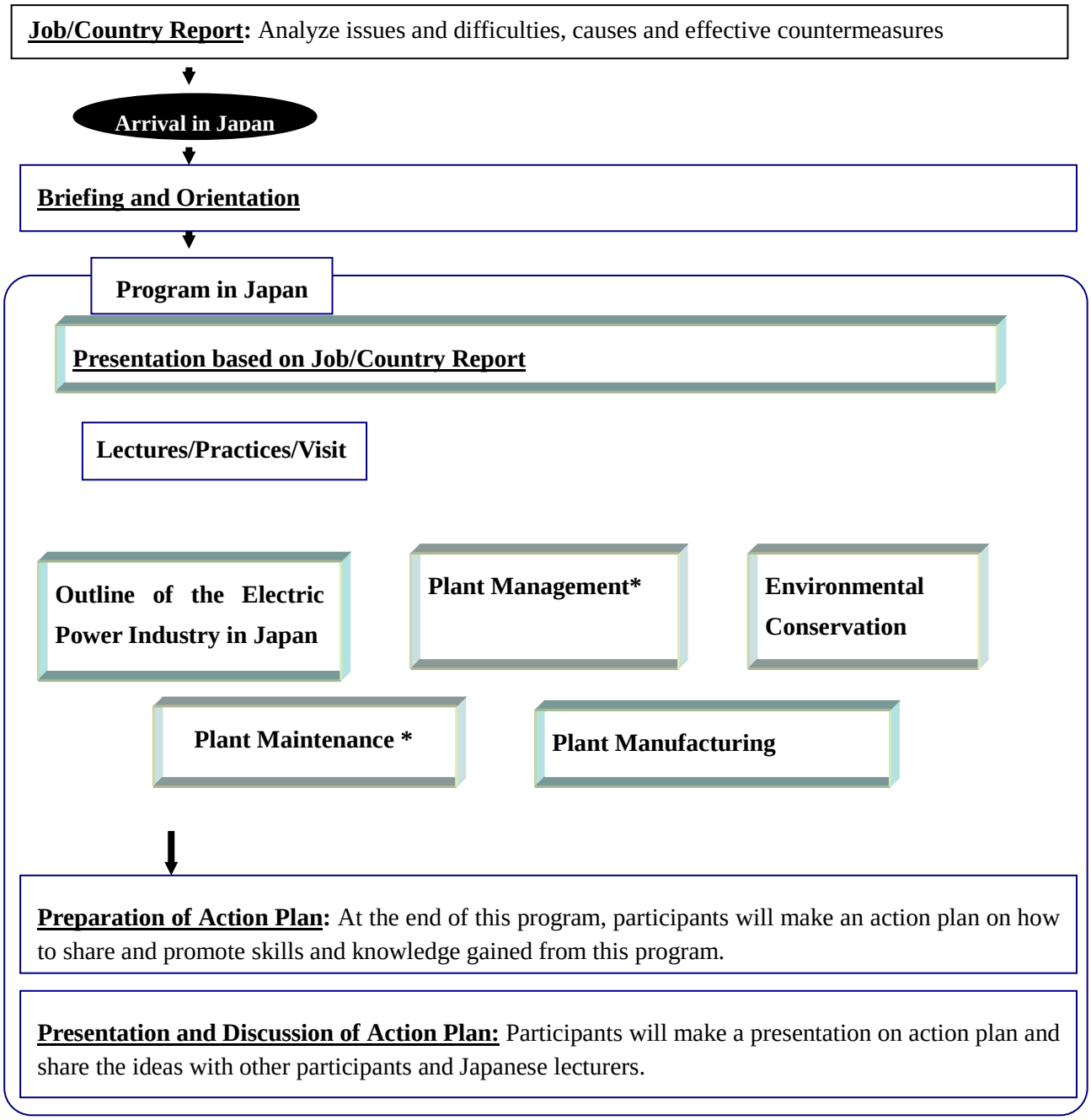
Date			Output	Contents	Venue
5-Jun	Mon		—	Arrival in Japan	
6-Jun	Tue	AM		Briefing Orientation	Yokohama
		PM		Program Orientation	
7-Jun	Wed	AM		General Orientation	
		PM			
8-Jun	Thu	AM		Opening Ceremony at JEPIC	
			Outline of the Electric Power Industry in Japan	Outline of the Electric Power Industry in Japan	
		PM		Total Quality Management (TQM) Activities in Japan	
9-Jun	Fri	AM			
		PM			
10-Jun	Sat		—	Holiday	
11-Jun	Sun		—	Holiday	
12-Jun	Mon	AM	Outline of the Electric Power Industry in Japan	Visit Electric Power Historical Museum	
		PM		Visit ISOGO Thermal Power Plant	
13-Jun	Tue	AM	—	Move from Yokohama to Ube	Ube
		PM		Opening Ceremony, Orientation by the implementing organization	
14-Jun	Wed	AM		Presentation of Job/Country Report	
		PM			
15-Jun	Thu	AM	Acquisition of management techniques for thermal power plants	Human Resource Development at Thermal Power Plant	
		PM			
16-Jun	Fri	AM		Non-Destructive Testing Lectures：(RT, UT, PT, MT, ET) Practice：(PT, MT)	
		PM			
17-Jun	Sat		—	Holiday	
18-Jun	Sun		—	Holiday	
19-Jun	Mon	AM	Acquisition of management techniques for thermal power plants	Observation of the Ube Waste Disposal Plant	
		PM		Non-Destructive Testing Practice：(UT, RT)	
20-Jun	Tue	AM	Acquisition of maintenance techniques for a thermal power plant	Remaining Life Assessment and Life Exttension Measures	
		PM			
21-Jun	Wed	AM			
		PM			
22-Jun	Thu	AM			
		PM	Basics of Vibration	Guidance for Action Plan 1	
23-Jun	Fri	AM		Move from Ube to Yanai	Yanai
		PM	Acquisition of maintenance techniques for a thermal power plant	Lectures at Gas turbine plant	
24-Jun	Sat		—	Holiday	
25-Jun	Sun		—	Holiday	
26-Jun	Mon	AM	Acquisition of maintenance techniques for a thermal power plant	Training at Gas turbine plant - Outline of facility, facility tour - Basics of combined generation - Gas Turbine Technologies - Periodic inspection & combustor inspection - Basics of GT hot parts - Check and inspection of GT hot parts - Case study of damaged GT hot parts and remedies - Management method of GT hot parts - Remaining life assessment of GT hot parts - Basics of LNG facility - Observation of LNG facility	
		PM			
27-Jun	Tue	AM			
		PM			
28-Jun	Wed	AM			
		PM			
29-Jun	Thu	AM			
		PM			
30-Jun	Fri	AM			
		PM	Acquisition of maintenance techniques for a thermal power plant	Move from Yanai to Hiroshima Observation of the central load dispatching office	Hiroshima
1-Jul	Sat		—	Holiday	
2-Jul	Sun		—	Holiday	

Tentative Schedule for the Training Program
"Improvement of Maintenance Skills for Gas Turbine and Coal Fired Steam Turbine Power Engineering(A)"

Date			Output	Contents	Venue
3-Jul	Mon	AM	Acquisition of maintenance techniques for a thermal power plant	Visit to Boiler manufacturing plant (MPHS Kure)	
		PM			
4-Jul	Tue	AM		Visit to Osaki Cool Gen	
		PM			
5-Jul	Wed	AM		Move from Hiroshima to Ube	Ube
		PM		Guidance for Action Plan 2	
6-Jul	Thu	AM	Acquisition of maintenance techniques for a thermal power plant	Basics of Vibration	Ube
		PM			
7-Jul	Fri	AM			
		PM			
8-Jul	Sat		—	Holiday	
9-Jul	Sun		—	Holiday	
10-Jul	Mon	AM	Acquisition of maintenance techniques for a thermal power plant	Basics of Vibration (Practice) Balancing	
		PM			
11-Jul	Tue	AM	Acquisition of environmental conservation technologies for thermal power plants	Environmental Conservation Technologies	
		PM			
12-Jul	Wed	AM		Comments on Draft Action Plan	Himeji
		PM		Move from Ube to Himeji	
13-Jul	Thu	AM	Acquisition of manufacturing techniques for a thermal power plant	Visit to Gas Turbine Manufacturing Plant (Mitsubishi Hitachi Power Systems)	
		PM			
14-Jul	Fri	AM	Acquisition of manufacturing techniques for a thermal power plant	Visit to Gas Turbine Manufacturing Plant (Kawasaki Heavy Industries)	
		PM			
15-Jul	Sat		—	Holiday	
16-Jul	Sun		—	Holiday (Move to Yokohama)	Yokohama
17-Jul	Mon		—	Holiday	
18-Jul	Tue	AM	Acquisition of manufacturing techniques for a thermal power plant	Simulation for activation and emergency	
		PM			
19-Jul	Wed	AM			
		PM			
20-Jul	Thu	AM		Move from Yokohama to Nakoso	
				Visit to Nakoso Power Plant (IGCC)	
		PM		Move from Yokohama to Hitachi	Hitachi
21-Jul	Fri	AM	Acquisition of manufacturing techniques for a thermal power plant	Observation of Gas Turbine Manufacturing Plant, MITSUBISHI-HITACHI Power Systems, Hitachi Plant	
		PM			
22-Jul	Sat		—	Holiday (Move from Hitachi to Yokohama)	Yokohama
23-Jul	Sun		—	Holiday	
24-Jul	Mon	AM	Wraping-up	Presentation of Action Plan	
		PM			
25-Jul	Tue	AM		Evaluation Meeting Closing Ceremony	
		PM			
26-Jul	Wed			Leave Japan	

※The schedule may be subject to minor change.

Flow of the program



ANNEX-3

JOB REPORT (Part-1)

All applicants must submit the Job Report along with the application form when applying for the program. This document shall be used to select applicants in a series of screening procedures. Please make sure that the documents are prepared according to instructions and are typewritten in English.

※The Participants who will be selected will have to prepare for presentation of Job /Country Report (Making the presentation material using Microsoft Power Point) based on the Job/Country Report on or before arriving Japan.

1. Applicant's Information

1. Full Name	[Family] [First] [Middle]
2. Country	
3. Tel/Fax	Tel. Fax.
4. Email address	
5. Title of your present Job	
6. Missions and works of your organization (Summarize in items)	
7. Works that you are in charge of in your organization. (Summarize in items)	
8. Title and detailed contents of Project; *To be filled up by only those who are involved in ongoing or prospect Japanese ODA financed thermal power projects and/or in power plants associated with JICA technical cooperation project	
9. Organizational chart	* Please attach the chart and circle where you belong.

2. Accidents, Problems, and Measures already taken to solve them

Describe cases of accidents, current problems, and countermeasures that have been already taken at your department and/or plant (regarding planning, design, operation and maintenance of thermal power plants mainly)

Problems		Causes	Measures taken to solve the problems
	(Example) Condenser tube failure	***Polluted cooling water***	***Clean cooling water drawn from deep sea***
1			
2			
3			
4			
5			

3. Participants' requests for the training topics

Describe subjects which you have particular interests in the thermal power sector, and you would like to study through the training **in the order of priority**.

Priority	Subject which you are interested in	Contents (Please write in detail.)
	(Example) ***Efficiency related technology***	***How to monitor the efficiency related parameters, analyzing the data and action requires to get the optimum efficiency of the generating units.***
1		
2		
3		
4		
5		

JOB REPORT (Part-2) : Gas Turbine Course

*If you can bring any brochures or relevant documents which include the data, you do not need to fill out the following tables.

Information related to your gas turbine plant

(1) Gas turbine specifications of your power plant or a typical plant

1) Type	
2) Capacity (kW)	
3) Duration of operation (number of years)	
4) Gas pressure at the turbine outlet (Pa)	
5) Gas temperature at the turbine outlet (C)	
6) Number of turbine stages	
7) Kind of fuel	
8) Gas combustion temperature (C)	
9) Type of combustor (Unit system or header system)	
10) Presence of water/steam injection system	
11) Number of air compression stages	
12) Air pressure at the air compressor outlet (Pa)	
13) Installed site (indoor or outdoor)	
14) Heat efficiency (%)	
15) Main steam pressure (Pa) (In case of combined type)	
16) Main steam temperature (C) (In case of combined type)	
17) Manufacturer	

(2) Generator specification

1) Capacity (kVA)	
2) Voltage (kV)	
3) Frequency (Hz)	
4) Manufacturer	

(3)Environmental equipment (Specify if provided or planned, and type)

1) Desulfurization system	
2) Denitration system	
3) Electric dust collector	
4) Wastewater treatment system	
5) Water purifier	
6) Other environmental facilities	

Country Report

*If you can bring any annual reports or statistics papers that include the data, you do not need to fill out tables as follows.

Outline of electric power sector in your country (Year: _____)

Generating Facilities	Generating Capacity [Installed] (MW) *1	Hydro	
		Thermal	
		Nuclear	
		Others *2	
		Total	
	Thermal Efficiency of Coal based Power plants (Gross) (%)		
	Generating Capacity [Planned] (MW)	Year	
		Hydro	
		Thermal	
		Nuclear	
		Others *2	
		Total	
Demand & Supply	Gross Electric Power Production (GWh) *3	Hydro	
		Thermal	
		Nuclear	
		Others *2	
		Total	
	Electric Power Sales (GWh)	Residential	
		Commercial	
		Industrial	
		Others	
		Total	
	Peak Load (MW) *4		
	Growth Rates of Peak Load (%)		
	Interchange of Electricity (GWh) *5	Export	
		Import	
T&D Facilities	Transmission Line Route Length (km)	200kV or over	
		under 200kV	
		Total	
	Distribution Line Route Length (km)	High Voltage	
		Low Voltage	
		Total	
	Transmission & Distribution Loss (%) *6		
Others	Total Minutes of Outage per Customer *7		
	Electricity Rates (nat.cur./kWh) *8		
	Electrification Ratio (%) *9		

*1 Includes major electric power utilities and IPP's, excludes industry owned power.
*2 Geothermal ,New and Renewable Energy.
*3 Major electric power utilities and IPP's.
*4 Day's highest daily loads.
*5 Interchange electricity through transmission line only.
*6 Includes Non-Technical Loss.
*7 Total minutes of scheduled and unplanned outages per low-voltage customer.
*8 Calculated by (Power Sales Revenue / Electric Power Sales).
*9 Calculated by (the number of customer / the number of household).

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 and 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 Chugoku International Center (JICA CHUGOKU)
Address: 3-3-1 Kagamiyama, Higashihiroshima, Hiroshima, 739-0046 Japan
TEL: 81-82-421-5800 FAX: 81-82-420-8082