Appendices

1. Member List of the Study Team
2. Study Schedule
3. List of Parties Concerned in the Recipient Country
4. Minutes of Discussions
5. Soft Component (Technical Assistance) Plan

1. Member List of the Study Team

Mr. Tomoyasu FUKUCHI	Consultant Team Leader / Grid-Connection PV System
Mr. Deepak Bista	Deputy Consultant Team Leader / PV System Technology
Mr. Sadatsugu TORIBAMI	Equipment and Facility Planning
Mr. Ryosuke OGAWA	Procurement Planning / Cost Estimation (2)
Mr. J M PRADHAN	Institution and Standards / Grid Operation
Ms. Mika MATSUMURA	Environmental and Social Considerations / Evaluation of Greenhouse Gas Reduction

2. Study Schedule

Mr. Tomoyasu FUKUCHI Consultant Team Leader / Grid-Connection PV System

- 1st Site Survey: July 6 to July 18, 2009
- 2nd Site Survey: October 21 to October 31, 2009
- 3rd Site Survey: March 29 to April 2, 2010

Mr. Deepak Bista Deputy Consultant Team Leader / PV System Technology

- 1st Site Survey: July 6 to July 18, 2009
- 2nd Site Survey: October 21 to November 20, 2009
- 3rd Site Survey: March 29 to April 2, 2010

Mr. Sadatsugu TORIBAMI Equipment and Facility Planning

- 2nd Site Survey: October 26 to November 9, 2009

Mr. Ryosuke OGAWA Procurement Planning / Cost Estimation (2)

- 1st Site Survey: July 10 to July 18, 2009
- 2nd Site Survey: November 11 to November 27, 2009

Mr. J M PRADHAN Institution and Standards / Grid Operation

- 1st Site Survey: July 10 to July 18, 2009
- 2nd Site Survey: October 26 to November 26, 2009

Ms. Mika MATSUMURA Environmental and Social Considerations / Evaluation of Greenhouse Gas Reduction

- 2nd Site Survey: October 26 to November 2

3. List of Parties Concerned in the Recipient Country

Planning Commission (PC)	Mr. Parvez Butt	Member	(Energy)	(92)51-9203615
Planning Commission (PC)	Mr. Zia Ud din Azhar	Chief	Energy Information Systems & Computer Section	(92)51-9204951
Pakistan Engineering Council (PEC)	Senator.Eng.Mrs.Rukhsana Zuberi	Chairperson		(92)51-2871271, 9222505
Pakistan Engineering Council (PEC)	Engr. Nasir Mahmood Khan	Additional Registrar		(92)51-2875875, 2829296 Ext. 235
Pakistan Engineering Council (PEC)	Dr. Ashfaq Ahmed Sheikh	Deputy Registerar		(92)51-2876702
Pakistan Engineering Council (PEC)	Mr. Khadim H Bhatti	Manager	IT Department	(92)51-9214882
Pakistan Engineering Council (PEC)	Mr. Engr. Aijaz Hussain Shah	Assistant Registrar		(92)51-2871271
Alternative Energy Development Board (AEDB)	Mr. Arif Alauddin	Chief Executive Officer		(92)51-9262956
Alternative Energy Development Board (AEDB)	Mr. Mujahid Sqdiq	Director General	(International Cooperation)	(92)51-9262947-50 (Ext. 205)
Alternative Energy Development Board (AEDB)	Mr. Imran Ahmed	Director	(Rural Electrification Program)	(92)51-2215308
National Electric Power Regulatory Authority (NEPRA)	Engr. Arshad Khan	Registrar		(92)51-9207200
National Electric Power Regulatory Authority (NEPRA)	Mr. Imtiaz Hussaim Baloch	Director Licensing		(92)51-9026527, 9217654 Ext. 327
Islamabad Electric Supply Company Ltd. (IESCO)	Mr. Muhammad Yousaf Awan	Chief Engineer	(Development)	(92)51-9252908
Islamabad Electric Supply Company Ltd. (IESCO)	Mr. Nasin Javed	Deputy General Manager	(Planning & Development)	(92)51-9252902
Islamabad Electric Supply Company Ltd. (IESCO)	Eng.. Abdul Rashid Khattak	Chief Engineer	(Operation)	(92)51-9252902
Islamabad Electric Supply Company Ltd. (IESCO)	Mr. Habib Ali Bangash	Chief Engineer/Operation Director	(Operation)	(92)51-9252902
Islamabad Electric Supply Company Ltd. (IESCO)	Mr. Raja Saeed Ahmed	Chief Engineer	(Planning & Engineering)	(92)51-9252902
Ministry of Water & Power	Mr. Riaz Ahmad Khan	Advisor		(92)51-9213666
Ministry of Water & Power	Mr. Saif Ullah	Joint Secretary		(92)51-9203187
Ministry of Science & Technology	Mr. M. Kashif Murtaza	Secretary		(92)51-9203416, 9210208
Pakistan Council of Renewable Energy Technologies, Ministry of Science & Technology	Dr. Parvez Akhter	Director General		(92)51-9258228
Pakistan Environmental Protection Agency, Ministry of Environment	Mr. Asif S. Khan	Director General		(92)51-9267621
Ministry of Environment	Mr. Syed Amjad Hussain	Acting Head	CDM Cell	(92)51-9205510
CDA	Mr. Amin Mahmad	Project Director (E & M)		(92)51-9253021
CDA	Mr. Qazi M. Omar	Project Director	F-9 Park	(92)51-925302, Cell 0321-5390080

4. Minutes of Discussions

"Minutes of Discussions" are attached in following pages.

1st Site Survey / Minutes of Discussion

1st Site Survey / Memorandum of Understanding of Technical Matter

2nd Site Survey / Memorandum of Understanding of Technical Matter

3rd Site Survey / Minutes of Discussion

Minutes of Discussions
on the Preparatory Survey
on the Project for Clean Energy Promotion Using Solar Photovoltaic System

The Government of Japan (hereinafter referred to as "GoJ") has established Cool Earth Partnership as a new financial mechanism. Through this, GoJ is cooperating actively with developing countries' efforts to reduce greenhouse gasses emissions, such as efforts to promote clean energy. A new scheme of grant aid, "Program Grant Aid for Environment and Climate Change ", was also created by GoJ as a component of this financial mechanism. According to the initiative of Cool Earth Partnership, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), in consultation with GoJ, decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") on the Project for Clean Energy Promotion Using Solar Photovoltaic System in Pakistan (hereinafter referred to as "the Project").

JICA sent to the Islamic Republic of Pakistan (hereinafter referred to as "Pakistan") the Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Mr. Tsutomu SHIMIZU, Senior Representative of JICA Pakistan Office, and is scheduled to stay in the country from 6th July to 11th July 2009.

The Team held discussions with the concerned officials of the Government of Pakistan (hereinafter referred to as "GoP") and conducted a field survey.

In the course of discussions and field survey, both sides confirmed the main items described in the attached sheets.

ISLAMABAD, 23 JULY, 2009

Mr. Tsutomu SHIMIZU
Leader
Preparatory Survey Team
Japan International Cooperation Agency
JAPAN

Mr. Ghulam Muhammad Mahar
Deputy Secretary (ADB/Japan)
Economic Affairs Division

Mr. Parvez Butt HI, SI
Member (Energy)
Planning Commission

Engr. Senator Rukhsana Zuberi
Chairperson
Pakistan Engineering Council

ATTACHMENT

1. Current Situation

GoP has been suffered by the shortage of the power supply. These days the power supply is only for 18-19 hours to the household in the big cities and 12 hours or so in rural areas.

As one of the solutions, GoP has taken the initiative to introduce Solar Energy for the purpose of increasing public awareness to popularize it in the country.

GoP encourages the implementation of Solar Photovoltaic System by means of, for example, Prime Minister's Initiative, introducing Tax Free for Solar Power Equipment etc.

2. Objective of the Project

The objective of the Project is to promote clean energy utilization and achieve emissions reductions by installing the photovoltaic system to be connected to the national grid.

3. Responsible Organization and Implementing Agency

The responsible organization is Planning Commission (hereinafter referred to as "PC"). (The organization chart of the responsible ministry is shown in Annex-1.)

The implementing agency is Pakistan Engineering Council (hereinafter referred to as "PEC"). (The organization chart of the implementing organization is shown in Annex-2.)

4. Items Requested by the Government of Pakistan

4-1. After discussions with the Team, the installation of the on-grid power generating system using photovoltaic including following equipment was requested by the Pakistan side.

(1) Solar module (panel) total capacity might be around 150 kw
(2) Junction Box
(3) Power Conditioner
(4) Transformer
(5) Data collecting and display device

4-2. The Pakistan side recommended the following sites as a candidate site/facility for installation of the system, (1)"P" block Pak Secretariat / PC, (2) PEC.

4-3. The Pakistan side explained that there is no duplication between requested contents of the Project and any other plans implemented by the other donors or the Pakistan side.

4-4. The Pakistan side has understood that the final component and the design of the Project shall be determined (confirmed) at the timing of 2nd phase of the Preparatory Survey.

4-5. The Team will report the findings and items requested by the Pakistan side to JICA Headquarters and the GoJ.

5. Japan's Program Grant Aid for Environment and Climate Change

The Pakistan side understood the Japan's Program Grant Aid for Environment and Climate Change scheme explained by the Team, (as described in Annex-3, 4, 5 and 6)

6. Schedule of the Study

6-1. The Team will proceed to further survey in Pakistan until 17th July 2009 as the 1st phase of the Preparatory Survey.

6-2. After the completion of the 1st phase of the Preparatory Survey, the Team will report the results to JICA Headquarters and GoJ.

6-3. If the Cabinet will approve the Project based on the results of the 1st Preparatory Survey, JICA will conduct the 2nd phase of Preparatory Survey for the basic design.

7. Other Relevant Issues

7-1 Major Undertakings to be taken by Each Government

Pakistan side confirmed that major undertakings as shown in Annex-7 should be taken by GoP at its own budget. In addition, GoP side should be responsible for the following issues;

(1) Securing necessary land
- for PV Modules
- for underground cables between PV Modules and Power Conditioners
- for Power Conditioners

(2) Temporary Stockyard during installation of the equipment and materials

(3) Vehicles for Operation and Maintenance

(4) Tables and PCs, if necessary

7-2 Land Acquisition Procedures

Pakistan side agreed to complete all necessary procedures for official land acquisition for the above 7-1 (1).

7-3 Procurement of Equipment

The Team explained that, in accordance with the policy of GoJ, products of Japan shall be procured for major equipment in the Project. The Pakistan side understood/agreed.

7-4 Coordination of the related Ministries and Agencies

The Responsible Organization for the Project shall be the focal point for the Team, and responsible for the coordination with related organizations.

7-5 Application of the Related Laws and Regulations

The Responsible Organization for the Project shall be responsible for the application of related laws and regulations for the operation of the Grid-Connected PV system before commissioning of the Project.

7-6 Applying JICA Environmental and Social Considerations Guideline

The Team explained the outline of JICA Environmental and Social Considerations Guideline (hereinafter referred to as "the JICA Guideline") to the Pakistan side. The Pakistan side took the JICA Guideline into consideration, and shall complete the necessary procedures

7-7 Property of Equipment and Materials

The Responsible Organization for the Project shall own the equipment and materials provided under the Project during and after implementation of the Project.

7-8 Operation and Maintenance

The Responsible Organization agreed to secure the necessary budget and personnel for the Operation and Maintenance of Grid-Connected PV system procured and installed under the Project.

7-9 Customs and Tax exemption

The Pakistan side agreed that the Pakistan side shall be responsible for the exemption and/or reimbursement(payment/assumption) of all customs, tax, levies and duties incurred in Pakistan for implementation of the Project.

7-10. The Pakistan side shall ensure the security of all concerned Japanese nationals working for the Project, if deemed necessary.

7-11. The Pakistan side shall provide necessary numbers of counterpart personnel to the Team during the period of their studies in Pakistan.

7-12 The Pakistan side shall submit all the answers to the Questionnaire, which the Team handed to the Pakistan side, by 17th July, 2009.

<List of Annex>

Annex-1 Organization Chart of PC (Responsible Organization)
Annex-2 Organization Chart of PEC (Implementing Agency)
Annex-3 Program Grant Aid for Environment and Climate Change
Annex-4 General Flow of Program Grant Aid for Environment and Climate Change
Annex-5 Project Implementation System
Annex-6 Flow of Funds for Project Implementation
Annex-7 Major Undertakings to be taken by Each Government
Annex-8 Terms of References of the Consultative Committee

Annex-I Organization Chart of PC

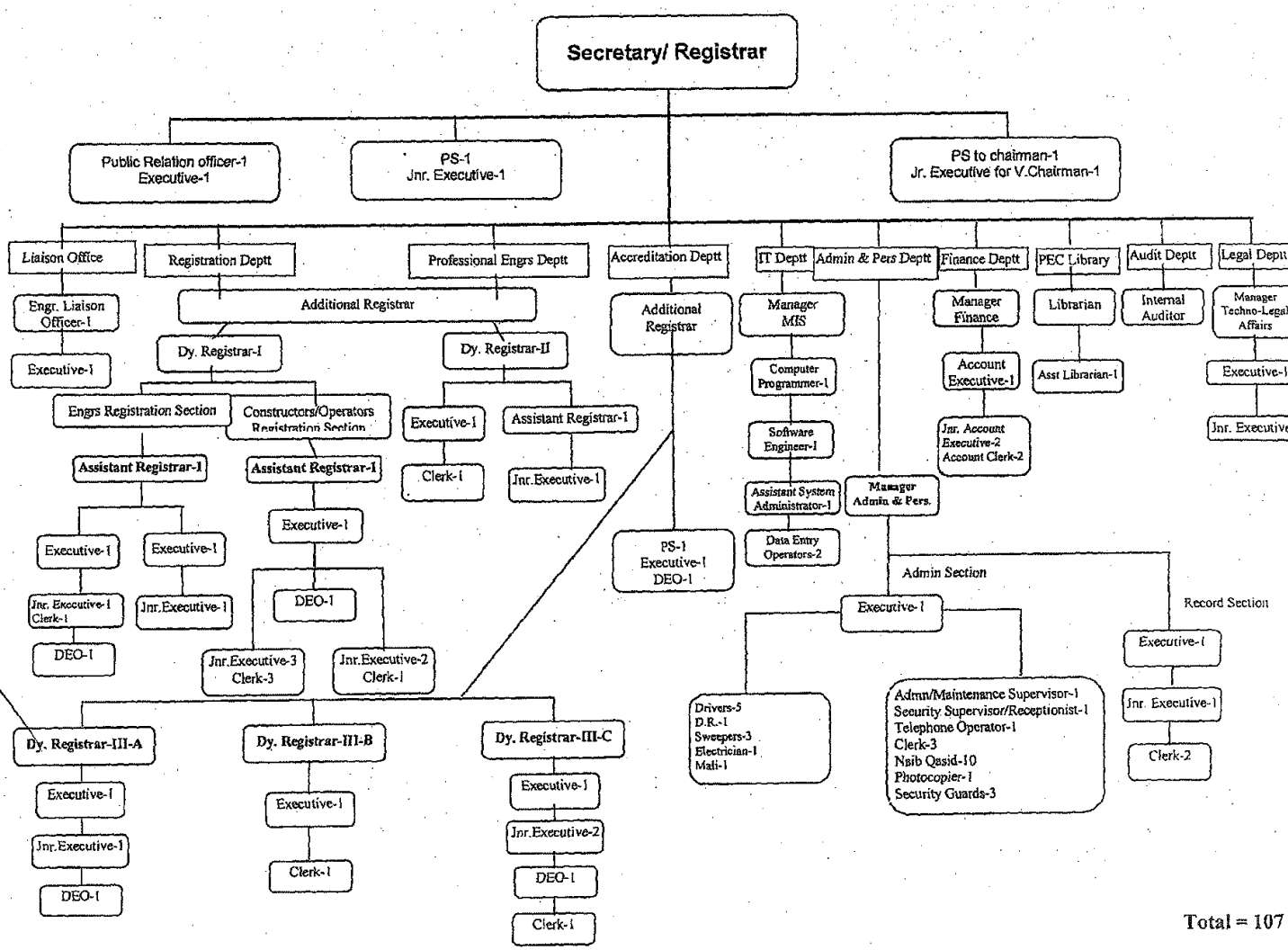
** Any other functions assigned by the Deputy Chairman

5/16

PROPOSED ORGANOGRAM OF PEC HQ

ISLAMABAD

Appendix-7
To Annex-G



Total = 107

Annex-2 Organization Chart of PEC

Annex – 3

Program Grant Aid for Environment and Climate Change of the Government of Japan
(Provisional)

The Grant Aid provides a recipient country (hereafter referred to as "the Recipient") with non-reimbursable funds to procure the facilities, equipment, and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

Based on "Cool Earth Partnership" initiative of the Government of Japan, the Program Grant Aid for Environment and Climate Change (hereafter referred to as "GAEC") aims to mitigate effects of global warming by reducing GHGs emission (mitigation; e.g. improvement of energy efficiency) and to take adaptive measures (adaptation; e.g. measures against disasters related to climate change, including disaster prevention such as enhancing disaster risk management).GAEC may contain multiple components that can be combined to effectively meet these needs.

1. Procedures for GAEC

GAEC is executed through the following procedures.

Preparatory Survey 1	Preparatory Survey for projects identification conducted by Japan International Cooperation Agency (JICA)
Application	Request made by a recipient country
Appraisal & Approval	Appraisal by the Government of Japan and Approval by the Cabinet
Determination of Implementation	The Notes exchanged between the Government of Japan and the Recipient Country
Grant Agreement (hereinafter reffered to as the "G/A")	Agreement concluded between JICA and the Recipient
Preparatory Survey 2	Preparatory Survey for design conducted by JICA
Implementation	Procurement through the Procurement Agency by the Recipient

Firstly, if the candidate project for a GAEC is identified by the Recipient and the Government of Japan, the Government of Japan (the Ministry of Foreign Affairs) examines it whether it is eligible for GAEC. When the request is deemed appropriate, JICA, in consultation with the Government of Japan, conducts the Preparatory Survey (hereafter referred to as "the Survey") on the candidate project as Phase 1 of the Survey with Japanese consulting firms.

Secondly, the Recipient submits the official request to the Government of Japan, while the appropriateness, necessity and the basic components of the project are examined in the course of Phase 1 of the Survey,

Thirdly, the Government of Japan appraises the project to see whether it is suitable for Japan's GAEC, based on the Survey report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Annex – 3

Program Grant Aid for Environment and Climate Change of the Government of Japan
(Provisional)

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Thirdly, the Government of Japan appraises the project to see whether it is suitable for Japan's GAEC, based on the Survey report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Governments of Japan and the Recipient.

Fifthly, JICA engages Grant Agreement (G/A) with the Recipient and executes the Grant by making payments of the amount agreed in the E/N and strictly monitors that the funds of the Grant are properly and effectively used.

Procurement Management Agent is designated to conduct the procurement services of products and services (including fund management, preparing tenders, contracts) for GAEC on behalf of the Recipient. The Agent is an impartial and specialized organization that will render services according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the Agreed Minutes ("A/M").

2 Preparatory Survey

1) Contents of the Survey

The purpose of the Preparatory Survey (hereafter referred to as "the Survey"), conducted by JICA on a requested project (hereafter referred to as "the Project"), is to provide the basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Survey are as follows:

- Confirmation of background, objectives, and benefits of the Project and institutional capacity of agencies and communities concerned of the Recipient necessary for project implementation.
- Evaluation of relevance of the Project to be implemented under the Grant Aid Scheme for Environment and Climate Change from a technical, social, and economic point of view.
- Confirmation of items agreed upon by both parties concerning the basic concept of the Project.
- Preparation of the design of the Project and reference document for tender.
- Estimation of cost for the Project.

The contents of the original request will be modified, as found necessary, in the design of the Project according to the guidelines of Japan's Grant Aid scheme.

The Government of Japan requests the Government of the Recipient to take whatever measures necessary to ensure its responsibility in implementing the Project. Such measures must be guaranteed even if they may fall outside the jurisdiction of the implementing organization of the Recipient. This has been confirmed by all relevant organizations of the Recipient through the Minutes of Discussions.

2) Selection of consulting firms

For the smooth implementation of the Survey, JICA will conduct the Survey with registered consulting firms. JICA selects the firms based on proposals submitted by firms with interest in implementing the Survey. The firms selected will carry out the Preparatory Survey and prepare a report, based on the terms of reference set by JICA.

3. Implementation of GAEC after the E/N

1) Exchange of Notes (E/N)

The content of GAEC will be determined in accordance with the Notes exchanged by the two

Governments concerned, in which items including, objectives of the project, period of execution, conditions and amount of the Grant Aid are confirmed.

2) Details of Procedures

Details of procedures on procurement and services under GAEC will be agreed between the authorities of the two governments concerned at the time of the signing of the G/A.

Essential points to be agreed are outlined as follows:

a) JICA will supervise the implementation of the Project.
b) Products and services will be procured and provided in accordance with JICA's "Procurement Guidelines for the Program Grant Aid for Environment and Climate Change."
c) The Recipient will conclude a contract with the Agent.
d) The Agent is the representative acting in the name of the Recipient concerning all transfers of funds to the Agent.

3) Focal points of "Procurement Guidelines for the Program Grant Aid for Environment and Climate Change"

a) The Agent

The Agent is the organization, which provides procurement of products and services on behalf of the Recipient according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the A/M.

b) Agent Agreement

The Recipient will conclude the Agent Agreement, in principle, within two months after the signing of the G/A, in accordance with the A/M. The scope of the Agent's services will be clearly specified in the Agent Agreement.

c) Approval of the Agent Agreement

The Agent Agreement is prepared as two identical documents and the copy of the Agent Agreement will be submitted to JICA by the Recipient through the Agent. JICA confirms whether the Agent Agreement is concluded in conformity with the E/N, A/M, and G/A and the Procurement Guidelines for the Program Grant Aid for Environment and Climate Change then approves the Agent Agreement.

The Agent Agreement concluded between the Recipient and the Agent will become effective after the approval by JICA in a written form.

d) Payment Methods

The Agent Agreement will stipulate that "Regarding all transfers of the fund to the Agent, the Recipient will designate the Agent to act on behalf of the Recipient and issue a Blanket Disbursement Authorization ("the BDA")to conduct the transfer of the fund (hereinafter referred to as "the Advances") to the Procurement Account from the Recipient Account.

The Agent Agreement will clearly state that the payment to the Agent will be made in Japanese yen from the Advances and that the final payment to the Agent will be made when the total remaining amount become less than three percent (3%) of the Grant and its accrued interests excluding the Agent's fees.

e) Products and Services Eligible for Procurement

Products and services to be procured will be selected from those defined in the G/A.

f) Selection of firms

In principle, firms of any nationality could be contracted as long as the firms satisfy the conditions specified in the tender documents.

The same applies for any individual consultants who will be involved in the Project and provide services necessary for the training and guidance related to the Project.

The consultants that will be employed to do detail design and supervise the work for the Project, however will be in principle, Japanese nationals recommended by JICA for the purpose of maintaining technical consistency with the Study.

g) Method of Procurement
When conducting the procurement, sufficient attention will be paid to transparency in selecting the firms and for this purpose, competitive tendering will be employed in principle.

h) Tender Documents
The tender documents should contain all information necessary to enable tenderers to prepare valid offers for the products and services to be procured by GAEC.

The rights and obligations of the Recipient, the Agent and the firms supplying products and services should be stipulated in the tender documents to be prepared by the Agent. Aside from this, the tender documents will be prepared in consultation with the Recipient.

i) Pre-qualification Examination of Tenderers
The Agent may conduct a pre-qualification examination of tenderers in advance of the tender so that the invitation to the tender can be extended only to eligible firms. The pre-qualification examination should be performed only with respect to whether the prospective tenderers have the capability of concluding the contracts.

For this, the following points should be taken into consideration:
(1) Experience and past performance in contracts of similar kind
(2) Financial credibility (including assets such as real estate)
(3) Existence of offices and other items to be specified in the tender documents.
(4) Their potentialities to use necessary personnel and facilities.

j) Tender Evaluation
The tender evaluation should be implemented on the basis of the conditions specified in the tender documents.

Those tenderers which substantially conform to the technical specifications and other stipulations of the tender documents, will be judged in principle on the basis of the submitted price, and the tenderer who offers the lowest price will be designated as the successful tenderer.

The Agent will submit a detailed evaluation report of tenders to JICA for its information, while the notification of the results to the tenderers will not be premised on the confirmation by JICA.

k) Additional procurement
If there is any remaining balance after the competitive and/or selective tendering and/or direct negotiation for a contract, and if the Recipient would like to procure additional items, the Agent is allowed to conduct this additional procurement, following the points mentioned below:
(1) Procurement of same products and services

When the products and services to be additionally procured are identical with the initial tender and a competitive tendering is judged not efficient, additional procurement can be conducted by a negotiated contract with the successful tenderer of the initial tender.

(2) Other procurements
When products and services other than those mentioned above in (1) are to be procured, the procurement should be conducted through competitive tendering. In this case, the products and services for additional procurement will be selected from among those in accordance with the G/A.

l) Conclusion of the Contracts
In order to procure products and services in accordance with the guideline, the Agent will conclude contracts with firms selected by tendering or other methods.

m) Terms of Payment
The contract will clearly state the terms of payment. The Agent will make payment from the "advances," against the submission of the necessary documents from the firm on the basis of the conditions specified in the contract. When the services are the object of procurement, the Agent may pay certain portion of the contract amount in advance to the firms on the conditions that such firms submit the advance payment guarantee worth the amount of the advance payment to the Agent.

4) Undertakings required by the Government of the Recipient Country
In the implementation of the Grant Aid Project, the Recipient is required to undertake necessary measures as the following:

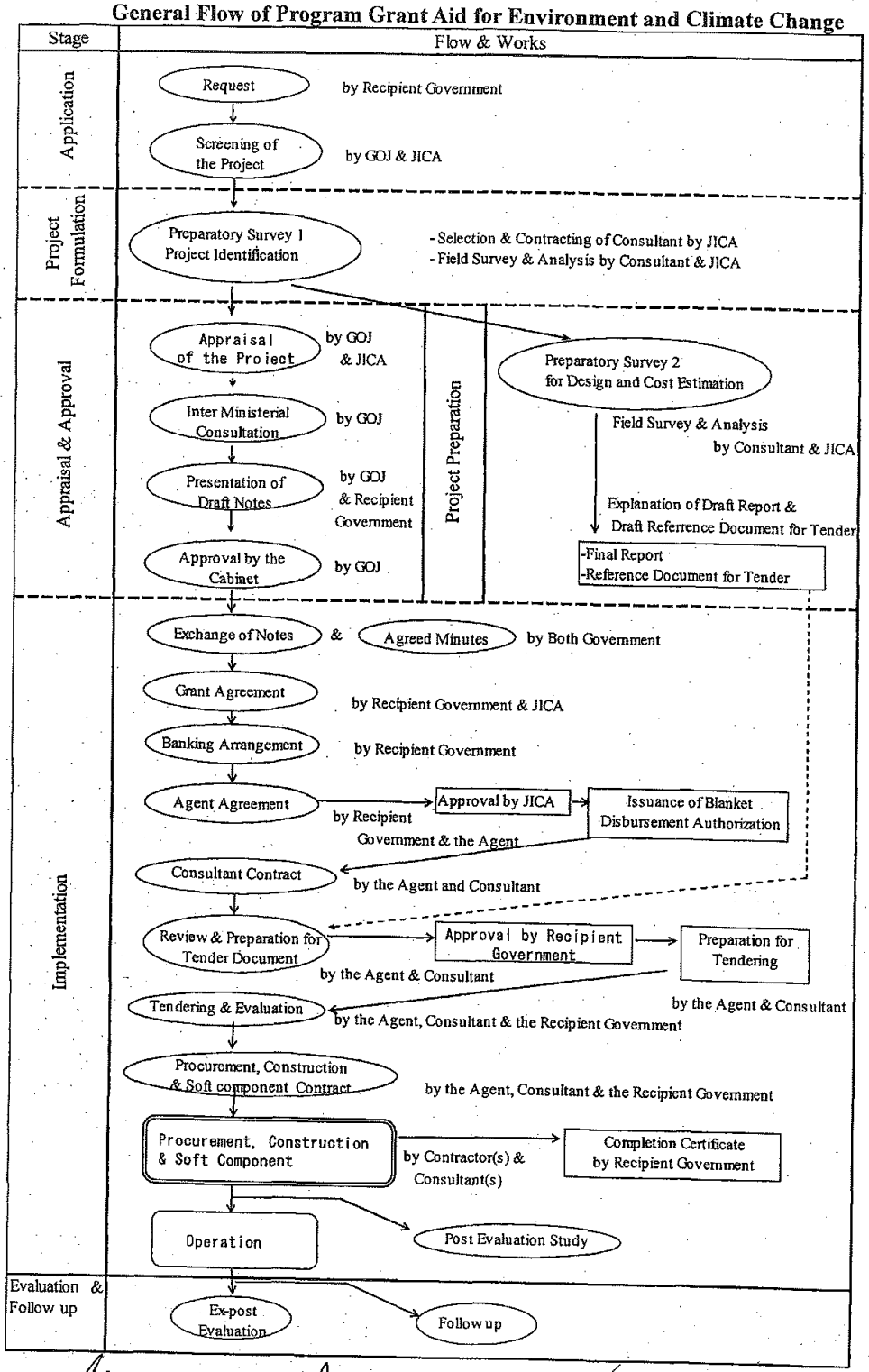
a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the Project.
b) To provide facilities for distributing electricity, water supply and drainage and other incidental facilities in and around the sites.
c) To ensure prompt execution for unloading and domestic transportation, and all the expense for customs clearing at the port of disembarkation of products purchased under the Grant Aid,
d) To ensure that customs duty, internal taxes and other fiscal levies that may be imposed in the Recipient with respect to the purchase of the Components and the Agent's services will be exempted by the Government of the Recipient.
e) To accord all the concerned parties, whose services may be required in connection with supply of the products and services under the contracts, such facilities as may be necessary for their entry into the Recipient and stay therein for the performance of their work.

5) "Proper use of funds"
The Recipient is required to operate and maintain the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign personnel necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

6) "Export and Re-export" of products
The products purchased under the Grant and its accrued interest will not be exported or re-exported from the Recipient.

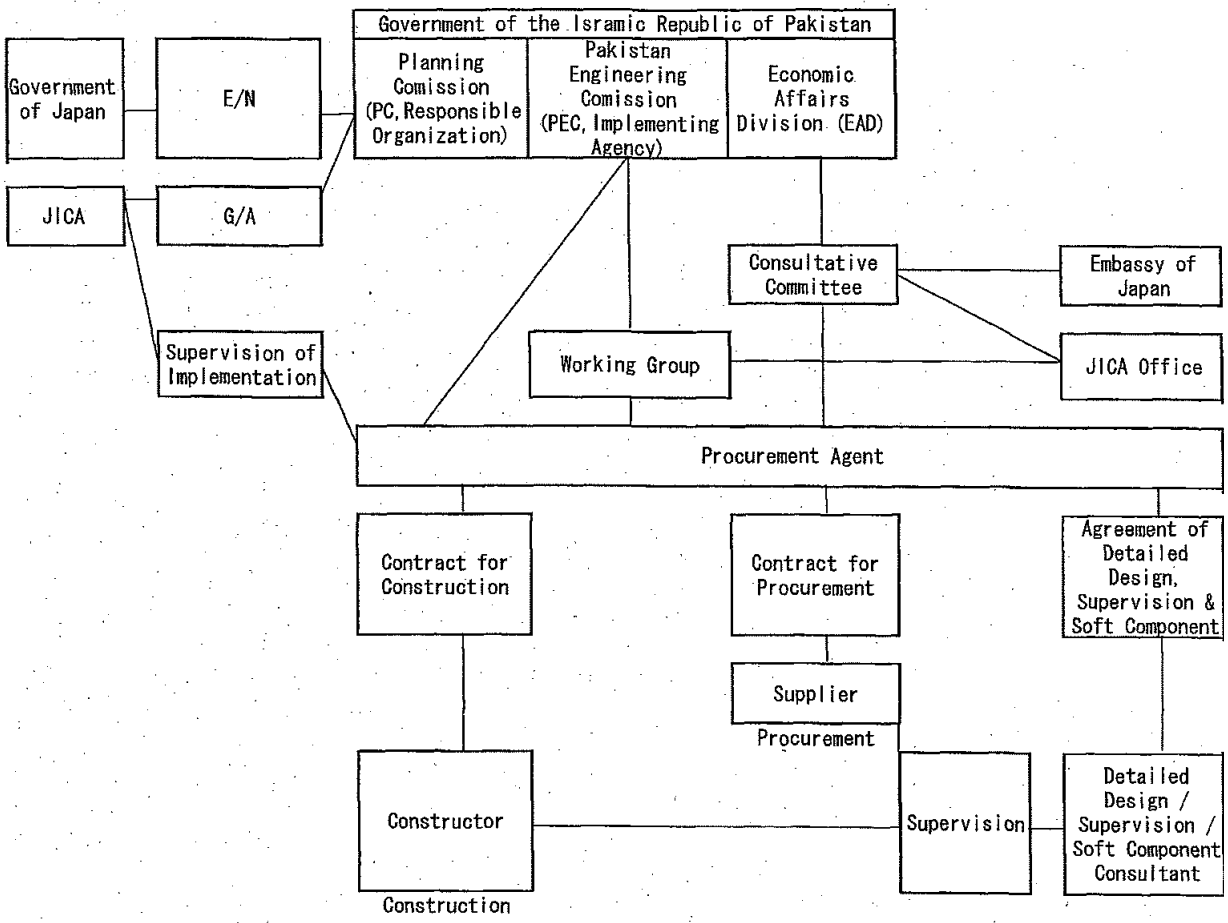
Annex-4

General Flow of Program Grant Aid for Environment and Climate Change

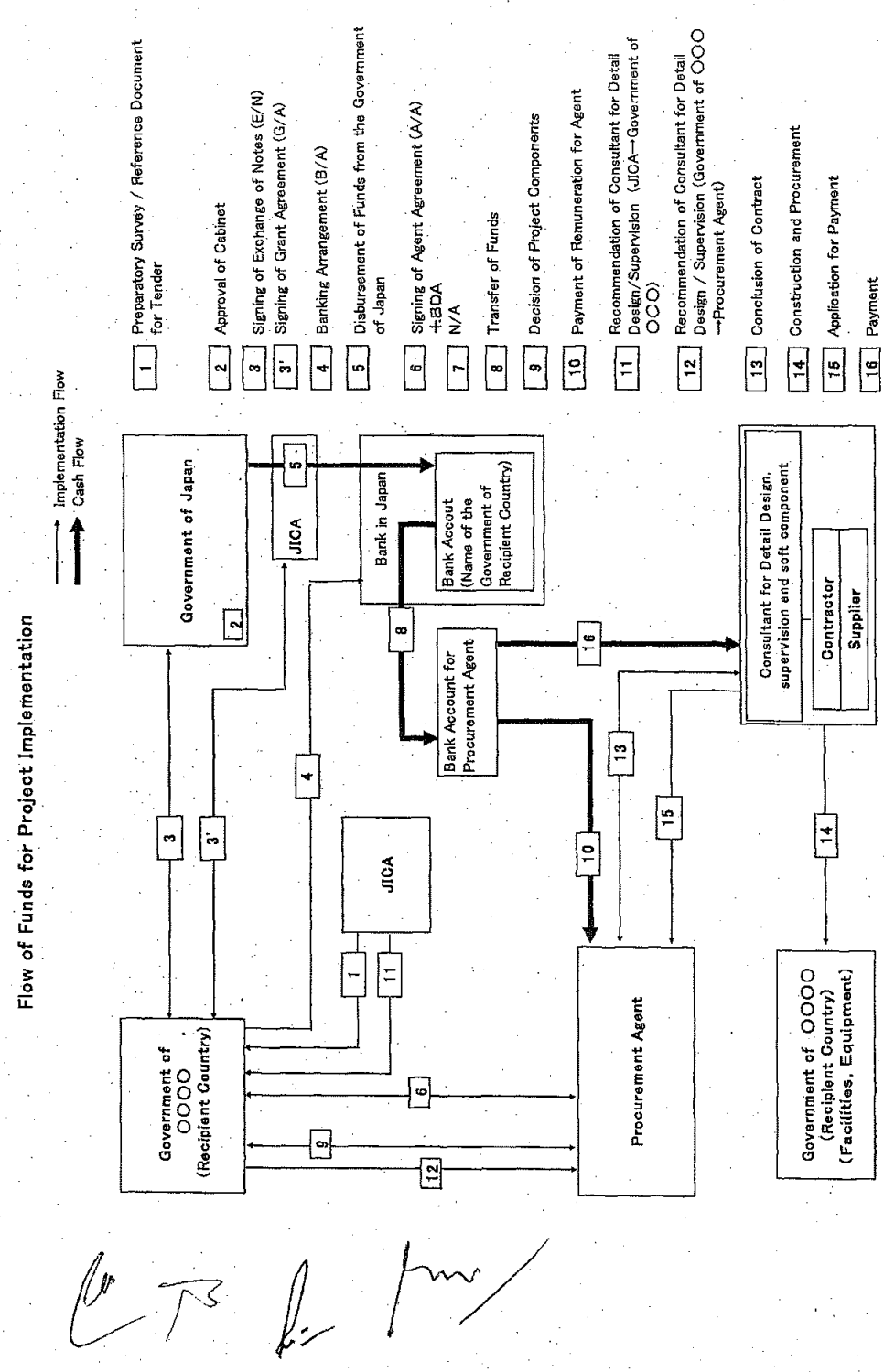


Annex-5

Project Implementation System



Annex-6


Flow of Funds for Project Implementation
Implementation Flow
Cash Flow
1 Preparatory Survey / Reference Document for Tender
2 Approval of Cabinet
3 Signing of Exchange of Notes (E/N)
3' Signing of Grant Agreement (G/A)
4 Banking Arrangement (B/A)
5 Disbursement of Funds from the Government of Japan
6 Signing of Agent Agreement (A/A) +:EDA N/A
7
8 Transfer of Funds
9 Decision of Project Components
10 Payment of Remuneration for Agent
11 Recommendation of Consultant for Detail Design/Supervision (JICA→Government of OOO)
12 Recommendation of Consultant for Detail Design / Supervision (Government of OOO →Procurement Agent)
13 Conclusion of Contract
14 Construction and Procurement
15 Application for Payment
16 Payment
Government of Japan
JICA
Bank in Japan
Bank Accout (Name of the Government of Recipient Country)
Bank Account for Procurement Agent
Consultant for Detail Design, supervision and soft component
Contractor
Supplier
Government of OOOO (Recipient Country)
JICA
Procurement Agent
Government of OOOO (Recipient Country) (Facilities, Equipment)

Annex-7

Major undertakings to be taken by each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure land		●
2	To clear, level and reclaim the site when needed urgently		●
3	To construct gates and fences in and around the site		●
4	To construct a parking lot if necessary		●
5	To construct roads		
	1) Within the site	●	
	2) Outside the site and Access road		●
6	To construct the facility and install the equipment	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities if necessary:		
	1)Electricity		
	a. The power distribution line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer for the site	●	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	3) Drainage		
	a. The city drainage main (for conveying storm water, sewage, etc. from the site)		●
	b. The drainage system within the site (for sewage, ordinary waste, storm water, etc.)	●	
	4) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
8	To bear the following commissions applied by the bank in Japan for banking services based upon the Bank Arrangement (B/A):		
	1) Payment of bank commission		●
9	To ensure all the expense and prompt execution of unloading and customs clearance at the port of disembarkation in the recipient country		
	1) Marine or air transportation of the products from Japan or third countries to the recipient	●	
	2) To ensure prompt execution for unloading and domestic transportation, and all the expense for customs clearing and tax exemption at the port of disembarkation of products purchased under the Grant Aid		●
	3) Internal transportation from the port of disembarkation to the project site	●	
10	To accord Japanese nationals and / or nationals of third countries, including persons employed by the agent whose services may be required in connection with the Components such facilities as may be necessary for their entry into recipient country and stay therein for the performance of their work.		●
11	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the Components and to the employment of the Agent will be exempted by the Government of recipient country		●
12	To maintain and use properly and effectively the facilities that are constructed and the equipment that is provided under the Grant.		●
13	To bear all the expenses, other than those covered by the Grant and its accrued interest, necessary for the purchase of the Components as well as for the agent's fees.		●
14	To ensure environmental and social consideration for the Programme.		●

Annex- 8

Terms of Reference of the Consultative Committee (Provisional)

1. To confirm an implementation schedule of the Programme for the speedy and effective utilization of the Grant and its accrued interest.

2. To discuss the modifications of the Programme, including modification of the design of the facility.

3. To exchange views on allocations of the Grant and its accrued interest as well as on potential end-users.

4. To identify problems which may delay the utilization of the Grant and its accrued interest, and to explore solutions to such problems.

5. To exchange views on publicity related to the utilization of the Grant and its accrued interest.

6. To discuss any other matters that may arise from or in connection with the G/A.

MEMORANDUM OF UNDERSTANDING ON TECHNICAL MATTER

FOR

PREPARATORY SURVEY ON THE PROJECT FOR CLEAN ENERGY PROMOTION USING SOLAR PHOTOVOLTAIC SYSTEM IN THE ISLAMIC REPUBLIC OF PAKISTAN

among
JICA Consultant Survey Team
and
Planning Commission
and
Pakistan Engineering Council

Islamabad
July 17, 2009

Mr. Tomoyasu Fukuchi
Team Leader,
JICA Consultant Survey Team
Nippon Koei Co., Ltd.

Mr. Zia ud Din Azhar
Chief,
Energy Information Systems &
Computer Section
Energy Wing, Planning Commission

Dr. Ashfaq Ahmed Sheikh
Deputy Registrar
Pakistan Engineering Council

The Consultant Survey Team (the Consultant Team) of the Japan International Cooperation Agency (JICA), which is headed by Mr. Tomoyasu FUKUCHI, continuously stayed in Islamabad after the official survey team of JICA left Islamabad on July 10, 2009 for the further survey on technical matter. The Consultant Team, Pakistan Engineering Council (PEC), and Planning Commission (PC) jointly conducted the further survey and discussed the technical matter of the Project for Clean Energy Promotion Using Solar Photovoltaic System (the Project). The three parties confirmed the mutual understanding on the Project as shown below. The Consultant Team will leave Islamabad on July 17, 2009.

1. **Installation Sites** : Photovoltaic (PV) panels will be installed in the following areas.

    i) On the roof of the parking of PC: PC site
    ii) The parking area existing in front of PEC: PEC site

    The parking allocated to PC is under control of PC. The parking area for PEC is the property of Capital Development Authority (CDA). PC and PEC will obtain the necessary permission and/or take the necessary procedure in due form for installation of PV system if required. The installation sites of PC and PEC are shown in Attachment-1 and -2, respectively.

2. **Installation Capacity** : The installation capacities of PV panel are shown below.

    i) at PC site: 100 kWp
    ii) at PEC site 100 kWp

    The Consultant Team will prepare the initial design of the Project based on the above installation capacity. The Consultant Team, however, will report the existence of the space in which it is available to install PV panel beyond the capacity of 100 kWp at each site to JICA.

3. **Grid Connection** : The PV system will be connected to the distribution line of Islamabad Electricity Supply Company Ltd (IESCO). The commitment for the PV system to be able to connect to the distribution line was given to the Consultant Team by Alternative Energy Development Board (AEDB) in the meeting with them held on July 15, 2009.

4. **Synchronization** : The PV system will be connected to 400 V, 3-phase distribution lines and synchronized with the ones both at PC site and PEC site. The PV system will be designed to supply electricity only when being synchronized with the grid electricity. The PV system will not be synchronized with any emergency and/or back-up power sources like the emergency diesel

generator of PEC.

5. **Stockyard** : The place of the stockyard to store the materials and equipment to be installed at the sites will be designated. The stockyard shall be secured good access, security, and space enough to work for loading and unloading, and inspection of them. The required space will be informed during the next site survey.

6. **License of Generation** : PC and PEC will obtain the license of generation from National Electricity Power Regulation Authority (NEPRA) immediately after the design of the PV system being finalized.

7. **Connection Agreement** : PC and PEC will have the agreement on connecting PV system to the distribution lines with IESCO immediately after the license of generation being obtained.

8. **Focal Point** : Dr. Ashfaq Ahmed Sheikh was designated as the focal point of the Preparatory Survey (the Survey). The focal point will coordinate PC, PEC, and all the other organizations concerned at practical working level for the Survey.

9. **Office Space** : The office space for the Consultant Team will be provided in PEC building in the next survey period: October to November 2009 for around one month. The office space will be equipped with working desk, meeting facilities, internet connections, copy machine, phone, and the other required equipment for daily works. The maximum number of the team members will be eight including local staff.

10. **Questionnaires** : The questionnaires are shown in Attachment-3. The answer of the questionnaires will be sent to Mr. J. M. Pradhan (cc to Mr. T. Fukuchi) by e-mail by the end of July, 2009. The e-mail addresses of them are shown below.

    Mr. J. M. Pradhan: jmpradhan51@yahoo.com
    Mr. T. Fukuchi: fukuchi-tm@n-koei.jp

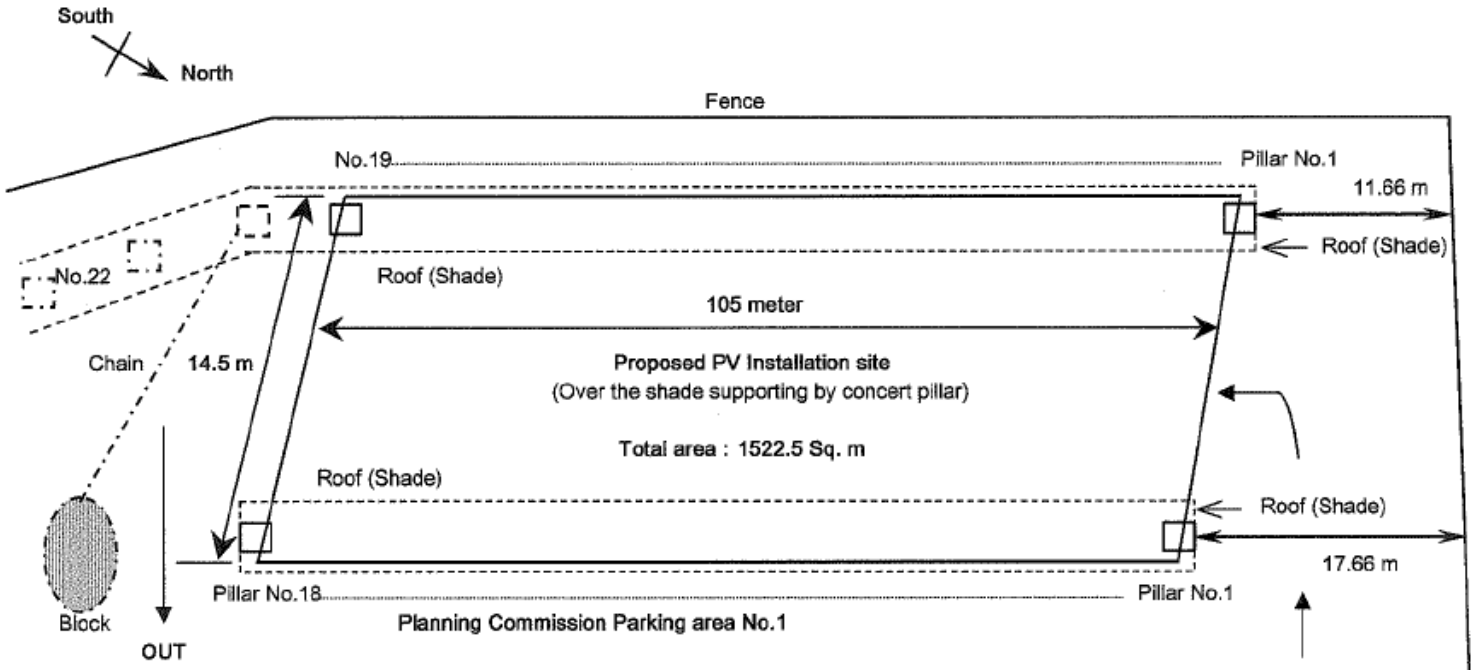
11. **Planning Commission Proforma-1 (PC-1)** : PC-1 of the Project was approved on July 17, 2009.

12. **Next Site Survey** : The next site survey is scheduled to be conducted from the end of October to the end of November 2009.

End

Attachment

1. Installation Site of PV System in Planning Commission
2. Installation Site of PV System in Pakistan Engineering Council
3. Questionnaires



Note :

1 Proposed PV installation capacity at ***Parking area No.1 : 100 kWp***
2 Additional area available at ***Parking area No.2 : 857.6 Sq. m***
3 Possible PV Capacity instalation at ***Parking area No.2 : 55 kWp***
4 Additional area available at ***Parking area No.3 : 1728.6 Sq. m***
5 Possible PV Capacity instalation at ***Parking area No.3 : 110 kWp***
6 Total PV capacity (Proposed + Possible) : ***265 kWp max***

& Existing concrete pillar

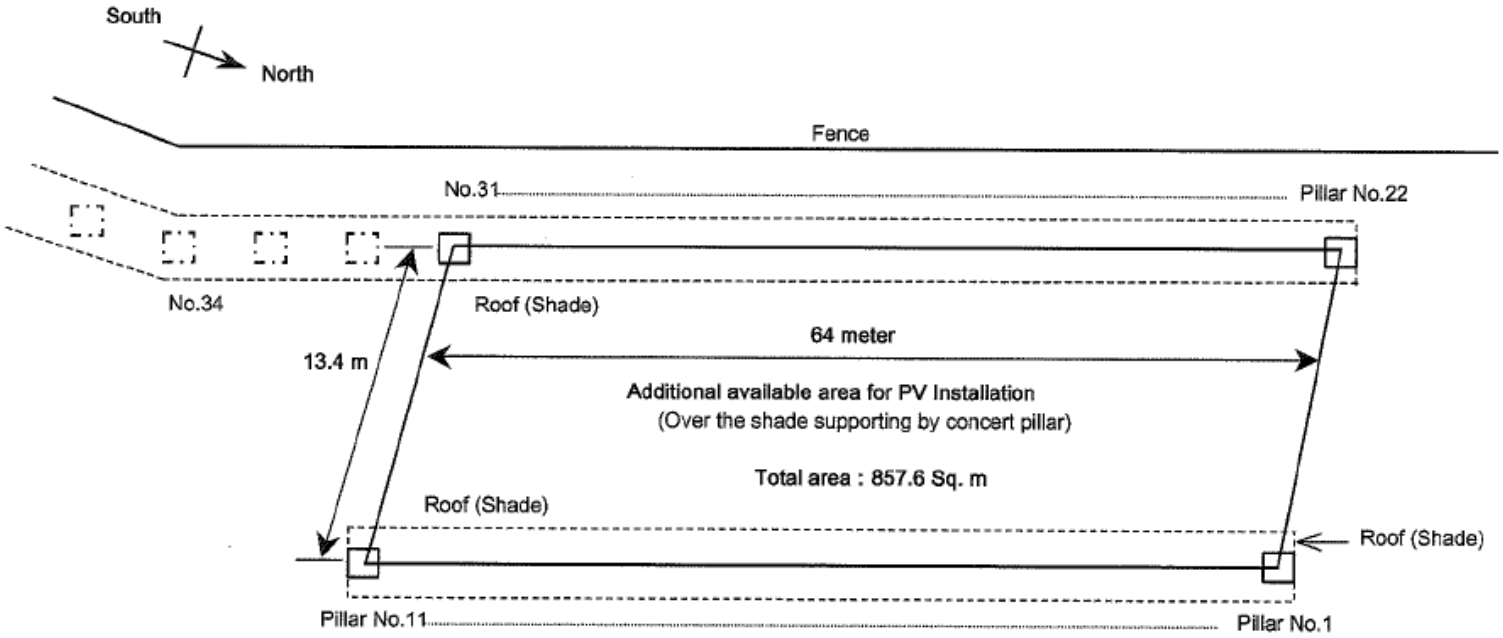
Existing roof of car parking

Available space for installation

Figures are not in scale

Installation Site of PV Syastem in Planning Commission (1/3)

Attachment 1-1



Planning Commission Parking area No.2

Note :

1 Additional space available at Parking area No.2 : 857.6 Sq. m

2 Possible PV Capacity installation : 55 kWp

& Existing concrete pillar

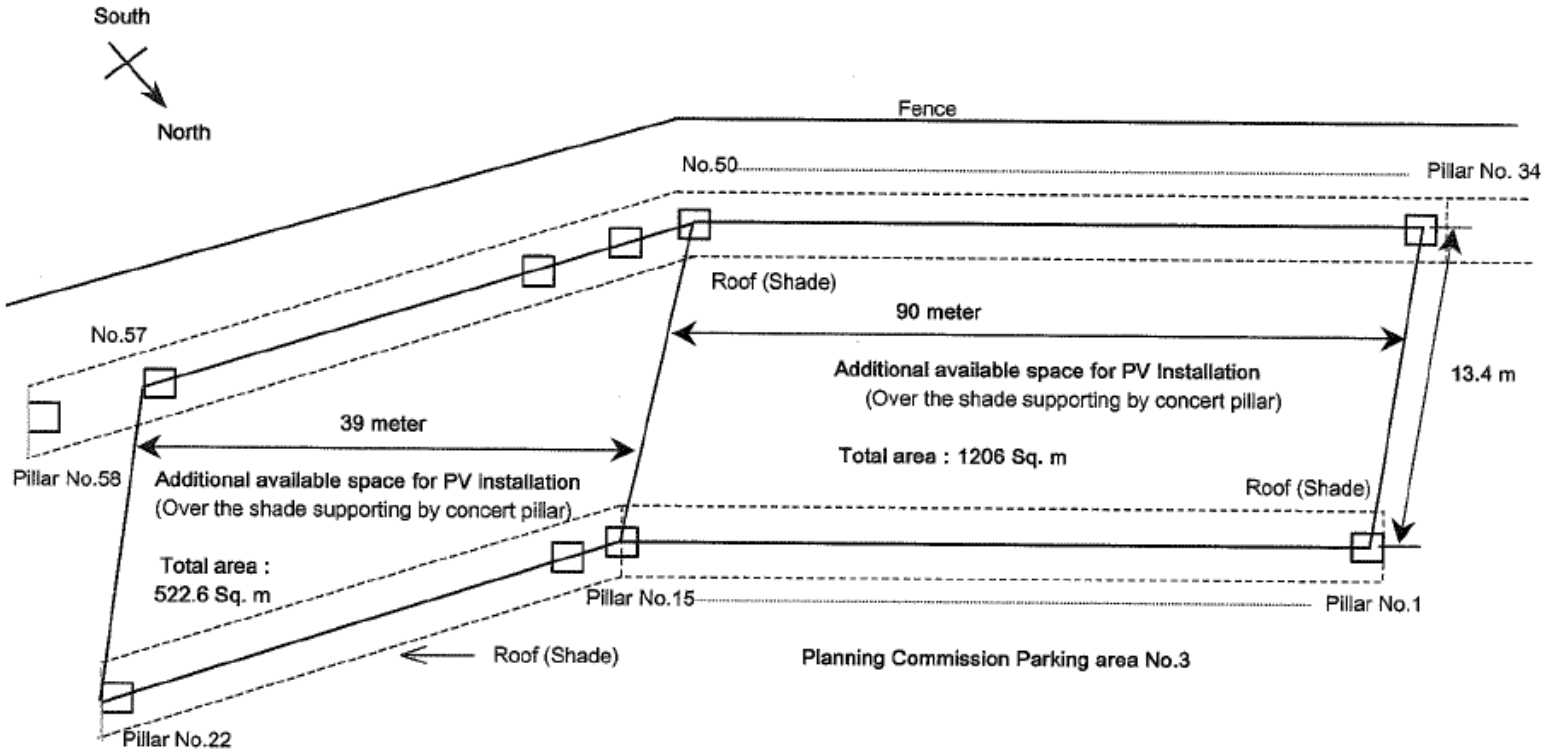
Existing roof of car parking

Available space for expansion

Figures are not in scale

Installation Site of PV System in Planning Commission (2/3)

Attachment 1-2



Note :

1 Additional area available at No.3 Parking : **1728.6 Sq. m**

2 Possible PV Capacity instalation : **110 kWp**

& Existing concrete pillar

Existing roof of car parking

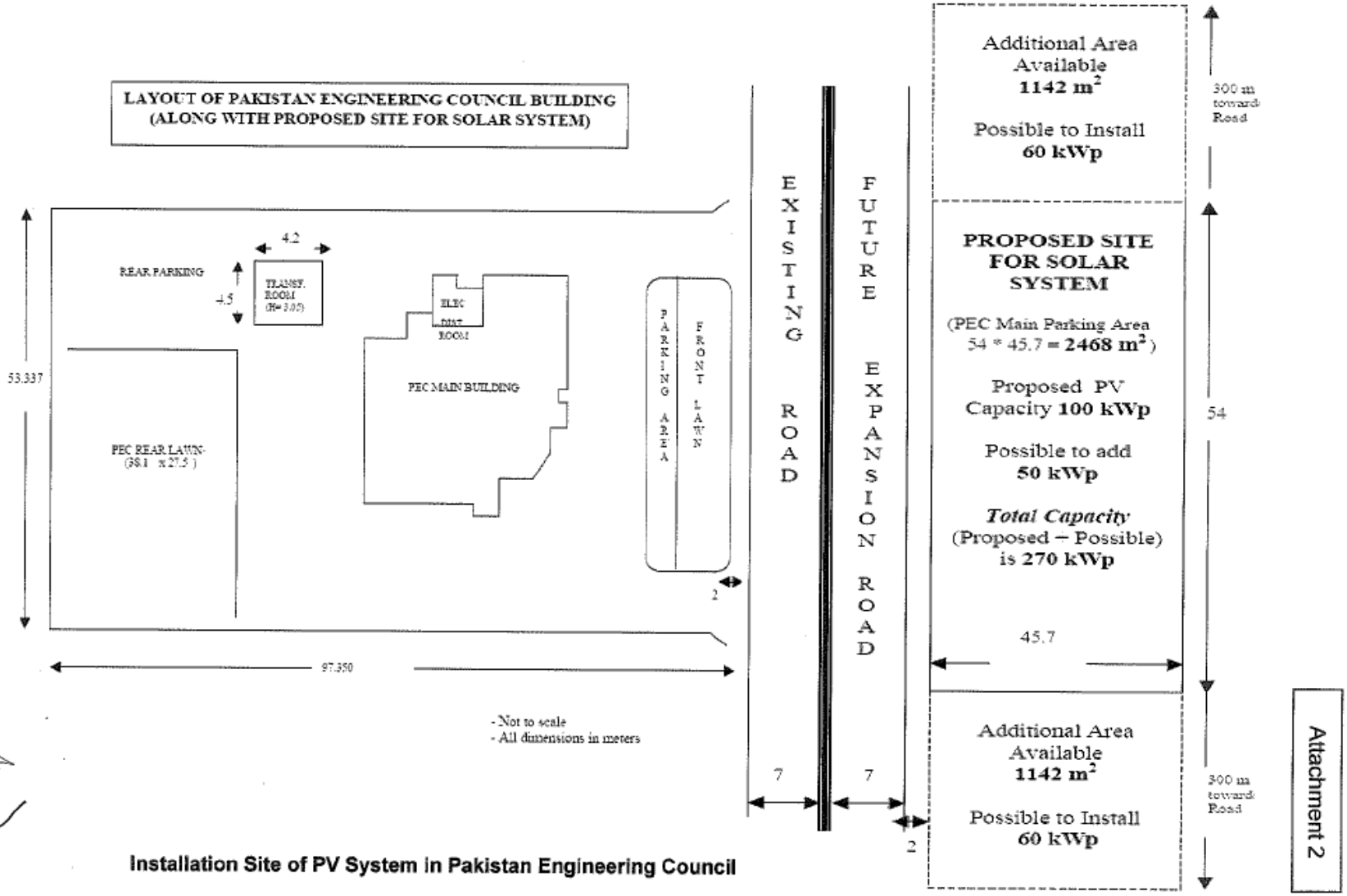
Available space for expansion

Figures are not in scale

Installation Site of PV System in Planning Commission (3/3)

Attachment 1-3

LAYOUT OF PAKISTAN ENGINEERING COUNCIL BUILDING
(ALONG WITH PROPOSED SITE FOR SOLAR SYSTEM)



Installation Site of PV System in Pakistan Engineering Council

Attachment 2

Attachment-3

Ver : 7/17/2009

QUESTIONNAIRES

(INFORMATION REQUIRED FROM PAKISTAN)

A. ACTS, REGULATIONS , RULES:

From Line Ministry MOWP/NEPRA/PC

1. Policy and Strategies of Power sector
2. Legislative and Regulatory frame work related to Power Sector like: Electricity act, Regulations etc

From IESCO/NEPRA

3. Distribution Construction Standard i.e. document is mandatory guide line for construction of distribution system.

From NTDC/NEPRA

4. Transmission Construction Standard i.e. document is mandatory guide line for construction of transmission system.

B. INFORMATION RELATED TO POWER PURCHASE AGREEMENT:

From NEPRA/AEDB

1. Guide line for PPA application.
2. Typical PPA document (preferably for PV cell if exists or Wind power)
3. Typical connection arrangement (schematic diagram with equipments, protection, metering scheme) required for the PPA for reference
4. Type of meters, accuracy class etc required at connection point.
5. Any other mandatory and specific requirement for the connection agreement switching , protection etc at connecting point with IESCO.
6. If there is any embedded generator connected to distribution system i.e. at 11kV, or 400V, please provide the typical connection diagram for reference.
7. Electricity Tariff Of IESCO for PC/PEC
8. Operation code and terms and condition by IESCO for supply and buy to PC/PEC
9. Type of PPA agreement : With net metering if exists

The Consultant Survey Team (the Consultant Team) of the Japan International Cooperation Agency (JICA), which is headed by Mr. Tomoyasu FUKUCHI, conducted the 2nd site survey form October 22nd to today and continues to 25th November 2009. As the result of the 2nd site survey the Consultant Team, Pakistan Engineering Council (PEC), and Planning Commission (PC) discussed and confirmed the following matters.

1. Installation Sites : Photovoltaic (PV) panels will be installed in the following areas.
   i) On the structure to be erected covering existing roof and space between the parking of PC: PC site
      The new installation of frame structure will maintain the almost same height of present existing roof.

   ii) On the structure to be erected at existing parking area in front of PEC building, crossing over the existing road in front of PEC: PEC site.
      The height of the erected structure frame shall be 2500mm in an average from ground level.

   Over view of PV array installation plan at PC and PEC sites are shown in Attachment-1 and -2, respectively.

2. Power Generation License : From the NEPRA Act, what ever the capacity of generation, transmission and distribution be, if connection for distribution or supply is there, it is mandatory to get license from NEPRA. From this by the regulation, PC and PEC shall apply and get license from NEPRA for power generation.

3. Interconnection Voltage and Energy Meter : The PV power generation system will interconnect with existing system of PEC and PC at secondary side of existing transformer with 3 phase 4 wire, 400V. The bidirectional LT CDP (Common Delivery Point) Energy Meter will be installed at LT 400V side of existing transformer at both sites. PC and PEC are confirming the detail specification of Energy meter from NTDC.

4. Grid connection MOU between IESCO and PEC/PC : PEC and PC will sign MOU with IESCO after signing E/N. For this, JICA survey team will provide information of technical matter related to PV power generation system and interconnection to IESCO grid.

5. Synchronization : The PV system will be connected to 400 V, 3-phase LT distribution lines and synchronized with the ones both at PC and PEC site, and will be designed to supply electricity only when being synchronized with the grid electricity. The PV system will not be synchronized with any emergency and/or back-up power sources like the emergency diesel generator of PEC.

6. **Soil Resistivity data :** The soil resistivity data measured at PC and PEC sites will be provided to JICA survey team until 24th November for PV power generation system deigning purpose.

7. **Custom Clearances :** The Statutory Rules and Orders (S.R.O.) notification on 9th June, 2007 explains that the items with dedicated use of solar energy namely, equipment and components for Solar Home System is exempted on one time basis for setting up of new project expansion, and it is subject to certification by Alternative Energy Development Board (AEDB). From this, for tax exemption PC and PEC will apply to the Ministry of Finance, Revenue and Economic Affairs, Revenue Division and if any tax is required, will be arranged by PC and PEC.

8. **Land Clearance of PV installation sites :** The land clearing and leveling, and removal of trees inside PV installation site shall be done after signing E/N. If in case the trees required to be destroyed then, at least same number of trees should be planted at appropriate site. The removal or trimming of other trees around the PV installation site should be done at the time of construction period. All required work related to land clearance and trees, will be arranged by PC and PEC.

9. **Fencing and Security of Project sites :** After installation if required, fencing and security system for PV as well as electrical equipment/instrument installation site, will be arranged by PC and PEC.

10. **Excavation and rebuilding of road :** For cabling and piping, road as well as ground excavation is required at both PC and PEC sites. For this necessary approval/permission for the excavations from concerned agency/department and management of parking at the time of installation will be arranged by PC and PEC.

11. **Stockyard :** The place of the stockyard to store the materials and equipment to be installed at the sites will be designated. The stockyard shall be secured good access, security, and space enough to work for loading and unloading, and inspection of them. The required space will be informed after finalization of procurement documents by JICA survey team.

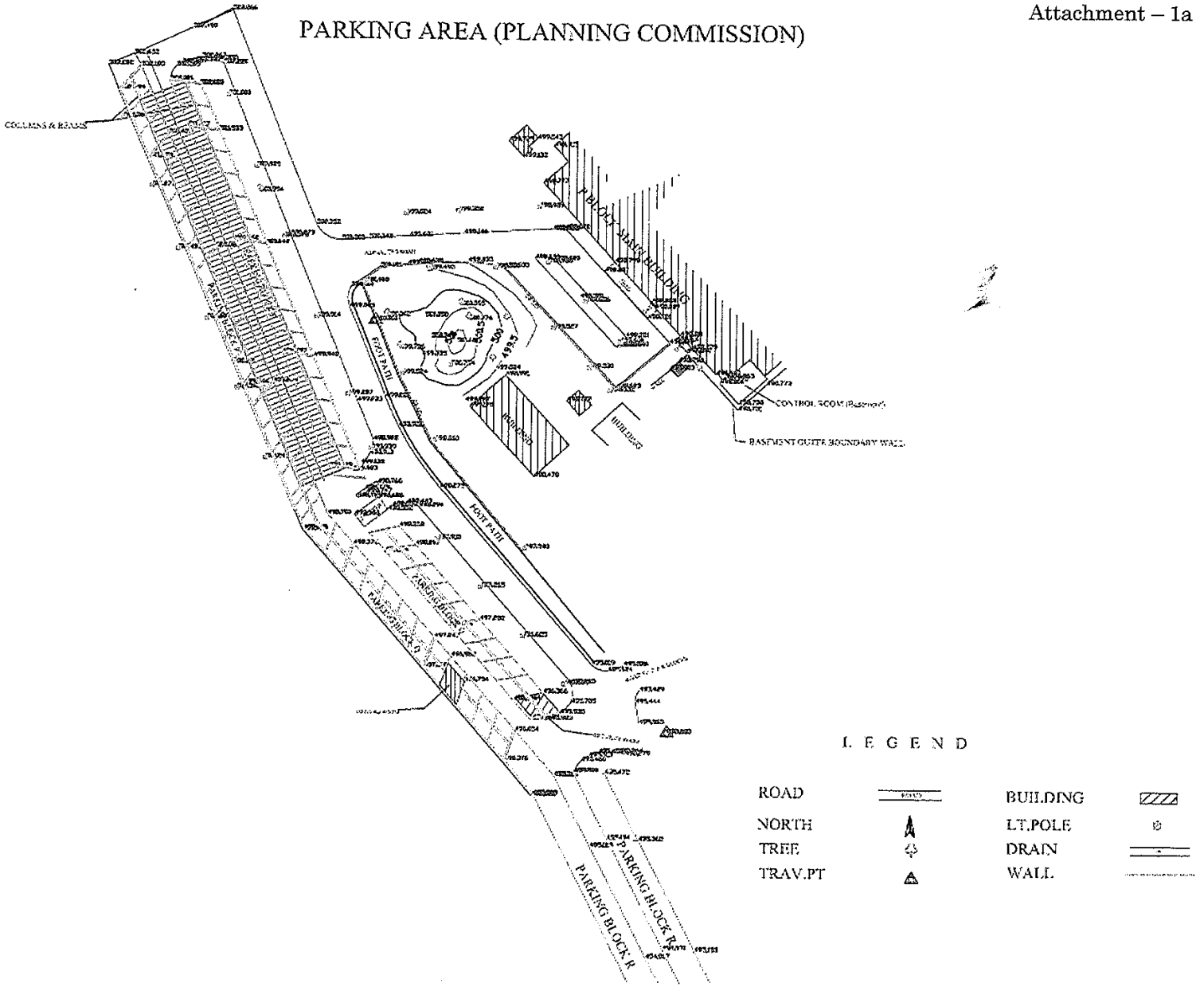
End

Attachment

1. Overview of PV array installation at Planning Commission (PC)
2. Overview of PV array installation at Pakistan Engineering Council (PEC)

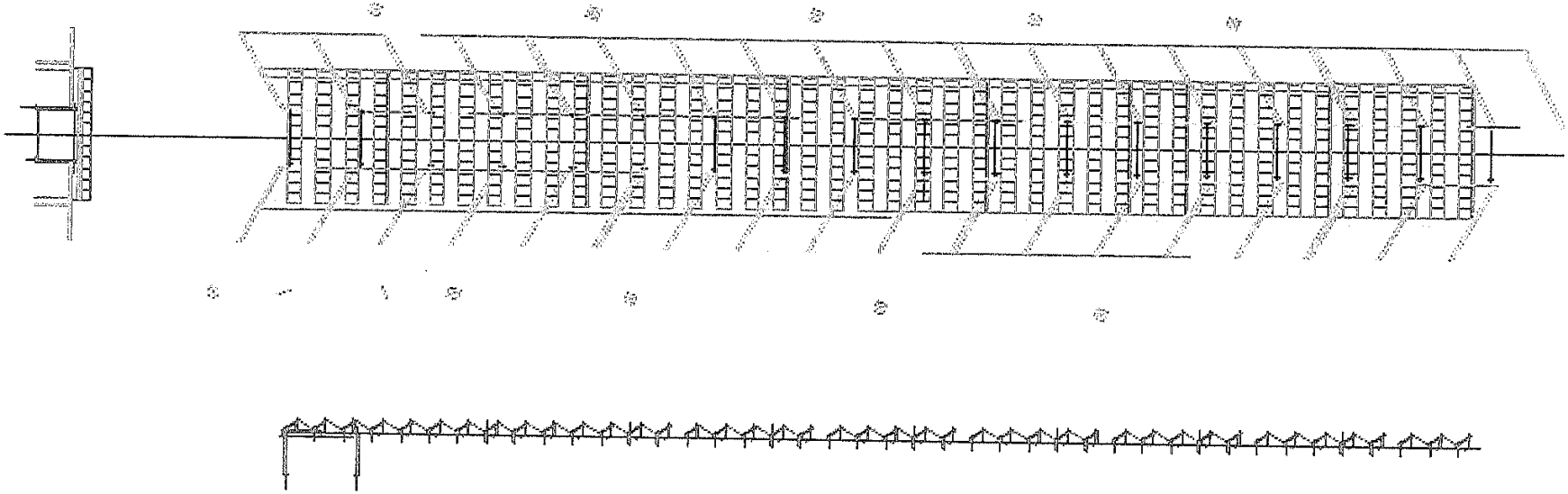
Attachment – 1a

PARKING AREA (PLANNING COMMISSION)



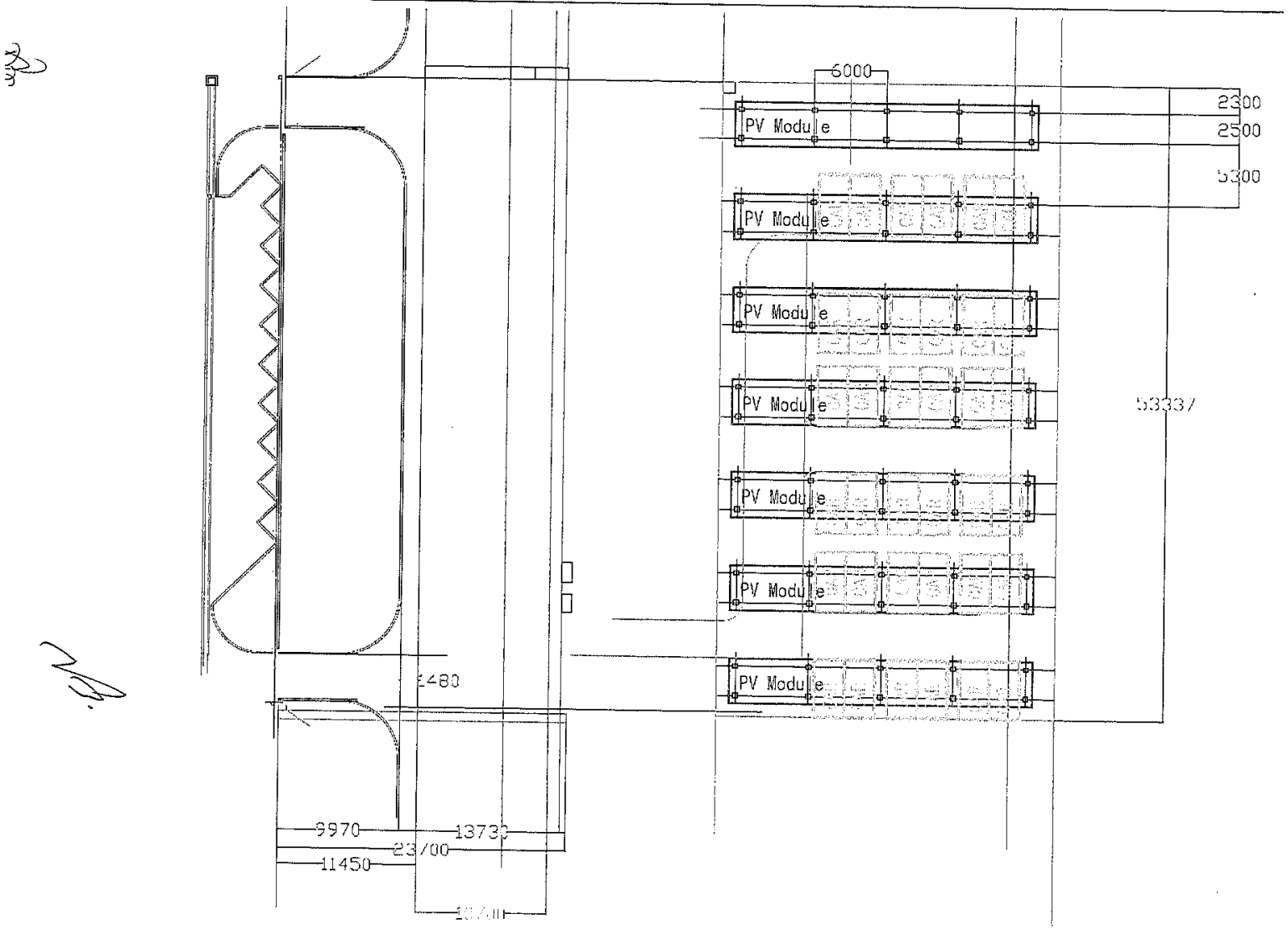
Attachment – 1b

PARKING AREA (PLANNING COMMISSION)



PARKING AREA (ENGINEERING COUNCIL

Attachment - 2



Minutes of Discussions
on
the Preparatory Survey (Outline Design)
on
The Project for Introduction of Clean Energy by Solar Electricity Generation System
in
the Islamic Republic of Pakistan

(Explanation on Draft Final Report)

In December 2009, the Japan International Cooperation Agency (hereinafter referred to as "JICA") conducted the Preparatory Survey on the Project for Clean Energy Promoting Using Solar Photovoltaic System (hereinafter referred to as "the Program") in the Islamic Republic of Pakistan (hereinafter referred to as "Pakistan"), and through discussions, field survey and technical examination of the results of the survey in Japan, JICA prepared a Draft Final Report of the Outline Design.

In order to explain and to consult with the concerned officials of the Government of Pakistan on the component of the Draft Final Report, JICA has dispatched to Pakistan the Preparatory Survey Team for Draft Final Report Explanation (hereinafter referred to as "the Team"), which is headed by Dr. Akira NIWA, Senior Advisor of JICA , from March 29th to April 2nd, 2010.

As a result of discussion, both sides confirmed the main items described on the attached sheets.

Islamabad, April 1, 2010

Dr. Akira NIWA
Leader
Preparatory Survey Team
Japan International Cooperation Agency

Mr. Zafar Hasan Reza
Joint Secretary (ADB/Japan)
Economic Affairs Division
Government of Pakistan

Engr. Parvez Butt HI, SI
Member(Energy)
Planning Commission

Engr. Senator Rukhsana Zuberi
Chairperson
Pakistan Engineering Council

ATTACHMENT

1. Components of the Draft Final Report

Planning Commission (hereinafter referred to as "PC") and Pakistan Engineering Council (hereinafter referred to as "PEC") agreed and accepted in principle the components of the Draft Final Report explained by the Team.

2. Program Grant Aid for Environment and Climate Change of the Government of Japan

The Pakistani side understood components of the Minutes of Discussion signed by both sides on 23rd July, 2009 (hereinafter referred to as "the previous M/D"), and would take the necessary measures confirmed on the previous M/D for smooth implementation of the Program in accordance with the procedures of the Program Grant Aid for Environment and Climate Change of the Government of Japan as shown in **Annex-1**.

3. Confirmation of progress made for the previous M/D

3.1. Project sites and capacity of PV module

Both sides confirmed that project sites are (1) parking lot of "P" block Pak Secretariat / PC and (2) parking lot for PEC, opposite to PEC building. The Team explained that the capacity of PV module can be increased up to 220 kW by the result of outline design and cost estimation. Pakistani side accepted the change.

3.2. Official permission to set the PV system on the site for the Program

Both sides confirmed that all the necessary procedures for official permission from related organizations to set the PV system in the project sites have been completed.

4. Items of Equipment to be procured

The Team explained that the items of equipment to be procured as shown in **Annex-2** based on the result of the Preparatory Survey conducted in July, 2009. Both sides confirmed that major equipment such as PV module, Power Conditioner and Transformer are products of Japan, and also accepted products of Pakistan or third country for other equipment.

5. Procurement Process of the Program

Both sides reconfirmed that procurement process would be supervised by the Procurement Agent (hereinafter referred to as "the Agent") with necessary consultation by the Consultative Committee (hereinafter referred to as "the Committee"). And both sides also reconfirmed roles of the Agent as follows;

(1) The Agent renders the services stipulated in the provisions of the G/A as well as the E/N for the Program;
(2) The Agent will undertake the procurement procedure necessary for the Program according to the provisions of the G/A and E/N and any other concerned guidelines;
(3) JICA will provide the draft Final Report and Final Report to the Agent and PC/PEC; and
(4) The Agent will commence the procurement according to the contents of the Final Report of the Outline Design.

The Team explained that if tender price exceeds the amount agreed on G/A and E/N,

quantity or/and items of the equipment would be reduced until the cost for the Program comes down to the amount agreed on G/A and E/N.

The Pakistani side agreed that if there is a remaining amount of the cost for the Program after tenders, additional items of equipment would be procured based on priorities, which are set in the Final Report.

The Pakistani side also understood that decision on addition or reduction of the equipment to be procured would be made through necessary consultation among members of the Committee.

6. Project Cost

The Pakistani side agreed that the cost for the Program should not exceed the upper limit of amount agreed on in E/N. Both sides also confirmed that the cost for the Program contains procurement cost of equipment, the cost for transportation up to the site for the Program, installation cost, the Agent fee, and the cost for soft component for the technical support of operation and maintenance of equipment.

7. Confidentiality of the Program

(1) Detailed specifications of the Facilities

Both sides confirmed that all the information related to the Program including detailed drawings and specifications of the facilities and equipment and other technical information shall not be released to any outside parties (i.e. outside of JICA, Pakistani side and the Agent) before conclusion of all the contract(s) for the Program.

(2) Confidentiality of the Cost Estimation

The Team explained the cost estimation of the Program as described in **Annex-3**. Both sides agreed that the cost for the Program Estimation should never be duplicated or released to any outside parties (i.e. outside of JICA, Pakistani side and the Agent) before tender for the Program. The Pakistani side understood that the cost for the Program Estimation attached as Annex-3 is not final and is subject to change by the result of examination through revision of the Outline Design Study.

8. The Consultative Committee

The Pakistani side understood that the PC will chair the Committee in order to facilitate consultation and procurement process. The Terms of Reference of the Committee was settled in Annex-8 of the previous M/D.

The members of the Committee are as follows:

(1) Representative(s) of PC (Chair): Engr. Parvez Butt HI, SI, Member (Energy)
(2) Representative(s) of PEC: Engr. Dr Ashfaq Ahmed Sheikh, Deputy Registrar
(3) Representative(s) of EAD: Mr. Waqar Hussain Abbasi, Deputy Secretary (ODA/Japan)
(4) Representative(s) of IESCO: Chief Executive Officer/Chief Engineer (Planning and Engineering)
(5) Representative(s) of JICA Pakistan Office

The first meeting of the Committee shall be held after the signing of the contract between the Agent and the consultant. Further meetings shall be held upon request of either the

Pakistani side or the Japanese side. The Procurement Agent may advise both sides on the necessity to call a meeting of the Committee.

9. Other Relevant Issues

9.1. Undertakings required by the Pakistan Country

The Team requested the Pakistani side to abide by the following undertakings by the Pakistani side in addition to major undertakings described in the previous M/D. The Pakistani side agreed to do so.

(1) Land usage for PV system

The owner of the land for the following equipment and materials for PV system is the Government of Pakistan. The project site (1) parking lot of "P" block Pak Secretariat / PC is managed by PC, and project site (2) parking lot for PEC, opposite to PEC building is managed by Capital Development Authority (CDA).

1) PV Modules
2) Underground cables between equipments
3) Power house
4) Temporary stockyards

PC and PEC has reconfirmed that land usage of the two sites has been secured and there is no objection for the implementation of the Program. PC and PEC has also reconfirmed that construction of fence for security protection at the project site (2) parking lot for PEC shall be the responsibility of Pakistan side.

(2) Approval of PC-1

CDWP approved, in principle, the project of PEC at the special CDWP meeting held on July 17, 2009. Ministry of Science and Technology has refined the PC-1 application form based on the definite design information of the project, and submitted to CDWP for final approval by the Planning and Development Division, PC. Pakistani side shall obtain the final approval of PC-1 on PEC project in the next CDWP, scheduled on April or May 2010.

(3) Generated Energy by PV system

Pakistani side confirmed that PC/PEC shall obtain generation license from NEPRA, and establish agreement on the grid connection including the tariff to be applied between IESCO and PC/PEC for power generation of PV system by adopting the existing Policy for Development of Renewable Energy for Power Generation, Government of Pakistan 2006, before the end of April 2011. The Japanese side shall assist the Pakistani side to introduce necessary procedures through soft component during the implementation of the Program.

(4) Environmental and Social Considerations

The Pakistani side reconfirmed that EIA and IEE are not required for the project implementation of solar generation in accordance with the environmental regulations of Pakistan Environmental Protection Agency, Statutory Notification S.R.O. 339(I)/2000. PC/PEC has prepared the application form for the project review, and submitted to Environmental Protection Agency for final approval for issuance of the environmental clearance of the project. PC has agreed to complete all the necessary procedures for obtaining

the environmental clearance from Pakistan Environmental Agency as soon as after the Final Report has been received from JICA.

(5) Application of the Related Laws and Regulations

The Pakistani side agreed the structural design for the installation of PV system shall comply with the Architectural Regulation in Japan and Pakistan. Electrical design for Grid-connected PV system should be done in accordance with JIS/IEC.

The Pakistani side agreed that the PC shall be responsible for the application of related laws and regulations for the operation of the PV system for interconnection with the distribution lines before commissioning of the Program. The Japanese side shall assist the Pakistani side to introduce necessary procedures through soft component during the implementation of the Program.

(6) Customs and Tax Exemption

The Pakistani side agreed that the PC shall be responsible for the exemption and/or reimbursement of all customs, tax, levies and duties incurred in Pakistan for the implementation of the Program.

(7) Assignment of Counterpart Personnel

1) Overall project management

The Pakistani side assigned following personnel for overall project management and coordination in each organization.

PC :Engr. Parvez Butt HI, SI, Member (Energy)
PEC :Engr. Ashfaq Ahmad Sheikh, Deputy Registrar

2) Soft Component

The Pakistani side agreed to assign the following personnel as the focal members for Counterpart Personnel and other necessary members in accordance with the soft component plan proposed by the Team.

PC : Engr. Khalid Mahmood
PEC : Engr. Khadim H. Bhatti

9.2. Ownership and Responsibilities for Operation and Maintenance (O&M) of Equipments

The Pakistani side has reconfirmed that the PC and PEC are the owner of Equipments for respective site. PC and PEC are responsible for securing necessary budget and personnel for Operation and Maintenance (O&M) of Equipments under the joint leading team, the estimated cost of which is described in Annex-3. The Pakistani side confirmed that the Equipments procured under the Program shall be operated and maintained in accordance with the organization structure for operation & maintenance of equipment as described in Annex-4.

<List of Annex>

Annex-1 Program Grant Aid for Environment and Climate Change of the Government of Japan
Annex-2 List of Equipments
Annex-3 Project Cost Estimation (Confidential)
Annex-4 Organization Structure for Operation and Maintenance of Equipment

Program Grant Aid for Environment and Climate Change
of the Government of Japan
(Provisional)

The Grant Aid provides a recipient country (hereafter referred to as "the Recipient") with non-reimbursable funds to procure the facilities, equipment, and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

Based on "Cool Earth Partnership" initiative of the Government of Japan, the Program Grant Aid for Environment and Climate Change (hereafter referred to as "GAEC") aims to mitigate effects of global warming by reducing GHGs emission (mitigation; e.g. improvement of energy efficiency) and to take adaptive measures (adaptation; e.g. measures against disasters related to climate change, including disaster prevention such as enhancing disaster risk management).GAEC may contain multiple components that can be combined to effectively meet these needs.

1. Procedures for GAEC

GAEC is executed through the following procedures.

Preparatory Survey 1	Preparatory Survey for project identification conducted by Japan International Cooperation Agency (JICA)
Application	Request made by a recipient country
Appraisal & Approval	Appraisal by the Government of Japan and Approval by the Cabinet
Determination of Implementation	The Notes exchanged between the Government of Japan and the Recipient Country
Grant Agreement (hereinafter referred to as the "G/A")	Agreement concluded between JICA and the Recipient
Preparatory Survey 2	Preparatory Survey for design conducted by JICA
Implementation	Procurement through the Procurement Agency by the Recipient

Firstly, if the candidate project for a GAEC is identified by the Recipient and the Government of Japan, the Government of Japan (the Ministry of Foreign Affairs) examines it whether it is eligible for GAEC. When the request is deemed appropriate, JICA, in consultation with the Government of Japan, conducts the Preparatory Survey (hereafter referred to as "the Survey") on the candidate project as Phase 1 of the Survey with Japanese consulting firms.

Secondly, the Recipient submits the official request to the Government of Japan, while the appropriateness, necessity and the basic components of the Program are examined in the course of Phase 1 of the Survey,

Thirdly, the Government of Japan appraises the Program to see whether it is suitable for Japan's GAEC, based on the Survey report prepared by JICA, and the results are then

submitted to the Cabinet for approval.

Fourthly, the Program, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Governments of Japan and the Recipient.

Fifthly, JICA engages Grant Agreement (G/A) with the Recipient and executes the Grant by making payments of the amount agreed in the E/N and strictly monitors that the funds of the Grant are properly and effectively used.

Procurement Management Agent is designated to conduct the procurement services of products and services (including fund management, preparing tenders, contracts) for GAEC on behalf of the Recipient. The Agent is an impartial and specialized organization that will render services according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the Agreed Minutes ("A/M").

2. Preparatory Survey

1) Contents of the Survey

The purpose of the Preparatory Survey (hereafter referred to as "the Survey"), conducted by JICA on a requested project (hereafter referred to as "the Project"), is to provide the basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Survey are as follows:

- Confirmation of background, objectives, and benefits of the Project and institutional capacity of agencies and communities concerned of the Recipient necessary for project implementation.
- Evaluation of relevance of the Project to be implemented under the Grant Aid Scheme for Environment and Climate Change from a technical, social, and economic point of view.
- Confirmation of items agreed upon by both parties concerning the basic concept of the Project.
- Preparation of the design of the Project and reference document for tender.
- Estimation of cost for the Project.

The contents of the original request will be modified, as found necessary, in the design of the Project according to the guidelines of Japan's Grant Aid scheme.

The Government of Japan requests the Government of the Recipient to take whatever measures necessary to ensure its responsibility in implementing the Project. Such measures must be guaranteed even if they may fall outside the jurisdiction of the implementing organization of the Recipient. This has been confirmed by all relevant organizations of the Recipient through the Minutes of Discussions.

2) Selection of consulting firms

For the smooth implementation of the Survey, JICA will conduct the Survey with registered consulting firms. JICA selects the firms based on proposals submitted by firms with interest in implementing the Survey. The firms selected will carry out the Preparatory Survey and prepare a report, based on the terms of reference set by JICA.

3. Implementation of GAEC after the E/N

1) Exchange of Notes (E/N)
The content of GAEC will be determined in accordance with the Notes exchanged by the two Governments concerned, in which items including, objectives of the project, period of execution, conditions and amount of the Grant Aid are confirmed.

2) Details of Procedures
Details of procedures on procurement and services under GAEC will be agreed between the authorities of the two governments concerned at the time of the signing of the G/A.

Essential points to be agreed are outlined as follows:
a) JICA will supervise the implementation of the Project.
b) Products and services will be procured and provided in accordance with JICA's "Procurement Guidelines for the Program Grant Aid for Environment and Climate Change."
c) The Recipient will conclude a contract with the Agent.
d) The Agent is the representative acting in the name of the Recipient concerning all transfers of funds to the Agent.

3) Focal points of "Procurement Guidelines for the Program Grant Aid for Environment and Climate Change"
a) The Agent
The Agent is the organization, which provides procurement of products and services on behalf of the Recipient according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the A/M.

b) Agent Agreement
The Recipient will conclude the Agent Agreement, in principle, within two months after the signing of the G/A, in accordance with the A/M. The scope of the Agent's services will be clearly specified in the Agent Agreement.

c) Approval of the Agent Agreement
The Agent Agreement is prepared as two identical documents and the copy of the Agent Agreement will be submitted to JICA by the Recipient through the Agent. JICA confirms whether the Agent Agreement is concluded in conformity with the E/N, A/M, and G/A and the Procurement Guidelines for the Program Grant Aid for Environment and Climate Change then approves the Agent Agreement.

The Agent Agreement concluded between the Recipient and the Agent will become effective after the approval by JICA in a written form.

d) Payment Methods
The Agent Agreement will stipulate that "Regarding all transfers of the fund to the Agent, the Recipient will designate the Agent to act on behalf of the Recipient and issue a Blanket Disbursement Authorization ("the BDA")to conduct the transfer of the fund (hereinafter referred to as "the Advances") to the Procurement Account from the Recipient Account.

The Agent Agreement will clearly state that the payment to the Agent will be made in Japanese yen from the Advances and that the final payment to the Agent will be made when the total remaining amount become less than three percent (3%) of the Grant and its accrued interests excluding the Agent's fees.

e) Products and Services Eligible for Procurement

Products and services to be procured will be selected from those defined in the G/A.

f) Firm and Consultant
The firm and consultant who would contract with the Agent shall be Japanese Nationals.

The consultants that will be employed to do detail design and supervise the work for the Project, however will be in principle, Japanese nationals recommended by JICA for the purpose of maintaining technical consistency with the Study.

g) Method of Procurement
When conducting the procurement, sufficient attention will be paid to transparency in selecting the firms and for this purpose, competitive tendering will be employed in principle.

h) Tender Documents
The tender documents should contain all information necessary to enable tenderers to prepare valid offers for the products and services to be procured by GAEC.

The rights and obligations of the Recipient, the Agent and the firms supplying products and services should be stipulated in the tender documents to be prepared by the Agent. Aside from this, the tender documents will be prepared in consultation with the Recipient.

i) Pre-qualification Examination of Tenderers
The Agent may conduct a pre-qualification examination of tenderers in advance of the tender so that the invitation to the tender can be extended only to eligible firms. The pre-qualification examination should be performed only with respect to whether the prospective tenderers have the capability of concluding the contracts.

For this, the following points should be taken into consideration:
(1) Experience and past performance in contracts of similar kind
(2) Financial credibility (including assets such as real estate)
(3) Existence of offices and other items to be specified in the tender documents.
(4) Their potentialities to use necessary personnel and facilities.

j) Tender Evaluation
The tender evaluation should be implemented on the basis of the conditions specified in the tender documents.

Those tenderers which substantially conform to the technical specifications and other stipulations of the tender documents will be judged in principle on the basis of the submitted price, and the tenderer who offers the lowest price will be designated as the successful tenderer.

The Agent will submit a detailed evaluation report of tenders to JICA for its information, while the notification of the results to the tenderers will not be premised on the confirmation by JICA.

k) Additional procurement
If there is any remaining balance after the competitive and/or selective tendering and/or direct negotiation for a contract, and if the Recipient would like to procure additional items, the Agent is allowed to conduct this additional procurement, following the points mentioned below:
(1) Procurement of same products and services

When the products and services to be additionally procured are identical with the initial tender and a competitive tendering is judged not efficient, additional procurement can be conducted by a negotiated contract with the successful tenderer of the initial tender.

(2) Other procurements
When products and services other than those mentioned above in (1) are to be procured, the procurement should be conducted through competitive tendering. In this case, the products and services for additional procurement will be selected from among those in accordance with the G/A.

l) Conclusion of the Contracts
In order to procure products and services in accordance with the guideline, the Agent will conclude contracts with firms selected by tendering or other methods.

m) Terms of Payment
The contract will clearly state the terms of payment. The Agent will make payment from the "advances," against the submission of the necessary documents from the firm on the basis of the conditions specified in the contract. When the services are the object of procurement, the Agent may pay certain portion of the contract amount in advance to the firms on the conditions that such firms submit the advance payment guarantee worth the amount of the advance payment to the Agent.

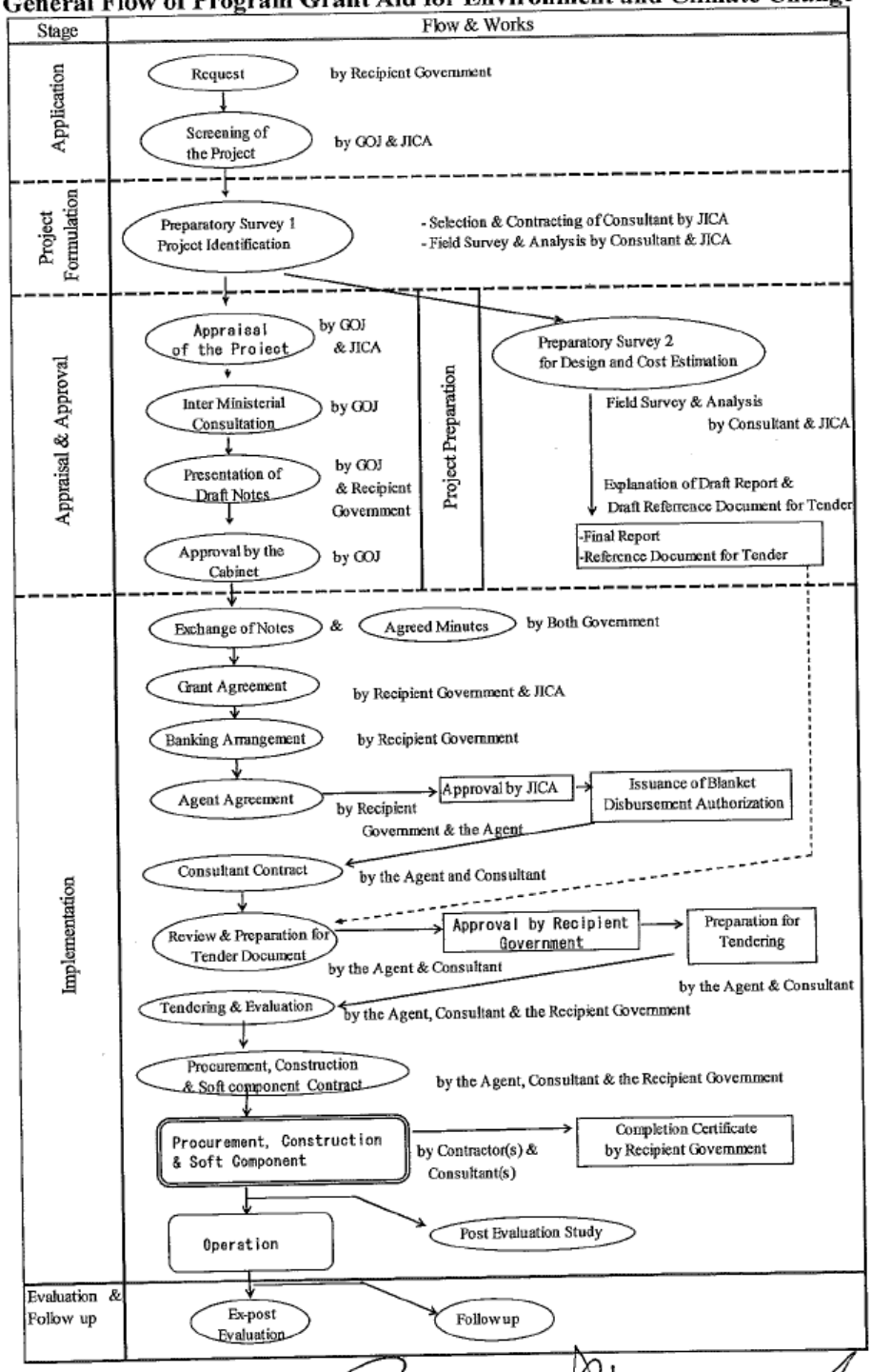
4) Undertakings required by the Government of the Recipient Country
In the implementation of the Grant Aid Project, the Recipient is required to undertake necessary measures as the following:

a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the Project.
b) To provide facilities for distributing electricity, water supply and drainage and other incidental facilities in and around the sites.
c) To ensure all the expense and prompt execution for unloading, customs clearing at the port of disembarkation and domestic transportation of products purchased under the Grant Aid,
d) To ensure that customs duty, internal taxes and other fiscal levies that may be imposed in the Recipient with respect to the purchase of the Components and the Agent's services will be exempted by the Government of the Recipient.
e) To accord all the concerned parties, whose services may be required in connection with supply of the products and services under the contracts, such facilities as may be necessary for their entry into the Recipient and stay therein for the performance of their work.

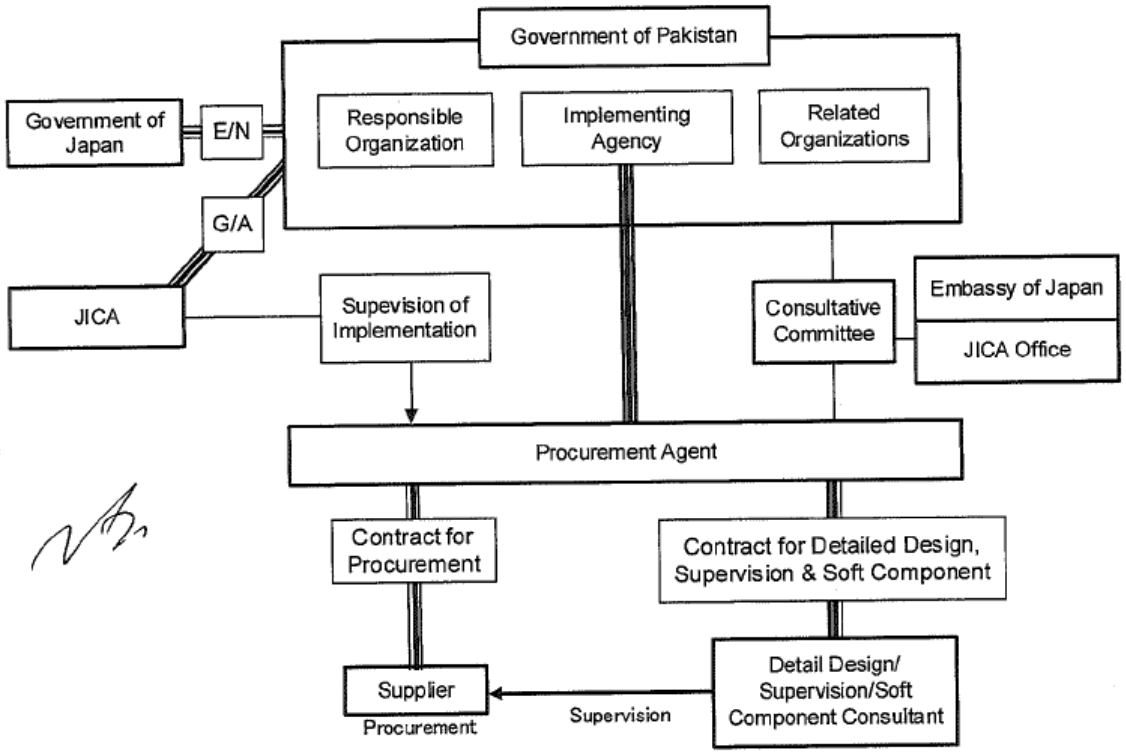
5) "Proper use of funds"
The Recipient is required to operate and maintain the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign personnel necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

6) "Export and Re-export" of products
The products purchased under the Grant and its accrued interest will not be exported or re-exported from the Recipient.

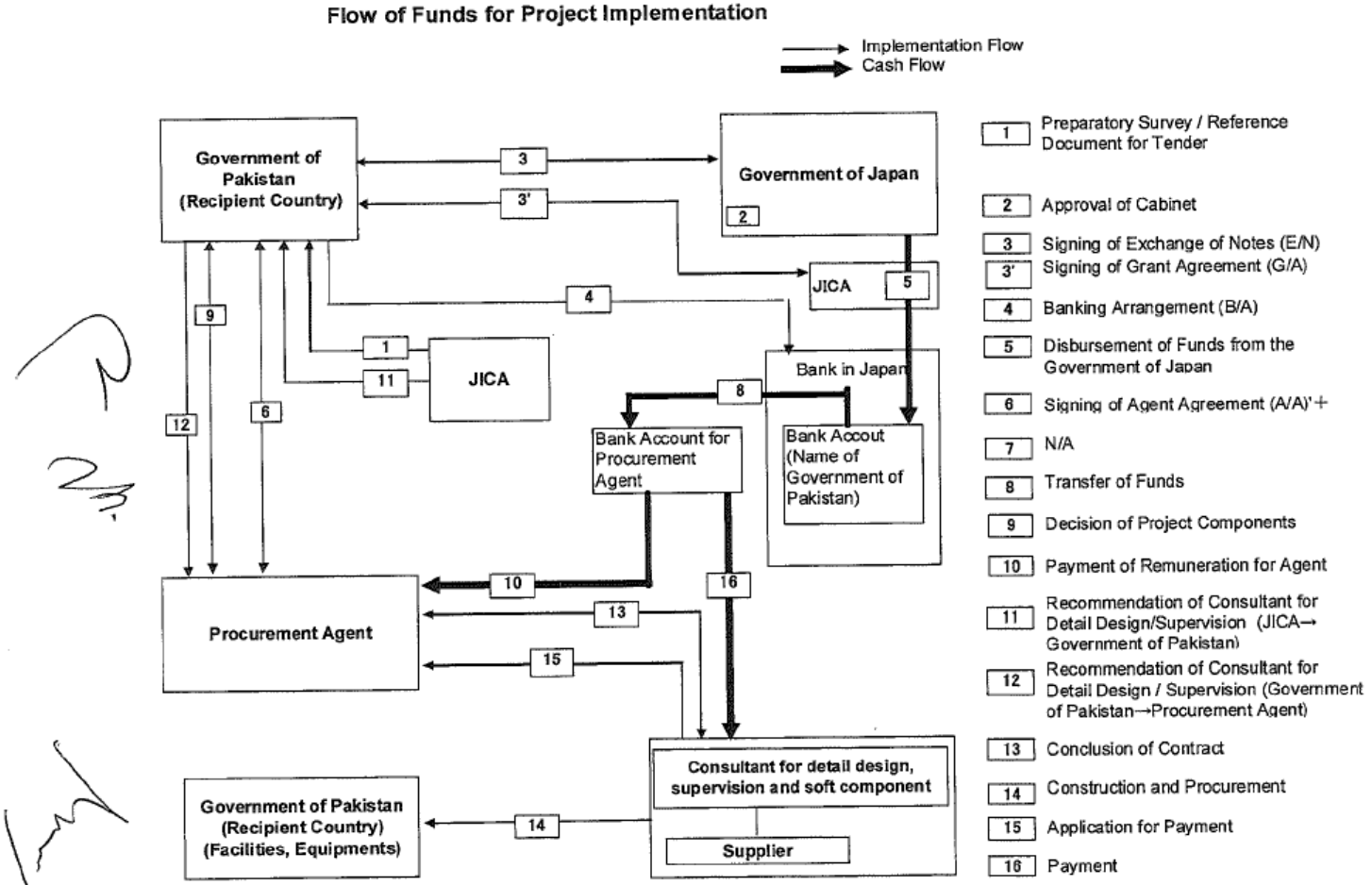
General Flow of Program Grant Aid for Environment and Climate Change



Project Implementation System



Flow of Funds for Project Implementation



Annex –2

List of Major Equipments

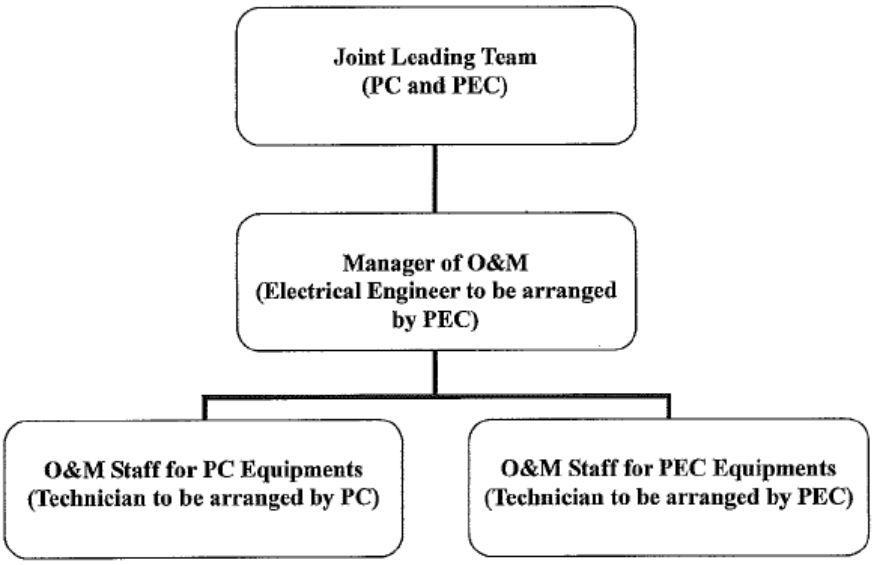
The following table shows a list of equipments procured under the Program.

List of Major Equipments (Unit Price above JPY 1,000 Thousand)

Components	Specification	Qty.	Unit	Purpose
PV Module	Total capacity 110 kWp and above at each site with no. of series and parallels to match the system voltage 3 Phase 400 V to be decided by supplier	1	Set	To generate power by receiving solar insolation
PV Structure	Galvanized finishing	1	Set	To support PV module at required height and angle
Junction Box	Outdoor use with reverse power flow protection, circuit breaker and surge absorber	1	Set	To collect and arrange the strings of modules at PV site
Connection Box	Outdoor use with reverse power flow protection, circuit breaker and surge absorber	1	Set	To connects and arrange the strings from Junction box to match the input of power conditioner
Power Conditioner	Indoor self standing, 110kW and above in total, output AC 400 V 3 Phase 4 Wire, efficiency 90% and above at rated capacity, with grid-connecting facility and safety protection relays (OCR, UVR, OVR, UFR, OFR)	1	Set	To convert the DC power generated by PV array to AC power and to match and supply power to load and grid.
Distribution Board	Indoor self standing, 3 Phase 3Wire, 50 Hz with protection relays	1	Unit	To connect 400 V distribution network
Low Voltage Switching Panel	Indoor self standing, 400 V, 3 Phase, 4 Wire, 50 Hz with no. of circuit breaker.	1	Unit	To connect several power conditioner to main 400 V system
Outdoor Cubicle	Outdoor self standing, dust, insects and vermin proof	1	Unit	To install power conditioner, 400 V distribution board, 400 V distribution panel and data collecting system
400 V Distribution Board	Indoor self standing with power distribution circuit breaker	1	Unit	To connect main feeder, existing load and distribution panel
400 V Distribution Panel	Indoor self standing with power distribution circuit breaker	1	Unit	To connect PV system and distribution board, supply power to equipments
Display Board	Outdoor display board of size W1,200 x L800 mm	1	Unit	To display PV power generation system information
Data Monitoring, Recording and Display System	Meteorological data and system data collection units for data management.	1	Unit	To collect and manipulate the system information to provide information to general public and for system operation and maintenance management.

Annex-4

Organization Structure for Operation and Maintenance of Equipment



5. Soft Component (Technical Assistance) Plan

“Soft Component (Technical Assistance) Plan” is attached in following pages.

Soft Component Plan
(Pakistan)

1. Background of the Soft Component Plan

This project promotes awareness of the PV system, builds technical experience on PV system and grid-connection, securement of electricity, and promotes mitigation of GHG emission by providing PV system and related equipment to Planning Commission (PC) and Pakistan Engineering Council (PEC) in Islamabad, the capital of Pakistan. The project also promotes/disseminates renewable energy through actual demonstration.

The main aim of the Renewable Energy policy established in 2006 is to develop and adopt the framework for the implementation and promotion of renewable energy resources, targeting to diminish the pollution created by utilizing low efficiency coals to generate power. Furthermore, on the basis of the commitments made at the United Nations Framework Convention on Climate Change (UNFCCC), Pakistan is enthusiastically struggling to diminish the Green House Gas (GHG) effect within the country.

In fiscal year 2007/08, to cope with the power shortage within the country, the institutional body of the Pakistan government, National Electric Power Regulatory Authority (NEPRA), issued licenses to power-generating entrepreneurs for a total capacity of 1,536 MW. However, it is still not enough to fulfill the required demand. To cope with the power shortage to some extent and also, to promote available renewable energy resources, the Alternative Energy Development Board (AEDB) was established and in 2006, the renewable energy policy was developed. Under this policy, small hydro facilities (less than 50 MW), wind power generation and PV power generation are targeted to be executed and implemented in actual practice.

However, until now, grid-connected power generation utilizing renewable energy resources has not yet been realized under this policy. If photovoltaic power generation system (PV system) planned under this assistance from Japan is implemented, this will be the first actual example of grid-connected renewable energy system.

Considering the fact that above mentioned system has not been widely introduced in the country, it is necessary to conduct the soft component in order to manage the grid-connected PV system in Pakistan, targeting to support smooth start up and ensure the sustainability of the project.

In particular, technical supports for (1) Existing Grid and PV System, (2) Grid Connection and Power Purchase Agreement (PPA), (3) Data Analysis of Data Logger, (4) Power Restoration and Failure Recovery Technique and (5) Awareness Campaign are required.

2. Target of Soft Component

There are standalone PV systems, however there is no grid-connected PV system and the PV system by this project will be first case in Pakistan. Therefore there is not enough accumulated technical/practical experience including PPA at present.

A certain amount of accumulated technical/practical experience is necessary for the smooth start up of the project. Accumulated technical/practical experience for trouble shooting, evaluation of

generation performance and operational efficiency, starting up of same kind of grid-connected facility are also necessary.

The targets of the soft component, defined as those that should be achieved after a certain period from the completion of the project, are as follows:

(1) The responsible organization and implementing agency, Planning Commission (PC) and Pakistan Engineering Council (PEC) are expected to operate the grid-connected PV system[1] smoothly, while Islamabad Electric Supply Company Ltd. (IESCO) operates their distribution network together with the grid-connected PV system without any hindrance.
(2) Generated power from the PV system shall be utilized at the PC and PEC facilities, while the surplus power flows into the grid of IESCO, which is called reverse power flow. The Power Purchase Agreement (PPA) between PEC, PC and IESCO is made for the trading of the reverse power.
(3) The impact of this assistance of Japan to the project is quantified and measured effectively through the accumulated data. Based on the accumulated data and corresponding analysis results, the efficiency of PV system operation is improved and the planning of other grid-connected PV is effectively conducted.
(4) When there is a system failure, the PC and PEC perform the necessary restoration works smoothly.
(5) The project becomes the model case for the introduction and promotion of renewable energy source as grid-connected renewable energy system.

3. Outcomes of the Soft Component

If the outcome of the soft component is defined as the situation that should be achieved at the completion-time of the soft component, the outcomes are shown as follows.

(1) Existing Grid and PV System

The PC, PEC and IESCO should understand the following points.

(i) The composition of the existing distribution grid that is connected with PV system
(ii) The protection system of the existing distribution grid
(iii) The actual situation of power supply from the existing distribution grid
(iv) The quality of power supply of the existing distribution grid that connects to PC and PEC facility (fluctuation of voltage, frequency and so on)
(v) Basic knowledge on PV system
(vi) Protection and operating method of grid-connected PV system

This soft component is executed at the introductory phase of the cluster of the five soft components to understand the composition of the existing grid and obtain basic knowledge on the PV system.

[1] Grid-connected PV system means the PV system that is connected to the power grid and is operated with the power grid. The electricity of the grid is Alternative Current (AC) and the electricity generated by PV system is Direct Current (DC). Thus, DC electricity has to be inverted to AC and this inverted AC needs to be synchronized with AC of the grid in order to connect PV system to the grid. Furthermore, whenever there is a failure of PV system, that failure should not be influence to the grid. For this, the grid-connected PV system requires protection devices. In this manner, the grid-connected PV system needs more advance technology comparing the standalone PV system with battery.

(2) Grid Connection and Power Purchases Agreement

In Pakistan, the Renewable Energy Policy mandates that the feed-in tariff of up to 1 MW capacity for renewable energy power projects is based on net metering. In the PPA IESCO requires that the Renewable Energy Policy should be followed and that the energy flow to and from PC and PEC should be recorded. For this, PC and PEC need to install unidirectional or special bidirectional energy meters capable of instantaneously recording net power transfer. The energy meters are essential to be approved by the National Transmission & Dispatch Company Ltd (NTDC). By fulfilling the entire necessary requirements for grid connection based on Renewable Energy Policy, PC and PEC finalizes the PPA with IESCO. To realize the reverse power flow toward the grid, it is mandatory to obtain a license from NEPRA. For this, PC and PEC apply for approval of NEPRA and secure the necessary license.

Even though there is a policy on feed-in-tariff, this has not yet been utilized with renewable energy resource in actual practice. If introductory example can be made, it will definitely help to promote the planning of future projects as well as those in the pipeline. As a result, the realization of reverse power sales with the support of the soft component can be realized as one of the most important outcomes.

(3) Data Analysis of Data Logger

The data logger is one of the components of the PV system that records data on solar insolation, generated power, generated energy, and so on. With the recorded data, the staff of PC and PEC will understand the (1) analysis method, (2) system management method from the analysis results, (3) methodology of utilizing data for further expansion of the project or applying the data for planning other PV systems.

(4) Power Restoration and Failure Recovery Technique

When the interconnected grid experiences black out due to some reasons, the PV system also stops supplying power to the grid automatically. When the system is restored, the PV system reconnects from the PC and PEC side without any problem. Moreover, the failure of the PV system is handled appropriately.

If soft component - (1) is assumed to be a chapter of the basic theory, this shall also be put into practice. The training proceeds with the equipment installed and the trainees learning how to properly operate the system.

(5) Awareness Campaign

From the inspection tour with concerned personnel like ministers, policymakers, civil servant, technical experts and advisers, the knowledge and information on the PV system in actual practice is disseminated. The inspection tour to sites with PV system is held targeting the local technical personnel and visitors of PC and PEC, as well as local inhabitants who are willing to visit and desire to have some information on the PV system installed at PEC.

4. Confirmation of Achievement

The method of confirming the achievement level is as follows:

(1) Existing Grid and PV System

The achievement level of the soft component is confirmed with the understanding level of the

staff of the PC and PEC, and the concerned staff of IESCO related to on the items shown in the above "3. Outcomes of the Soft Component". At the end of the soft component, the level of understanding is determined through a written examination.

(2) Grid Connection and Power Purchase Agreement

The achievement level of the soft component is confirmed with the fulfillment of the (i) tariff of reverse power sales being finalized, (ii) power sales license being issued to PC and PEC, (iii) PPA being signed between PC, PEC and IESCO, and finally (iv) grid-connected renewable energy sources being utilized following the above PPA as a good example.

(3) Data Analysis

The achievement level of the soft component is confirmed with the facts that the staff of PC and PEC are able to (i) analyze the collected data from the data logger, (ii) use the analysis results for maintenance purposes, (iii) put the data and analysis results to practical use for the expansion plan of the project or for promotion of new grid-connected PV systems. At the end of the soft component, the achievement level is confirmed through a practical work test.

(4) Power Restoration and Failure Recovery Technique

The achievement level of the soft component is confirmed with the facts that the staff of PC and PEC are able to (i) restore PV system appropriately during the training operation, which involves simulated situation of power failure in the distribution network, and (ii) fix the failures appropriately during the training where occurrence of failure of the PV system is simulated. At the end of the soft component, the achievement level is confirmed through a practical work test.

(5) Awareness Campaign

The achievement level of the soft component is confirmed through a questionnaire survey executed at the time of inspection tour and querying the personnel of the concerned organization about their awareness.

5. Activities of the Soft Component (Input Plan)

(1) Existing Grid and PV System

(Japanese Side)

(a) Necessary Technology and Type of Profession: Power facilities and PV power generation, Consultant

(b) Required Expertise Level: The expert is required to be knowledgeable in overall electricity power management engineering, has general knowledge on distribution networks, and should be able to conduct lectures on grid-connected PV power generation systems.

(c) Execution Method: Preparation of handouts and operations manual, and consequently training and initiate actual practice. The training and practice described in items (i) to (vi) of "3. Outcomes of the Soft Component" is executed. Especially, for item (iv), i.e., the quality of power supply of the existing grid that connects to the PC and PEC facility (fluctuation of voltage, frequency and so on), the actual data recorded during the survey period should be used.

(d) Input from Resource Person (Number of experts and duration): Electrical and PV System Expert: 1 expert for 2.0 man-months (M/M), estimated based on the following tasks:

- Preparation of training and text: 0.5 M/M
- The training and lecture will be executed on the following contents.

(i) The composition of the existing grid network that connects with the grid-connected PV system: 0.1 M/M
(ii) Protection system of the grid: 0.1 M/M
(iii) Power supply situation of the grid: 0.1 M/M
(iv) Quality of electricity in PC and PEC supplied by the existing grid: 0.2 M/M
(v) Basic knowledge of the PV system: 0.1 M/M
(vi) Operation of grid-connected PV system and its protection system: 0.3 M/M

- Execution of evaluation test: 0.1 M/M
- Preparation of maintenance manual: 0.2 M/M
- Execution of appropriate maintenance practice: 0.3 M/M

(Pakistani Side)

(e) Necessary Technology and Type of Profession: Electrical engineering, Consultant
(f) Required Technical Level: Senior Engineer or equivalent professional (with technical background)
(g) Execution Method: Preparation of handouts, carry out training and practice
(h) Input from Resource (Number of person and duration): Consultant (1 person for 1.5 M/M)
(i) Targeted Personnel: Staff of PC, PEC and IESCO

(2) Grid Connection and Power Purchase Agreement

(Japanese Side)

(a) Necessary Technology and Type of Profession: Grid operation/power management, Consultant
(b) Required Expertise: The expert should be able to guide the management and institution of distribution grid network
(c) Execution Method: Preparation of procedure manual on PPA and provide related practical support
(d) Input from Resource Person (Number of experts and duration): Grid operation/power management expert: 1 person for 1.5 M/M, estimated based on the following tasks:

- Preparation of procedure manual: 0.5 M/M
- Planned support for PPA is as follows.

(i) Consultation with NEPRA: 0.1 M/M
(ii) Support on submitting application for power sales licenses: 0.1 M/M
(iii) Support on preparation of documents for net metering: 0.2 M/M
(iv) Support on the negotiation for PPA with IESCO: 0.3 M/M
(v) Support on preparing the PPA document: 0.3 M/M

(Pakistani Side)

(e) Necessary Technology and Type of Profession: Power management engineering, Consultant

(f) Required Technical Level: Senior Engineer or equivalent professional (with technical background)
(g) Execution Method: Preparation of procedure manual and execution of related support
(h) Input from Resource Person (Number of person and duration): Consultant (1 person for 1.0 M/M)
(i) Targeted Personnel: Staff of PC, PEC and IESCO

(3) Data Analysis

(Japanese Side)

(a) Necessary Technology and Type of Profession: Data analysis/PV power generation, Consultant
(b) Required Expertise: In addition to the knowledge on data analysis, familiarity with PV system is necessary
(c) Execution Method: Preparation of data logger operation manual, conduct of training, and initiation of actual practice.
(d) Input from Resource Person (Number of expert and duration): Data analysis expert: 1 person for 1.5 M/M, estimated based on the following tasks:

- Preparation of users' manual on data logger: 0.5 M/M
- The target and input of the training on data logger operation is as follows.

(i) Understanding function and composition of data logger system: 0.1 M/M
(ii) Understanding applied software: 0.1 M/M
(iii) Understanding appropriate technique on data sampling and raw data processing: 0.1 M/M
(iv) Learning management process of recorded daily, weekly, monthly and annual data: 0.1 M/M
(v) Finding out the cause of fault that occurred based on the recorded data: 0.2 M/M
(vi) Selecting appropriate preset values of power conditioner and other equipment for effective operation based on the recorded data: 0.2 M/M
(vii) Utilizing recorded data for future promotion: 0.2 M/M

(Pakistani Side)

(e) Necessary Technology and Type of Profession: Data analysis/computer literacy
(f) Required Technical Level: Senior engineer or equivalent personnel (with technical background)
(g) Execution Method: Training and practice
(h) Input from Resource Person (Number of person and duration): Consultant (1 person for 1.0 M/M)
(i) Targeted Personnel: Staff of PC and PEC

(4) Power Restoration and Failure Recovery Technique

(Japanese Side)

(a) Necessary Technology and Type of Profession: PV power generation, Consultant
(b) Required Expertise Adequate knowledge on management, operation and maintenance of grid-connected PV system

(c) Execution Method: Preparation of manual, conduct training and practice

The manual will be prepared for the restoration of operation of grid-connected PV system when existing grid experiences power breakdown. Practical training on restoration will be conducted using this procedure manual.

The manual will be prepared for the trouble shooting of PV system. The manual includes (i) method of specifying breakdown point of occurrence, (ii) method of replacement of component, and (iii) the information that should be passed on accurately to the manufacturers in Japan, in order to fix the defects.

(d) Input from Resource Person (Number of expert and duration): PV power generation expert: 1 person for 1.2 M/M, estimated based on the following tasks

- Preparation of restoration process manual: 0.5 M/M
- Training for restoration of operation: 0.4 M/M
- Training for finding faulty components and their replacement: 0.6 M/M

(Pakistani Side)

(e) Necessary technology and type of profession: Electrical engineering, Consultant

(f) Required Technical Level: Senior engineer or equivalent professional (with technical background)

(g) Execution Method: Manual preparation, conduct training, and practice

(h) Input from Resource Person (Number of person and duration): Consultant (1 person for 1.2 M/M)

(i) Targeted Personnel: Staff of PC and PEC

(5) Awareness Campaign

(Japanese Side)

(a) Necessary Technology and Type of Profession: Dissemination of renewable energy, consultant

(b) Required Expertise: Knowledgeable in awareness campaign of renewable energy

(c) Execution Method: Preparation of awareness campaign pamphlet and execution of inspection tour

(d) Input from Resource Person (Number of expert and duration): Renewable energy popularization management expert: 1 person for 0.5 M/M, estimated based on the following tasks:

- Preparation of pamphlet: 0.1 M/M
- Execution of inspection tour: 0.1 M/M
- Preparation of draft awareness promotion plan: 0.2 M/M
- Consultation and coordination for execution of awareness promotion plan with the related organizations: 0.1 M/M

(Pakistani Side)

(e) Necessary Technology and Type of Profession: PV power generation, consultant

(f) Required Technical Level: Senior engineer or equivalent professional (with technical background)

(g) Execution Method: Preparation of awareness pamphlet for dissemination and execution of inspection tour

(h) Input from Resource Person (Number of person and duration): Consultant (1 person 0.4 M/M)

(i) Targeted Personnel: Staff of PC and PEC

6. Procurement of Input Resource of Soft Component

It is planned that Japanese consultant will be directly procured as resource person for providing input and conducting the soft component.

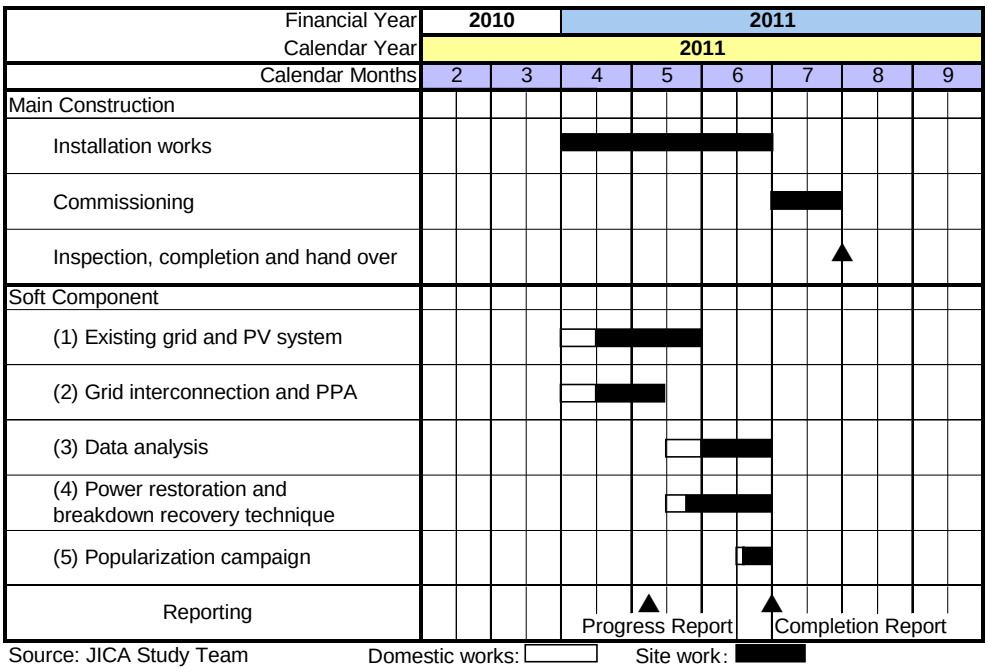
It is difficult to find local human resources who are able to conduct the soft component program in Pakistan because installation of the grid-connected PV system is the first case in the country. Therefore, local consultants shall only be employed only to provide support to Japanese consultant.

7. Implementation Schedule of Soft Component

The implementation schedule is shown in the following chart.

Execution of the soft components during the actual PV system installation will be much effective through witnessing and actual application of PV system. Therefore, it is planned to perform all the soft components during the period of actual installation of the PV system.

Implementation Schedule of Soft Component



Source: JICA Study Team Domestic works: Site work:

8. Reports and Documents

The reports and documents to be submitted are as follows:

(i) Text for Existing Grid and PV System (English): 10 sets

(ii) Manual for the Daily Operation and Maintenance of PV System (English): 10 sets

(iii) Manufacturer's Manual on Grid Connection for PV System (English): 10 sets

(iv) Application Manual on Data Logger (English): 10 sets

(v) Manual for Power Restoration and Breakdown Recovery (English): 10 sets
(vi) Promotion and Awareness Campaign Pamphlet (Urdu/English): 200 sets each
(vii) Progress Report (English/Japanese): 4 sets each
(viii) Completion Report (English/Japanese): 5 sets each

Due to the short implementation period of the soft component (5), the progress report for said component will not be submitted.

9. Obligation of Implementing Agency of Recipient Country

In order to achieve the targets of the soft component, it is essential for PC, PEC and other related organizations to continue the activities based on the technology and knowledge learned during its implementation. Moreover, the technology and knowledge need to be transferred or taken over continuously in the organizations.

One of the foreseen obstructions in the efficient execution of the above is the transfer of the staff who already learned in soft component, to other organizations. In such case, it is highly possible that related activities and transfer of technology and knowledge will be discontinued. In order to avoid such situation, PEC and PC need to (i) determine the number of staff who will participate in the execution of each soft component, (ii) properly maintain the manuals and documents prepared during the implementation of the soft component, and (iii) carefully manage the technology and knowledge transfer in the organization.