



# TRAINING AND DIALOGUE PROGRAMS

## GENERAL INFORMATION ON

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

**集団研修「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 2013**

**<Type: Solution Creation Program / 類型: 課題解決促進型 >**

**NO. J13-00801/ ID. 1380578**

**From June 4, 2013 to July 27, 2013**

This information pertains to one of the Training and Dialogue Programs 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.

## Executive Summary of the General Information

<b>Title</b>	Improvement of Maintenance Skills for Gas Turbine and Coal Fired Steam Turbine Thermal Power Engineering(A) (J13-00801)	
<b>Program Objective</b>	Knowledge for the improvement of efficient management, operations & maintenance skills in each country are acquired by thermal power engineers and they will study necessary measures for dissemination in his/her county.	
<b>Period</b>	From June 4, 2013 to July 27, 2013	
<b>Target Organization</b>	Management, operations or maintenance section at a gas turbine/coal fired steam turbine power plant	
<b>Target Countries</b>	Serbia, Bangladesh, Nigeria, Mongolia, Iraq, Bosnia and Herzegovina	
<b>Total No. of Participants</b>	Nine(9) participants	
<b>Nominee Qualifications</b>	<p>Essential Qualifications;</p> <p>1) Current Duties: be senior mechanical engineers and leaders currently involved in the operational management and maintenance of a <b>gas Turbine / coal fired steam turbine power plants</b>.</p> <p>2) Academic Background: be university/college graduates or with equivalent academic backgrounds</p> <p>3) Language: have a sufficient command of English for listening to the lectures, reading the textbooks, discussing and writing in the above field</p> <p>4) Health: be in good health, both physically and mentally, to undergo the course of training</p> <p>5) Must not be serving any form of military service</p>	
<b>Required Documents &amp; Deadline</b>	<b>Application Form</b>	April 17, 2013
	<b>Job / Country Report</b>	
	<b>Assignments for the Accepted Participants</b>	Preparation for Presentation of Job /Country Report (Making the presentation material using Microsoft Power Point based on the Job/Country Report which is submitted at the application) Submission Dead Line : Before/On arriving Japan
<b>Notice of Acceptance</b>	May 8, 2013	
<b>JICA Center in Charge</b>	JICA Chugoku International Center Mr. OKUDA Hisakatsu ( <a href="mailto:cicctp@jica.go.jp">cicctp@jica.go.jp</a> )	

# **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. With electricity consumption 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 launched in 1963 and has been renewed several times. From 2007, this course was revised to be a trainers training and added dissemination stage as a finalization phase in participants' country after the core stage in Japan. From 2010, this training program is divided into 2 courses, one is focused on gas turbine, and other is combined coal fired steam with gas turbine.

## **For what?**

This program aims to provide knowledge and skills for management, operations, 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, operation and maintenance at a gas turbine/ coal fired steam turbine power plant / station.

## **How?**

This program is implemented by the cooperation with Japan's regional electric power company and related organizations / associations.

## ***II. Description***

**1. Title (J-No.):**

Improvement of Maintenance Skills for Gas Turbine and Coal Fired Steam Turbine Thermal Power Engineering (A) **(J13-00801)**

**2. Period of program:**

**Duration of whole program:** May 2013 to October 2013

**Preliminary Phase:** May 2013 to June 2013

(in a participant's home country)

**Core Phase in Japan:** June 4 2013 to July 27 2013

**Finalization Phase:** July 2013 to October 2013

(in a participant's home country)

**3. Target Regions or Countries:**

Serbia, Bangladesh, Nigeria, Mongolia, Iraq, Bosnia and Herzegovina

**4. Eligible / Target Organization:**

Operational management/ maintenance section at a gas turbine/coal fired steam turbine power plant / station

**5. Total Number of Participants:** 9 participants

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

**7. Program Objective:**

Knowledge for the improvement of efficient management, operations & maintenance skills in each country which are the outputs of this program will be acquired by thermal power engineers and they will study necessary measures for dissemination in his/her county.

**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 Outputs and Contents:**

In this program, participants are expected to achieve these five

(5) outputs through Three (3) phases;

(1) Participants will make a job/country report of their organizations by the end of preliminary phase.

(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 operation, maintenance and troubleshooting by thermal power plants according to the prepared issue analysis.

- (4) Participants will make an action plan on dissemination activities of skills and knowledge gained from the training program in Japan.
- (5) The action plans made by the participants will be shared in their organizations, after returning to the respective home country. The action plans will be discussed and promoted in their organizations.

Details on each phase are given below:

<b>Preliminary Phase in a participant's home country</b> (May 2013 to June 2013) <i>Participating organizations make required preparation for the Program in the respective country.</i>	
Expected Output	Activities
Job/Country Report	Formulation and submission of Job/Country Report

<b>Core Phase in Japan</b> (June 4 to July 27, 2013) <i>Participants dispatched by the organizations attend the Program implemented in Japan.</i>			
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.	3.5
(2)Acquisition of operation and management techniques for thermal power	· Human Resource Development at Thermal Power Plant	To learn about human resource development at thermal power plant.	1.0
	· Performance management	To introduce check items such as generating efficiency and their sampling methods.	1.5

plants	<ul style="list-style-type: none"> <li>• Observation of the central load dispatching office</li> </ul>	To observe the central load dispatching systems	0.5
(3)Acquisition of operation and maintenance techniques for thermal power plants	<ul style="list-style-type: none"> <li>• Training at a gas/coal-fired steam turbine power plant</li> <li>• Observation of thermal power station (outline of facility, safety measures, environmental measures)</li> </ul>	To learn about the rationale for setting control values and responses to abnormal condition for items related to facilities maintenance. Operating methods of various environmental facilities are also to be learnt.	COAL:4.5
		To learn the following issues. <ul style="list-style-type: none"> <li>• Basics of combined generation</li> <li>• Periodic inspection &amp; combustor inspection</li> <li>• Basics of GT hot parts</li> <li>• Check and inspection of GT hot parts</li> <li>• Case study of damaged GT hot parts and remedies</li> <li>• Management method of GT hot parts</li> <li>• Remaining life assessment of GT hot parts</li> </ul>	GAS:4.5
	<ul style="list-style-type: none"> <li>• Observation of fuel facility</li> </ul>	Visit of coal supply base Observation of LNG facility	COAL:0.5 GAS:0.5
(4)Acquisition of maintenance techniques for a thermal power plant	<ul style="list-style-type: none"> <li>• Maintenance for turbine body</li> </ul>	To learn the basic knowledge and to acquire skills of turbine body maintenance through practice.	2.0
	<ul style="list-style-type: none"> <li>• Non-destructive inspection techniques</li> </ul>	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.	1.0
	<ul style="list-style-type: none"> <li>• Remaining life assessment and life extension measures</li> </ul>	To assess remaining life of machine and equipment and deepen understanding of sustaining and extending their life.	2.5
	<ul style="list-style-type: none"> <li>• Basic knowledge of vibration</li> </ul>	As vibration techniques, to learn the basic knowledge and to acquire skills of balancing through practice.	3.5
	<ul style="list-style-type: none"> <li>• Power plant Supervisory Instrument</li> </ul>	To introduce the Power plant Supervisory Instrument in Japan	0.5
(5)Acquisition of manufacturing techniques for a thermal power plant	<ul style="list-style-type: none"> <li>• Observation of power plant manufacturing plant</li> <li>• Lecture on new manufacturing technology</li> </ul>	To improve maintenance and operation techniques by obtaining architecture and technical skills of plant facilities.	3.5

(6)Acquisition of environmental conservation technologies for thermal power plants	<ul style="list-style-type: none"> <li>• Environmental situation and efforts in Japan</li> <li>• Environmental measures taken by a power company</li> <li>• Treatment technology of waste gas and water</li> <li>• Observation of a Waste Disposal Plant</li> <li>• Water quality management technology of boiler</li> </ul>	To learn what environmental measures have been taken by the national government and by a power company and to increase awareness about environmental conservation.	2.5
4. Preparation & presentation of Action Plan	<ul style="list-style-type: none"> <li>• Preparation by the participants and comments by the lecturer</li> <li>• Presentation of Action Plan</li> </ul>	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.	2.0

The curriculum may be subject to minor change.

<p><b>Finalization Phase in a participant's home country</b>  (August 2013 to October 2013)  <i>Participating organizations produce final outputs by making use of results brought back by participants. This phase marks the end of the Program.</i></p>	
Expected Output	Activities
To implement an action plan (progress report )	Participants are to implement the relevant activities based on the action plan which was made during the program. Also, participants must submit the progress report to JICA by the end of October 2013.

### ***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 .
- (4) Participating organizations are also 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) 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/coal fired steam 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.
- 6) Those who are not serving in the military.



## **(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.

### **\*Pregnancy**

Pregnant participants are strictly requested to attach the following documents in order to minimize the risk for their health.

- ① letter of the participant's consent to bear economic and physical risks
- ② letter of consent from the participant's supervisor
- ③ doctor's letter with agreement of his/her training participation

Please ask National Staffs in JICA office for the details.

**(2) 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.

**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 application to the JICA Center in JAPAN: **April 17, 2013.**

Note: Please confirm the closing date set by the respective country's JICA office or Embassy of Japan of your country to meet the final date in Japan.

### **(2) Selection:**

After receiving the document(s) through due administrative procedures in the respective government, the respective country's JICA office (or Japanese Embassy) shall conduct screenings, and send the documents to the JICA Center in charge in Japan, which organizes this program. Selection shall be made by the JICA Center in consultation with the organizations concerned in Japan based on submitted documents according to qualifications. **The organization with intention to utilize**

**the opportunity of this program will be highly valued in the selection.**

**(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 May 8, 2013.**

**5. Conditions for Attendance:**

- (1)** to observe the schedule of the program,
- (2)** not to change the program subjects or extend the period of stay in Japan,
- (3)** not to bring any members of their family,
- (4)** to return to their home countries at the end of the program in Japan according to the travel schedule designated by JICA,
- (5)** to refrain from engaging in political activities, or any form of employment for profit or gain,
- (6)** 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,
- (7)** to observe the rules and regulations of their place of accommodation and not to change the accommodation designated by JICA, and
- (8)** to participate the whole program including a preparatory phase prior to the program in Japan. Applying organizations, after receiving notice of acceptance for their nominees, are expected to carry out the actions described in section II -9 and section III -4.

## 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:** Mr. OKUDA Hisakatsu ([cicctp@jica.go.jp](mailto:cicctp@jica.go.jp))

### 2. Implementing Partner:

Under selection process

### 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 TOKYO**

JICA Tokyo International Center (JICA TOKYO, TIC)

Address: 49-5, Nishihara 2-chome, Shibuya-ku, Tokyo 151-0066 Japan

Tel: 03-3485-7051 Fax: 03-3485-7904

(where "81" is the country code for Japan, and "82" is the local area code)

#### **At other area** (where most of the technical training will be organized)

JICA will arrange local hotels where the technical training will be organized

The information of these accommodations 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 "KENSU-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 are supposed to be submitted by April 26) 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.

### **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 and Progress Report**

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. Furthermore, the program requires the participants to submit the progress report after the program in Japan, which shows the progress of your action plan at your home country.

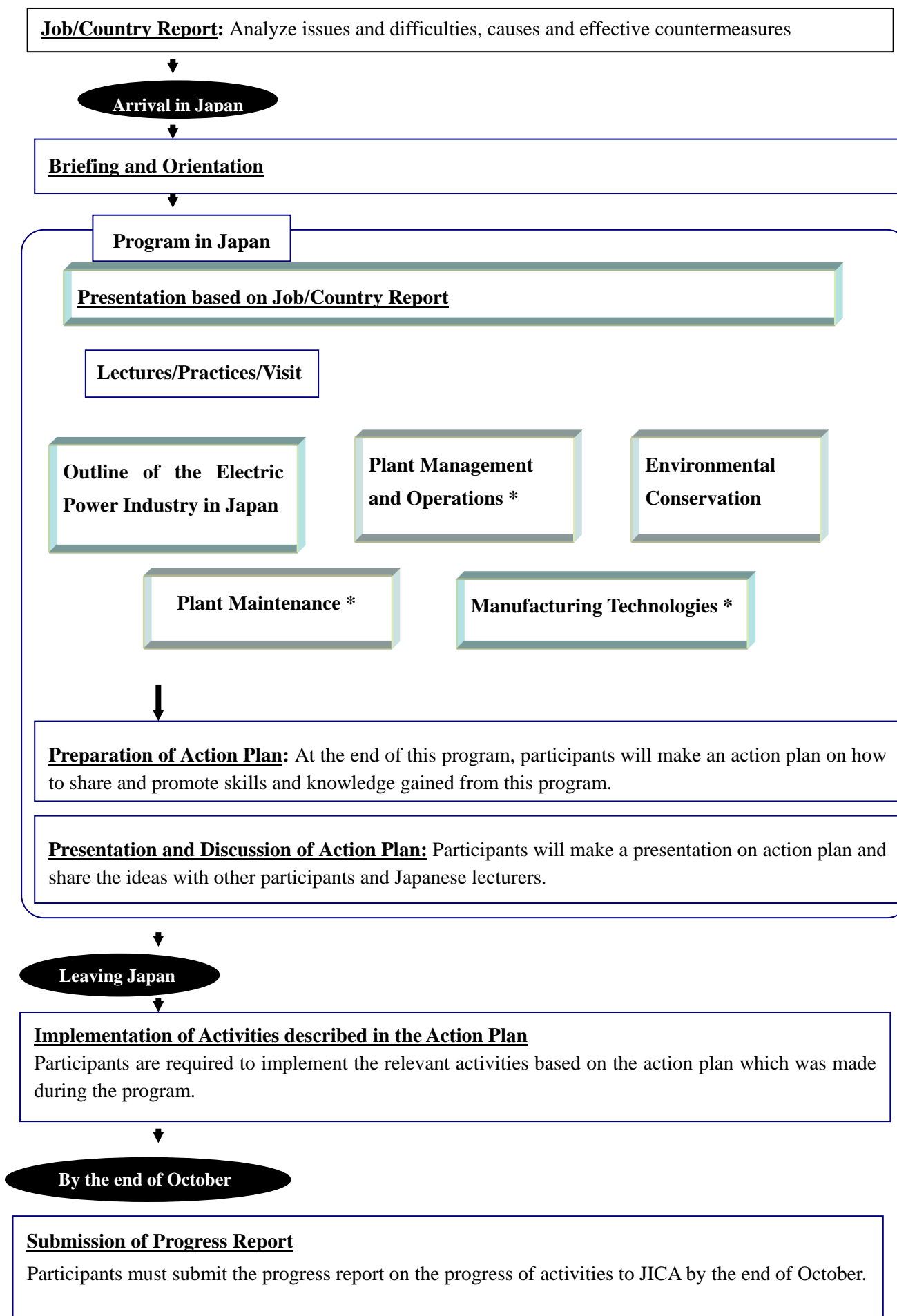
**Tentative Schedule for the Training Program**  
**"Thermal Power Engineering Course for Coal Fired Steam Turbine 2013"**

Date			Output	Contents		Venue
4-Jun	Tue	AM PM	—	Arrival in Japan		
5-Jun	Wed	AM PM	—	Briefing		Tokyo
6-Jun	Thu	AM PM	—	Orientation		Tokyo
7-Jun	Fri	AM PM	Outline of the Electric Power Industry in Japan	Outline of the Electric Power Industry in Japan Policy for Saving Energy and its Promotion		Tokyo
8-Jun	Sat		—	Holiday		Tokyo
9-Jun	Sun		—	Holiday		Tokyo
10-Jun	Mon	AM PM	Outline of the Electric Power Industry in Japan	Total Quality Management (TQM) Activities in Japan		Tokyo
11-Jun	Tue	AM PM	Outline of the Electric Power Industry in Japan	Visit of Thermal Power Plant Visit Electric Power Historical Museum		Tokyo
12-Jun	Wed	AM PM	Outline of the Electric Power Industry in Japan	Move from Tokyo to Regional Area Opening Ceremony, Orientation by the Training Agent		Region
13-Jun	Thu	AM PM	—	Presentation of Job/Country Report		
14-Jun	Fri	AM PM	Acquisition of operation and management techniques for thermal power plants	Human Resource Development at Thermal Power Plant		
15-Jun	Sat		—	Holiday		
16-Jun	Sun		—	Holiday		
17-Jun	Mon	AM PM	Acquisition of environmental conservation technologies for thermal power plants	·Environmental Technologies		
18-Jun	Tue	AM PM		Water Quality Management Technology of Boiler		
19-Jun	Wed	AM PM		Observation of a Waste Disposal Plant		
20-Jun	Thu	AM PM	Acquisition of operation and management techniques for thermal power plants	Performance Management Technologies		
21-Jun	Fri	AM PM	Acquisition of maintenance techniques for a thermal power plant	Remaining Life Assessment and Life Extension Measures		
22-Jun	Sat		—	Holiday		
23-Jun	Sun		—	Holiday		
24-Jun	Mon	AM PM	Acquisition of maintenance techniques for a thermal power plant	Remaining Life Assessment and Life Extension Measures		
25-Jun	Tue	AM PM		Non-Destructive Testing		
26-Jun	Wed	AM PM		Power plant Supervisory Instrument		
27-Jun	Thu	AM PM		Acquisition of operation and Maintenance techniques for thermal power plants	Coal Fired Steam Turbine Group	Gas Turbine Group
28-Jun	Fri	AM PM	Training at Coal-fired Power Plant (outline of facility and facility tour)		Training at Gas turbine plant - Outline of facility, facility tour - Basics of combined generation	
29-Jun	Sat		—	Holiday		
30-Jun	Sun		—	Holiday		

**Tentative Schedule for the Training Program**  
**"Thermal Power Engineering Course for Coal Fired Steam Turbine 2013"**

Date			Output	Contents	Venue		
1-Jul	Mon	AM	Acquisition of operation and Maintenance techniques for thermal power plants	Maintenance for Boiler body - Maintenance for Boiler body - Troubleshooting Examples - Coal handling	Training at Gas turbine plant - 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		
		PM					
2-Jul	Tue	AM		Observation of Coal Supply Base		Move	
		PM					
3-Jul	Wed	AM		Observation of Supercritical Pressure Power Generating Facilities		Move	
		PM					
4-Jul	Thu	AM		Move		Move	
		PM					
5-Jul	Fri	AM		Observation of the central load dispatching office			
		PM					
6-Jul	Sat		—	Holiday			
7-Jul	Sun		—	Holiday			
8-Jul	Tue	AM	Acquisition of manufacturing techniques for a thermal power plant	Observation of power plant manufacturing plant Factory	Region		
		PM					
9-Jul	Wed	AM		Move			
		PM					
10-Jul	Thu	AM	Acquisition of maintenance techniques for a thermal power plant	Maintenance for Turbine Body			
		PM					
11-Jul	Fri	AM					
		PM					
12-Jul	Fri	AM		Basics of Vibration			
		PM					
13-Jul	Sat		—	Holiday			
14-Jul	Sun		—	Holiday			
15-Jul	Mon		—	National Holiday			
16-Jul	Tue	AM	Acquisition of maintenance techniques for a thermal power plant	Basics of Vibration			
		PM					
17-Jul	Wed	AM					
		PM					
18-Jul	Thu	AM	Wrapping-up	Comments on Draft Action Plan Preparation of Action Plan			
		PM					
19-Jul	Fri	AM	—	Move from Regional Area to Tokyo	Tokyo		
		PM					
20-Jul	Sat		—	Holiday			
21-Jul	Sun		—	Holiday			
19-Jul	Fri	AM	Acquisition of manufacturing techniques for a thermal power plant	Steam Turbine and Gas Turbine Production Technology Visit of 2-3 Plant			
		PM					
19-Jul	Fri	AM					
		PM					
25-Jul	Mon	AM				Wrapping-up	Presentation of Action Plan
		PM					
26-Jul	Tue	AM	—	Evaluation Meeting/ Closing Ceremony			
		PM					
27-Jul	Wed		—	Leave Japan	—		

## Flow of the program





## 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.

### 1. Applicant's Information

<b>1. Full Name</b>	[Family]	[First]	[Middle]
<b>2. Country</b>			
<b>3. Tel/Fax</b>	Tel.	Fax.	
<b>4. Email address</b>			
<b>5. Title of your present Job</b>			
<b>6. Missions and works of your organization (Summarize in items)</b>			
<b>7. Works that you are in charge of in your organization. (Summarize in items)</b>			
<b>8. Title and detailed contents of Project;</b> *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			

<b>9. Choose either “Gas Turbine Course” or “ Coal Fired Steam Turbine Course”</b>	Enter a ○ mark in the blank for the course you would like to take. If you would like to take both courses, write the order of priority.	
	<b>Gas Turbine Course</b>	<b>Coal Fired Steam Turbine Course</b>
<b>8. Organizational chart</b>	* 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
	<i>(Example) Condenser tube failure</i>	<i>Polluted cooling water</i>	<i>Clean cooling water drawn from deep sea</i>
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.)
	<p><i>(Example)</i></p> <p><i>Efficiency related technology</i></p>	<p><i>How to monitor the efficiency related parameters, analyzing the data and action requires to get the optimum efficiency of the generating units.</i></p>
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	

## **JOB REPORT (Part-2) : Coal Fired Steam 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 coal fired steam turbine plant**

#### **(1) Turbine system of your power plant or a typical plant**

1) Type	
2) Capacity (kW)	
3) Duration of operation (number of years)	
4) Pressure (Pa)	
5) Temperature (C)	
6) Speed (rpm)	
7) Installed site (indoor or outdoor)	
8) Cooling method (air-cooling or water-cooling) + vacuum (mmHg)	
9) Turbine efficiency (%)	
10) Manufacturer	

#### **(2) Boiler specification**

1) Type	
2) Capacity (t/h)	
3) Duration of operation(number of years)	
4) Pressure (Pa)	
5) Temperature (C)	
6) Heating area (m <sup>2</sup> )	
7) Fuel used (kind, calorie)	
8) Kind of burner (combustion method)	
9) Installed site (indoor or outdoor)	
10) Boiler efficiency (%)	
11) Manufacturer	

#### **(3) Generator specification**

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

#### **(4) 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 Facilities	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 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.





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