

**REQUEST FOR PROPOSALS**

**FEASIBILITY STUDY FOR THE**

**BIOMASS COGENERATION AT BULLEH SHAH PAPER MILL**

Submission Deadline: **4:00 PM**

**LOCAL TIME IN PAKISTAN**

**[September 15, 2010]**

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**SEALED PROPOSALS SHALL BE CLEARLY MARKED AND RECEIVED PRIOR TO THE TIME AND DATE SPECIFIED ABOVE. PROPOSALS RECEIVED AFTER SAID TIME AND DATE WILL NOT BE ACCEPTED OR CONSIDERED.**

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## **Section 1: INTRODUCTION**

The U.S. Trade and Development Agency (USTDA) has provided a grant in the amount of US\$289,125 to Packages Limited (the “Grantee”) in accordance with a grant agreement dated July 20, 2010 (the “Grant Agreement”). Packages Limited (“Packages”) produces paper and cardboard at its own paper mills, including the Bulleh Shah paper mill at Kasur, 40 kilometers southeast of Lahore, in Punjab. The mill currently has a process steam plant that helps to meet their operational electricity demands. As with other paper mills, this facility generates waste. Packages wishes to use the waste to build and operate a biomass cogeneration facility to generate additional electricity for their paper mills and business operations.

Packages has undertaken a number of internal and external studies over the past few years to evaluate the composition of waste stream, preliminary designs, and performance analysis and now seeks to commission a feasibility study that will help them select between two possible options for a biomass cogeneration facility. The options include: (1) installing a new 50-ton per hour biomass boiler that would generate 10 MW of electrical power in the existing 41 MW steam turbine; or (2) a significantly larger biomass project of up to 60 MW based on the available fuel supply, interconnection, site and financing constraints.

The feasibility study requested by Packages and funded by USTDA, has a number of objectives: to identify the most appropriate option, size, and optimal design for the plant; to plan the integration of the new plant into the existing production facilities; to provide a professional feasibility assessment to prospective lenders and investors; to provide technical documentation to support permit applications; and to provide specifications and bid documents for selection of an Engineering, Procurement, and Construction (EPC) contractor to accomplish the installation. A well-qualified and experienced U.S. Contractor needed to undertake this important feasibility study.

### **1.1 BACKGROUND SUMMARY**

Packages Limited produces paper and cardboard at its own paper mills, including the Bulleh Shah paper mill at Kasur, 40 kilometers southeast of Lahore, in Punjab. The mill has its own process steam plant to meet electricity demands. As with other paper mills, this facility generates tremendous amounts of waste, including paper pulp sludge, cardboard and paper scrap, as well as aluminum foil and polyethylene sheet trimming wastes. In addition, Packages uses locally sourced wheat straw as a paper component, giving it access to an existing source of agricultural wastes as potential supplemental fuels. Packages commissioned several internal and external studies over the last couple of years on the quantities and composition of their waste stream, on preliminary designs, and on performance analyses to determine pressures, efficiencies, output in tons of steam and in megawatts; the Grantee incurred costs in excess of \$120,000 for this work.

The conclusion of these studies was that the previously referenced Option 1 (i.e., installation of a new 50-ton per hour biomass boiler that would be connected in parallel with the

existing conventional boiler and steam network) allows for a highly effective use of biomass and fossil fuels. The new biomass boiler under this option would produce 10 MW of electrical power and would reduce the amount of fossil fuel required in the existing boiler. Packages proceeded so far as to conduct an international competitive bidding for a 50-ton biomass boiler, which concluded in August 2009 but were unable to identify a suitable partner to work with on the project and subsequently cancelled the tender. Packages remains committed to pursuing the biomass cogeneration project and confirmed its commitment to increasing the plant size to make full use of existing waste fuel supplies in order to reduce fossil fuel consumption. Further, if the project is viable, Packages would seek to export power to the grid (per Option 2).

Under this larger alternative, the Contractor will assess the supply of agricultural waste, municipal solid waste, and other waste fuels, even including cattle waste from feedlots. Likewise, the Contractor will estimate the cost of adding an additional steam turbine to produce more electric power than what is needed for processes at Bulleh Shah and estimate the additional feed-in tariff revenues to be gained from exporting significant amounts of power to the grid. Further, the Contractor will provide conceptual estimates to optimize the design at a larger scale. Developing this option fully has the potential to result in a greater reduction in the fossil fuel consumption and CO<sub>2</sub> emissions, total self-sufficiency for electricity supply, the ability to eliminate all fossil-fueled steam production, and the export of large amounts of power to the grid if another steam turbine is installed.

The Study will verify the applicability of Option 1, define and size Option 2, provide pricing and financing scenarios, provide technical documentation to support permit applications, and provide specifications and bid documents for the selection of an EPC contractor to accomplish the installation. The timeframe for this feasibility effort is six-to-seven months. The Study will begin with a technical assessment and review of existing options and documentation, followed by a complete project analysis of each of the two main options for utilizing waste from the Bulleh Shah paper mill itself and other sources. Upon notification by the Grantee and Contractor that the project is viable, USTDA will advise the Contractor and Grantee in writing to proceed with the preparation of tender documents for a competitive bid for project implementation based on the option chosen by the Grantee. The Grant Agreement and Terms of Reference are attached here as Annex 4 and 5. The Definitional Mission Study of this project, including background, is provided for reference in Annex 2.

### *Packages Limited*

Packages Limited, the proposed Grantee, is a publicly traded company based in Pakistan. This major industrial company, which provides premium packaging materials for other Pakistani businesses and for export, employs over 3,000 workers and indirectly employs about 27,000 people. In 2005, Packages initiated its paper and board expansion plan at the greenfield Bulleh Shah paper mill, almost tripling the firm's capacity from 100,000 tons per annum to 300,000 tons per annum. Packages' 2009 revenues were approximately \$200 million with a gross profit of about \$3.7 million. Of note, the International Finance Corporation (IFC) made a \$50 million equity investment in Packages in April 2009 to support this socially responsible company to enhance its capital base, improve cost competitiveness, strengthen its ability to handle the effects of the global economic crisis, and undertake several programs designed to have a positive impact on climate change.

## 1.2 OBJECTIVE

The purpose of the Project is to improve the efficiency and reduce waste and emissions from an industrial plant that produces paper and cardboard packaging for commercial products. The new Bulleh Shah paper mill is owned by Packages Limited. The plant produces large volumes of packaging waste that could be burned to provide extra process steam and extra electrical power, decreasing the plant's dependence on fossil fuels. The Study will assess and recommend one of two options to utilize the waste from the paper mill and potentially local biomass resources: Option 1 – installing a new 50-ton per hour biomass boiler that would generate approximately 10 megawatts (MW) of electrical power in the existing 41 MW steam turbine; or Option 2 – a significantly larger biomass cogeneration plant of up to 60 MW based on the available fuel supply, interconnection, site and financing constraints. The Study Terms of Reference, in Annex 5 of this RFP include: identify the most appropriate option, size, and optimal design of the plant; plan the integration of the new plant into the existing production facilities; provide a professional feasibility assessment to prospective lenders and investors; provide technical documentation to support permit applications; and provide specifications and bid documents for selection of an Engineering, Procurement, and Construction (EPC) contractor to accomplish the installation.

The full TOR for this Feasibility Study are attached as Annex 5.

## 1.3 PROPOSALS TO BE SUBMITTED

Technical proposals are solicited from interested and qualified U.S. firms. The administrative and technical requirements as detailed throughout the Request for Proposals (RFP) will apply. Specific proposal format and content requirements are detailed in Section 3.

The amount for the contract has been established by a USTDA grant of US\$289,125. **The USTDA grant of US\$289,125 is a fixed amount. Accordingly, COST will not be a factor in the evaluation and therefore, cost proposals should not be submitted.** Upon detailed evaluation of technical proposals, the Grantee shall select one firm for contract negotiations.

## 1.4 CONTRACT FUNDED BY USTDA

In accordance with the terms and conditions of the Grant Agreement, USTDA has provided a grant in the amount of US\$289,125 to the Grantee. The funding provided under the Grant Agreement shall be used to fund the costs of the contract between the Grantee and the U.S. firm selected by the Grantee to perform the TOR. The contract must include certain USTDA Mandatory Contract Clauses relating to nationality, taxes, payment, reporting, and other matters. The USTDA nationality requirements and the USTDA Mandatory Contract Clauses are attached at Annexes 3 and 4, respectively, for reference.

## **Section 2: INSTRUCTIONS TO OFFERORS**

### **2.1 PROJECT TITLE**

The project is called Biomass Cogeneration at Bulleh Shah Paper Mill.

### **2.2 DEFINITIONS**

Please note the following definitions of terms as used in this RFP.

The term "Request for Proposals" means this solicitation of a formal technical proposal, including qualifications statement.

The term "Offeror" means the U.S. firm, including any and all subcontractors, which responds to the RFP and submits a formal proposal and which may or may not be successful in being awarded this procurement.

### **2.3 DEFINITIONAL MISSION REPORT**

USTDA sponsored an expanded energy and power sector Definitional Mission (DM) for Pakistan to address technical, financial, sociopolitical, environmental and other aspects of the proposed project. A copy of the report is attached at Annex 2 for background information only. Please note that the TOR referenced in the report are included in this RFP as Annex 5.

### **2.4 EXAMINATION OF DOCUMENTS**

Offerors should carefully examine this RFP. It will be assumed that Offerors have done such inspection and that through examinations, inquiries and investigation they have become familiarized with local conditions and the nature of problems to be solved during the execution of the Feasibility Study.

Offerors shall address all items as specified in this RFP. Failure to adhere to this format may disqualify an Offeror from further consideration.

Submission of a proposal shall constitute evidence that the Offeror has made all the above mentioned examinations and investigations, and is free of any uncertainty with respect to conditions which would affect the execution and completion of the Feasibility Study.

## **2.5 PROJECT FUNDING SOURCE**

The Feasibility Study will be funded under a grant from USTDA. The total amount of the grant is not to exceed US\$289,125.

## **2.6 RESPONSIBILITY FOR COSTS**

Offeror shall be fully responsible for all costs incurred in the development and submission of the proposal. Neither USTDA nor the Grantee assumes any obligation as a result of the issuance of this RFP, the preparation or submission of a proposal by an Offeror, the evaluation of proposals, final selection or negotiation of a contract.

## **2.7 TAXES**

Offerors should submit proposals that note that in accordance with the USTDA Mandatory Contract Clauses, USTDA grant funds shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in the Host Country.

## **2.8 CONFIDENTIALITY**

The Grantee will preserve the confidentiality of any business proprietary or confidential information submitted by the Offeror, which is clearly designated as such by the Offeror, to the extent permitted by the laws of the Host Country.

## **2.9 ECONOMY OF PROPOSALS**

Proposal documents should be prepared simply and economically, providing a comprehensive yet concise description of the Offeror's capabilities to satisfy the requirements of the RFP. Emphasis should be placed on completeness and clarity of content.

## **2.10 OFFEROR CERTIFICATIONS**

The Offeror shall certify (a) that its proposal is genuine and is not made in the interest of, or on behalf of, any undisclosed person, firm, or corporation, and is not submitted in conformity with, and agreement of, any undisclosed group, association, organization, or corporation; (b) that it has not directly or indirectly induced or solicited any other Offeror to put in a false proposal; (c) that it has not solicited or induced any other person, firm, or corporation to refrain from submitting a proposal; and (d) that it has not sought by collusion to obtain for itself any advantage over any other Offeror or over the Grantee or USTDA or any employee thereof.

## **2.11 CONDITIONS REQUIRED FOR PARTICIPATION**

Only U.S. firms are eligible to participate in this tender. However, U.S. firms may utilize subcontractors from the Host Country for up to 20 percent of the amount of the USTDA grant for specific services from the TOR identified in the subcontract. USTDA's nationality requirements, including definitions, are detailed in Annex 3.

## **2.12 LANGUAGE OF PROPOSAL**

All proposal documents shall be prepared and submitted in English, and only English.

## **2.13 PROPOSAL SUBMISSION REQUIREMENTS**

Mr. Aslam Mehdi of Packages will provide offerors with instructions to maintain a record of receipt of their proposal if electronic delivery is required or allowed.

The **Cover Letter** in the proposal must be addressed to:

Aslam Mehdi  
Director and General Manager  
Packages Limited  
Shahrah-E-Roomi  
P.O. Amer Sidhu  
Lahore - 54760  
Pakistan

Phone: +92 425920478

Fax: +92 5811978

**An Original and eight (8) copies of your proposal must be received at the above address no later than 4:00 PM Local Time in Pakistan, on September 15, 2010.**

Proposals may be either sent by mail, overnight courier, or hand-delivered. Whether the proposal is sent by mail, courier or hand-delivered, the Offeror shall be responsible for actual delivery of the proposal to the above address before the deadline. Any proposal received after the deadline will be returned unopened. The Grantee will promptly notify any Offeror if its proposal was received late.

Upon timely receipt, all proposals become the property of the Grantee.

## **2.14 PACKAGING**

The original and each copy of the proposal must be sealed to ensure confidentiality of the information. The proposals should be individually wrapped and sealed, and labeled for content including "original" or "copy number x"; the original and eight (8) copies should be collectively wrapped and sealed, and clearly labeled.

Neither USTDA nor the Grantee will be responsible for premature opening of proposals not properly wrapped, sealed and labeled.

#### **2.15 AUTHORIZED SIGNATURE**

The proposal must contain the signature of a duly authorized officer or agent of the Offeror empowered with the right to bind the Offeror.

#### **2.16 EFFECTIVE PERIOD OF PROPOSAL**

The proposal shall be binding upon the Offeror for ninety (90) days after the proposal due date and Offeror may withdraw or modify this proposal at any time prior to the due date upon written request, signed in the same manner and by the same person who signed the original proposal.

#### **2.17 EXCEPTIONS**

All Offerors agree by their response to this RFP announcement to abide by the procedures set forth herein. No exceptions shall be permitted.

#### **2.18 OFFEROR QUALIFICATIONS**

As provided in Section 3, Offerors shall submit evidence that they have relevant past experience and have previously delivered advisory, feasibility study and/or other services similar to those required in the TOR, as applicable.

#### **2.19 RIGHT TO REJECT PROPOSALS**

The Grantee reserves the right to reject any and all proposals.

#### **2.20 PRIME CONTRACTOR RESPONSIBILITY**

Offerors have the option of subcontracting parts of the services they propose. The Offeror's proposal must include a description of any anticipated subcontracting arrangements, including the name, address, and qualifications of any subcontractors. USTDA nationality provisions apply to the use of subcontractors and are set forth in detail in Annex 3. The successful Offeror shall cause appropriate provisions of its contract, including all of the applicable USTDA Mandatory Contract Clauses, to be inserted in any subcontract funded or partially funded by USTDA grant funds.

#### **2.21 AWARD**

The Grantee shall make an award resulting from this RFP to the best qualified Offeror, on the basis of the evaluation factors set forth herein. The Grantee reserves the right to reject any and all

proposals received and, in all cases, the Grantee will be the judge as to whether a proposal has or has not satisfactorily met the requirements of this RFP.

## **2.22 COMPLETE SERVICES**

The successful Offeror shall be required to (a) provide local transportation, office space and secretarial support required to perform the TOR if such support is not provided by the Grantee; (b) provide and perform all necessary labor, supervision and services; and (c) in accordance with best technical and business practice, and in accordance with the requirements, stipulations, provisions and conditions of this RFP and the resultant contract, execute and complete the TOR to the satisfaction of the Grantee and USTDA.

## **2.23 INVOICING AND PAYMENT**

Deliverables under the contract shall be delivered on a schedule to be agreed upon in a contract with the Grantee. The Contractor may submit invoices to the designated Grantee Project Director in accordance with a schedule to be negotiated and included in the contract. After the Grantee's approval of each invoice, the Grantee will forward the invoice to USTDA. If all of the requirements of USTDA's Mandatory Contract Clauses are met, USTDA shall make its respective disbursement of the grant funds directly to the U.S. firm in the United States. All payments by USTDA under the Grant Agreement will be made in U.S. currency. Detailed provisions with respect to invoicing and disbursement of grant funds are set forth in the USTDA Mandatory Contract Clauses attached in Annex 4.

### **Section 3: PROPOSAL FORMAT AND CONTENT**

To expedite proposal review and evaluation, and to assure that each proposal receives the same orderly review, all proposals must follow the format described in this section.

Proposal sections and pages shall be appropriately numbered and the proposal shall include a Table of Contents. Offerors are encouraged to submit concise and clear responses to the RFP. Proposals shall contain all elements of information requested without exception. Instructions regarding the required scope and content are given in this section. The Grantee reserves the right to include any part of the selected proposal in the final contract.

The proposal shall consist of a technical proposal only. A cost proposal is NOT required because the amount for the contract has been established by a USTDA grant of US\$289,125, which is a fixed amount.

Offerors shall submit one (1) original and eight (8) copies of the proposal. Proposals received by fax cannot be accepted.

Each proposal must include the following:

- Transmittal Letter,
- Cover/Title Page,
- Table of Contents,
- Executive Summary,
- Company Information,
- Organizational Structure, Management Plan, and Key Personnel,
- Technical Approach and Work Plan, and
- Experience and Qualifications.

Detailed requirements and directions for the preparation of the proposal are presented below.

#### **3.1 EXECUTIVE SUMMARY**

An Executive Summary should be prepared describing the major elements of the proposal, including any conclusions, assumptions, and general recommendations the Offeror desires to make. Offerors are requested to make every effort to limit the length of the Executive Summary to no more than five (5) pages.

## **3.2 COMPANY INFORMATION**

For convenience, the information required in this Section 3.2 may be submitted in the form attached in Annex 6 hereto.

### **3.2.1 Company Profile**

Provide the information listed below relative to the Offeror's firm. If the Offeror is proposing to subcontract some of the proposed work to another firm(s), the information requested in sections 3.2.5 and 3.2.6 below must be provided for each subcontractor.

1. Name of firm and business address (street address only), including telephone and fax numbers.
2. Year established (include predecessor companies and year(s) established, if appropriate).
3. Type of ownership (e.g. public, private or closely held).
4. If private or closely held company, provide list of shareholders and the percentage of their ownership.
5. List of directors and principal officers (President, Chief Executive Officer, Vice-President(s), Secretary and Treasurer; provide full names including first, middle and last). Please place an asterisk (\*) next to the names of those principal officers who will be involved in the Feasibility Study.
6. If Offeror is a subsidiary, indicate if Offeror is a wholly-owned or partially-owned subsidiary. Provide the information requested in items 1 through 5 above for the Offeror's parent(s).
7. Project Manager's name, address, telephone number, e-mail address and fax number.

### **3.2.2 Offeror's Authorized Negotiator**

Provide name, title, address, telephone number, e-mail address and fax number of the Offeror's authorized negotiator. The person cited shall be empowered to make binding commitments for the Offeror and its subcontractors, if any.

### **3.2.3 Negotiation Prerequisites**

1. Discuss any current or anticipated commitments which may impact the ability of the Offeror or its subcontractors to complete the Feasibility Study as proposed and reflect such impact within the project schedule.
2. Identify any specific information which is needed from the Grantee before commencing contract negotiations.

### 3.2.4 Offeror's Representations

If any of the following representations cannot be made, or if there are exceptions, the Offeror must provide an explanation.

1. Offeror is a corporation *[insert applicable type of entity if not a corporation]* duly organized, validly existing and in good standing under the laws of the State of \_\_\_\_\_. The Offeror has all the requisite corporate power and authority to conduct its business as presently conducted, to submit this proposal, and if selected, to execute and deliver a contract to the Grantee for the performance of the Feasibility Study. The Offeror is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment, or ineligible for the award of contracts by any federal or state governmental agency or authority.
2. The Offeror has included, with this proposal, a certified copy of its Articles of Incorporation, and a certificate of good standing issued within one month of the date of its proposal by the State of \_\_\_\_\_. The Offeror commits to notify USTDA and the Grantee if they become aware of any change in their status in the state in which they are incorporated. USTDA retains the right to request an updated certificate of good standing.
3. Neither the Offeror nor any of its principal officers have, within the three-year period preceding this RFP, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.
4. Neither the Offeror, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 3 above.
5. There are no federal or state tax liens pending against the assets, property or business of the Offeror. The Offeror, has not, within the three-year period preceding this RFP, been notified of any delinquent federal or state taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.
6. The Offeror has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself or its debts under any bankruptcy, insolvency or other similar law. The Offeror has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

The selected Offeror shall notify the Grantee and USTDA if any of the representations included in its proposal are no longer true and correct at the time of its entry into a contract with the Grantee.

### **3.2.5 Subcontractor Profile**

1. Name of firm and business address (street address only), including telephone and fax numbers.
2. Year established (include predecessor companies and year(s) established, if appropriate).

### **3.2.6 Subcontractor's Representations**

If any of the following representations cannot be made, or if there are exceptions, the Subcontractor must provide an explanation.

1. Subcontractor is a corporation [*insert applicable type of entity if not a corporation*] duly organized, validly existing and in good standing under the laws of the State of \_\_\_\_\_. The subcontractor has all the requisite corporate power and authority to conduct its business as presently conducted, to participate in this proposal, and if the Offeror is selected, to execute and deliver a subcontract to the Offeror for the performance of the Feasibility Study and to perform the Feasibility Study. The subcontractor is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment or ineligible for the award of contracts by any federal or state governmental agency or authority.
2. Neither the subcontractor nor any of its principal officers have, within the three-year period preceding this RFP, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.
3. Neither the subcontractor, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 2 above.
4. There are no federal or state tax liens pending against the assets, property or business of the subcontractor. The subcontractor, has not, within the three-year period preceding this RFP, been notified of any delinquent federal or state taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.

5. The subcontractor has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself or its debts under any bankruptcy, insolvency or other similar law. The subcontractor has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

The selected subcontractor shall notify the Offeror, Grantee and USTDA if any of the representations included in this proposal are no longer true and correct at the time of the Offeror's entry into a contract with the Grantee.

### **3.3 ORGANIZATIONAL STRUCTURE, MANAGEMENT, AND KEY PERSONNEL**

Describe the Offeror's proposed project organizational structure. Discuss how the project will be managed including the principal and key staff assignments for this Feasibility Study. Identify the Project Manager who will be the individual responsible for this project. The Project Manager shall have the responsibility and authority to act on behalf of the Offeror in all matters related to the Feasibility Study.

Provide a listing of personnel (including subcontractors) to be engaged in the project, including both U.S. and local subcontractors, with the following information for key staff: position in the project; pertinent experience, curriculum vitae; other relevant information. If subcontractors are to be used, the Offeror shall describe the organizational relationship, if any, between the Offeror and the subcontractor.

A manpower schedule and the level of effort for the project period, by activities and tasks, as detailed under the Technical Approach and Work Plan shall be submitted. A statement confirming the availability of the proposed project manager and key staff over the duration of the project must be included in the proposal.

### **3.4 TECHNICAL APPROACH AND WORK PLAN**

Describe in detail the proposed Technical Approach and Work Plan (the "Work Plan"). Discuss the Offeror's methodology for completing the project requirements. Include a brief narrative of the Offeror's methodology for completing the tasks within each activity series. Begin with the information gathering phase and continue through delivery and approval of all required reports.

Prepare a detailed schedule of performance that describes all activities and tasks within the Work Plan, including periodic reporting or review points, incremental delivery dates, and other project milestones.

Based on the Work Plan, and previous project experience, describe any support that the Offeror will require from the Grantee. Detail the amount of staff time required by the Grantee or other participating agencies and any work space or facilities needed to complete the Feasibility Study.

### 3.5 EXPERIENCE AND QUALIFICATIONS

Provide a discussion of the Offeror's experience and qualifications that are relevant to the objectives and TOR for the Feasibility Study. If a subcontractor(s) is being used, similar information must be provided for the prime and each subcontractor firm proposed for the project. The Offeror shall provide information with respect to relevant experience and qualifications of key staff proposed. The Offeror shall include letters of commitment from the individuals proposed confirming their availability for contract performance.

As many as possible but not more than six (6) relevant and verifiable project references must be provided for each of the Offeror and any subcontractor, including the following information:

Project name,  
Name and address of client (indicate if joint venture),  
Client contact person (name/ position/ current phone and fax numbers),  
Period of Contract,  
Description of services provided,  
Dollar amount of Contract, and  
Status and comments.

Offerors are strongly encouraged to include in their experience summary primarily those projects that are similar to or larger in scope than the Feasibility Study as described in this RFP.

### Section 4: AWARD CRITERIA

Individual proposals will be evaluated by a Procurement Selection Committee of representatives from the Grantee. The Committee will then conduct a final evaluation and completion of ranking of qualified Offerors. The Grantee will notify USTDA of the best qualified Offeror, and upon receipt of USTDA's no-objection letter, the Grantee shall promptly notify all Offerors of the award and negotiate a contract with the best qualified Offeror. If a satisfactory contract cannot be negotiated with the best qualified Offeror, negotiations will be formally terminated. Negotiations may then be undertaken with the second most qualified Offeror and so forth.

The selection of the Contractor will be based on the following criteria:

- A Project Manager with at least 10 years experience in project management, in design, construction, or operational engineering of industrial cogeneration facilities, either within an industry or within an Architect/Engineering firm.
- An Engineering Manager, PE, with at least 10 years experience supervising power plant engineering design groups.
- A Mechanical Engineer, PE, with 10 years of experience with industrial cogeneration plant design.
- A Civil Engineer with 6 years of experience in power plant design.
- A Project Finance Specialist with 10 years experience in structuring project financing.

- An Electrical Engineer, PE, with 10 years experience in industrial cogeneration plant design.
- An Environmental Specialist with 6 years experience dealing with power plant pollution controls and permit issues.

The consultant selected should have the Personnel Qualifications above in the persons and titles listed or in equivalent combinations of experience under other titles.

Selection criteria for competitive bidding are:

- Experience working on current industrial cogeneration design projects (35points)
- Experience working on design feasibility studies similar to this feasibility study (35 points)
- Recent experience in design and performance optimization modeling (20 points)
- Experience working on energy projects in Pakistan (5 points)
- Experience with projects in the Region (5 points)

Proposals that do not include all requested information may be considered non-responsive.

**Price will not be a factor in contractor selection.**

**ANNEX 1**

**FEDBIZOPPS ANNOUNCEMENT**

Grantee Contact: Aslam Mehdi, Director and General Manager, Packages Limited, Shahrah-E-Roomi, P.O. Amer Sidhu, Lahore – 54760, Pakistan, Phone: +92 425920478, Fax: +92 5811978

Project Title: Biomass Cogeneration at Bulleh Shah Paper Mill

POC: Nina Patel, USTDA, 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901, Tel: (703) 875-4357, Fax: (703) 875-4009. BIOMASS COGENERATION AT BULLEH SHAH PAPER MILL. The Grantee invites submission of qualifications and proposal data (collectively referred to as the "Proposal") from interested U.S. firms that are qualified on the basis of experience and capability to develop a feasibility study for Packages Limited to determine the best option to utilize various paper and agricultural wastes from a recently built paper mill for purposes of biomass cogeneration.

#### BACKGROUND SUMMARY

Packages Limited, the proposed Grantee, is a publicly traded company based in Pakistan, produces paper and cardboard at its own paper mills, including the Bulleh Shah paper mill at Kasur, 40 kilometers southeast of Lahore, in Punjab. The mill has its own process steam plant and can supply its own electrical demand; however Packages wishes to use the waste generated by the plant to build and operate a biomass cogeneration facility to generate additional electricity for their paper mills and business operations. The waste generated by Bulleh Sah, includes paper pulp sludge, cardboard and paper scrap, as well as aluminum foil and polyethylene sheet trimming wastes. In addition, Packages uses locally sourced wheat straw as a paper component, giving it access to an existing source of agricultural waste. Packages has commissioned several internal and external studies over the last couple of years on the quantities and composition of their waste stream, on preliminary designs for a biomass cogeneration system, and on performance analyses to determine pressures, efficiencies, output in tons of steam and in megawatt. At this point, Packages seeks expert advice from a U.S. company to determine the applicability, size, financial scope and technical requirements of implementing a biomass cogeneration facility. The study will begin with a technical assessment and review of existing options and documentation, followed by a complete project analysis of two options for utilizing waste from the Bulleh Shah paper mill itself and other sources.

The U.S. firm selected will be paid in U.S. dollars from a \$289,125 grant to the Grantee from the U.S. Trade and Development Agency (USTDA).

A detailed Request for Proposals (RFP), which includes requirements for the Proposal, the Terms of Reference, and a background definitional mission/desk study report are available from USTDA, at 1000 Wilson Boulevard, Suite 1600, Arlington, VA 22209-3901. To request the RFP in PDF format, please go to: <https://www.usda.gov/businessopps/rfpform.asp>. Requests for a mailed hardcopy version of the RFP may also be faxed to the IRC, USTDA at 703-875-4009. In the fax, please include your firm's name, contact person, address, and telephone number. Some firms have found that RFP materials sent by U.S. mail do not reach them in time for preparation of an adequate response. Firms that want USTDA to use an overnight delivery service should include the name of the delivery service and your firm's account number in the

request for the RFP. Firms that want to send a courier to USTDA to retrieve the RFP should allow one hour after faxing the request to USTDA before scheduling a pick-up. Please note that no telephone requests for the RFP will be honored. Please check your internal fax verification receipt. Because of the large number of RFP requests, USTDA cannot respond to requests for fax verification. Requests for RFPs received before 4:00 PM will be mailed the same day. Requests received after 4:00 PM will be mailed the following day. Please check with your courier and/or mail room before calling USTDA.

Only U.S. firms and individuals may bid on this USTDA financed activity. Interested firms, their subcontractors and employees of all participants must qualify under USTDA's nationality requirements as of the due date for submission of qualifications and proposals and, if selected to carry out the USTDA-financed activity, must continue to meet such requirements throughout the duration of the USTDA-financed activity. All goods and services to be provided by the selected firm shall have their nationality, source and origin in the U.S. or host country. The U.S. firm may use subcontractors from the host country for up to 20 percent of the USTDA grant amount. Details of USTDA's nationality requirements and mandatory contract clauses are also included in the RFP.

Interested U.S. firms should submit their Proposal in English directly to the Grantee by 4:00 PM local time in Pakistan, September 15, 2010 at the above address. Evaluation criteria for the Proposal are included in the RFP. Price will not be a factor in contractor selection, and therefore, cost proposals should NOT be submitted. The Grantee reserves the right to reject any and/or all Proposals. The Grantee also reserves the right to contract with the selected firm for subsequent work related to the project. The Grantee is not bound to pay for any costs associated with the preparation and submission of Proposals.

**ANNEX 2**

**PORTIONS OF THIS DEFINITIONAL MISSION REPORT HAVE BEEN  
INTENTIONALLY REDACTED**

**ONLY RELEVANT PORTIONS OF THIS DEFINITIONAL MISSION REPORT  
PERTAINING TO BIOMASS COGENERATION AT BULLEH SHAH PAPER MILL  
FEASIBILITY STUDY ARE INCLUDED HEREIN.**



# Definitional Mission: Pakistan Energy Sector Projects



**FINAL  
REPORT**

**April 23, 2010**



This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U.S. Government. The opinions, findings, conclusions, or recommendations expressed in this document are those of the author(s) and do not necessarily represent the official position or policies of USTDA. USTDA makes no representation about, nor does it accept responsibility for, the accuracy or completeness of the information contained in this report.

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## **The U.S. Trade and Development Agency**

The U.S. Trade and Development Agency (USTDA) advances economic development and U.S. commercial interests in developing and middle-income countries. The agency funds various forms of technical assistance, early investment analysis, training, orientation visits and business workshops that support the development of a modern infrastructure and a fair and open trading environment.

USTDA's strategic use of foreign assistance funds to support sound investment policy and decision-making in host countries creates an enabling environment for trade, investment, and sustainable economic development. Operating at the nexus of foreign policy and commerce, USTDA is uniquely positioned to work with U.S. firms and host countries in achieving the agency's trade and development goals. In carrying out its mission, USTDA gives emphasis to economic sectors that may benefit from U.S. exports of goods and services.

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## EXECUTIVE SUMMARY

Pakistan, a valued friend, ally, and trading partner of the United States, has severe shortages of fuels and electricity that threaten to hold back its economic growth. USTDA desires to find ways to provide assistance to specific project opportunities that serve the energy needs of Pakistan, that have potential to use U.S. vendors and services, and that qualify for USTDA assistance. Assistance may take the form of feasibility studies to support international bidding and financing, technical assistance and capacity development to improve the enabling environment, or assistance arranging contact with U.S. vendors and financial institutions.

USTDA contracted Energy Markets Group (EMG) to complete a Definitional Mission of the Pakistan Energy Sector. EMG was charged to identify at least 6 energy projects for which USTDA assistance would be pivotal, valuable, and timely. EMG assembled a team of its energy experts comprised of Ahmad Ghamarian, Michael Gembol, Ashfaq Mahmood, Mohammad Raziuddin, and Stratos Tavoulareas. During part of the Mission, the team was accompanied by Jacob Flewelling of USTDA.

During preparations and during a 2-week fact-finding visit to Pakistan, October 3 to 18, 2009, EMG held 82 meetings with individuals, corporations, and government agencies. These meetings identified 170 active projects that qualify in some respect for USTDA assistance. They represent over 16,000 MW of immediate projects, with potential to be replicated or "rolled out" to over 77,000 MW, roughly four times the size of Pakistan's present electricity infrastructure. Of these, 14 projects were evaluated as having the highest value and potential. Their project descriptions are attached. In discussions with USTDA, this list was narrowed down to 8 projects. For these selected projects EMG completed Terms of Reference to support the process by which USTDA will select vendors of the services to be supported by USTDA.

The selected projects will provide a total of 480 MW of urgently needed electrical generating capacity and loss reductions, and sufficient fuel for another 673 MW of generating capacity. Total capital cost of the projects is approximately \$4.1 billion. Potential value of trade with U.S. vendors is approximately \$1.7 billion. Many of the projects have potential to be rolled out to other sites and applications, and the total rollout potential is estimated at over 16,000 MW, or almost as much as the present total generating capacity of Pakistan. A summary table is shown on the following page.

The project selections are weighed heavily for feasibility: the Definitional Mission considered capabilities of sponsors, the policy framework of the Government of Pakistan, environmental issues, and both financial and economic viability of the proposals. In each case, USTDA assistance can reduce delays, improve the focus of the project, and increase probability of successful financial closing.

Among the 162 projects not selected for USTDA assistance, there are many good, viable, and important projects. USTDA may later find resources to support some of these projects; other agencies may as well assign resources to some.

## **PACKAGES COGENERATION DEFINITIONAL MISSION STUDY**

**PURPOSE:** Founded in 1956, Packages, Ltd, ("Packages") provides premium packaging materials for other Pakistan businesses and for export. They produce offset-printed cartons, shipping containers, and flexible packaging materials. Packages has become a major industrial company; it employs over 3,000 people and has revenues over \$100 million/year. Packages has formed a vertically integrated process, producing paper and cardboard at its own paper mill, and has recently built a new paper mill, the Bulleh Shah paper mill at Kasur, Punjab. These facilities produce large amounts of waste, including paper pulp sludge, cardboard and paper scrap, and aluminum foil and polyethylene sheet trimming wastes. In addition, they use locally-sourced wheat straw as a paper component, giving them access to an existing stream of agricultural wastes as possible supplemental fuels. The plant has its own process steam plant and can supply its own electrical demand. Packages has asked for USTDA assistance to conduct a Feasibility Study for building a biomass-fueled boiler at the new paper plant.

**BACKGROUND:** The Bulleh Shah plant has an existing 130-ton per hour (TPH) boiler providing steam to the paper plant and to a 41-MW steam turbine, and an 11-MW combined cycle plant consisting of a 6.3-MW Gas Turbine, a 30-TPH Heat Recovery Boiler, and a 4.7-MW Steam Turbine. Both are now powered by fossil fuels, which are increasing in price and which face possible supply interruptions due to shortages.

Two options are being considered for utilizing paper mill waste/straw from the paper and pulp mill and from other possible waste sources in the area:

### ***Option #1 Self-Generation***

Under this option, it is proposed to install a new biomass boiler of 50 tons per hour (TPH) of steam capacity. This boiler will be connected in parallel with the existing 130 TPH (260,000 lb/hr) conventional boiler of the existing steam network operating at a pressure of 96 Bar (1400 psi) and 528°C (980 °F) and subsequently feeding the 41-MW Steam Turbine. The new 50-TPH biomass boiler will produce 10 MW of electrical power in the existing 41-MW steam turbine and the rest of the steam for power generation will come from the existing boiler. Using steam produced with biomass fuel will reduce the amount of fossil fuel required in the existing fossil fueled boiler.

### ***Option #2 Power Export to Grid***

Pakistan is short of electrical generating capacity. Large industrial plants are being encouraged to sell excess power back to the grid. Under this option, Packages would install a larger biomass boiler of a capacity limited by the constraints of available fuel supplies, site infrastructure, ability to export power to the electric grid, and financial resources of Packages. Developing this option fully may lead to:

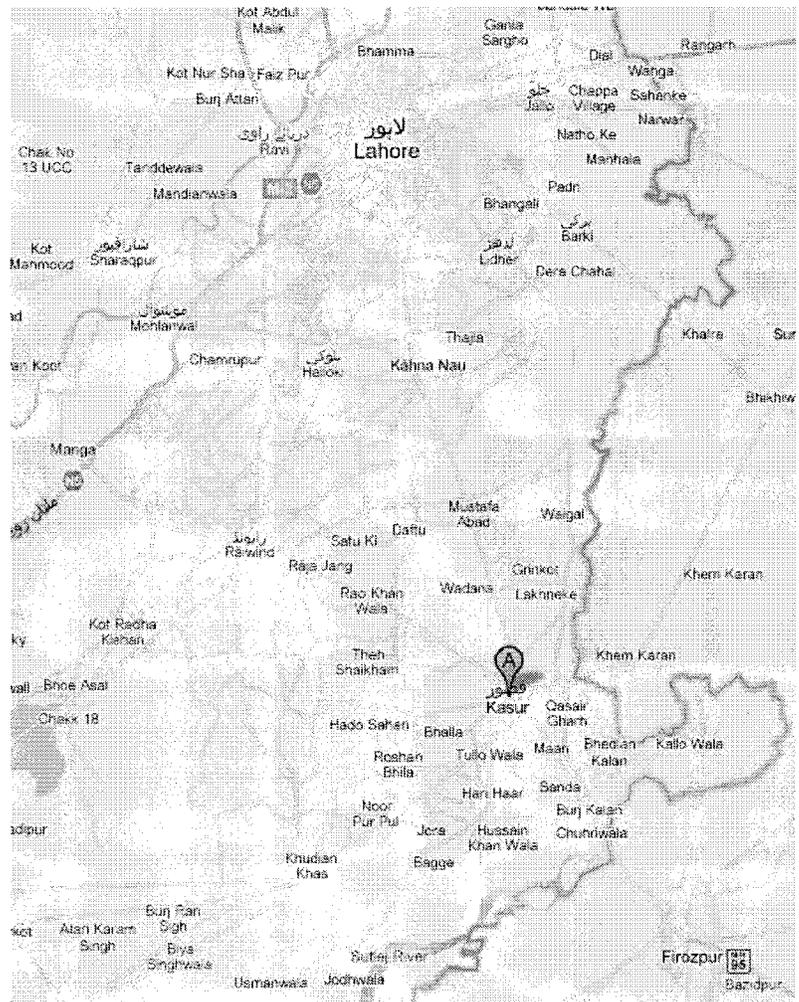
- greater reduction in the fossil fuel consumption and CO2 emissions than would result from Option 1,

- total self-sufficiency for electricity supply,
- the ability to back down all fossil-fueled steam production, making that fuel available to other electricity generators, and
- the possibility to install another steam turbine and export large amounts of power to the grid.

Packages has an able engineering staff which has already completed its own studies arriving at Option 1 above as one of the most effective uses of fossil and biomass fuels. The Feasibility Study would verify the Option 1 and define and size Option 2, provide pricing and financing scenarios, and enable Packages to select and proceed with the better option.

**PROJECT LOCATION:** Kasur, a city in Punjab, Pakistan, is located near the Sutlej River and the border with India, 40 km southeast of Lahore.

The name Bulleh Shah honors the town's 18<sup>th</sup> century Sufi mystic and poet. The paper mill is located about 5 km west of the city.



**PROJECT DESCRIPTION:** The Project comprises these stages:

1. Selection of a qualified consultant.
2. Preparation of Feasibility Study
3. Preparation of Tender Documents
4. Evaluation of EPC Bids
5. Design Review, Construction Management and Supervision
6. Construction
7. Training of Staff
8. Startup, Testing, and Commissioning of the Plant

USTDA will provide funding support for Stages 1, 2, and 3. Packages will select a United States independent consultant ("Contractor") by competitive bidding under USTDA guidelines. Contractor shall conduct the Feasibility Study and prepare Tender Documents at direction of and to the satisfaction of Packages management.

Time frame of the study will be about six months. Contractor shall submit a draft Feasibility Study for review and comments prior to submitting the Final Feasibility Study.

**IMPLEMENTATION FINANCING:** The project must be able to pay for itself from the avoided cost of fossil fuels and electricity purchases, from electricity sales (under Option 2), from reduction in waste disposal expenses, from possible Clean Development Mechanism (CDM) fees, and from possible fees for disposal of other waste fuels. Contractor shall provide a financing plan, including policy research to show the design qualifies for financing from parties that may include Packages and its investors, OPIC, U.S.-Exim, various MLA banks, various venture capital financiers, and various domestic and international commercial banks.

Note that Packages has recently financed the \$300 million Bulleh Shah facility using primarily domestic banks. The effect of this project will improve the profitability of the Bulleh Shah plant and lessen its dependence on fossil fuels, improving its debt coverage on the existing financing. The Definitional Mission suggests that the most favorable financing terms are very likely to be provided by the same lenders. An objective of the Feasibility Study, then, is to provide a basis for other lenders to compete for the opportunity to serve this project, other Packages projects, and similar projects which may follow suit in related industries.

USTDA's grant funds shall not be used for the purchase of any equipment associated with project. The Grantee is responsible for identifying requesting and or securing the financing needed to implement the project, outside of the scope of these USTDA-funded Terms of Reference.

**SPONSOR' S CAPABILITY AND COMMITMENT:** Packages has built the new Bulleh Shah Paper Mill at a cost of US\$ 300 million, which shows full commitment for implementation of the proposed project. This is a major, modern industrial facility.



In addition, Packages has installed a Chemical Recovery Plant at its Lahore mill, indicating that they fully adhere to International Standards on environmental protection.

Packages is publicly traded with an A1+ credit rating. 2008 revenues were \$167 million with \$11.5 million profit. The company is substantial and now recovering from the global business downturn. Packages was unable to pay dividends in 2008, but resumed in 2009 after an 11% growth in revenues as of the 3<sup>rd</sup> quarter.

In conducting the assessment, the contractor will quantify the amount of biomass fuel and fossil fuel that is offset, and determine the net reduction of CO<sub>2</sub>. The contractor will examine other emissions such as carbon monoxide (CO), nitrous oxides (NO<sub>x</sub>), sulfur oxides (SO<sub>2</sub> and SO<sub>3</sub>),

and particulate emissions. With modern boilers and proper emissions controls, it is likely that all of these will be reduced by the new plant.

As part of the study, the contractor will recommend methods for handling and disposal of ash according to its content. It is expected that there will be two dominant factors: the ash can be landfilled without producing methane, as it will have little remaining carbon, and the volume of waste will be reduced by a great factor, extending the service life of the landfill. As an optimum result, it may be found that the ash can be used as fertilizer or as a soil stabilization medium.

The contractor will also evaluate the industrial wastes being used for fuel to ensure they are not contaminated with any toxic chemicals which could pass through the combustions process or show up in ash. If any toxic chemicals are found, the contractor will help Packages identify and correct the source, or specify additional emissions controls to prevent release to the atmosphere.

The plant will be sited on existing industrial property, so there should be no issues with land use or habitat destruction.

For all these reasons, the Feasibility Study is very likely to determine that the Packages plant will have net beneficial environmental impact under either technology option.

**U.S. EXPORT POTENTIAL:**

<b>CATEGORY</b>	<b>COMPANY</b>	<b>SPECIFIC DETAILS</b>
Biomass Boilers and Biomass Incinerators	Siemens McBurney Hurst Peregrine	Equipment vendor, some EPC services
EPC	Black & Veatch Bechtel Sargent & Lundy Stanley Consultants	Design, procure, supervise construction

Under Option 1, a 50 TPH lb/hr biomass boiler on an existing site may cost roughly \$12 million, and potential U.S. trade is roughly 40% of that amount, or \$4.8 million. Under Option 2, the size of the plant is to be determined by the Feasibility Study. However, using an assumed size of 60 MW, the power plant would cost roughly \$108 million, and potential U.S. trade for the second option would be roughly \$43 million.

Either option is an environmentally sound concept that may be expanded at the Bulleh Shah plant, or replicated at other Packages plants, or replicated into any of a large number of industrial facilities around Pakistan, leading to further business opportunities for U.S. trade.

**FOREIGN COMPETITION AND MARKET ENTRY ISSUES:**

Foreign competition will be intense. Regional competitors, particularly from China, will very likely offer considerably less expensive services and equipment. U.S. vendors must offset the

price difference with experience, quality of service, and better followup when the plant is in service. If this were a stand-alone, single power plant in this size range, it would probably be won by a Chinese vendor. However, the entire design and construction have to be integrated into an existing (and operating) power plant and process steam system. U.S. companies have very high standards for system integration and for startup and followup services. The U.S. has the world's largest agricultural infrastructure, with thousands of successful projects in crop waste fuel, cogeneration in the food processing industry, biomass crop plants, animal waste processing into fuels, and energy efficiency projects. This experience base gives U.S. companies a competitive advantage. Packages has stated its distinct preference for a U.S. vendor and is actively searching for one to manage this project.

Packages has actually proceeded so far as to conduct an international competitive bidding which concluded in August, 2009. The U.S. companies, Energy Products of Idaho, and McBurney, declined to submit bids. Packages was not satisfied with the offers and canceled its tender. Only three valid bids were received from ten qualified bidders from Pakistan, India, China, Finland, Denmark, Austria, Japan, Italy, and the U.S.

Packages also has a current proposal for a Feasibility Study from the Finnish company, Poyry Consultants, which has a strong international presence both in consulting and in EPC services for renewable energy technologies. The proposal is for an amount significantly less than the proposed cost of the Feasibility Study, but direct comparison is not possible without knowing the scope and commercial purpose of the Poyry proposal.

Packages has kept its options open in hopes that the USTDA sponsorship would help identify a qualified U.S. bidder and persuade them to work with Packages.

By contrast, the Definitional Mission was advised by several parties that Chinese vendors have failed to successfully complete projects, have delivered very low quality equipment, and have utterly failed to follow up with fixing design and construction problems. One company allegedly took payment at completion and then walked off without paying its Pakistani construction crews.

There is no market entry issue from the Pakistan side. From the U.S. side, there are two major concerns. First, some vendors have in the past pursued project opportunities in Pakistan and found that their technologies and integration schemes were allegedly then given to regional vendors who delivered cheaper equipment. The Definitional Mission judges that Packages has the integrity and the long-term view to conduct its bidding and contract management properly. The Definitional Mission suggests that the experience of the Feasibility Study contractor in dealing with Packages will confirm this judgment, and that this information will be a factor in persuading U.S. companies to participate.

Second, U.S. companies have concerns for the safety of their employees in conflict areas. Again, the experience and perceptions of the Feasibility Study contractor regarding personnel safety in travel, accommodations, and field work will be a factor in persuading U.S. companies to participate.

**DEVELOPMENT IMPACT:** Besides delivering a significant increment of generating capacity, if any, it can serve as a demonstration project. By shifting part or all of its fuel requirement to biomass sources, the project will save significant quantities of fossil fuel, which will then become available for other generating plants. Pakistan has enormous quantities of agricultural waste and other biomass fuels which can be used for electricity generation where financially feasible. In this sense, this project can lead to a major transformation away from fossil fuels and toward industrial cogeneration to relieve fuel and electricity shortages and allow growth of the economy worth many times the cost of the project.

<b>Category</b>	<b>Explanation</b>
<b>Infrastructure</b>	Pakistan's economy and industrial production are being held back by severe seasonal load shedding and frequent outages caused by lack of dependable reserve capacity. The Government of Pakistan is changing its policies step-by-step to convert its infrastructure toward more private ownership and competitive responsiveness. One avenue for that development is to encourage more self-generation. New feed-in tariffs are being set up to allow industrial generators to sell excess power back to the grid. Using the efficiencies of cogeneration adapted to their specific processes, their often great financing capacity, and their ability to exploit diverse and innovative fuel supplies, industrial generators are often the least-cost producers of electricity, and their electricity revenues can support other productivity improvements. This project is an excellent example and, if implemented successfully, it may be replicated to other Packages plants and to other paper mills and similar industries, resulting in a large block of available capacity at a time when the nation needs it desperately.
<b>Market-Oriented Reform</b>	Several major industries now sell power back to the grid; this project can expand the range of fuels and cogeneration technologies, increasing and diversifying competition against traditional fossil-fueled generating plants. If successful in increasing the profitability of the Packages operations, the project will ostensibly improve their competitiveness, increase their international trade in packaging materials, and do the same for the thousands of businesses that use Packages products to ship and market their own products.
<b>Human Capacity Building</b>	This project will require training of the Packages operating staffs.
<b>Technology Transfer and Productivity Improvement</b>	Technologies involved will be established and well-proven, but not innovative and not new to Pakistan. Depending on the design option selected, the project may open opportunities for local manufacturers and construction companies to expand into biomass technologies.
<b>Other</b>	The project may create local markets for agricultural wastes as supplemental boiler fuels.

**IMPACT ON U.S. JOBS:** U.S. vendors of equipment and services are likely to win contracts from this and similar projects elsewhere in Pakistan. Packages management has stated a strong desire to have U.S. companies in competition for the award. Though small, this project will marginally support or increase the number of U.S. jobs in heavy equipment fabrication, consulting, and engineering design service jobs.

**QUALIFICATIONS:** Personnel Qualifications required to properly complete this Feasibility Study include:

- A Project Manager with at least 10 years experience in project management, preferably in design, construction, or operational engineering of industrial cogeneration facilities, either within an industry or within an Architect/Engineering firm.
- An Engineering Manager, PE, with at least 10 years experience supervising power plant engineering design groups.
- A Mechanical Engineer, PE, with 10 years of experience with industrial cogeneration plant design.
- A Civil Engineer with 6 years of experience in power plant design.
- A Project Finance Specialist with 10 years experience in structuring project financing.
- An Electrical Engineer, PE, with 10 years experience in industrial cogeneration plant design.
- An Environmental Specialist with 6 years experience dealing with power plant pollution controls and permit issues.

The consultant selected should have the Personnel Qualifications above in the persons and titles listed or in equivalent combinations of experience under other titles.

Selection criteria for competitive bidding are:

- Experience in current industrial cogeneration design projects (35points)
- Experience in design feasibility studies of this type (35 points)
- Recent experience in design and performance optimization modeling (20 points)
- Experience on energy projects in Pakistan (5 points)
- Experience with USTDA (5 points)

**JUSTIFICATION:** The U.S., with its vast agricultural and processed foods infrastructure, leads the world in industrial cogeneration technology and reputation. Packages has expressed a distinct preference for U.S. technology and equipment, with a specific preference for one company in particular, but has been unable to persuade that company to venture to Pakistan contrary to its policy against sending personnel to conflict areas. The Definitional Mission discerns that conducting a Feasibility Study through a U.S. consultant will lend familiarity, credibility, and palatability to the project, greatly increasing the probability of U.S. companies taking on the project. From the viewpoint of a U.S. company, the project is more tangible if the Feasibility Study was done by a U.S. consultant known to them, if that consultant has been to the site and worked with the client and is able to vouch for the working environment and professionalism of the client, and if the work product is written with terminology, standards, and

specifications in American English. Note that the Terms of Reference task the contractor to identify qualified U.S. companies and to confirm their willingness to serve a client in Pakistan.

**TERMS OF REFERENCE:** Packages shall be referred to hereinafter as “Grantee.” To perform the Feasibility Study, Grantee shall select an independent consultant, “Contractor”, in competitive bidding under USTDA guidelines.

The Terms of Reference for the Request for Proposal for the Feasibility Study can be found in Annex 5.

**POTENTIAL OBSTACLES:** The project is relatively small; major U.S. biomass plant vendors are reluctant to undertake a project at a remote site where there may be risks to their employees. Energy Products of Idaho and McBurney both declined to respond to direct inquiries from Packages.

Pakistan has limited borrowing capacity. Although Packages is a public listed company, its credit will be subject to sector limits and credit constraints of the exchequer, especially in the capital-intensive energy sector. Financing any project will be a challenge.

As mentioned in the BACKGROUND section above, Pakistan has severe fossil fuel shortages. There is grave doubt that projects now in development and construction will have adequate fuel supplies over the next several years. This may hamper the process of obtaining financing, even though the project will decrease dependence on fossil fuels, because fuel interruptions may interrupt production at the plant. Note that a project that converted the plant’s energy requirements to biomass fuels might actually be more financially feasible than one that left the plant partly dependent on gas or oil.

**RISKS:**

Category	Risk Description	Possible Mitigation Strategy
Project	Construction, startup, and performance risk	The Tender Documentation will specify guarantee and warranty provisions to minimize capital losses. However, economic losses caused by delays or underperformance cannot be guaranteed.
Operational	<ul style="list-style-type: none"> <li>• Risk of operator error and procedural inadequacy</li> <li>• Inability to provide fuel to the plant, resulting in loss of generation.</li> </ul>	<ul style="list-style-type: none"> <li>• Consultant will review the performance record of the Packages LTD operating staff and prescribe sufficient training, staffing, operational procedures and organizational arrangement needed.</li> <li>• Feasibility Study will evaluate fuel supply projections.</li> </ul>
Commercial	<ul style="list-style-type: none"> <li>• Commercial failure of Packages LTD resulting in failure to make debt</li> </ul>	<ul style="list-style-type: none"> <li>• The project will improve financial strength of Packages LTD, which at</li> </ul>

	payments to project investors and lenders	any rate has sufficient strength and diversity to be a good credit risk.
Political	<ul style="list-style-type: none"> <li>Risk of nationalization of assets, confiscation of earnings, or rescinding the right to repatriation of earnings</li> </ul>	<ul style="list-style-type: none"> <li>Pakistan has an acceptable record of honoring international debt and IPP investment.</li> </ul>
Environmental	<ul style="list-style-type: none"> <li>Increased cost of CO<sub>2</sub> emissions</li> </ul>	<ul style="list-style-type: none"> <li>Feasibility Study shall compare CO<sub>2</sub> emissions with original design emissions. Due to increased efficiency and renewable biomass fuels, the repowered plant may actually qualify for CDM credits</li> </ul>

**CAPITAL COSTS ESTIMATES:** Contractor shall provide detailed capital cost estimates for both options, and these will depend on the size and design of plant best suited to the limitations of existing site infrastructure, available fuel supplies, and operating needs of the paper mill.

For planning purposes, under Option 1, a 50 TPH lb/hr biomass boiler on an existing site may cost roughly \$12 million, including all biomass fuel handling and interfaces for controls, feedwater, and steam to the existing plant. Potential U.S. trade is roughly 40% of that amount, or \$4.8 million. Under Option 2, the size of the plant is to be determined by the Feasibility Study. However, a reasonable assumption is that the plant could be sized at 60 MW. A biomass plant in that size range would cost roughly \$1.8 million per MW, or \$108 million total. The final price may be affected greatly by many factors, both positive and negative. Positive factors include strong credit rating and technical capabilities of Packages, work from an existing site zoned for industrial purposes, existing waste fuel handling and ash handling facilities, other existing site infrastructure such as the electrical interconnection, backup power supplies, fuel storage, water supply, and emissions permits. Negative factors may include the complexity of interfacing to existing process steam and control systems, additional environmental impact and emissions studies if required, water constraints, and security considerations for foreign workers. Potential U.S. trade for the second option would be roughly \$43 million.

The estimated cost of the Feasibility Study consultancy services is US\$289,125 as shown in the following Study Budget; Packages will support the project by cost-sharing in the form of studies and analyses already completed, technical manpower for further data collection and analysis, and field facilities.

**STUDY BUDGET:**

Feasibility Study for a Biomass Cogeneration Plant at Packages Ltd						
DIRECT LABOR COSTS						
TOR TASK	TOR TASK NAME	PRIMARY CONTRACTOR (Employee) LABOR			TOTAL COST	
		Total Person Days		US\$		
1.1	Inception Meeting	17			17,970	
1.2	Inception Report	6			6,140	
2.1	Review of Existing Documentation	40			35,950	
2.2	Review and Optimization of Existing Options	31			31,070	
2.3	Performance Analysis	13			11,970	
2.4	CDM Credit Estimates	7			7,260	
3.0	Economic Analysis	13			12,210	
4.0	Financing Plan	9			9,900	
5.1	Adverse Environmental Effects	11			11,740	
5.2	Beneficial Environmental Effects	22			25,930	
6.0	Review of Regulatory Issues	13			12,250	
7.0	Developmental Impact Analysis	12			11,410	
8.0	U.S. Sources of Supply	12			11,800	
9.0	Bid Documents	34			26,280	
10.0	Final Report to Grantee and USTDA	12			12,560	
HOST COUNTRY NATIONALS						
TOR TASK	TOR TASK NAME	PRIMARY CONTRACTOR (Non-Employee) LABOR			TOTAL COST	
		Total Person Days		US\$		
	Local research, surveys, inspections	50	\$150		\$7,500	
<b>TOTAL DIRECT LABOR COSTS</b>				<b>US\$</b>	<b>251,940</b>	
OTHER DIRECT COSTS						
TRAVEL	PERSON-TRIPS					TOTAL COST
International Air Travel	10		(including per diem -- see labor breakdown table)			27,800
In Country Air Travel	23	\$300				6,900
Ground Travel	36	\$20				720
Reproduction and Binding	20	\$40				800
Courier Services	5	\$46				230
Visa Services	5	\$120				600
Communication	15	\$9				135
<b>Total Other Direct Costs</b>				<b>US\$</b>	<b>37,185</b>	
<b>TOTAL COSTS (DIRECT LABOR COSTS + OTHER DIRECT COSTS)</b>				<b>US\$</b>	<b>289,125</b>	
<b>PROPOSED USTDA GRANT</b>				<b>US\$</b>	<b>289,125</b>	

DIRECT LABOR BREAKDOWN		LABOR BY PERSON-DAYS										SUMMARY BY TASK				INTNAT'L TRIP RECAP BY TASK			
TASK DESCRIPTION		Project Manager	Engineer Manager	Project Finance Specialist	Mechanical Engineers	Civil Engineer	Electrical Engineer	Environmental Specialists	Admin Assistants	Total Days	Labor Cost	Local Labor	International Person-Trips	Trip Days	Trip Cost				
TASK NO.	DESCRIPTION	Eng Mgmt	Engineering	Finance	Mech Eng	Civil Eng	EE	Env	Admin										
1.1	Inception Meeting	3	3		3		3		5	17	17,970		5	3	12,675				
1.2	Inception Report	1	1		1		1		2	6	6,140								
2.1	Review of Existing Documentation	1	2	2	5	5	5	5	15	40	35,950	\$7,500							
2.2	Review and Optimization of Existing Options	1	2		7	3	7	4	7	31	31,070		5	5	15,125				
2.3	Performance Analysis	1	1		5			1	5	13	11,970								
2.4	CDM Credit Estimates	1	1		1			2	2	7	7,260								
3.0	Economic Analysis	1	1	3	2			1	5	13	12,210								
4.0	Financing Plan	1	1	5					2	9	9,900								
5.1	Adverse Environmental Effects	1	1		1			6	2	11	11,740								
5.2	Beneficial Environmental Effects	1	5	1	2			2	1	22	25,950								
6.0	Review of Regulatory Issues	1	2		2			3	5	13	12,250								
7.0	Developmental Impact Analysis	2	1	1	1			2	5	12	11,410								
8.0	U.S. Sources of Supply	1	2		2	1	1	1	4	12	11,800								
9.0	Bid Documents	2	2	1	3	1	3	2	20	34	26,280								
10.0	Final Report to Grantee and USTDA	3	1	1	1			2	4	12	12,560								
Total Labor in Person-Days		21	26	14	39	12	25	31	84	252	Emp	Non-Emp							
								Total Labor Cost		244,440	\$7,500				251,940				
								Person-Trips and Days				10	8						
								Total Trip Cost							27,800				
LABOR INCLUDING OVERHEAD AND GENERAL AND ADMINISTRATIVE																			
Daily Rate		1,600	1,400	1,200	1,120	1,120	1,120	1,120	450	Total			Per diem	Lodging	M&IE	Total			
Total Labor		33,600	36,400	16,800	43,680	13,440	28,000	34,720	37,800	Labor			Lahore	188	57	245			
										Cost			Other	154	63	217			
										244,440			International Airfare		Economy	1,800			

Task Completion Schedule		1	2	3	4	5	6
Feasibility Study for a Biomass Cogeneration Plant at Packages Ltd		Months					
TASK							
1.1	Inception Meeting	█					
1.2	Inception Report	█					
2.1	Review of Existing Documentation	█	█				
2.2	Review and Optimization of Existing Options		█	█			
2.3	Performance Analysis			█			
2.4	CDM Credit Estimates			█			
3.0	Economic Analysis				█		
4.0	Financing Plan					█	
5.1	Adverse Environmental Effects				█		
5.2	Beneficial Environmental Effects				█		
6.0	Review of Regulatory Issues					█	
7.0	Developmental Impact Analysis						█
8.0	U.S. Sources of Supply						█
9.0	Bid Documents						█
10.0	Final Report to Grantee and USTDA						█

**DEFINITIONAL MISSION RECOMMENDATION:** USTDA should support this project. This is an environmentally preferred biomass fueled project at a time when Pakistan is experiencing both fuel and electricity shortages. The host is financially capable and the project may be replicated at other host facilities and at other industrial facilities. The project helps pave the way for Pakistan to convert its energy infrastructure to renewable fuels.

The project meets USTDA's basic funding criteria.

An appropriate TOR for the proposed study is enclosed above.

An appropriate budget for the proposed study is enclosed above.

The project should be implemented in a single phase without interruption or delay.

**PROJECT PORTFOLIO ASSESSMENT:** No other Packages, Ltd projects were identified to the Definitional Mission. Though small in size, the project will free some quantity of fossil fuels which can be then made available to other projects under evaluation by USTDA.

## **1.0 Definitional Mission for the Pakistan Energy Sector**

### **BACKGROUND**

On August 3, 2009, USTDA awarded a contract to EMG to perform a Definitional Mission for Pakistan Energy Sector Projects. The objective of the DM is to review and assess the current energy industry of Pakistan and identify and develop the TOR for USTDA funding consideration for at least six feasibility studies, technical assistance or other capacity building projects which would help relieve severe energy shortages in Pakistan.

EMG formed a team for the project consisting of Ahmad Ghamarian, team leader; Michael Gembol, project development specialist; Stratos Tavoulareas, coal project development specialist; Mohammad Raziuddin, oil project development specialist; and Ashfaq Mahmood, former Secretary of Water and Power of Pakistan. Ashfaq Mahmood is a Pakistan citizen and resident.

TDA provided a briefing to clarify the Scope of Work and provided current information on known projects. They emphasized renewable energy projects such as biomass, solar, and hydro. While there is some concern with coal, considering very large undeveloped reserves in coal, TDA might support coal generation, especially if it involved a Clean Coal technology such as gasification combined cycle (GCC). Viable possibilities would include upgrades or repowering at existing coal, oil, gas, and hydro plants, and at refineries. Capacity Building might be included, along with Technical Assistance if it is an instrument for enabling project execution such as advisory services for Power Purchase Agreement negotiation and Financial Package structuring. Nuclear power plants would not be considered. USTDA requested the DM Team to explore projects for potential cost sharing and coordination with other agencies such as USAID. The studies and/or technical assistance activities recommended by EMG should target the substantial implementation financing from OPIC and U.S. Ex-Im Bank as well as multilaterals such as the World Bank and ADB. USTDA prefers that four or five out of six nominated projects be from the private sector. USTDA provided relevant background information and extracts from specific project documents.

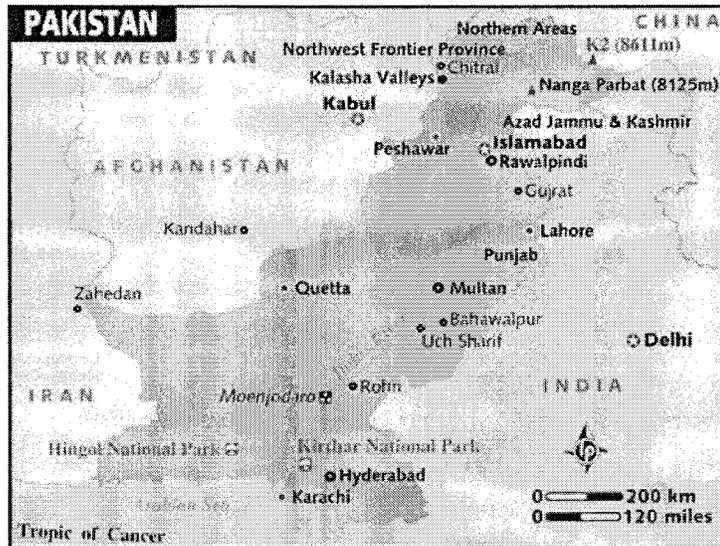
EMG initiated a series of meeting with knowledgeable and interested U.S. parties, including USAID, WB, DOE, AEAI, Chemonics, IRG, Akkadian, and Caterpillar/Solar Turbines. These led to arrangements for follow-on meetings with their field offices and counterparts in Pakistan.

With the help of USTDA and the U.S. parties, and using EMG's own resources in the industry and within Pakistan, EMG prepared a detailed itinerary and schedule of meetings for a 2-week visit, proceeding to Islamabad, Lahore, Karachi, and Faisalabad, then back to Islamabad for checkout and departure. EMG arranged meetings with Pakistan government agencies and officials and private sector managers through its team members in Pakistan, Ashfaq Mahmood and Mohammad Raziuddin. Originally scheduled to start August 24, the itinerary was postponed to October 1 to allow time for Pakistan counterparts to schedule the meetings, their administrative activities having been interrupted by Ramadan. This itinerary is Attachment B.

EMG prepared a Letter of Introduction describing the DM and requesting specific information on projects they may propose. The letter includes a set of *pro forma* questions needed to assess and select nominations for USTDA support. The Letter is included as an attachment to the Pre-Visit Report, Appendix A.

## 2.0 Pakistan's location and Economy

**Location:** The Islamic Republic of Pakistan is located in Asia at 30N and 70E. Pakistan occupies a very strategic position on the map of the world. It has Afghanistan and China in the North, India in the East, Afghanistan and Iran in the West, and the Arabian Sea in the South. Pakistan is viewed as a gateway for the export of energy from energy-rich Central Asian States. Its Gawadar port in the western part of Balochistan Province opens towards the Straits of Hormuz, an important energy transport corridor for Middle Eastern oil and liquefied natural gas (LNG). It has 6,774 km of land boundary comprised of 2,430 km with Afghanistan, 523 km with China, 2,912 km with India and 909 Km with Iran. It has a coastline of 1,046 km. The total area of Pakistan is 796,095 sq km<sup>1</sup>.



**Pakistan's Economy:** Pakistan's total population at the end of 2008-09 was 162.4 million<sup>2</sup>, with about 65% of its population living in rural areas<sup>3</sup>. The estimated population growth rate between 2007-08 and 2008-09 was about 1.7% per annum<sup>4</sup>. Pakistan has a relatively young population. Estimates of numbers below the poverty line vary in the range<sup>5</sup> of 23.9 to 36.1%.

The total GDP of Pakistan during 2008-09 was Rs 5.5 trillion (US\$71 billion at \$1=82 Rs.) The contribution to GDP from the Agricultural sector was 21.8%; from the industrial sector, 24.3%; from wholesale and trade, 17.5%; and 36.4% from other service sectors (*op. cit.* ref Economic Survey).

Pakistan's economy weathered an unprecedented set of challenges during the last couple of years. Skyrocketing oil prices followed by a price crash, the global financial crisis, and rising commodity prices in the world have severely affected the economy of Pakistan. The collapse of external

<sup>1</sup> CIA Website

<sup>2</sup> Pakistan Economic Survey, 2008-09, Government of Pakistan. The population at the end of June 2008 was estimated to be 161 million (page 7 Statistical Appendix)

<sup>3</sup> Ibid Page 94 Statistical Appendix

<sup>4</sup> Ibid 2 (page 7 Statistical Appendix)

<sup>5</sup> Ibid 2 (page 197)

demand for its exports and a sharp decline of external capital to finance its fiscal and current account deficits accentuated the economic pains. Energy shortages, particularly electric power shortages, have severely affected all segments of economy and society. These factors coupled with the change of the government in 2008 and various inherent inefficiencies in the governance system have taken their toll.

As a result of the above factors, the inflation rate reached 23%, the rupee (currency) depreciated, foreign exchange reserves fell sharply, and fiscal deficits increased. A significant collateral impact was a squeezing of the fiscal space for critical infrastructure development (such as the energy and social sectors). A summary of key financial indicators<sup>1</sup> is given below:

**Table: Key financial indicators<sup>2</sup>**

	2006-07	2007-08	2008-09
<b>GDP Growth (%)</b>	6.8	4.1	2.0
<b>GDP per capita</b>			\$403.18
<b>Consumer Price Index (%)</b>	7.8	16.2	22.6
<b>Fiscal Deficit (% of GDP)</b>	4.3	7.6	4.3
<b>Trade Deficit (% of GDP)</b>	6.6	9.3	6.5
<b>Domestic saving % of GDP</b>			11.2

According to Pakistan government estimates, Pakistan's role in the War on Terror has resulted in an economic cost of US\$ 35 billion since 2001-02. The intensification of an unprecedented domestic security challenge has also exacted enormous cost on the economy both in terms of direct costs of the fight against extremism, as well as in a consequential effect on investment inflows and market confidence. Foreign direct investment has accordingly become very shy. During 2008, FDI flow fell by 21.4% from 2007 levels.

However, the worst seems to be over, as some of the factors responsible for this decline are receding (such as oil prices, global financial crises, etc.) and the economic performance of the country appears to be bound to improve. Positive signs have already started to emerge in the current fiscal year (2009-10). Inflation has come down to 17.2% from 25.3% in April 2009, foreign exchange reserves have increased to US\$ 11 billion and GDP growth rate is being estimated at 2.0% for the fiscal year 2008-09. The law and order situation is also beginning to improve after the successful military operation against extremists in the northwestern part (Swat/Malakand and Waziristan) of the country.

<sup>1</sup> Ibid 2

<sup>2</sup> Ibid 2

Pakistan has also recently signed a 25-month US\$11.3 billion Standby Agreement with the IMF. The program aims to:

- restore financial stability through a tightening of fiscal and monetary policies to bring down inflation and strengthen foreign currency reserves;
- protect the poor by strengthening the social safety net—this is a key element of the government's policy strategy; and
- raise budgetary revenues through comprehensive tax reforms to enable significant increases in public investment and social spending, needed to achieve sustainable growth.

The US Government has also approved annual assistance of US\$ 1.5 billion to Pakistan with the Kerry- Lugar Bill enacted October 15, 2009. A “Friends of Pakistan Forum” comprising a number of countries sympathetic to Pakistan have also pledged significant assistance.

Looking forward, Pakistan's economy is still subject to an unusual degree of uncertainty associated with security problems, the depth and duration of the global slowdown, high inflation driven by spikes in food prices, the acute energy (particularly fuel and electric power) shortages, a bewildered stock market, continued contraction in large scale manufacturing, a slowdown in the lower services sector, and several other adverse factors.

## 3.0 Energy Sector of Pakistan

### 3.1 Overview of Pakistan's Energy Sector

1. Total energy consumption in Pakistan is comprised of 66 % from commercial energy resources and 34 % from non-commercial resources. Statistics on commercial energy are well-documented, while no recent survey of non-commercial energy resources is available.
2. The total primary commercial energy supply in Pakistan was 62.92 MTOE (million tons of oil equivalent) in 2007-08 whereas the final commercial energy consumption after accounting for transformation, transmission losses, and non-energy uses was 39.41 MTOE, or 0.39 TOE and 0.245 TOE per capita respectively).
3. The total primary commercial energy supplies were comprised of 30.5% from oil, 47.5% from natural gas, 9.2% from coal, 10.9 % from hydroelectricity, 1.2% from nuclear, 0.7% from LPG, and the remaining 0.1% from imported energy<sup>1</sup>. Of the total commercial energy supply, about 25 % was imported in the form of oil. This import dependence is, however, increasing due to increased oil-based power generation. At present, oil is the fuel of last resort and energy shortages are met by increases in oil imports. The total oil bill for 2007-08 was about US\$12 billion<sup>2</sup>. This situation is non-sustainable as the country's economy may not be able to afford the required foreign exchange and increased exposure to the volatility of oil prices.
4. Final commercial energy is being consumed by various sectors of the economy, with 42.6% by industries, 29.3% by transport, 20.4% by domestic, 3.7% by commercial, 2.0% by agriculture, and 1.9% by other sectors in 2007-08<sup>3</sup>. The following charts show energy supply and consumption in Pakistan.

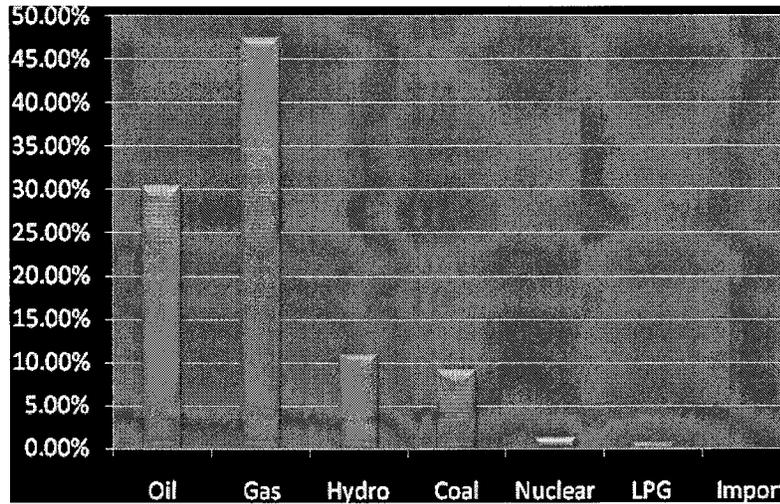
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<sup>1</sup> Ibid

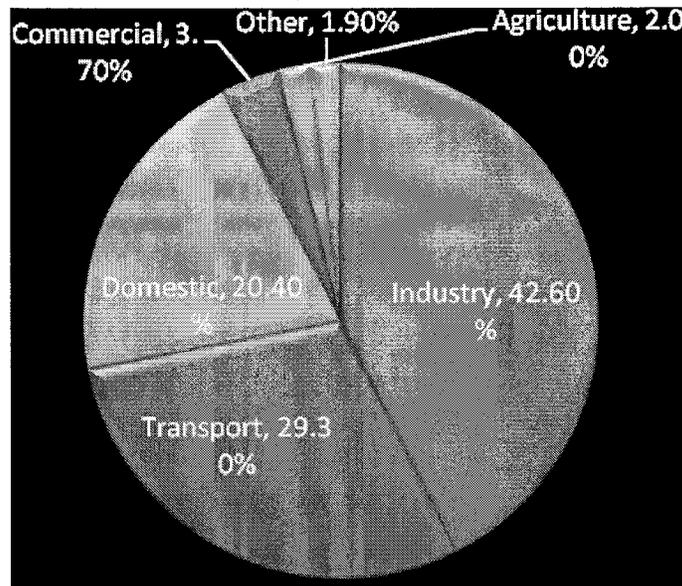
<sup>2</sup> Ibid 8. Pakistan Economic Survey 2008-09 shows the "expected" figure of US\$ 8.7 billion

<sup>3</sup> Ibid 8

### Energy Supply Pattern in Pakistan 2007-08



### Energy Consumption Pattern 2007-08



5. Pakistan has not prepared any recent Integrated Energy Plan. It had prepared a Medium Term Development Framework (MTDF) and a Vision 2030 document for all economic sectors including the energy sector. However, these are now somewhat outdated. At present, a USAID-sponsored consultant is assisting the Planning Commission of Pakistan in the preparation of an Integrated Energy Plan. The Planning Commission has also recently constituted work for the preparation of a five-year plan for 2010-15.

6. The only recent credible projections of energy outlook for Pakistan have been prepared by Petroleum Institute of Pakistan (PIP) in June, 2008<sup>11</sup>. These projections are for the period 2008-2022. The projections of energy demand in this work are based on econometric models. The demand projections are based on the following two scenarios:

Case I Based on annual compounded GDP growth rate of 4.5%

Case II Based on annual compounded GDP growth rate of 6.5%

7. Case I is based on historical growth and can be termed as conservative, while Case II reflects the growth achieved during 2002-07, in which period the country's economy was performing much better than the historical long-term growth rates.
8. Pakistan's total energy demand is projected to increase to 116 MTOE in 2022 in Case I and to 147.5 MTOE in Case II. As per the two scenarios given above, the demand for primary energy is projected to increase at annual compounded growth rates of 4.4% and 6.1% in Case I and Case II respectively, compared to the historical growth rate of 4.8% during 1992-2007.

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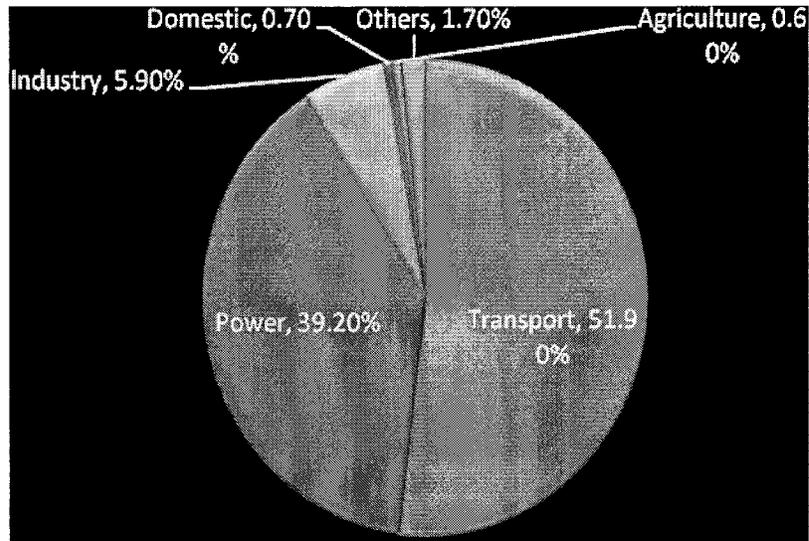
<sup>11</sup> Pakistan Energy Outlook 2008-09, prepared by Petroleum Institute of Pakistan (PIP), consultant ENAR Petrotech Services, June 2008

## 3.2 Energy Resources, demand, supply, issues and future outlook

### 3.2.1 Oil

1. The total resource potential of oil in the country has been estimated to be 27 billion barrels<sup>1</sup>. Against this potential, the total resources of oil discovered so far are 0.9 billion barrels. Out of this, the total remaining recoverable reserves at the end of 2007-08 were 326.7 million barrels (43.83 MTOE) which are only equal to 70% of one year's energy requirement, or barely equal to 2.8 years of oil demand at the present consumption level. Pakistan has about 127 discovered oil fields, but all of these are small producers<sup>2</sup>. The total domestic oil production during 2007-08 was 69,954 barrels per day (3.43 MTOE per annum) against a requirement of about 392,000 barrels per day. In other words, local production met only 18% of the total oil-based energy requirements.
2. The total consumption of petroleum products in Pakistan was 18.44 MTOE, with the transportation sector being the largest consumer with 51.9% share of the total consumption, followed by the power sector with 39.2%, then by the industrial sector with 5.9% share. The sector-wise consumption pattern is shown in the following chart:

**Oil consumption by sectors**



<sup>1</sup> Petroleum E&P Policy 2009 by G.A. Sabri Special Secretary, Petroleum and Natural Resources, Government of Pakistan

<sup>2</sup> Ibid 8

3. The annual compounded growth rate of demand for petroleum products was 1.9% during 2002-2008, but the annual growth rates recorded in 2006-07 and 2007-08 were 15.18% and 7.32%, mainly due to increased demand in the electric power sector. In the medium term, power sector demand is likely to maintain a high growth rate because about 2300 MW of rental power capacity<sup>1</sup>, mostly oil-fired, is due for commissioning during 2009-10. Besides that, a number of other thermal plants in the private and public sectors are scheduled to be commissioned in the next several years.
4. According to PIP's Pakistan Energy Outlook, the demand for oil is expected to increase at the rate of 2.2% in Case I and 5.3% in Case II. The demand for oil has been projected at 28 MTOE for Case I and 44 MTOE for Case II. Local oil production is estimated to increase to 5.4 MTOE if there is no major departure from the current trends of exploration, development activities, and success ratios. This implies that supply deficits for oil will be in the range of 22.6 MTOE to 38.6 MTOE to be met through imports.

### **3.2.2 Natural Gas**

1. The total estimated potential of natural gas resources in Pakistan is 280 Trillion Cubic Feet (TCF)<sup>2</sup>. So far, 53 trillion cubic feet of gas have been discovered in Pakistan. Out of this, the remaining recoverable resource is about 30 TCF (551 MTOE). At the current rate of production of 1.45 BCF per year, the reserves can last for about 20 years. At higher levels of consumption in future years due to growth in demand, the remaining resources may last for fewer years.
2. The total consumption of natural gas in Pakistan was 1.27 TCF (27.5 MTOE) against production of 1.45 TCF (29.87 MTOE). About 33.7% of the gas was consumed by the electric power sector, followed by 26.3% by the industrial sector and 15.7% for fertilizer in the agricultural sector. The gas utilization pattern<sup>3</sup> is shown in the chart below:

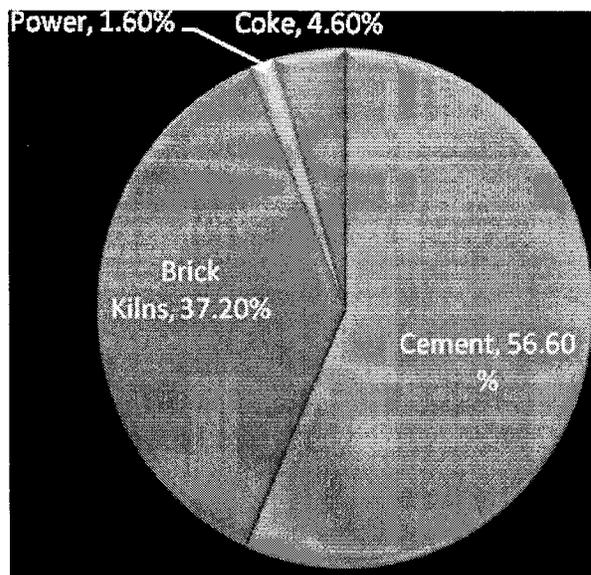
#### **Natural Gas Consumption 2007-08**

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<sup>1</sup> Source PEPCO and PPIB

<sup>2</sup> Ibid 13

<sup>3</sup> Ibid 8



3. The annual compounded growth rate of consumption of natural gas was 7.9% over 2002-08. The annual production of natural gas is, however, less than the demand. The demand for natural gas increases in winter due to requirement for heating as well as for fuel for increased thermal power generation because hydropower production decreases in winter. For the winter 2008-09, a shortage of 750 MMCFD (million cubic feet per day) is forecast<sup>1</sup>. Besides, a number of new power projects had to adopt furnace oil as fuel in view of the non-availability of natural gas.
4. According to PIP's Pakistan Energy Outlook, the natural gas demand is projected to increase from 29.8 MTOE to 57.07 MTOE in 2022 in Case I and to 69.36 MTOE in Case II. The natural gas deficit is estimated to be 44.56 MTOE and 56.86 MTOE for Cases I & II respectively<sup>2</sup>.

### 3.2.3 Coal

1. The total estimated resources of coal in Pakistan are 186 billion tons; of this, 3.45 billion tons are measured while the rest are in the categories of indicated inferred and hypothetical reserves. Coal constitutes about 9.2 % of the primary energy requirements in the country<sup>3</sup>.
2. The total consumption of coal during 2007-08 was 10.11 million tons (5.8 MTOE), of which 4.12 million tons (1.85 MTOE) were domestically produced and 5.99 million tons (3.94 MTOE) were imported. About 56.6% of the coal was consumed in the cement sector as almost all the cement factories have in the recent past converted from furnace oil to coal.

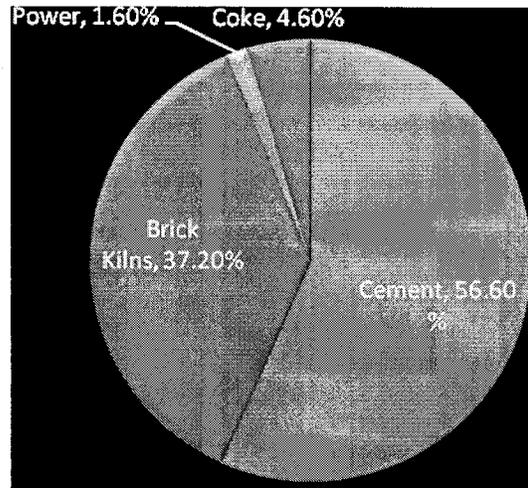
<sup>1</sup> Ministry of Petroleum and Natural Resources

<sup>2</sup> Ibid 12

<sup>3</sup> Ibid 8

The brick kiln industry consumed about 37.2% of coal. Use of coal in the electric power sector was only 1.6%. The coal consumption pattern<sup>1</sup> is shown in the chart below:

**Coal Consumption Pattern 2007-08**



3. Pakistan's coal resources are mostly of lignite quality most suited for consumption for power generation at the mine site. Because of high sulfur content, the coal is not suited for domestic consumption. A number of power generation proposals for utilization of coal are in the pipeline. Besides projects for conventional power generation based on coal, studies are in hand for coal gasification and harnessing of coal bed methane potential. It is expected that the consumption of coal will show a phenomenal increase in future. The annual compounded growth in coal during 2002-08 was 15.6%.
4. According to PIP's demand projections<sup>2</sup>, it is expected that coal will contribute about 8.31 MTOE in accordance with Case I and 10.34 MTOE according to Case II in 2022. Coal's share in the final energy demand is projected to be 11% for both cases. These projections may, however, be on the lower side, considering the efforts for exploitation of the major coal resources of the coal fields in Pakistan.
5. The Definitional Mission met with government officials in Punjab and Sindh and with private developers planning various coal mining projects. One topic of investigation was Coal Bed Methane (CBM) or Coal Mine Methane (CMM). Some preliminary bore samples in the Thar Valley in Sindh were negative for methane, but there was concern the samples may have been mishandled and compromised prior to analysis. Research by the U.S. Geological

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<sup>1</sup> Ibid 8

<sup>2</sup> Ibid 12

Survey suggests that some of the reserve areas have high potential for CBM extraction.<sup>1</sup> CBM and CMM are particularly valuable options to Pakistan for several reasons:

- Pakistan is desperately short of fuels; CBM can be placed into service within months, compared to estimates ranging from 5 to 15 years to establish large-scale underground mining and associated coal-fired generating plants.
- CBM tends to have low BTU content, but electricity can be generated at very competitive prices at the collection area using diesels modified for gaseous fuel ignition.
- Mining will release CMM to the atmosphere, where methane has approximately 24 times the effect of the same quantity of CO<sub>2</sub> on the greenhouse effect causing global climate change. CBM and CMM capture techniques can both reduce methane release.
- CMM is a danger to proposed underground mining operations, particularly in a situation where the nation has no body of experience in deep mining and where mine safety standards are relatively underdeveloped.
- CBM can extract usable methane from areas in which underground mining is not feasible, such as where the overburden is loose or fractured.

For these reasons, the Definitional Mission suggested a need for further field investigations of CBM/CMM potential, and the possibility of USTDA sponsorship of an Orientation Visit to operating U.S. CBM/CMM facilities for Pakistan officials to familiarize themselves with the potential.

### 3.2.4 Hydropower

1. The total hydropower potential of Pakistan is about 42,000 -57,000 MW<sup>2,3</sup>. Of this, 6,480 MW of capacity has been harnessed so far. This represents about 15 % of the total potential. Development of hydro power, particularly large storage-based hydro power plants, has been a victim of lack of consensus amongst the provinces on allocation of water. Development of run-of-river power projects has also not been pursued vigorously. At present hydroelectricity contributes about 10.9 % of the primary energy supply by supplying 28.6 billion kwh (TWh)<sup>4</sup>.

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<sup>1</sup> A primer on the occurrence of coalbed methane in low-rank coals, with special reference to its potential occurrence in Pakistan, SanFilipo, J.R., U.S. Geological Survey Open-File Report 00-293

<sup>2</sup> Pakistan Hydro Power Potential, PPIB, Ministry of Water and Power and WAPDA's Submission for 10 Plan

<sup>3</sup> Energizing Pakistan, Challenges and Opportunities in Energy Sector, Government of Pakistan 2009

<sup>4</sup> Ibid 8

2. PIP's Pakistan Energy Outlook<sup>1</sup> projects that about 7,810 MW of additional hydro power generation will be included in the power system by 2022. According to the Water and Power Development Authority (WAPDA) projects with 1,505 MW of capacity are under construction, 4,689 MW are ready for construction, and feasibility studies for 24,341 MW are in various stages.

### **3.2.5 Nuclear**

The total installed capacity of nuclear power plants in Pakistan is 462 MW. At present one unit of 325 MW is under construction and expected to be commissioned by 2011. It is envisaged that two more units of 325 MW each are to be commissioned by 2016-17. Thereafter, the Pakistan Atomic Energy Commission plans to install units of 1,000 MW size every 3-4 years. Accordingly about 1,975 MW of additional capacity can be installed by 2022<sup>2</sup>. It has also been projected that Pakistan will add 8,800 MW of nuclear power capacity by 2030<sup>3</sup>. However, PIP's Pakistan Energy Outlook<sup>4</sup> envisages that by 2022 only about 900 MW of additional nuclear capacity will be realized.

### **3.2.6 Renewable Energy**

Pakistan is blessed with huge renewable energy resources, particularly wind, solar, hydropower, and biomass. Other than some large and medium hydropower development utilizing only 15% of the hydropower potential, commercial exploitation of renewable energy resources has been negligible. Mainstreaming of renewable energy can help diversify Pakistan's energy mix, improve the environment, and reduce dependence on fossil fuel.

#### **3.2.7.1 Wind**

Significant wind resources exist in many parts of the country, especially in southern Sindh, western areas of Balochistan, Northern Punjab, and the North West Frontier (NWFP) province (reference USAID Wind Map).

#### **Map Showing Wind Resources of Pakistan**

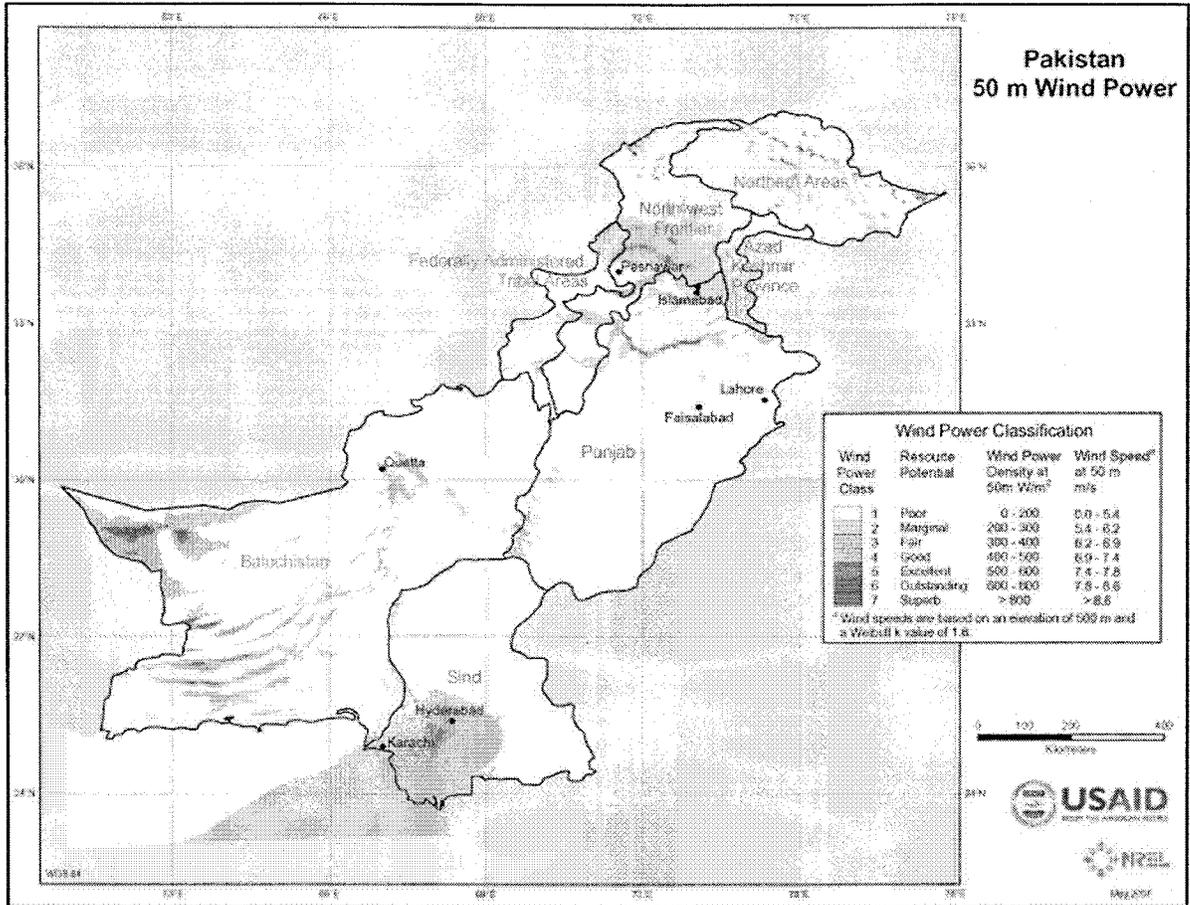
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<sup>1</sup> Ibid 12

<sup>2</sup> Source PAEC

<sup>3</sup> Vision 2030 Planning Commission of Pakistan

<sup>4</sup> Ibid 12



Currently Pakistan is focusing on wind power development in the lower Sindh area in what is called the “Gharo Corridor”. According to measurements and estimation done so far, wind velocities in the range of 5-11 meters/second (m/s) exist at 80-meter height (depending upon months of the year) averaging<sup>1</sup> up to 7 m/s<sup>2</sup>. Estimates show that the wind resource is equal to 340,000 MW power<sup>3</sup>. Other estimates reckon the wind energy potential of up to 50,000 MW<sup>4</sup>. Except for the Gharo Corridor, Pakistan’s wind resources and the feasibility of exploitation has not yet been systemically determined. Under the circumstances, Pakistan has set a target of development of 9,700 MW of electric power by 2030<sup>5</sup>. This can be revised upwards in view of the huge potential for development of wind resources as indicated above.

<sup>1</sup> Development of benchmark wind speed for Gharo, Jhimpir, Pakistan. Irfan Mirza, Nasim A. Khan and Naeen Memon. Renewable Energy Vol35,, issue3 ISSN 0960-1481.<http://www.elsevier.com>

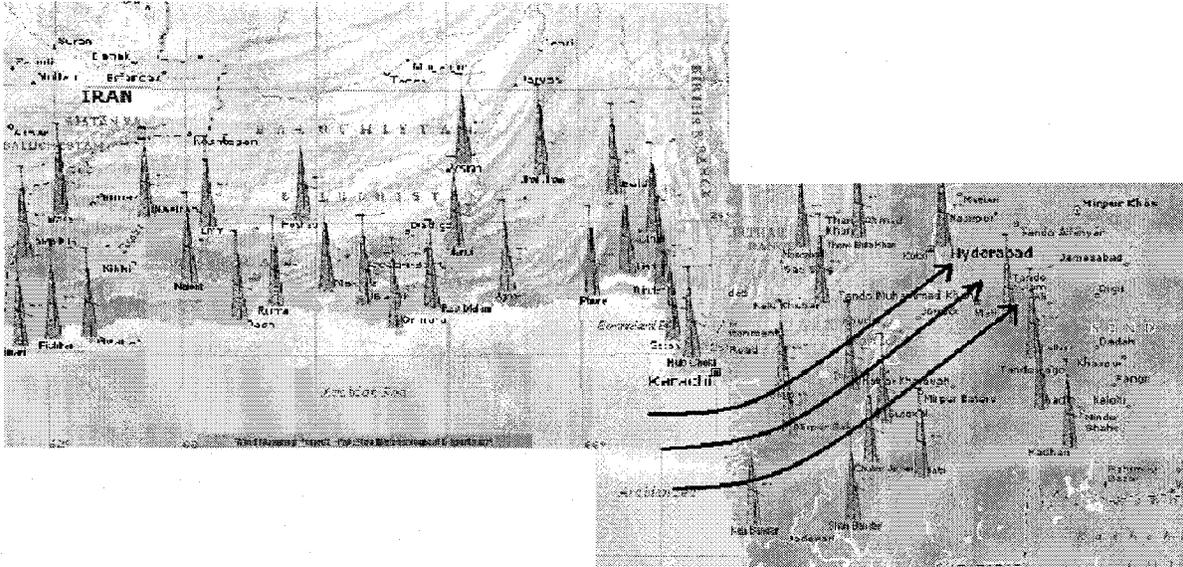
<sup>2</sup> Policy for Development of Renewable Energy for Power Generation 2006, Government of Pakistan

<sup>3</sup> Ibid 25

<sup>4</sup> Ibid 31

<sup>5</sup> Ibid 29

## Map Showing Wind Regime in Sindh and Balochistan



A number of Letters of Intent (LOIs) have been issued by the Alternate Energy Development Board (AEDB) inviting investment in wind power by the private sector. About 10-12 private sector parties have made credible progress in terms of development of projects and preparation of feasibility studies, and all of these are for 50-MW projects. One investor has installed 6 turbines and is generating about 2 MW of electricity (the first turbines of a planned 50-MW project). It is expected that during the next 12-18 months, 100 MW of wind turbines will be installed.

### **3.2.7.2 Solar**

1. Pakistan receives solar radiation in the range of 4.7KWh/m<sup>2</sup> to 6.2 KWh/ m<sup>2</sup> per day on the average<sup>1</sup>. According to the Planning Commission, the total potential is equal to 1.2 million MW of capacity<sup>2</sup>.

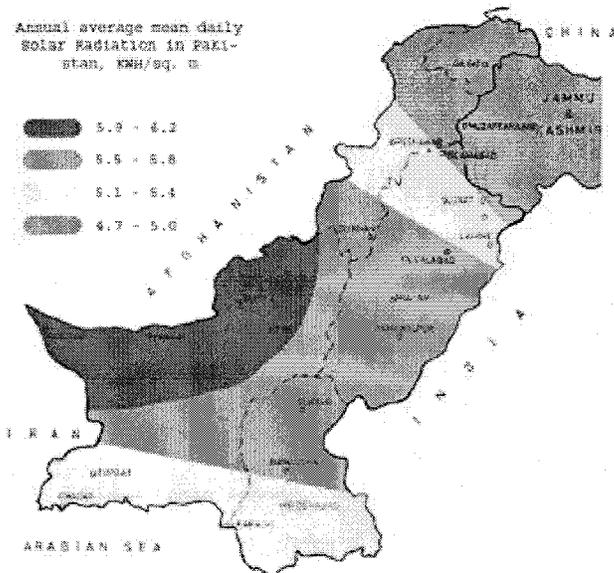
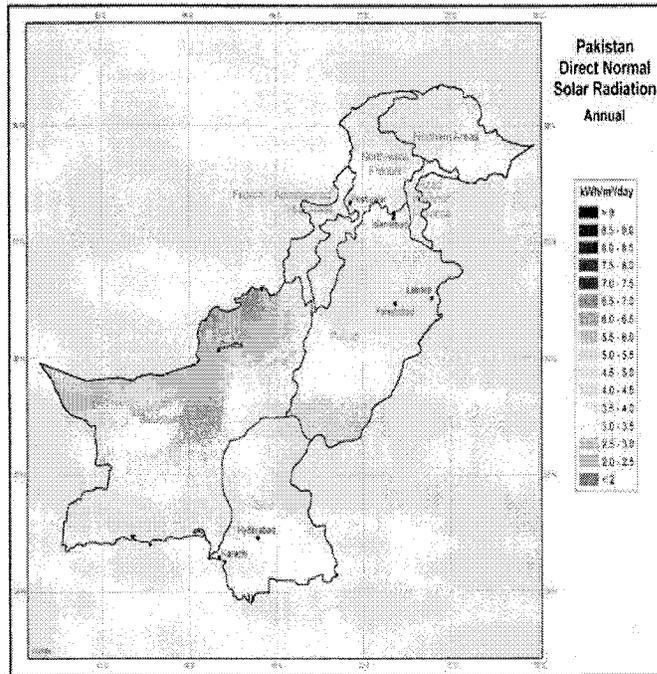
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<sup>1</sup> NREL Map

<sup>2</sup> Ibid 25

- However, there is still no significant commercial use of solar energy in Pakistan. AEDB is developing a number of off-grid applications of solar energy. Small-scale projects of demonstration plants for solar PV-based electricity generation, solar street lights, electrification of 100 homes based on stand-alone solar PV cells, and demonstration projects of solar water heating units are being undertaken<sup>1</sup>. With the falling prices of solar PV, it is expected that solar energy will play a significant role in the energy sector of the country in future.

### Maps Showing Solar Radiation Received by Pakistan and Solar Potential



<sup>1</sup> Ibid 25



### **3.2.7.5 Biomass**

Millions of tons of biomass comprised of bagasse, cotton and wheat stalks, rice husk, jute waste, other crop residues, and cow dung is produced in Pakistan annually. Except for use of this resource by rural households, mainly for cooking, the biomass is not being used for power generation or other energy uses. The use of biomass in the rural sector is also very inefficient because of inefficient cook stoves. Studies are being undertaken to generate biomass-based electric power, primarily from thermal combustion and from biogas digesters. In particular, it has been identified that the bagasse (sugar cane waste) available from sugar mills can be used to generate up to 2,000 MWs of electricity<sup>1</sup>.

### **3.2.7.6 Waste-to-Energy**

There is not yet significant application of waste-to-energy in Pakistan despite the fact that a number of metropolitan cities have the potential for gainful and economic use of waste-to-energy conversions. Studies are being undertaken to prepare projects for at least one or two major cities. Some companies in the private sector are already using their industrial waste for electricity and heat generation.

Cattle waste is another important source of energy. There are several large cattle colonies near large cities which produce commercially exploitable cattle waste. Studies are being undertaken to prepare projects of power generation utilizing this important source of biomass.

One project for production of 38 MW power at Karachi (Landhi) was being developed by Karachi Electricity Supply Company (KESC). USTDA had provided funding for a formal feasibility study. The project has been delayed for 15 years due to conflicting areas of responsibility and financing uncertainty. These have now been resolved by intervention of the Alternative Energy Development Board (AEDB). The project has now been taken over by the Government of Sindh. The project has the potential to be one of the largest such projects in the world, and would produce salable CO<sub>2</sub> and fertilizer in addition to electricity. The project would include modular biogas digesters providing gas to 2-MW spark ignition diesel generators. ADB will provide counter-guarantees to lenders and investors to relieve uncertainty at the strength of sovereign guarantees.

The Landhi project is important for its potential to be replicated at many other cattle colonies. However, its greater potential is to serve as a development model for sewage treatment waste: Karachi produces enough domestic waste sludge to support 250-300 MW of generation and perhaps greater amounts from solid sewage sludge when treatment plants are built.

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<sup>1</sup> AEDB estimate

### **3.2.7.7 Biodiesel/Vegetable Oil<sup>1</sup>**

Initial research on biodiesel resources in Pakistan has identified varieties of seeds and plants that can produce oil that can be converted to biodiesel or vegetable oil which can be used directly as fuel. After iterative experiments, a number of bio-resources have been identified including Pongamia Pinnate (Sukh Chane), Rape seeds, Castor Bean and Jatropa. Further research is in progress in some universities in Pakistan. Demonstration farms of Jatropa and plantation of Sukh Chane trees along the railway tracks are also envisaged.

Research is also in progress to utilize waste vegetable oil (WVO) available from restaurants and hotels, etc., for use as diesel fuel. According to one survey, an approximate quantity of 150 million liters of Bio-diesel can be produced in Pakistan from WVO.

### ***3.3 Electric Power supply, demand, transmission, distribution, sector issues, and future outlook***

#### **Supply:**

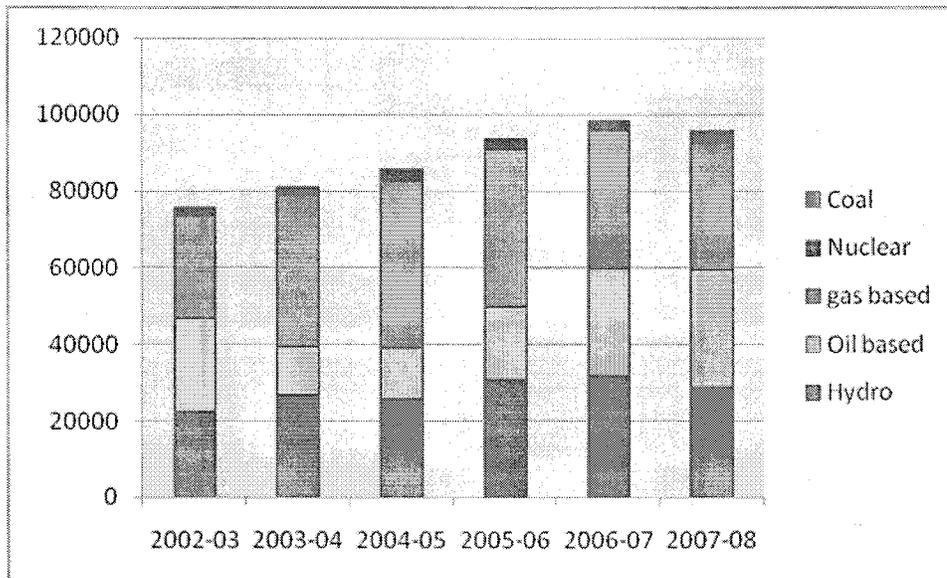
The total installed capacity in the country at the end of June 2008 was 19,420 MW. It was comprised of 6,480 MW hydro, 12,478 MW thermal (4,900 M in public sector, 5,822 MW in IPPs and 1,756 MW in KESC), and 462 MW of nuclear power. A number of power plants in the public sector and KESC are of very old vintage (1960-75) and inefficient. Their availability is also unreliable and the forced outage rate is very high. The total installed capacity in Pakistan was practically stagnant during 2003-08. During 2007-08, the total electricity generation in Pakistan was 95.86 TWh. It was comprised of 28.7 TWh hydro, 30.8 TWh oil-based, 32.9 TWh gas-based, 0.136 TWh coal-based, 3 TWh nuclear, and the rest imported electricity from Iran. The thermal generation required 8.5 MTOE of Natural gas, 6.7 MTOE of furnace oil, 0.07 MTOE of coal and 0.2 MTOE of diesel<sup>2</sup>. The chart below shows the trends over the last 6 years.

#### **Electricity Generation Mix (GWh)**

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<sup>1</sup> AEDB Web site

<sup>2</sup> Ibid 8



(Note: coal generation is too small to be seen on this chart.)

For future supply, the initial response of Pakistan Electric Power Company (PEPCO) seems rather panicky as it has contracted<sup>1,2</sup> about 2,300 MW of power generation capacity on rental for 3-5 years contracts to meet the immediate power shortages. This is, however, at very high prices costing about 17 cents/kWh, higher even than some authorized tariffs for renewable projects. Rental contracts had been a subject of major criticism in Pakistan. PEPCO's indicative planning is to install<sup>3</sup> 11,491 MWs in the period 2009-15, which will replace the rental projects on the expiry of their contracts as well as obsolete plants. The planned capacity will, however, be largely thermal as new hydropower plants require long lead times. KESC's plans envisage installation of 1,970 MW of thermal capacity<sup>4</sup> in the same period.

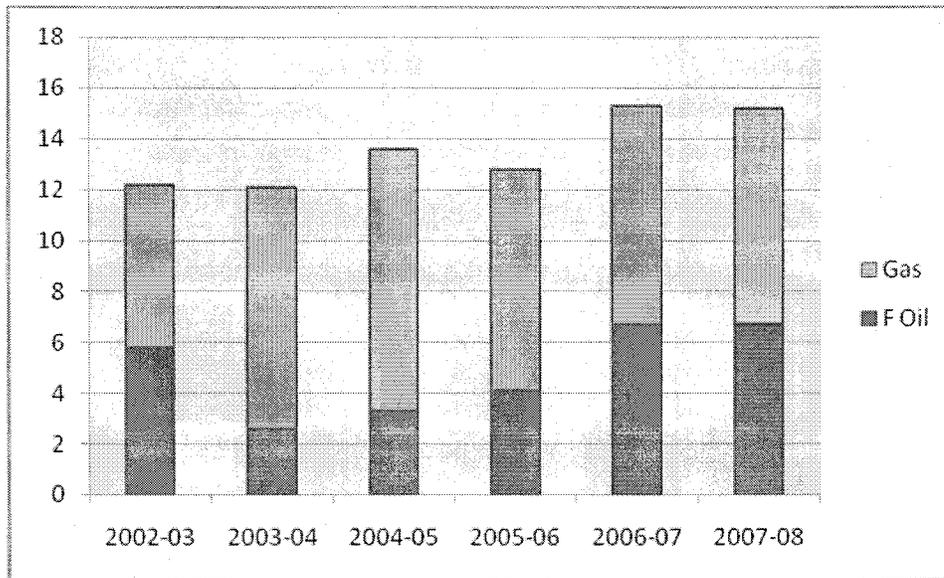
#### Electricity Generation Fuel Dependence (MTOE)

<sup>1</sup> Ibid 16

<sup>2</sup> 10<sup>th</sup> Five-Year Plan Approach Paper, Planning Commission of Pakistan, Government of Pakistan. June 2009

<sup>3</sup> Source PEPCO

<sup>4</sup> Source KESC



In the long term, Pakistan will be adding significant amount of hydropower capacity in the system. A number of large hydro power projects are being studied. Implementation of one large hydro power project, Diamir-Basha Dam with installed capacity of 4500 MW has recently been started. A 969-MW Neelum Jhelum hydro power project is also under implementation. Besides, the Thar Coal and Energy Board envisages development of large coal fired power plants on Thar coal. Pakistan is also studying the option of importing power through interconnections of 1,000MW each from Central Asian States and from Iran. It is already importing about 30-35 MW from Iran. Interest from private sector has also been solicited for construction of 1000-MW imported coal-based power project<sup>1</sup>.

#### **Demand:**

The power systems of PEPCO and KESC had been experiencing load shedding in the range of 3,000 MW to 5,000 MW in the last 3 years<sup>2</sup>. The order of magnitude of unmet demand in peak demand months is over 25% of peak demand. This coupled with the unforeseen forced outages, fuel shortages (mainly natural gas), seasonal variation of hydropower, and unprecedented increase in demand due to air-conditioning load, etc., had been causing load shedding of 8 hrs/day in urban areas and 14-16 hrs/day in rural areas.

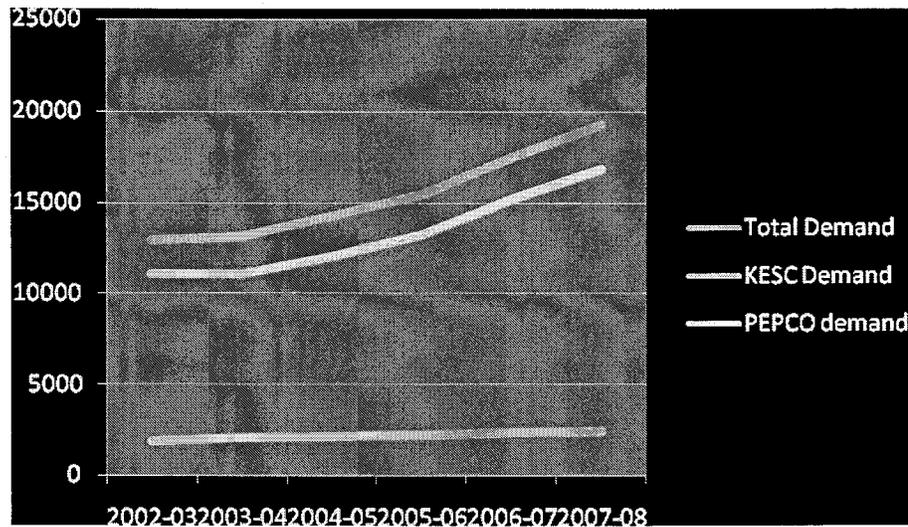
The computed maximum demand after taking into account the estimates of load shedding at the end of the year 2007-08 was 19,281 MW. The trend of computed maximum demand is shown in the chart below. The power demand had been growing at the rate of 10-13 % per year in the last 2-3

<sup>1</sup> WAPDA, PPIB

<sup>2</sup> Ibid 25

years while the growth rate over the entire period 2000-08 was in the range of 8-8.5% per annum<sup>1</sup>. It is being estimated that the demand would grow at the rate of 8-8.5 % for several future years (at least for 5 years).

**Figure---Trend of Computed Maximum Demand**



**Supply and Demand Projections:**

Thorough projections of demand supply balances taking into account latest data are not currently available. Tentative analyses done by PEPCO/KESC for the next five years after taking into account recent data shows that the planned generation capacity will not be adequate to meet the power demand and power shortages are likely to continue during the period in the range of 3,000-5,000MW. A working group has been formed by the Government to look into this situation and prepare a five-year plan (Tenth Five-Year Plan).

**Transmission and Distribution:**

The transmission system of the country did not come under stress during the recent past years mainly because not much new generation was added to the system. Normal expansion plans and construction of transmission lines to connect new power generation are currently in hand. For the future, PEPCO is planning to construct 765KV of high capacity DC lines as a number of large hydropower, coal-fired, and gas/oil power plants are being envisaged as well as importing of power from Central Asian States.

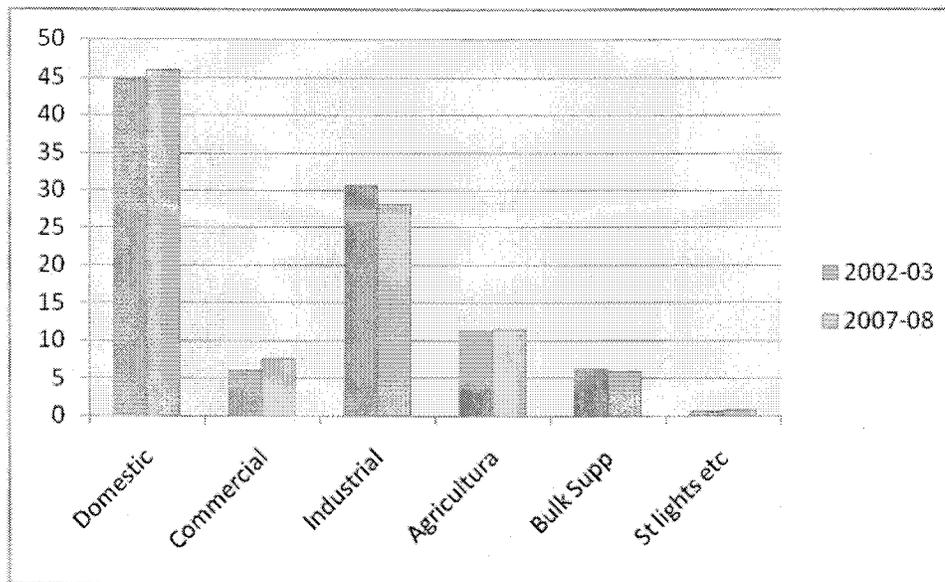
In the power distribution sector, the total number of consumers in the country at the end of June 2008 was 19.94 million. According to government estimates<sup>2</sup>, about 53% of the population has access to electricity. The total supply of electricity by electric utilities was 95.7 TWh, while the sale to consumers was 73.4 TWh, the difference being technical and commercial losses. Per capita

<sup>1</sup> Electricity Marketing Data (33<sup>rd</sup> issue) updated to June 2008, NTDC , Lahore

<sup>2</sup> Ibid 8

electricity generation was 594 KWh and per capita consumption was 456 KWh. On the overall basis the average losses in the system were about 23.3 %, whereas the losses in individual companies ranged from 10% to 35%<sup>1</sup>. About 45.9% of electricity was consumed by domestic accounts, 28.2% by industries, 11.5% by agriculture and 7.6% by the commercial sector<sup>2</sup>. Details are shown in the chart below.

**Changes in Consumption Pattern of Electricity (%):**



Distribution systems have been facing many difficulties. Due to lack of investment and poor maintenance, the distribution companies have not been able to cope with customer needs. A large percentage of transformers and lines are over loaded. Losses are high in many distribution companies (DISCOs), the metering system and bill collection system are becoming outdated, and the companies do not have effective demand management. There is also a substantive amount of electricity theft in the distribution sector.

#### **Issues in the Energy Sector:**

Some issues have been briefly discussed in the foregoing description of the energy sector. Following is the summary of major issues confronting the sector:

1. Pakistan's power generation is predominantly thermal (70%) and, in the next 5 years or so, the proportion of thermal power is going to increase further as no new medium and large hydropower plants can be commissioned in the period.
2. Electricity prices are increasingly becoming unaffordable. Over-dependence on thermal power is going to exacerbate the problem.

<sup>1</sup> Ibid 52

<sup>2</sup> Ibid 8

3. The total amount of price subsidies to be paid by the government is becoming unsustainable.
4. The issue of "Circular Debt" needs to be addressed on top priority. Circular debt is the situation in which the state utilities are unable to collect enough revenue from customers, due to losses and to inadequate tariffs, to pay for their fuel and for power from IPPs. The IPPs then are unable to pay for their fuel bills and debt service. When the situation grows severe, generating plants run out of fuel, the utility sheds load, and customers left without power are unable to produce, so they become unable to pay their electric bills.
5. Power losses and thefts of electricity are very high.
6. There is a lack of integrated planning for energy sector.
7. Extensive load shedding in the country is adversely affecting the economy and creating public unrest.
8. Rental power generation as a stopgap arrangement is likely to provide the most expensive power, which will be unsustainable.
9. Lack of effort exists for energy conservation and demand management.
10. Foreign direct investment has slowed.
11. Implementation of power sector reforms is not being carried out effectively.
12. There is a lack of consensus on development of large hydropower power resources.
13. Very slow progress has been made in the development of renewable and alternate energy resource development.
14. Shortages of natural gas persist for distribution and for electric power generation.
15. Dependence on imported fuels continues to increase.
16. Lack of tangible progress has slowed the development of one of the world's largest lignite coal resources at Thar.
17. Failure of coordination of decisions between government agencies hampers progress.

### **3.4 Energy Sector Organizations**

Various institutions in the energy sector and their roles are briefly described below:

1. *Planning Commission*: It is responsible for preparation of national socio-economic plans. Within the Planning Commission, the Energy Wing is responsible for integrated energy planning at the national level.

#### **Power Sector**

2. *Ministry of Water & Power*: It is responsible for formulation of water and power sector policies, supervision of performance of various power sector companies, planning of projects, budgets and investments.
3. *Private Power Infrastructure Board (PPIB)*: It provides one-window support to investors in the power sector and promotes private investment.
4. *Water and Power Development Authority (WAPDA Hydrel)*: It is responsible for preparation implementation and operation of hydro power projects in the public sector.
5. *Pakistan Electric Power Company (PEPCO)*: It is responsible for the planning, supervision and coordination of performance of thermal power generation companies in public sector.
6. *GENCOs (Generation Companies)*: Four GENCOS are responsible for thermal generation in the public sector.
7. *National Transmission and Dispatch. Company (NTDC)*: It is responsible for transmission system of 220KV and above as well as National Dispatch and Control Center. It is also responsible for preparation of power sector plans
8. *Distribution Companies (DISCOS) Public Sector*: Nine DISCOS are responsible for distribution of electricity in Pakistan other than in Karachi.
9. *KESC (Karachi Electric Supply Company)*: KESC is a majority privately-owned vertically integrated company (Government of Pakistan owns 25.66%) and is responsible for generation, transmission and distribution of electricity in the Karachi area.

10. *IPPs (Independent Power Producers)*: Sixteen IPPs are operating under long-term contracts (typically 20-30 year) and are providing power to NTDC.
11. *RPPs (Rental Power Producers)*: GoP is in the process of inducting a number of power plants on rental basis
12. *Pakistan Atomic Energy Commission*: It is responsible for planning, implementation, and operation of nuclear power in Pakistan.

#### **Fuel Sector**

13. *Ministry of Petroleum and Natural Resources*: It is responsible for fossil fuel sector, policy formulation, supervision of the preparation of various entities in the fuel sector, planning of projects, budgets, etc.
14. *OGDCL (Oil and Gas Development Company Ltd)*: It is a public sector company responsible for upstream oil and gas exploration and production.
15. *SNGPL (Sui Northern Gas Pipeline Ltd.)*: It is a public sector company responsible for transmission and distribution of gas in the areas North of Guddu in Pakistan. The Government and Government-controlled institutions shareholding is 54%, with the remaining 46% held by the private sector.
16. *SSGC (Sui Southern Gas Company)*: It is responsible for transmission and distribution of natural gas in areas of South of Guddu in Pakistan. The Company is a public limited company listed on the Karachi, Lahore and Islamabad Stock Exchanges with 60.43% direct share holding by Government of Pakistan (GOP).
17. *ISGS(Inter State Gas Systems (Pvt) Ltd)*: It is responsible for import of natural gas. ISGS is a private company owned 51% by SSGC and 49% by SNGC.
18. *PSO (Pakistan State Oil)*: It is a public-sector oil marketing company

19. *Refineries*: There are seven oil refineries namely PARCO, ARL, NRL, PRL, Boscicor Refinery, Dhodak Refinery and ENAR Petrotech Refinery with a combined capacity of about 13 million tons per annum capacity.
20. *Private Oil Marketing Companies*: There are a number of oil marketing companies in the private sector.
21. *E & P Companies (Exploration and Production)*: A number of E&P companies hold leases/licenses/rights in Pakistan, mostly in private sector.
22. *LPG Marketing Companies*: There are a number of LPG companies engaged in LPG Production/recovery and marketing of LPG.
23. *Thar Coal and Energy Board (TCEB)*: TC&EB has been formed by Government of Sindh and is responsible for the development of the Thar Valley coal resource.
24. *Lakhara Coal Mining Company*: This is a public sector company responsible for mining of coal from Lakhara coal field and supply to the Lakhara coal field power plant.

### **Renewables**

25. *Alternate Energy Development Board (AEDB)*: It is responsible for development of alternate and renewable energy resources less than 50 MW in size by private investors.

### **3.5 Reforms and Restructuring**

The Government of Pakistan is committed to a program of reform and restructuring of the energy sector. Under this program, it has embarked upon a program of unbundling of vertically integrated public sector entities, privatization of utilities, creation of competition, and open access markets under the supervision of independent regulators. In the power sector, WAPDA has been restructured into 4 GENCO's, one Hydro Power Company, one transmission company (TRANSCO), and 9 DISCO's. However, there are some issues regarding the true autonomy of these unbundled companies. A new entity, the National Electric Power Regulatory Authority (NEPRA) has been created by law to issue licenses, determine tariffs, bring market reforms, and supervise the functioning of the sector. NEPRA is performing these functions with some limitations. Continuing effort will improve its capabilities and independence.

In the fuel sector, unbundling, though planned for quite some time, has not been done. An office of independent regulator, Oil and Gas Regulatory Authority (OGRA) has been created. Its functions are related to mid- and downstream activities in the oil and gas sectors. It is currently performing limited functions of determination of gas tariffs, setting retail prices of oil, issuing licenses, and general supervision of the oil and gas sector. Recently it has also started examining the market prices of LPG. OGRA also needs improvements in its capability and independence.

### ***3.5 National Energy Plan and Policies<sup>1</sup>***

#### **Petroleum Policy 2009**

The GOP is committed to accelerate an exploration and development program in order to reverse the decline in crude oil production to increase domestic gas production & supply and to reduce the burden of imported energy which otherwise will continue to adversely affect the balance of payments and trade. Accordingly it has announced a new policy, Petroleum Policy 2009, with the following objectives:

- a. "To accelerate exploration activities in Pakistan with a view to achieve maximum self sufficiency in energy by increasing oil and gas production;
- b. To promote direct foreign investment in Pakistan by increasing the competitiveness of its terms of investment in the upstream sector;
- c. To promote the involvement of Pakistan oil and gas companies in the country's upstream investment opportunities;
- d. To train Pakistani professionals in the Exploration and Production (E&P) sector to international standards and create favorable conditions for their being retained within the country;
- e. To promote increased E&P activities by providing globally competitive incentives;
- f. To enable a more proactive management of resources through establishment of a strengthened Directorate General of Petroleum Concessions (DGPC) and providing the necessary control and procedures to enhance effective management of Pakistan's petroleum reserves; and
- g. To undertake exploration of oil & gas resources in a socially, economically and environmentally sustainable and responsible manner".

#### **Renewable Energy Policy**

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<sup>1</sup> Ibid 25

The Government envisages mainstreaming of renewable energy in the development plans of the country. At present there is a Short-Term – Renewable Energy Policy which was announced in 2006. It has been extended to December 2009 and it is proposed to be replaced with a new Medium Term Renewable Energy Policy before mid-year, 2010. The new policy is expected to include waste-to-energy, cogeneration, hydro, solar, wind, geothermal and other non-conventional resources. The new policy, which is being finalized through a consultative process involving all stakeholders including the Province, is likely to contain feed-in-tariffs for renewable energy projects, while maintaining most of the incentives of the existing policy.

“The Renewable Energy Policy invites investment from private sector for:

- i) Independent Power Projects (IPPS) for sale of power to the grid only;
- ii) Captive cum grid spillover power projects for self-use and sale to utility;
- iii) Captive power projects for self or dedicated use; and iv) Isolated grid power projects (i.e. small, stand-alone).

The RE policy offers a number of incentives. Specifically, it:

- a. makes purchase of electricity by the National Transmission & Distribution Company (NTDC) from qualifying renewable energy-based generation projects mandatory
- b. permits an investor to generate electricity based on renewable resources at one location and receive an equivalent amount for his or her own use elsewhere on the grid at the investor's own cost of generation plus transmission charges (wheeling)
- c. allows net metering and billing so that a producer can sell surplus electricity at one time and receive electricity from the grid at another time and settle accounts on a net basis
- d. de-licenses and deregulates small scale power production through renewable resources (up to 5 MW for hydro and 1 MW for net metered sales) to reduce the transaction costs for such investments
- e. lays down simplified and transparent principles of tariff determination
- f. insulates the investor from resource variability risk, which is allocated to the power purchaser; and
- g. facilitates projects to obtain Carbon Credits for avoided greenhouse gas emissions, thereby helping improve financial returns and reducing per unit costs for the purchaser".

### **Power Generation Policy 2002**

Private sector investments in the thermal and hydroelectric sector are governed by the "Power Generation Policy 2002". Key features of the Policy include:

- a. Exception from corporate income tax, turn-over tax and sales tax;
- b. Protection against Force Majeure, change in law, and change in duties and taxes;
- c. Compensation in case of termination;
- d. Tariff adjustments for variation in currency exchange and fuel prices;
- e. Remitability of foreign exchange;
- f. Protection against hydrological risk in case of hydroelectric projects;
- g. Determination of tariffs by the independent National Electricity Power Regulatory Authority (NEPRA), using a cost plus method.
- h. Concessionary duty of 5% on import of plant and equipment

i. Payment guarantee in case of default by the power purchaser

j.

Pursuant to Policy 2002, twelve (12) projects with a cumulative capacity of 2,543 MW (investment US \$ 2.446 billion) are at various advance stages of implementation; of these, two projects have already started supplying 390 MW cumulatively to the national grid.

### **National Power Plan & the Integrated Energy Plan – Vision 2020.**

PEPCO is in the process of reviewing the National Power Plan 1994 and formulating a new Power Plan. A Request for Proposal (RFP) is being issued to firms short-listed through a process of Expression of Interest (EOI). This plan, costing US\$ 10 Million, would provide a 'least-cost generation and transmission plan' along with the requirement of fuel and other resources. This would also indicate the capital outlays, required for each activity with timelines. Pakistan has also announced specific policies in the energy sector, which are investor-friendly and expected to expedite investments in this sector.

## Abbreviations

1	AEDB	Alternative Energy Development Board
2	CIA	Central Intelligence Agency
3	DGPC	Director General Petroleum Concessions
4	DISCOs	Distribution Companies
5	E&P	Exploration and Production
6	ENAR	ENAR Petrotech Services, Ltd
7	EoI	Expression of Interest
8	FDI	Foreign Direct Investment
9	GDP	Gross Development Product
10	GENCOs	Generation Companies
11	GoP	Government of Pakistan
12	GWh	Giga Watt hour
13	HDIP	Hydrocarbon Development Institute of Pakistan
14	IPPs	Independent Power Producers
15	ISGS	Inter State Gas System
16	KESC	Karachi Electric Supply Company
17	KV	KiloVolt
18	KW	KiloWatt
19	KWh	KiloWatt hour
20	LNG	Liquefied Natural Gas
21	LPG	Liquefied Petroleum Gas
22	MMCFD	Million Cubic Feet per Day
23	MTDF	Medium Term Development Framework
24	MTOE	Million metric Tons Oil Equivalent

25	MW	MegaWatt
26	NEPRA	National Power Regulatory Authority
27	NTDC	National Transmission and Dispatch Company
28	NWFP	North West Frontier Province
29	OGDCL	Oil and Gas Development Corporation Ltd
30	OGRA	Oil and Gas Regulatory Authority
31	PAEC	Pakistan Atomic Energy Commission
32	PEPCO	Pakistan Electric Power Company
33	PIP	Petroleum Institute of Pakistan
34	PPIB	Private Power Infrastructure Board
35	PSO	Pakistan State Oil
36	PV	Photo Voltaic
37	RPPs	Rental Power Producers
38	Rs	Rupees
39	SNGPL	Sui Northern Gas Company Ltd
40	SSGCL	Sui Southern Gas Company Ltd
41	TC&EB	Thar Coal and Energy Board
42	TCF	Trillion Cubic Feet
43	TOE	Ton of Oil Equivalent
44	TWh	Trillion Watt hours
45	US	United States
46	USAID	United States Agency for International Development
47	USTDA	United States Trade and Development Agency
48	WAPDA	Water and Power Development Authority
49	WVO	Waste Vegetable Oil

## 4.0 Project Reports

### 4.1 Project Selection Process

Selection criteria were determined in discussions with USTDA before the start of the Definitional Meeting. The project opportunities selected by the Definitional Mission must have value in one of the following Value Criteria or in combinations, and must meet all the Compliance Criteria.

#### Value Criteria

- A. Support the energy sector of Pakistan with:
  - 1. Significant increase in electricity supply by
    - a. Importing electricity,
    - b. Increasing generating capacity,
    - c. Providing fuel to present or future generating capacity projects, or
    - d. improving electric efficiency.
  - 2. Significant additional fuel supply by
    - a. Importing fuel,
    - b. Increasing domestic fuel production, or
    - c. improving fuel efficiency.
- B. Have potential for replication of the project concept, once demonstrated, in larger quantities by the same sponsor or by other sponsors or agencies.
- C. Improve the enabling environment of policy, regulation, institutional capacity, and investor confidence in order to facilitate and accelerate investment, both domestic and foreign, in the energy sector.

#### Compliance Criteria

- D. Have minimum feasible adverse impact on the environment and on the general population of Pakistan.
- E. Have a high degree of certainty of completion through economic and financial and technical feasibility; reasonable cooperation of all involved parties; compliance with laws, policies and regulations governing the energy sector; and the commitment and resources of the sponsors.

- F. Exhibit diversity with the intent of opening doors in many technologies, financing methods, locations, fuel types, involved industries, and agencies.
- G. Have potential for greater than \$10 million of U.S.-sourced equipment or services.
- H. Require assistance of a nature which USTDA is able to provide: U.S. consultant services to conduct feasibility studies costing in the range of \$250,000 to \$750,000 (with cost sharing where available); Technical Assistance for analyzing specific problems or helping to complete financing packages; or Capacity Development services to provide training to government officials.

The members of the Definitional Mission acted as a panel of experts in applying these criteria subjectively during the course of meetings with sponsors and responsible agencies. In addition to their own experience as energy professionals, they sought and applied the advice of literally hundreds of counterparts.

**END OF DEFINITIONAL MISSION STUDY**

**ANNEX 3**



**U.S. TRADE AND DEVELOPMENT AGENCY  
Arlington, VA 22209-2131**

**NATIONALITY, SOURCE, AND ORIGIN REQUIREMENTS**

The purpose of USTDA's nationality, source, and origin requirements is to assure the maximum practicable participation of American contractors, technology, equipment and materials in the prefeasibility, feasibility, and implementation stages of a project.

**USTDA STANDARD RULE (GRANT AGREEMENT STANDARD LANGUAGE):**

Except as USTDA may otherwise agree, each of the following provisions shall apply to the delivery of goods and services funded by USTDA under this Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from host country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for implementation of the Study and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in host country are not subject to the above restrictions. USTDA will make available further details concerning these standards of eligibility upon request.

**NATIONALITY:**

1) Rule

Except as USTDA may otherwise agree, the Contractor for USTDA funded activities must be either a U.S. firm or a U.S. individual. Prime contractors may utilize U.S.

subcontractors without limitation, but the use of host country subcontractors is limited to 20% of the USTDA grant amount.

## 2) Application

Accordingly, only a U.S. firm or U.S. individual may submit proposals on USTDA funded activities. Although those proposals may include subcontracting arrangements with host country firms or individuals for up to 20% of the USTDA grant amount, they may not include subcontracts with third country entities. U.S. firms submitting proposals must ensure that the professional services funded by the USTDA grant, to the extent not subcontracted to host country entities, are supplied by employees of the firm or employees of U.S. subcontractor firms who are U.S. individuals.

Interested U.S. firms and consultants who submit proposals must meet USTDA nationality requirements as of the due date for the submission of proposals and, if selected, must continue to meet such requirements throughout the duration of the USTDA-financed activity. These nationality provisions apply to whatever portion of the Terms of Reference is funded with the USTDA grant.

## 3) Definitions

A "U.S. individual" is (a) a U.S. citizen, or (b) a non-U.S. citizen lawfully admitted for permanent residence in the U.S. (a green card holder).

A "U.S. firm" is a privately owned firm which is incorporated in the U.S., with its principal place of business in the U.S., and which is either (a) more than 50% owned by U.S. individuals, or (b) has been incorporated in the U.S. for more than three (3) years prior to the issuance date of the request for proposals; has performed similar services in the U.S. for that three (3) year period; employs U.S. citizens in more than half of its permanent full-time positions in the U.S.; and has the existing capability in the U.S. to perform the work in question.

A partnership, organized in the U.S. with its principal place of business in the U.S., may also qualify as a "U.S. firm" as would a joint venture organized or incorporated in the United States consisting entirely of U.S. firms and/or U.S. individuals.

A nonprofit organization, such as an educational institution, foundation, or association may also qualify as a "U.S. firm" if it is incorporated in the United States and managed by a governing body, a majority of whose members are U.S. individuals.

## SOURCE AND ORIGIN:

### 1) Rule

In addition to the nationality requirement stated above, any goods (e.g., equipment and materials) and services related to their shipment (e.g., international transportation and insurance) funded under the USTDA Grant Agreement must have their source and origin in the United States, unless USTDA otherwise agrees. However, necessary purchases of goods and project support services which are unavailable from a U.S. source (e.g., local food, housing and transportation) are eligible without specific USTDA approval.

### 2) Application

Accordingly, the prime contractor must be able to demonstrate that all goods and services purchased in the host country to carry out the Terms of Reference for a USTDA Grant Agreement that were not of U.S. source and origin were unavailable in the United States.

### 3) Definitions

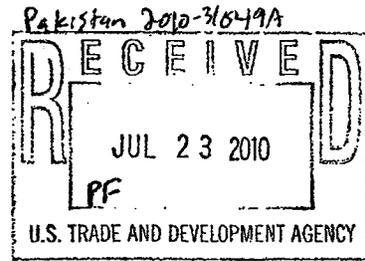
“Source” means the country from which shipment is made.

“Origin” means the place of production, through manufacturing, assembly or otherwise.

*Questions regarding these nationality, source and origin requirements may be addressed to the USTDA Office of General Counsel.*

**ANNEX 4**

**GRANT AGREEMENT**



## GRANT AGREEMENT

This Grant Agreement is entered into between the Government of the United States of America, acting through the U.S. Trade and Development Agency ("USTDA") and Packages Limited ("Grantee"). USTDA agrees to provide the Grantee under the terms of this Agreement US\$289,125 ("USTDA Grant") to fund the cost of goods and services required for a feasibility study ("Study") on the proposed Biomass Cogeneration at Bulleh Shah Paper Mill project ("Project") in Pakistan ("Host Country").

WS  
DR  
PA  
JS  
MB  
PD  
KA

### 1. USTDA Funding

The funding to be provided under this Grant Agreement shall be used to fund the costs of a contract between the Grantee and the U.S. firm selected by the Grantee ("Contractor") under which the Contractor will perform the Study ("Contract"). Payment to the Contractor will be made directly by USTDA on behalf of the Grantee with the USTDA Grant funds provided under this Grant Agreement.

LZ  
PD  
JW

### 2. Terms of Reference

The Terms of Reference for the Study ("Terms of Reference") are attached as Annex I and are hereby made a part of this Grant Agreement. The Study will examine the technical, financial, environmental, and other critical aspects of the proposed Project. The Terms of Reference for the Study shall also be included in the Contract.

### 3. Standards of Conduct

USTDA and the Grantee recognize the existence of standards of conduct for public officials, and commercial entities, in their respective countries. The parties to this Grant Agreement and the Contractor shall observe these standards, which include not accepting payment of money or anything of value, directly or indirectly, from any person for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the Study.

### 4. Grantee Responsibilities

The Grantee shall undertake its best efforts to provide reasonable support for the Contractor, such as local transportation, office space, and secretarial support.

## **5. USTDA as Financier**

### **(A) USTDA Approval of Competitive Selection Procedures**

Selection of the U.S. Contractor shall be carried out by the Grantee according to its established procedures for the competitive selection of contractors with advance notice of the procurement published online through *Federal Business Opportunities* ([www.fedbizopps.gov](http://www.fedbizopps.gov)). Upon request, the Grantee will submit these contracting procedures and related documents to USTDA for information and/or approval.

### **(B) USTDA Approval of Contractor Selection**

The Grantee shall notify USTDA at the address of record set forth in Article 17 below upon selection of the Contractor to perform the Study. Upon approval of this selection by USTDA, the Grantee and the Contractor shall then enter into a contract for performance of the Study. The Grantee shall notify in writing the U.S. firms that submitted unsuccessful proposals to perform the Study that they were not selected.

### **(C) USTDA Approval of Contract Between Grantee and Contractor**

The Grantee and the Contractor shall enter into a contract for performance of the Study. This contract, and any amendments thereto, including assignments and changes in the Terms of Reference, must be approved by USTDA in writing. To expedite this approval, the Grantee (or the Contractor on the Grantee's behalf) shall transmit to USTDA, at the address set forth in Article 17 below, a photocopy of an English language version of the signed contract or a final negotiated draft version of the contract.

### **(D) USTDA Not a Party to the Contract**

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of the contract and any amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any contract funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of funding the Study and shall not be construed as making USTDA a party to the contract. The parties hereto understand and agree that USTDA may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the Project with the parties to the contract or any subcontract, jointly or separately, without thereby incurring any responsibility or liability to such parties. Any approval or failure to approve by USTDA shall not bar the Grantee or USTDA from asserting any right they might have against the

Contractor, or relieve the Contractor of any liability which the Contractor might otherwise have to the Grantee or USTDA.

**(E) Grant Agreement Controlling**

Regardless of USTDA approval, the rights and obligations of any party to the contract or subcontract thereunder must be consistent with this Grant Agreement. In the event of any inconsistency between the Grant Agreement and any contract or subcontract funded by the Grant Agreement, the Grant Agreement shall be controlling.

**6. Disbursement Procedures**

**(A) USTDA Approval of Contract Required**

USTDA will make disbursements of Grant funds directly to the Contractor only after USTDA approves the Grantee's contract with the Contractor.

**(B) Contractor Invoice Requirements**

The Grantee should request disbursement of funds by USTDA to the Contractor for performance of the Study by submitting invoices in accordance with the procedures set forth in the USTDA Mandatory Clauses in Annex II.

**7. Effective Date**

The effective date of this Grant Agreement ("Effective Date") shall be the date of signature by both parties or, if the parties sign on different dates, the date of the last signature.

**8. Study Schedule**

**(A) Study Completion Date**

The completion date for the Study, which is February 28, 2011, is the date by which the parties estimate that the Study will have been completed.

**(B) Time Limitation on Disbursement of USTDA Grant Funds**

Except as USTDA may otherwise agree, (a) no USTDA funds may be disbursed under this Grant Agreement for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (b) all funds made available under the Grant Agreement must be disbursed within four (4) years from the Effective Date of the Grant Agreement.

## **9. USTDA Mandatory Clauses**

All contracts funded under this Grant Agreement shall include the USTDA mandatory clauses set forth in Annex II to this Grant Agreement. All subcontracts funded or partially funded with USTDA Grant funds shall include the USTDA mandatory clauses, except for clauses B(1), G, H, I, and J.

## **10. Use of U.S. Carriers**

### **(A) Air**

Transportation by air of persons or property funded under the Grant Agreement shall be on U.S. flag carriers in accordance with the Fly America Act, 49 U.S.C. 40118, to the extent service by such carriers is available, as provided under applicable U.S. Government regulations.

### **(B) Marine**

Transportation by sea of property funded under the Grant Agreement shall be on U.S. carriers in accordance with U.S. cargo preference law.

## **11. Nationality, Source and Origin**

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and services funded by USTDA under the Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the Study and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

## **12. Taxes**

USTDA funds provided under the Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country. Neither the Grantee nor the Contractor will seek reimbursement from USTDA for such taxes, tariffs, duties, fees or other levies.

### **13. Cooperation Between Parties and Follow-Up**

The parties will cooperate to assure that the purposes of the Grant Agreement are accomplished. For five (5) years following receipt by USTDA of the Final Report (as defined in Clause I of Annex II), the Grantee agrees to respond to any reasonable inquiries from USTDA about the status of the Project.

### **14. Implementation Letters**

To assist the Grantee in the implementation of the Study, USTDA may, from time to time, issue implementation letters that will provide additional information about matters covered by the Grant Agreement. The parties may also use jointly agreed upon implementation letters to confirm and record their mutual understanding of matters covered by the Grant Agreement.

### **15. Recordkeeping and Audit**

The Grantee agrees to maintain books, records, and other documents relating to the Study and the Grant Agreement adequate to demonstrate implementation of its responsibilities under the Grant Agreement, including the selection of contractors, receipt and approval of contract deliverables, and approval or disapproval of contractor invoices for payment by USTDA. Such books, records, and other documents shall be separately maintained for three (3) years after the date of the final disbursement by USTDA. The Grantee shall afford USTDA or its authorized representatives the opportunity at reasonable times to review books, records, and other documents relating to the Study and the Grant Agreement.

### **16. Representation of Parties**

For all purposes relevant to the Grant Agreement, the Government of the United States of America will be represented by the U. S. Ambassador to Host Country or USTDA and Grantee will be represented by the Director & General Manager. The parties hereto may, by written notice, designate additional representatives for all purposes under the Grant Agreement.

### **17. Addresses of Record for Parties**

Any notice, request, document, or other communication submitted by either party to the other under the Grant Agreement shall be in writing or through a wire or electronic medium which produces a tangible record of the transmission, such as a telegram, cable or facsimile, and will be deemed duly given or sent when delivered to such party at the following:

To: Aslam Mehdi  
Director and General Manager  
Packages Limited

Shahrah-E-Roomi  
P.O. Amer Sidhu  
Lahore - 54760  
Pakistan

Phone: +92 425920478  
Mobile: +92 3008494660  
Fax: +92 5811978

To: U.S. Trade and Development Agency  
1000 Wilson Boulevard, Suite 1600  
Arlington, Virginia 22209-3901  
USA

Phone: (703) 875-4357  
Fax: (703) 875-4009

All such communications shall be in English, unless the parties otherwise agree in writing. In addition, the Grantee shall provide the Commercial Section of the U.S. Embassy in Host Country with a copy of each communication sent to USTDA.

Any communication relating to this Grant Agreement shall include the following fiscal data:

Appropriation No.: 119/101001  
Activity No.: 2010-31049A  
Reservation No.: 2010310065  
Grant No.: GH2010310022

#### **18. Termination Clause**

Either party may terminate the Grant Agreement by giving the other party thirty (30) days advance written notice. The termination of the Grant Agreement will end any obligations of the parties to provide financial or other resources for the Study, except for payments which they are committed to make pursuant to noncancellable commitments entered into with third parties prior to the written notice of termination.

**19. Non-waiver of Rights and Remedies**

No delay in exercising any right or remedy accruing to either party in connection with the Grant Agreement shall be construed as a waiver of such right or remedy.

**20. U.S. Technology and Equipment**

By funding this Study, USTDA seeks to promote the project objectives of the Host Country through the use of U.S. technology, goods, and services. In recognition of this purpose, the Grantee agrees that it will allow U.S. suppliers to compete in the procurement of technology, goods and services needed for Project implementation.

**[THE REMAINDER OF THIS PAGE IS INTENTIONALLY LEFT BLANK]**

IN WITNESS WHEREOF, the Government of the United States of America and Packages Limited, each acting through its duly authorized representative, have caused this Agreement to be signed in the English language in their names and delivered as of the day and year written below. In the event that this Grant Agreement is signed in more than one language, the English language version shall govern.

**For the Government of the  
United States of America**

**For  
Packages Limited**

By: *Anne W. Patterson*  
Ambassador Anne W. Patterson

By: *S. Aslam Mehdi*  
Mr. Syed Aslam Mehdi

Date: *July 20, 2010*

Date: *20 July 10*

Witnessed:

Witnessed:

By: *Henry Steingass*  
Mr. Henry Steingass

By: *Khairat Jansh*

**Annex I -- Terms of Reference**

**Annex II -- USTDA Mandatory Clauses**

## Annex I

### Terms of Reference

**Purpose and Objectives:** The purpose of the Project is to improve the efficiency and reduce waste and emissions from an industrial plant that produces paper and cardboard packaging for commercial products. The new Bulleh Shah paper mill is owned by Packages Limited. The plant produces large volumes of packaging waste that could be burned to provide extra process steam and extra electrical power, decreasing the plant's dependence on fossil fuels. The Study will assess and recommend one of two options to utilize the waste from the paper mill and potentially local biomass resources: Option 1 – installing a new 50-ton per hour biomass boiler that would generate approximately 10 megawatts (MW) of electrical power in the existing 41 MW steam turbine; or Option 2 – a significantly larger biomass cogeneration plant of up to 60 MW based on the available fuel supply, interconnection, site and financing constraints. Objectives of the Study include: to identify the most appropriate option, size, and optimal design; to plan the integration of the new plant into the existing production facilities; to provide a professional feasibility assessment to prospective lenders and investors; to provide technical documentation to support permit applications; and to provide specifications and bid documents for selection of an Engineering, Procurement, and Construction (EPC) contractor to accomplish the installation.

#### **Task 1. Inception Meeting and Report**

##### **Task 1.1 Inception Meeting**

Contractor shall meet with Grantee to agree on details of work and methodology for the Study, establish working and reporting relationships, visit the site, obtain copies of available information, and make arrangements for field data collection as needed.

##### **Task 1.2 Inception Report**

Following the meeting, Contractor shall prepare an Inception Report for the Study, documenting attendance at the meeting, topics discussed, and any insights gained from discussions. Contractor shall include in the Inception Report a concise statement of the Purpose and Objectives of the Study, adding perspectives of the Grantee.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 1.

#### **Task 2. Technical Assessment**

##### **Task 2.1 Review of Existing Documentation**

Contractor shall review existing studies and available information regarding technical, economic, and environmental aspects of the Project. This review shall include, but not be limited to:

1. Site infrastructure drawings and original specifications
  - a. Subsurface study

- b. Space availability
  - c. Configuration of existing high pressure and process steam systems
  - d. Construction access and laydown areas
  - e. Interface to existing controls and instrumentation systems
  - f. Water treatment and boiler feed systems
  - g. Stack design and foundation requirements
  - h. Site drainage and collection ponds
  - i. Fuel handling, storage, and receipt equipment
  - j. Ash handling provisions for fly ash and bottom ash
  - k. Requirements for pollution control and monitoring equipment
  - l. Standards for freeze protection and weatherization of systems
  - m. Auxiliary power systems
  - n. Underground piping and cathodic protection systems
2. Site contamination tests or studies.
  3. Existing environmental permits, their limitations, and ability to be re-used.
  4. Current government plans or policies on fuel supply management, resource planning, or other issues that may influence technology selection.
  5. Existing staffing, work management, operational control, data collection, log keeping, record keeping, budget, stores and inventory management, and administrative systems.

#### **Task 2.2 Review and Optimization of Existing Options**

Contractor shall assess technical feasibility of Option 1 and Option 2 within the constraints of site space and infrastructure, fuel supplies and transportation to boiler site, the sludge de-watering system available, permitted emissions limits, and operating requirements within the needs of the paper mill. Contractor shall determine by discussion with Grantee the degree of flexibility around these basic designs and shall bring to light any considerations which might call for significant design changes to improve the Project. For example, if the Contractor concludes it is technically and economically viable, some of the biomass fuels may be gasified in a thermal process or used to produce methane in a digester process, thereby expanding the range of combustion technologies and vendors available.

Contractor shall investigate the possibility of increasing the plant size (Option 2) to make full use of existing waste fuel supplies and other supplies in the area toward the end of reducing fossil fuel consumption further and exporting power to the grid. This option requires the Contractor to:

- judge the supply of agricultural waste, municipal solid waste (MSW), and other waste fuels, even including cattle wastes from feedlots, which could be included as supplemental fuels;
- estimate the marginal cost of enlarging the boiler required for Option 1;
- assess the capability for Grantee's collection system and the associated transportation logistics to assure an uninterrupted fuel supply;
- estimate the cost of adding an additional steam turbine to produce more MW than needed for the Bulleh Shah processes;

- estimate additional feed-in tariff revenues to be gained from exporting significant amounts of power to the grid;
- evaluate the potential for utilization of ash as a fertilizer and in the construction industry; and
- include an estimate of additional Clean Development Mechanism (CDM) credits from further reducing fossil fuel use and from reduction of CO<sub>2</sub> and methane emissions from decomposition of the supplemental waste fuels.

### **Task 2.3 Performance Analysis**

Contractor shall conduct performance model studies to determine the year-round operating capacity, heat rate, operating expense, fossil fuel savings, reductions of CO<sub>2</sub> and other emissions, and reasonable assumptions of maintenance and repair costs. Contractor shall project the operating reliability and capacity factor of the biomass boiler under Option 1 and Option 2, with special attention to (i) additional maintenance time and reliability problems which might occur with mixtures of fuels, and (ii) providing biomass exhaust gases to the heat recovery steam generator in the combined cycle plant option.

Contractor shall verify that optimized designs for Option 1 and Option 2 are fully compatible with the operating and maintenance capabilities of the Grantee, and shall recommend training, staffing, and management changes where appropriate to ensure continuous optimum performance.

Contractor shall ensure that the optimized designs for Option 1 and Option 2 meet Grantee's needs for reliability, responsiveness to changes in steam and electricity demand, operation in all weather, suitable sludge dryness level, and flexibility to handle and combust the specified range of fuel mixtures.

### **Task 2.4 CDM Credit Estimation**

Using performance models under the expected season operating schedule of the plants, the Contractor shall determine the quantities and potential market value of CDM credits that may be generated by fossil fuel reductions.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 2.

### **Task 3. Economic Analysis**

Contractor shall conduct a *pro forma* economic analysis of both Option 1 and Option 2 and present the analysis to Grantee for their determination of the superior option under their financing and demand situations. Evaluation shall include a sensitivity analysis considering the fuel requirements, auxiliary load requirements, supplemental fuels, fuel budget, availability, capital cost, O&M costs, effective cost per unit of steam produced, machine throughputs, efficiency, collection time seasonally, construction time, financing, environmental impacts, and other performance parameters as Grantee may require. Contractor shall specifically address any differences in projected performance, O&M

costs, and reliability differences caused by mixed biomass fuel operation. The Contractor shall also address the reliability and price predictions of fossil fuel supplies in its analysis. The fuel requirement of other plants now in planning in the public sector may exceed the available fuel supply of either furnace oil or natural gas, or both. If, in the judgment of the Contractor, Grantee will experience fossil fuel supply interruptions, resulting in under-utilization of the plant, Contractor shall demonstrate to the Grantee the effects of that scenario on financing, return on investment, and financial feasibility.

The Grantee shall determine whether to proceed with Option 1 or Option 2 at the completion of the Economic Analysis.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 3.

#### **Task 4. Financing Plan**

Contractor shall prepare a Financing Plan with respect to the selected option, consistent with Grantee's financial resources and borrowing capacity. The Financing Plan should show probable sources of equity and debt and confirm that the Project conforms to the standards and portfolio policies of major multi-lateral lenders. The Financing Plan shall include a proposed financial structure of the project financing according to the policies and requirements of the likely financing parties, including debt/equity ratio, debt coverage ratio requirements, recovery of development costs, covenants, term of loans, amortization methods, use of subordinated debt, reserve requirements, closing costs, and other relevant parameters.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 4.

#### **Task 5. Preliminary Environmental Analysis**

##### **Task 5.1 Adverse Environmental Effects**

Contractor shall make a preliminary review of the Project's environmental impact based on the selected option, with reference to local requirements and those of multilateral lending agencies (such as the International Finance Corporation). This review shall identify potential negative impacts, discuss the extent to which they can be mitigated, and develop plans for full environmental impact assessment, if required. The Contractor shall address the environmental impact of the burning of materials containing polyethylene, plastics, and aluminum foils in tandem with paper waste. The Contractor shall determine and document if an environmental assessment is required under Pakistan law and policy in the situation where the site has existing permits for a fossil-fueled technology and the proposed options are for renewable fuels.

The USTDA Grant covers a preliminary environmental analysis and not a full environmental impact assessment. If an assessment is required, its cost must be paid separately by Grantee or included in the project financing.

If mitigating actions must be taken, Contractor shall identify those actions and include their costs and time requirements in Project budgets, analyses, and schedules. Contractor shall ensure that mitigating actions identified in this task are included in drafting bid documents (Task 9).

#### **Task 5.2 Beneficial Environmental Effects**

Contractor shall determine and quantify beneficial environmental effects on the basis of the selected option, including, but not limited to, reduction of solid waste materials and avoided emissions of CO<sub>2</sub>, SO<sub>2</sub>, ozone, unburned carbon, CO, and NO<sub>x</sub> per unit of fossil fuel.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 5.

#### **Task 6. Review of Regulatory Issues**

Contractor shall confirm that the repowered plant design based on the selected option conforms to the requirements of existing site permits, including land use, water use, waste disposal, atmospheric emissions, highway access, security, wildlife preservation, noise limits, and other such criteria as may be defined. Contractor shall provide documentation, calculations, and examples to support Grantee in filings for waivers, extensions, or new permits as may be required.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 6.

#### **Task 7. Developmental Impact Analysis**

The industrial cogeneration Project is expected to improve efficiency of Grantee's operations, reduce fossil fuel use and associated emissions, and reduce solid waste.

Contractor shall assess the development impacts associated with the implementation of the Project, based on the selected option, and the methodology for measuring those benefits/adverse impacts. The assessment shall include examples of the development impacts that would be expected if the Project is implemented as described in the Final Report. Contractor shall develop a methodology for assessing these impacts over time and shall identify where to obtain this information in the future (e.g., Government of Pakistan and other regional governmental statistics, the Asian Development Bank, etc).

Contractor shall evaluate the categories listed below to determine which are likely to result from the recommended Project. Where possible, Contractor shall include quantitative estimates. The categories to be considered are as follows:

- **Infrastructure:** Contractor shall estimate the expected scale of infrastructure development and improvements.

- *Human Capacity Building:* Contractor shall estimate the number and type of jobs that would be created if Contractor's recommendations are implemented. Contractor shall comment on any prospective training recommended (the training needed after and as a result of the Project) in the Final Report, including an estimate of the number of persons to be trained, type of training needed, and the desired outcome of the training.
- *Technology Transfer and Productivity Improvement:* Contractor shall discuss potential commercial contracts for licensing new technologies that are recommended, as well as the expected productivity benefits of any such technologies. More generally, Contractor shall discuss the expected efficiency gains related to the recommendations, such as improved systems or processes that enhance productivity or result in a more efficient use of resources.
- *Market-Oriented Reform:* Contractor shall discuss any market-oriented reforms that would facilitate implementation of the Project or that would result from the implementation of the Project, such as any policy changes that would result in more transparent regulatory systems and institutions or increased competition.
- *Other Benefits:* Contractor shall discuss prospective indirect development impacts of the Study recommendations, such as enhanced public safety and economic growth (including increases in investment and indirect job creation) that are not captured in the four categories listed above.

Contractor shall include the Developmental Impact Analysis in the Final Report (Task 10).

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 7.

#### **Task 8. Identification of U.S. Sources of Supply**

Contractor shall, based on the option selected and on the equipment included in the conceptual design, identify qualified U.S. vendors of equipment and services to be included in the competitive bidding at the discretion of Grantee. Contractor shall contact each company and obtain confirmation that the company is competitive in Pakistan on the selected option and willing to participate in the Project. Contractor shall provide name of company, contact person, telephone, fax and email contact information, and descriptions of equipment and services provided, in accordance with USTDA Mandatory Clause I(3)(e). Contractor shall include the list of contacts in the Final Report (Task 10). Contractor shall also provide a list of comparable facilities in the United States that were built along the lines of the above-referenced Option 2.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 8.

If the Grantee decides not to proceed with the preparation of bid documents by Contractor, the Grantee and Contractor shall notify USTDA in writing and Task 9 shall be eliminated from the Study. The Contractor shall then proceed to Task 10. If Task 9 is

eliminated from the Terms of Reference, the Contractor shall not be paid for Task 9 and the Grantee shall not receive the benefit of Task 9. If Task 9 is eliminated from the Terms of Reference, the sum of \$26,280, which is the budgeted costs for Task 9, shall be eliminated from the budget. Accordingly, the USTDA Grant shall be reduced by \$26,280, and such funds shall be deobligated.

If the Grantee decides to move forward with the preparation of bid documents based on the selected option, the Grantee and Contractor shall notify USTDA in writing and provide an estimated completion date of the remaining work to be performed under the Terms of Reference. USTDA will notify the Grantee and Contractor of the authority to proceed with the remaining work under these Terms of Reference.

#### **Task 9. Preparation of Bid Documents**

Contractor shall prepare draft documents for inclusion in the international competitive bid documents for the selected option for issuance by Grantee within the laws and policies of Pakistan regarding international tender and with policies and requirements of probable lenders.

The USTDA Grant does not cover the cost of any work associated with publicizing the bid documents or evaluating proposals under any procurement related activity for this Project, and Contractor shall not be responsible for any such work.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 9.

#### **Task 10. Final Report**

The Contractor shall prepare and deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference ("Final Report"). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement. The Final Report shall contain the findings, recommendations, and conclusions of the Study, and shall incorporate all other documents and/or reports provided pursuant to Tasks 1 through 9 above. The Final Report shall be a substantive and comprehensive report of work performed to carry out all of the tasks set forth in the Terms of Reference and shall include, among other things, an Executive Summary and all deliverables. Each task of the Terms of Reference shall form a separate chapter of the Final Report.

The Final Report shall also include a comprehensive list of sources of U.S. equipment and services relevant to the implementation of each component of the Project as described in the Study.

The Contractor shall submit the Final Report in English. The Contractor shall provide five (5) hard copies and one (1) electronic version of both the confidential and public versions of the Final Report to the Grantee and shall provide copies to USTDA in accordance with Clause I of Annex II of the Grant Agreement. One copy of the public report shall be provided to the U.S. Embassy in Islamabad.

**Notes:**

- (1) The Contractor is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of the Terms of Reference.**
- (2) The Contractor and the Grantee shall be careful to ensure that the public version of the Final Report contains no security or confidential information.**
- (3) The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report and all work product that is developed under these Terms of Reference.**

## Annex II

### USTDA Mandatory Contract Clauses

#### A. USTDA Mandatory Clauses Controlling

The parties to this contract acknowledge that this contract is funded in whole or in part by the U.S. Trade and Development Agency ("USTDA") under the Grant Agreement between the Government of the United States of America acting through USTDA and Packages Limited ("Client"), dated \_\_\_\_\_ ("Grant Agreement"). The Client has selected \_\_\_\_\_ ("Contractor") to perform the feasibility study ("Study") for the Biomass Cogeneration at Bulleh Shah Paper Mill project ("Project") in Pakistan ("Host Country"). Notwithstanding any other provisions of this contract, the following USTDA mandatory contract clauses shall govern. All subcontracts entered into by Contractor funded or partially funded with USTDA Grant funds shall include these USTDA mandatory contract clauses, except for clauses B(1), G, H, I, and J. In addition, in the event of any inconsistency between the Grant Agreement and any contract or subcontract thereunder, the Grant Agreement shall be controlling.

#### B. USTDA as Financier

##### (1) USTDA Approval of Contract

All contracts funded under the Grant Agreement, and any amendments thereto, including assignments and changes in the Terms of Reference, must be approved by USTDA in writing in order to be effective with respect to the expenditure of USTDA Grant funds. USTDA will not authorize the disbursement of USTDA Grant funds until the contract has been formally approved by USTDA or until the contract conforms to modifications required by USTDA during the contract review process.

##### (2) USTDA Not a Party to the Contract

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of this contract and amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any contract funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of financing the Study and shall not be construed as making USTDA a party to the contract. The parties hereto understand and agree that USTDA may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the Project with the parties to the contract or any subcontract, jointly or separately, without thereby incurring any responsibility or liability to such parties. Any approval or failure to approve by USTDA shall not

bar the Client or USTDA from asserting any right they might have against the Contractor, or relieve the Contractor of any liability which the Contractor might otherwise have to the Client or USTDA.

### **C. Nationality, Source and Origin**

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and services funded by USTDA under the Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the Study and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

### **D. Recordkeeping and Audit**

The Contractor and subcontractors funded under the Grant Agreement shall maintain, in accordance with generally accepted accounting procedures, books, records, and other documents, sufficient to reflect properly all transactions under or in connection with the contract. These books, records, and other documents shall clearly identify and track the use and expenditure of USTDA funds, separately from other funding sources. Such books, records, and documents shall be maintained during the contract term and for a period of three (3) years after final disbursement by USTDA. The Contractor and subcontractors shall afford USTDA, or its authorized representatives, the opportunity at reasonable times for inspection and audit of such books, records, and other documentation.

### **E. U.S. Carriers**

#### **(1) Air**

Transportation by air of persons or property funded under the Grant Agreement shall be on U.S. flag carriers in accordance with the Fly America Act, 49 U.S.C. 40118, to the extent service by such carriers is available, as provided under applicable U.S. Government regulations.

**(2) Marine**

Transportation by sea of property funded under the Grant Agreement shall be on U.S. carriers in accordance with U.S. cargo preference law.

**F. Workman's Compensation Insurance**

The Contractor shall provide adequate Workman's Compensation Insurance coverage for work performed under this Contract.

**G. Reporting Requirements**

The Contractor shall advise USTDA by letter as to the status of the Project on March 1st annually for a period of two (2) years after completion of the Study. In addition, if at any time the Contractor receives follow-on work from the Client, the Contractor shall so notify USTDA and designate the Contractor's contact point including name, telephone, and fax number. Since this information may be made publicly available by USTDA, any information which is confidential shall be designated as such by the Contractor and provided separately to USTDA. USTDA will maintain the confidentiality of such information in accordance with applicable law.

**H. Disbursement Procedures**

**(1) USTDA Approval of Contract**

Disbursement of Grant funds will be made only after USTDA approval of this contract. To make this review in a timely fashion, USTDA must receive from either the Client or the Contractor a photocopy of an English language version of a signed contract or a final negotiated draft version to the attention of the General Counsel's office at USTDA's address listed in Clause M below.

**(2) Payment Schedule Requirements**

A payment schedule for disbursement of Grant funds to the Contractor shall be included in this Contract. Such payment schedule must conform to the following USTDA requirements: (1) up to twenty percent (20%) of the total USTDA Grant amount may be used as a mobilization payment; (2) all other payments, with the exception of the final payment, shall be based upon contract performance milestones; and (3) the final payment may be no less than fifteen percent (15%) of the total USTDA Grant amount, payable upon receipt by USTDA of an approved Final Report in accordance with the specifications and quantities set forth in Clause I below. Invoicing procedures for all payments are described below.

### **(3) Contractor Invoice Requirements**

USTDA will make all disbursements of USTDA Grant funds directly to the Contractor. The Contractor must provide USTDA with an ACH Vendor Enrollment Form (available from USTDA) with the first invoice. The Client shall request disbursement of funds by USTDA to the Contractor for performance of the contract by submitting the following to USTDA:

#### **(a) Contractor's Invoice**

The Contractor's invoice shall include reference to an item listed in the Contract payment schedule, the requested payment amount, and an appropriate certification by the Contractor, as follows:

##### **(i) For a mobilization payment (if any):**

"As a condition for this mobilization payment, the Contractor certifies that it will perform all work in accordance with the terms of its Contract with the Client. To the extent that the Contractor does not comply with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

##### **(ii) For contract performance milestone payments:**

"The Contractor has performed the work described in this invoice in accordance with the terms of its contract with the Client and is entitled to payment thereunder. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

##### **(iii) For final payment:**

"The Contractor has performed the work described in this invoice in accordance with the terms of its contract with the Client and is entitled to payment thereunder. Specifically, the Contractor has submitted the Final Report to the Client, as required by the Contract, and received the Client's approval of the Final Report. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

#### **(b) Client's Approval of the Contractor's Invoice**

(i) The invoice for a mobilization payment must be approved in writing by the Client.

(ii) For contract performance milestone payments, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the Contractor have been performed satisfactorily, in accordance with applicable Contract provisions and the terms and conditions of the USTDA Grant Agreement."

(iii) For final payment, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the Contractor have been performed satisfactorily, in accordance with applicable Contract provisions and terms and conditions of the USTDA Grant Agreement. The Final Report submitted by the Contractor has been reviewed and approved by the Client. "

**(c) USTDA Address for Disbursement Requests**

Requests for disbursement shall be submitted by courier or mail to the attention of the Finance Department at USTDA's address listed in Clause M below.

**(4) Termination**

In the event that the Contract is terminated prior to completion, the Contractor will be eligible, subject to USTDA approval, for reasonable and documented costs which have been incurred in performing the Terms of Reference prior to termination, as well as reasonable wind down expenses. Reimbursement for such costs shall not exceed the total amount of undisbursed Grant funds. Likewise, in the event of such termination, USTDA is entitled to receive from the Contractor all USTDA Grant funds previously disbursed to the Contractor (including but not limited to mobilization payments) which exceed the reasonable and documented costs incurred in performing the Terms of Reference prior to termination.

**I. USTDA Final Report**

**(1) Definition**

"Final Report" shall mean the Final Report described in the attached Annex I Terms of Reference or, if no such "Final Report" is described therein, "Final Report" shall mean a substantive and comprehensive report of work performed in accordance with the attached Annex I Terms of Reference, including any documents delivered to the Client.

**(2) Final Report Submission Requirements**

The Contractor shall provide the following to USTDA:

(a) One (1) complete version of the Final Report for USTDA's records. This version shall have been approved by the Client in writing and must be in the English language. It is the responsibility of the Contractor to ensure that confidential information, if any, contained in this version be clearly marked. USTDA will maintain the confidentiality of such information in accordance with applicable law.

and

(b) One (1) copy of the Final Report suitable for public distribution ("Public Version"). The Public Version shall have been approved by the Client in writing and must be in the English language. As this version will be available for public distribution, it must not contain any confidential information. If the report in (a) above contains no confidential information, it may be used as the Public Version. In any event, the Public Version must be informative and contain sufficient Project detail to be useful to prospective equipment and service providers.

and

(c) Two (2) CD-ROMs, each containing a complete copy of the Public Version of the Final Report. The electronic files on the CD-ROMs shall be submitted in a commonly accessible read-only format. As these CD-ROMs will be available for public distribution, they must not contain any confidential information. It is the responsibility of the Contractor to ensure that no confidential information is contained on the CD-ROMs.

The Contractor shall also provide one (1) copy of the Public Version of the Final Report to the Foreign Commercial Service Officer or the Economic Section of the U.S. Embassy in Host Country for informational purposes.

### **(3) Final Report Presentation**

All Final Reports submitted to USTDA must be paginated and include the following:

(a) The front cover of every Final Report shall contain the name of the Client, the name of the Contractor who prepared the report, a report title, USTDA's logo, USTDA's mailing and delivery addresses. If the complete version of the Final Report contains confidential information, the Contractor shall be responsible for labeling the front cover of that version of the Final Report with the term "Confidential Version." The Contractor shall be responsible for labeling the front cover of the Public Version of the Final Report with the term "Public Version." The front cover of every Final Report shall also contain the following disclaimer:

"This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U. S. Government. The opinions, findings, conclusions or recommendations expressed in this document are those of the author(s) and do not necessarily represent the official position or policies of

USTDA. USTDA makes no representation about, nor does it accept responsibility for, the accuracy or completeness of the information contained in this report."

(b) The inside front cover of every Final Report shall contain USTDA's logo, USTDA's mailing and delivery addresses, and USTDA's mission statement. Camera-ready copy of USTDA Final Report specifications will be available from USTDA upon request.

(c) The Contractor shall affix to the front of the CD-ROM a label identifying the Host Country, USTDA Activity Number, the name of the Client, the name of the Contractor who prepared the report, a report title, and the following language:

"The Contractor certifies that this CD-ROM contains the Public Version of the Final Report and that all contents are suitable for public distribution."

(d) The Contractor and any subcontractors that perform work pursuant to the Grant Agreement must be clearly identified in the Final Report. Business name, point of contact, address, telephone and fax numbers shall be included for Contractor and each subcontractor.

(e) The Final Report, while aiming at optimum specifications and characteristics for the Project, shall identify the availability of prospective U.S. sources of supply. Business name, point of contact, address, telephone and fax numbers shall be included for each commercial source.

(f) The Final Report shall be accompanied by a letter or other notation by the Client which states that the Client approves the Final Report. A certification by the Client to this effect provided on or with the invoice for final payment will meet this requirement.

## **J. Modifications**

All changes, modifications, assignments or amendments to this contract, including the appendices, shall be made only by written agreement by the parties hereto, subject to written USTDA approval.

## **K. Study Schedule**

### **(1) Study Completion Date**

The completion date for the Study, which is February 28, 2011, is the date by which the parties estimate that the Study will have been completed.

## **(2) Time Limitation on Disbursement of USTDA Grant Funds**

Except as USTDA may otherwise agree, (a) no USTDA funds may be disbursed under this contract for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (b) all funds made available under the Grant Agreement must be disbursed within four (4) years from the Effective Date of the Grant Agreement.

## **L. Business Practices**

The Contractor agrees not to pay, promise to pay, or authorize the payment of any money or anything of value, directly or indirectly, to any person (whether a governmental official or private individual) for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the Study. The Client agrees not to receive any such payment. The Contractor and the Client agree that each will require that any agent or representative hired to represent them in connection with the Study will comply with this paragraph and all laws which apply to activities and obligations of each party under this Contract, including but not limited to those laws and obligations dealing with improper payments as described above.

## **M. USTDA Address and Fiscal Data**

Any communication with USTDA regarding this Contract shall be sent to the following address and include the fiscal data listed below:

U.S. Trade and Development Agency  
1000 Wilson Boulevard, Suite 1600  
Arlington, Virginia 22209-3901  
USA

Phone: (703) 875-4357  
Fax: (703) 875-4009

### Fiscal Data:

Appropriation No.: 119/101001  
Activity No.: 2010-31049A  
Reservation No.: 2010310065  
Grant No.: GH2010310022

## **N. Definitions**

All capitalized terms not otherwise defined herein shall have the meaning set forth in the Grant Agreement.

**O. Taxes**

USTDA funds provided under the Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country. Neither the Client nor the Contractor will seek reimbursement from USTDA for such taxes, tariffs, duties, fees or other levies.

**ANNEX 5**

**TERMS OF REFERENCE**

## Annex I

### **Terms of Reference**

**Purpose and Objectives:** The purpose of the Project is to improve the efficiency and reduce waste and emissions from an industrial plant that produces paper and cardboard packaging for commercial products. The new Bulleh Shah paper mill is owned by Packages Limited. The plant produces large volumes of packaging waste that could be burned to provide extra process steam and extra electrical power, decreasing the plant's dependence on fossil fuels. The Study will assess and recommend one of two options to utilize the waste from the paper mill and potentially local biomass resources: Option 1 – installing a new 50-ton per hour biomass boiler that would generate approximately 10 megawatts (MW) of electrical power in the existing 41 MW steam turbine; or Option 2 – a significantly larger biomass cogeneration plant of up to 60 MW based on the available fuel supply, interconnection, site and financing constraints. Objectives of the Study include: to identify the most appropriate option, size, and optimal design; to plan the integration of the new plant into the existing production facilities; to provide a professional feasibility assessment to prospective lenders and investors; to provide technical documentation to support permit applications; and to provide specifications and bid documents for selection of an Engineering, Procurement, and Construction (EPC) contractor to accomplish the installation.

#### **Task 1. Inception Meeting and Report**

##### **Task 1.1 Inception Meeting**

Contractor shall meet with Grantee to agree on details of work and methodology for the Study, establish working and reporting relationships, visit the site, obtain copies of available information, and make arrangements for field data collection as needed.

##### **Task 1.2 Inception Report**

Following the meeting, Contractor shall prepare an Inception Report for the Study, documenting attendance at the meeting, topics discussed, and any insights gained from discussions. Contractor shall include in the Inception Report a concise statement of the Purpose and Objectives of the Study, adding perspectives of the Grantee.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 1.

#### **Task 2. Technical Assessment**

##### **Task 2.1 Review of Existing Documentation**

Contractor shall review existing studies and available information regarding technical, economic, and environmental aspects of the Project. This review shall include, but not be limited to:

1. Site infrastructure drawings and original specifications
  - a. Subsurface study

- b. Space availability
  - c. Configuration of existing high pressure and process steam systems
  - d. Construction access and laydown areas
  - e. Interface to existing controls and instrumentation systems
  - f. Water treatment and boiler feed systems
  - g. Stack design and foundation requirements
  - h. Site drainage and collection ponds
  - i. Fuel handling, storage, and receipt equipment
  - j. Ash handling provisions for fly ash and bottom ash
  - k. Requirements for pollution control and monitoring equipment
  - l. Standards for freeze protection and weatherization of systems
  - m. Auxiliary power systems
  - n. Underground piping and cathodic protection systems
2. Site contamination tests or studies.
  3. Existing environmental permits, their limitations, and ability to be re-used.
  4. Current government plans or policies on fuel supply management, resource planning, or other issues that may influence technology selection.
  5. Existing staffing, work management, operational control, data collection, log keeping, record keeping, budget, stores and inventory management, and administrative systems.

**Task 2.2 Review and Optimization of Existing Options**

Contractor shall assess technical feasibility of Option 1 and Option 2 within the constraints of site space and infrastructure, fuel supplies and transportation to boiler site, the sludge de-watering system available, permitted emissions limits, and operating requirements within the needs of the paper mill. Contractor shall determine by discussion with Grantee the degree of flexibility around these basic designs and shall bring to light any considerations which might call for significant design changes to improve the Project. For example, if the Contractor concludes it is technically and economically viable, some of the biomass fuels may be gasified in a thermal process or used to produce methane in a digester process, thereby expanding the range of combustion technologies and vendors available.

Contractor shall investigate the possibility of increasing the plant size (Option 2) to make full use of existing waste fuel supplies and other supplies in the area toward the end of reducing fossil fuel consumption further and exporting power to the grid. This option requires the Contractor to:

- judge the supply of agricultural waste, municipal solid waste (MSW), and other waste fuels, even including cattle wastes from feedlots, which could be included as supplemental fuels;
- estimate the marginal cost of enlarging the boiler required for Option 1;
- assess the capability for Grantee's collection system and the associated transportation logistics to assure an uninterrupted fuel supply;
- estimate the cost of adding an additional steam turbine to produce more MW than needed for the Bulleh Shah processes;

- estimate additional feed-in tariff revenues to be gained from exporting significant amounts of power to the grid;
- evaluate the potential for utilization of ash as a fertilizer and in the construction industry; and
- include an estimate of additional Clean Development Mechanism (CDM) credits from further reducing fossil fuel use and from reduction of CO<sub>2</sub> and methane emissions from decomposition of the supplemental waste fuels.

### **Task 2.3 Performance Analysis**

Contractor shall conduct performance model studies to determine the year-round operating capacity, heat rate, operating expense, fossil fuel savings, reductions of CO<sub>2</sub> and other emissions, and reasonable assumptions of maintenance and repair costs. Contractor shall project the operating reliability and capacity factor of the biomass boiler under Option 1 and Option 2, with special attention to (i) additional maintenance time and reliability problems which might occur with mixtures of fuels, and (ii) providing biomass exhaust gases to the heat recovery steam generator in the combined cycle plant option.

Contractor shall verify that optimized designs for Option 1 and Option 2 are fully compatible with the operating and maintenance capabilities of the Grantee, and shall recommend training, staffing, and management changes where appropriate to ensure continuous optimum performance.

Contractor shall ensure that the optimized designs for Option 1 and Option 2 meet Grantee's needs for reliability, responsiveness to changes in steam and electricity demand, operation in all weather, suitable sludge dryness level, and flexibility to handle and combust the specified range of fuel mixtures.

### **Task 2.4 CDM Credit Estimation**

Using performance models under the expected season operating schedule of the plants, the Contractor shall determine the quantities and potential market value of CDM credits that may be generated by fossil fuel reductions.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 2.

### **Task 3. Economic Analysis**

Contractor shall conduct a *pro forma* economic analysis of both Option 1 and Option 2 and present the analysis to Grantee for their determination of the superior option under their financing and demand situations. Evaluation shall include a sensitivity analysis considering the fuel requirements, auxiliary load requirements, supplemental fuels, fuel budget, availability, capital cost, O&M costs, effective cost per unit of steam produced, machine throughputs, efficiency, collection time seasonally, construction time, financing, environmental impacts, and other performance parameters as Grantee may require. Contractor shall specifically address any differences in projected performance, O&M

costs, and reliability differences caused by mixed biomass fuel operation. The Contractor shall also address the reliability and price predictions of fossil fuel supplies in its analysis. The fuel requirement of other plants now in planning in the public sector may exceed the available fuel supply of either furnace oil or natural gas, or both. If, in the judgment of the Contractor, Grantee will experience fossil fuel supply interruptions, resulting in under-utilization of the plant, Contractor shall demonstrate to the Grantee the effects of that scenario on financing, return on investment, and financial feasibility.

The Grantee shall determine whether to proceed with Option 1 or Option 2 at the completion of the Economic Analysis.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 3.

#### **Task 4. Financing Plan**

Contractor shall prepare a Financing Plan with respect to the selected option, consistent with Grantee's financial resources and borrowing capacity. The Financing Plan should show probable sources of equity and debt and confirm that the Project conforms to the standards and portfolio policies of major multi-lateral lenders. The Financing Plan shall include a proposed financial structure of the project financing according to the policies and requirements of the likely financing parties, including debt/equity ratio, debt coverage ratio requirements, recovery of development costs, covenants, term of loans, amortization methods, use of subordinated debt, reserve requirements, closing costs, and other relevant parameters.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 4.

#### **Task 5. Preliminary Environmental Analysis**

##### **Task 5.1 Adverse Environmental Effects**

Contractor shall make a preliminary review of the Project's environmental impact based on the selected option, with reference to local requirements and those of multilateral lending agencies (such as the International Finance Corporation). This review shall identify potential negative impacts, discuss the extent to which they can be mitigated, and develop plans for full environmental impact assessment, if required. The Contractor shall address the environmental impact of the burning of materials containing polyethylene, plastics, and aluminum foils in tandem with paper waste. The Contractor shall determine and document if an environmental assessment is required under Pakistan law and policy in the situation where the site has existing permits for a fossil-fueled technology and the proposed options are for renewable fuels.

The USTDA Grant covers a preliminary environmental analysis and not a full environmental impact assessment. If an assessment is required, its cost must be paid separately by Grantee or included in the project financing.

If mitigating actions must be taken, Contractor shall identify those actions and include their costs and time requirements in Project budgets, analyses, and schedules. Contractor shall ensure that mitigating actions identified in this task are included in drafting bid documents (Task 9).

#### **Task 5.2 Beneficial Environmental Effects**

Contractor shall determine and quantify beneficial environmental effects on the basis of the selected option, including, but not limited to, reduction of solid waste materials and avoided emissions of CO<sub>2</sub>, SO<sub>2</sub>, ozone, unburned carbon, CO, and NO<sub>x</sub> per unit of fossil fuel.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 5.

#### **Task 6. Review of Regulatory Issues**

Contractor shall confirm that the repowered plant design based on the selected option conforms to the requirements of existing site permits, including land use, water use, waste disposal, atmospheric emissions, highway access, security, wildlife preservation, noise limits, and other such criteria as may be defined. Contractor shall provide documentation, calculations, and examples to support Grantee in filings for waivers, extensions, or new permits as may be required.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 6.

#### **Task 7. Developmental Impact Analysis**

The industrial cogeneration Project is expected to improve efficiency of Grantee's operations, reduce fossil fuel use and associated emissions, and reduce solid waste.

Contractor shall assess the development impacts associated with the implementation of the Project, based on the selected option, and the methodology for measuring those benefits/adverse impacts. The assessment shall include examples of the development impacts that would be expected if the Project is implemented as described in the Final Report. Contractor shall develop a methodology for assessing these impacts over time and shall identify where to obtain this information in the future (e.g., Government of Pakistan and other regional governmental statistics, the Asian Development Bank, etc).

Contractor shall evaluate the categories listed below to determine which are likely to result from the recommended Project. Where possible, Contractor shall include quantitative estimates. The categories to be considered are as follows:

- **Infrastructure:** Contractor shall estimate the expected scale of infrastructure development and improvements.

- *Human Capacity Building:* Contractor shall estimate the number and type of jobs that would be created if Contractor's recommendations are implemented. Contractor shall comment on any prospective training recommended (the training needed after and as a result of the Project) in the Final Report, including an estimate of the number of persons to be trained, type of training needed, and the desired outcome of the training.
- *Technology Transfer and Productivity Improvement:* Contractor shall discuss potential commercial contracts for licensing new technologies that are recommended, as well as the expected productivity benefits of any such technologies. More generally, Contractor shall discuss the expected efficiency gains related to the recommendations, such as improved systems or processes that enhance productivity or result in a more efficient use of resources.
- *Market-Oriented Reform:* Contractor shall discuss any market-oriented reforms that would facilitate implementation of the Project or that would result from the implementation of the Project, such as any policy changes that would result in more transparent regulatory systems and institutions or increased competition.
- *Other Benefits:* Contractor shall discuss prospective indirect development impacts of the Study recommendations, such as enhanced public safety and economic growth (including increases in investment and indirect job creation) that are not captured in the four categories listed above.

Contractor shall include the Developmental Impact Analysis in the Final Report (Task 10).

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 7.

#### **Task 8. Identification of U.S. Sources of Supply**

Contractor shall, based on the option selected and on the equipment included in the conceptual design, identify qualified U.S. vendors of equipment and services to be included in the competitive bidding at the discretion of Grantee. Contractor shall contact each company and obtain confirmation that the company is competitive in Pakistan on the selected option and willing to participate in the Project. Contractor shall provide name of company, contact person, telephone, fax and email contact information, and descriptions of equipment and services provided, in accordance with USTDA Mandatory Clause I(3)(e). Contractor shall include the list of contacts in the Final Report (Task 10). Contractor shall also provide a list of comparable facilities in the United States that were built along the lines of the above-referenced Option 2.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 8.

If the Grantee decides not to proceed with the preparation of bid documents by Contractor, the Grantee and Contractor shall notify USTDA in writing and Task 9 shall be eliminated from the Study. The Contractor shall then proceed to Task 10. If Task 9 is

eliminated from the Terms of Reference, the Contractor shall not be paid for Task 9 and the Grantee shall not receive the benefit of Task 9. If Task 9 is eliminated from the Terms of Reference, the sum of \$26,280, which is the budgeted costs for Task 9, shall be eliminated from the budget. Accordingly, the USTDA Grant shall be reduced by \$26,280, and such funds shall be deobligated.

If the Grantee decides to move forward with the preparation of bid documents based on the selected option, the Grantee and Contractor shall notify USTDA in writing and provide an estimated completion date of the remaining work to be performed under the Terms of Reference. USTDA will notify the Grantee and Contractor of the authority to proceed with the remaining work under these Terms of Reference.

#### **Task 9. Preparation of Bid Documents**

Contractor shall prepare draft documents for inclusion in the international competitive bid documents for the selected option for issuance by Grantee within the laws and policies of Pakistan regarding international tender and with policies and requirements of probable lenders.

The USTDA Grant does not cover the cost of any work associated with publicizing the bid documents or evaluating proposals under any procurement related activity for this Project, and Contractor shall not be responsible for any such work.

**Deliverable:** The Contractor shall submit an interim report to the Grantee containing all documents collected, work performed, and analyses completed under Task 9.

#### **Task 10. Final Report**

The Contractor shall prepare and deliver to the Grantee and USTDA a substantive and comprehensive final report of all work performed under these Terms of Reference ("Final Report"). The Final Report shall be organized according to the above tasks, and shall include all deliverables and documents that have been provided to the Grantee. The Final Report shall be prepared in accordance with Clause I of Annex II of the Grant Agreement. The Final Report shall contain the findings, recommendations, and conclusions of the Study, and shall incorporate all other documents and/or reports provided pursuant to Tasks 1 through 9 above. The Final Report shall be a substantive and comprehensive report of work performed to carry out all of the tasks set forth in the Terms of Reference and shall include, among other things, an Executive Summary and all deliverables. Each task of the Terms of Reference shall form a separate chapter of the Final Report.

The Final Report shall also include a comprehensive list of sources of U.S. equipment and services relevant to the implementation of each component of the Project as described in the Study.

The Contractor shall submit the Final Report in English. The Contractor shall provide five (5) hard copies and one (1) electronic version of both the confidential and public versions of the Final Report to the Grantee and shall provide copies to USTDA in accordance with Clause I of Annex II of the Grant Agreement. One copy of the public report shall be provided to the U.S. Embassy in Islamabad.

**Notes:**

- (1) The Contractor is responsible for compliance with U.S. export licensing requirements, if applicable, in the performance of the Terms of Reference.**
- (2) The Contractor and the Grantee shall be careful to ensure that the public version of the Final Report contains no security or confidential information.**
- (3) The Grantee and USTDA shall have an irrevocable, worldwide, royalty-free, non-exclusive right to use and distribute the Final Report and all work product that is developed under these Terms of Reference.**

## Annex II

### USTDA Mandatory Contract Clauses

#### A. USTDA Mandatory Clauses Controlling

The parties to this contract acknowledge that this contract is funded in whole or in part by the U.S. Trade and Development Agency ("USTDA") under the Grant Agreement between the Government of the United States of America acting through USTDA and Packages Limited ("Client"), dated \_\_\_\_\_ ("Grant Agreement"). The Client has selected \_\_\_\_\_ ("Contractor") to perform the feasibility study ("Study") for the Biomass Cogeneration at Bulleh Shah Paper Mill project ("Project") in Pakistan ("Host Country"). Notwithstanding any other provisions of this contract, the following USTDA mandatory contract clauses shall govern. All subcontracts entered into by Contractor funded or partially funded with USTDA Grant funds shall include these USTDA mandatory contract clauses, except for clauses B(1), G, H, I, and J. In addition, in the event of any inconsistency between the Grant Agreement and any contract or subcontract thereunder, the Grant Agreement shall be controlling.

#### B. USTDA as Financier

##### (1) USTDA Approval of Contract

All contracts funded under the Grant Agreement, and any amendments thereto, including assignments and changes in the Terms of Reference, must be approved by USTDA in writing in order to be effective with respect to the expenditure of USTDA Grant funds. USTDA will not authorize the disbursement of USTDA Grant funds until the contract has been formally approved by USTDA or until the contract conforms to modifications required by USTDA during the contract review process.

##### (2) USTDA Not a Party to the Contract

It is understood by the parties that USTDA has reserved certain rights such as, but not limited to, the right to approve the terms of this contract and amendments thereto, including assignments, the selection of all contractors, the Terms of Reference, the Final Report, and any and all documents related to any contract funded under the Grant Agreement. The parties hereto further understand and agree that USTDA, in reserving any or all of the foregoing approval rights, has acted solely as a financing entity to assure the proper use of United States Government funds, and that any decision by USTDA to exercise or refrain from exercising these approval rights shall be made as a financier in the course of financing the Study and shall not be construed as making USTDA a party to the contract. The parties hereto understand and agree that USTDA may, from time to time, exercise the foregoing approval rights, or discuss matters related to these rights and the Project with the parties to the contract or any subcontract, jointly or separately, without thereby incurring any responsibility or liability to such parties. Any approval or failure to approve by USTDA shall not

bar the Client or USTDA from asserting any right they might have against the Contractor, or relieve the Contractor of any liability which the Contractor might otherwise have to the Client or USTDA.

### **C. Nationality, Source and Origin**

Except as USTDA may otherwise agree, the following provisions shall govern the delivery of goods and services funded by USTDA under the Grant Agreement: (a) for professional services, the Contractor must be either a U.S. firm or U.S. individual; (b) the Contractor may use U.S. subcontractors without limitation, but the use of subcontractors from Host Country may not exceed twenty percent (20%) of the USTDA Grant amount and may only be used for specific services from the Terms of Reference identified in the subcontract; (c) employees of U.S. Contractor or U.S. subcontractor firms responsible for professional services shall be U.S. citizens or non-U.S. citizens lawfully admitted for permanent residence in the U.S.; (d) goods purchased for performance of the Study and associated delivery services (e.g., international transportation and insurance) must have their nationality, source and origin in the United States; and (e) goods and services incidental to Study support (e.g., local lodging, food, and transportation) in Host Country are not subject to the above restrictions. USTDA will make available further details concerning these provisions upon request.

### **D. Recordkeeping and Audit**

The Contractor and subcontractors funded under the Grant Agreement shall maintain, in accordance with generally accepted accounting procedures, books, records, and other documents, sufficient to reflect properly all transactions under or in connection with the contract. These books, records, and other documents shall clearly identify and track the use and expenditure of USTDA funds, separately from other funding sources. Such books, records, and documents shall be maintained during the contract term and for a period of three (3) years after final disbursement by USTDA. The Contractor and subcontractors shall afford USTDA, or its authorized representatives, the opportunity at reasonable times for inspection and audit of such books, records, and other documentation.

### **E. U.S. Carriers**

#### **(1) Air**

Transportation by air of persons or property funded under the Grant Agreement shall be on U.S. flag carriers in accordance with the Fly America Act, 49 U.S.C. 40118, to the extent service by such carriers is available, as provided under applicable U.S. Government regulations.

**(2) Marine**

Transportation by sea of property funded under the Grant Agreement shall be on U.S. carriers in accordance with U.S. cargo preference law.

**F. Workman's Compensation Insurance**

The Contractor shall provide adequate Workman's Compensation Insurance coverage for work performed under this Contract.

**G. Reporting Requirements**

The Contractor shall advise USTDA by letter as to the status of the Project on March 1st annually for a period of two (2) years after completion of the Study. In addition, if at any time the Contractor receives follow-on work from the Client, the Contractor shall so notify USTDA and designate the Contractor's contact point including name, telephone, and fax number. Since this information may be made publicly available by USTDA, any information which is confidential shall be designated as such by the Contractor and provided separately to USTDA. USTDA will maintain the confidentiality of such information in accordance with applicable law.

**H. Disbursement Procedures**

**(1) USTDA Approval of Contract**

Disbursement of Grant funds will be made only after USTDA approval of this contract. To make this review in a timely fashion, USTDA must receive from either the Client or the Contractor a photocopy of an English language version of a signed contract or a final negotiated draft version to the attention of the General Counsel's office at USTDA's address listed in Clause M below.

**(2) Payment Schedule Requirements**

A payment schedule for disbursement of Grant funds to the Contractor shall be included in this Contract. Such payment schedule must conform to the following USTDA requirements: (1) up to twenty percent (20%) of the total USTDA Grant amount may be used as a mobilization payment; (2) all other payments, with the exception of the final payment, shall be based upon contract performance milestones; and (3) the final payment may be no less than fifteen percent (15%) of the total USTDA Grant amount, payable upon receipt by USTDA of an approved Final Report in accordance with the specifications and quantities set forth in Clause I below. Invoicing procedures for all payments are described below.

### **(3) Contractor Invoice Requirements**

USTDA will make all disbursements of USTDA Grant funds directly to the Contractor. The Contractor must provide USTDA with an ACH Vendor Enrollment Form (available from USTDA) with the first invoice. The Client shall request disbursement of funds by USTDA to the Contractor for performance of the contract by submitting the following to USTDA:

#### **(a) Contractor's Invoice**

The Contractor's invoice shall include reference to an item listed in the Contract payment schedule, the requested payment amount, and an appropriate certification by the Contractor, as follows:

##### **(i) For a mobilization payment (if any):**

"As a condition for this mobilization payment, the Contractor certifies that it will perform all work in accordance with the terms of its Contract with the Client. To the extent that the Contractor does not comply with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA. "

##### **(ii) For contract performance milestone payments:**

"The Contractor has performed the work described in this invoice in accordance with the terms of its contract with the Client and is entitled to payment thereunder. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

##### **(iii) For final payment:**

"The Contractor has performed the work described in this invoice in accordance with the terms of its contract with the Client and is entitled to payment thereunder. Specifically, the Contractor has submitted the Final Report to the Client, as required by the Contract, and received the Client's approval of the Final Report. To the extent the Contractor has not complied with the terms and conditions of the Contract, including the USTDA mandatory provisions contained therein, it will, upon USTDA's request, make an appropriate refund to USTDA."

#### **(b) Client's Approval of the Contractor's Invoice**

(i) The invoice for a mobilization payment must be approved in writing by the Client.

(ii) For contract performance milestone payments, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the Contractor have been performed satisfactorily, in accordance with applicable Contract provisions and the terms and conditions of the USTDA Grant Agreement."

(iii) For final payment, the following certification by the Client must be provided on the invoice or separately:

"The services for which disbursement is requested by the Contractor have been performed satisfactorily, in accordance with applicable Contract provisions and terms and conditions of the USTDA Grant Agreement. The Final Report submitted by the Contractor has been reviewed and approved by the Client. "

**(c) USTDA Address for Disbursement Requests**

Requests for disbursement shall be submitted by courier or mail to the attention of the Finance Department at USTDA's address listed in Clause M below.

**(4) Termination**

In the event that the Contract is terminated prior to completion, the Contractor will be eligible, subject to USTDA approval, for reasonable and documented costs which have been incurred in performing the Terms of Reference prior to termination, as well as reasonable wind down expenses. Reimbursement for such costs shall not exceed the total amount of undisbursed Grant funds. Likewise, in the event of such termination, USTDA is entitled to receive from the Contractor all USTDA Grant funds previously disbursed to the Contractor (including but not limited to mobilization payments) which exceed the reasonable and documented costs incurred in performing the Terms of Reference prior to termination.

**I. USTDA Final Report**

**(1) Definition**

"Final Report" shall mean the Final Report described in the attached Annex I Terms of Reference or, if no such "Final Report" is described therein, "Final Report" shall mean a substantive and comprehensive report of work performed in accordance with the attached Annex I Terms of Reference, including any documents delivered to the Client.

**(2) Final Report Submission Requirements**

The Contractor shall provide the following to USTDA:

(a) One (1) complete version of the Final Report for USTDA's records. This version shall have been approved by the Client in writing and must be in the English language. It is the responsibility of the Contractor to ensure that confidential information, if any, contained in this version be clearly marked. USTDA will maintain the confidentiality of such information in accordance with applicable law.

and

(b) One (1) copy of the Final Report suitable for public distribution ("Public Version"). The Public Version shall have been approved by the Client in writing and must be in the English language. As this version will be available for public distribution, it must not contain any confidential information. If the report in (a) above contains no confidential information, it may be used as the Public Version. In any event, the Public Version must be informative and contain sufficient Project detail to be useful to prospective equipment and service providers.

and

(c) Two (2) CD-ROMs, each containing a complete copy of the Public Version of the Final Report. The electronic files on the CD-ROMs shall be submitted in a commonly accessible read-only format. As these CD-ROMs will be available for public distribution, they must not contain any confidential information. It is the responsibility of the Contractor to ensure that no confidential information is contained on the CD-ROMs.

The Contractor shall also provide one (1) copy of the Public Version of the Final Report to the Foreign Commercial Service Officer or the Economic Section of the U.S. Embassy in Host Country for informational purposes.

### **(3) Final Report Presentation**

All Final Reports submitted to USTDA must be paginated and include the following:

(a) The front cover of every Final Report shall contain the name of the Client, the name of the Contractor who prepared the report, a report title, USTDA's logo, USTDA's mailing and delivery addresses. If the complete version of the Final Report contains confidential information, the Contractor shall be responsible for labeling the front cover of that version of the Final Report with the term "Confidential Version." The Contractor shall be responsible for labeling the front cover of the Public Version of the Final Report with the term "Public Version." The front cover of every Final Report shall also contain the following disclaimer:

"This report was funded by the U.S. Trade and Development Agency (USTDA), an agency of the U. S. Government. The opinions, findings, conclusions or recommendations expressed in this document are those of the author(s) and do not necessarily represent the official position or policies of

USTDA. USTDA makes no representation about, nor does it accept responsibility for, the accuracy or completeness of the information contained in this report."

(b) The inside front cover of every Final Report shall contain USTDA's logo, USTDA's mailing and delivery addresses, and USTDA's mission statement. Camera-ready copy of USTDA Final Report specifications will be available from USTDA upon request.

(c) The Contractor shall affix to the front of the CD-ROM a label identifying the Host Country, USTDA Activity Number, the name of the Client, the name of the Contractor who prepared the report, a report title, and the following language:

"The Contractor certifies that this CD-ROM contains the Public Version of the Final Report and that all contents are suitable for public distribution."

(d) The Contractor and any subcontractors that perform work pursuant to the Grant Agreement must be clearly identified in the Final Report. Business name, point of contact, address, telephone and fax numbers shall be included for Contractor and each subcontractor.

(e) The Final Report, while aiming at optimum specifications and characteristics for the Project, shall identify the availability of prospective U.S. sources of supply. Business name, point of contact, address, telephone and fax numbers shall be included for each commercial source.

(f) The Final Report shall be accompanied by a letter or other notation by the Client which states that the Client approves the Final Report. A certification by the Client to this effect provided on or with the invoice for final payment will meet this requirement.

#### **J. Modifications**

All changes, modifications, assignments or amendments to this contract, including the appendices, shall be made only by written agreement by the parties hereto, subject to written USTDA approval.

#### **K. Study Schedule**

##### **(1) Study Completion Date**

The completion date for the Study, which is February 28, 2011, is the date by which the parties estimate that the Study will have been completed.

## **(2) Time Limitation on Disbursement of USTDA Grant Funds**

Except as USTDA may otherwise agree, (a) no USTDA funds may be disbursed under this contract for goods and services which are provided prior to the Effective Date of the Grant Agreement; and (b) all funds made available under the Grant Agreement must be disbursed within four (4) years from the Effective Date of the Grant Agreement.

## **L. Business Practices**

The Contractor agrees not to pay, promise to pay, or authorize the payment of any money or anything of value, directly or indirectly, to any person (whether a governmental official or private individual) for the purpose of illegally or improperly inducing anyone to take any action favorable to any party in connection with the Study. The Client agrees not to receive any such payment. The Contractor and the Client agree that each will require that any agent or representative hired to represent them in connection with the Study will comply with this paragraph and all laws which apply to activities and obligations of each party under this Contract, including but not limited to those laws and obligations dealing with improper payments as described above.

## **M. USTDA Address and Fiscal Data**

Any communication with USTDA regarding this Contract shall be sent to the following address and include the fiscal data listed below:

U.S. Trade and Development Agency  
1000 Wilson Boulevard, Suite 1600  
Arlington, Virginia 22209-3901  
USA

Phone: (703) 875-4357  
Fax: (703) 875-4009

### Fiscal Data:

Appropriation No.: 119/101001  
Activity No.: 2010-31049A  
Reservation No.: 2010310065  
Grant No.: GH2010310022

## **N. Definitions**

All capitalized terms not otherwise defined herein shall have the meaning set forth in the Grant Agreement.

**O. Taxes**

USTDA funds provided under the Grant Agreement shall not be used to pay any taxes, tariffs, duties, fees or other levies imposed under laws in effect in Host Country. Neither the Client nor the Contractor will seek reimbursement from USTDA for such taxes, tariffs, duties, fees or other levies.

## ANNEX 6

### COMPANY INFORMATION

#### A. Company Profile

Provide the information listed below relative to the Offeror's firm. If the Offeror is proposing to subcontract some of the proposed work to another firm(s), the information below must be provided for each subcontractor.

1. Name of firm and business address (street address only), including telephone and fax numbers:
2. Year established (include predecessor companies and year(s) established, if appropriate).
3. Type of ownership (e.g. public, private or closely held).
4. If private or closely held company, provide list of shareholders and the percentage of their ownership.
5. List of directors and principal officers (President, Chief Executive Officer, Vice-President(s), Secretary and Treasurer; provide full names including first, middle and last). Please place an asterisk (\*) next to the names of those principal officers who will be involved in the Feasibility Study.
6. If Offeror is a subsidiary, indicate if Offeror is a wholly-owned or partially-owned subsidiary. Provide the information requested in items 1 through 5 above for the Offeror's parent(s).
7. Project Manager's name, address, telephone number, e-mail address and fax number .

**B. Offeror's Authorized Negotiator**

Provide name, title, address, telephone number, e-mail address and fax number of the Offeror's authorized negotiator. The person cited shall be empowered to make binding commitments for the Offeror and its subcontractors, if any.

**C. Negotiation Prerequisites**

1. Discuss any current or anticipated commitments which may impact the ability of the Offeror or its subcontractors to complete the Feasibility Study as proposed and reflect such impact within the project schedule.
2. Identify any specific information which is needed from the Grantee before commencing contract negotiations.

**D. Offeror's Representations**

Please provide exceptions and/or explanations in the event that any of the following representations cannot be made:

1. Offeror is a corporation [*insert applicable type of entity if not a corporation*] duly organized, validly existing and in good standing under the laws of the State of \_\_\_\_\_. The Offeror has all the requisite corporate power and authority to conduct its business as presently conducted, to submit this proposal, and if selected, to execute and deliver a contract to the Grantee for the performance of the Feasibility Study. The Offeror is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment, or ineligible for the award of contracts by any federal or state governmental agency or authority.
2. The Offeror has included, with this proposal, a certified copy of its Articles of Incorporation, and a certificate of good standing issued within one month of the date of its proposal by the State of \_\_\_\_\_. The Offeror commits to notify USTDA and the Grantee if they become aware of any change in their status in the state in which they are incorporated. USTDA retains the right to request an updated certificate of good standing.

3. Neither the Offeror nor any of its principal officers have, within the three-year period preceding this RFP, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.
4. Neither the Offeror, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 3 above.
5. There are no federal or state tax liens pending against the assets, property or business of the Offeror. The Offeror, has not, within the three-year period preceding this RFP, been notified of any delinquent federal or state taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.
6. The Offeror has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself or its debts under any bankruptcy, insolvency or other similar law. The Offeror has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

The selected Offeror shall notify the Grantee and USTDA if any of the representations included in its proposal are no longer true and correct at the time of its entry into a contract with the Grantee.

Signed: \_\_\_\_\_  
(Authorized Representative)

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

**E. Subcontractor Profile**

1. Name of firm and business address (street address only), including telephone and fax numbers.
  
  
  
  
  
  
  
  
  
  
2. Year established (include predecessor companies and year(s) established, if appropriate).

**F. Subcontractor's Representations**

If any of the following representations cannot be made, or if there are exceptions, the subcontractor must provide an explanation.

1. Subcontractor is a corporation *[insert applicable type of entity if not a corporation]* duly organized, validly existing and in good standing under the laws of the State of \_\_\_\_\_ . The subcontractor has all the requisite corporate power and authority to conduct its business as presently conducted, to participate in this proposal, and if the Offeror is selected, to execute and deliver a subcontract to the Offeror for the performance of the Feasibility Study and to perform the Feasibility Study. The subcontractor is not debarred, suspended, or to the best of its knowledge or belief, proposed for debarment or ineligible for the award of contracts by any federal or state governmental agency or authority.
  
2. Neither the subcontractor nor any of its principal officers have, within the three-year period preceding this RFP, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a federal, state or local government contract or subcontract; violation of federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating federal or state criminal tax laws, or receiving stolen property.

3. Neither the subcontractor, nor any of its principal officers, is presently indicted for, or otherwise criminally or civilly charged with, commission of any of the offenses enumerated in paragraph 2 above.
4. There are no federal or state tax liens pending against the assets, property or business of the subcontractor. The subcontractor, has not, within the three-year period preceding this RFP, been notified of any delinquent federal or state taxes in an amount that exceeds \$3,000 for which the liability remains unsatisfied. Taxes are considered delinquent if (a) the tax liability has been fully determined, with no pending administrative or judicial appeals; and (b) a taxpayer has failed to pay the tax liability when full payment is due and required.
5. The subcontractor has not commenced a voluntary case or other proceeding seeking liquidation, reorganization or other relief with respect to itself or its debts under any bankruptcy, insolvency or other similar law. The subcontractor has not had filed against it an involuntary petition under any bankruptcy, insolvency or similar law.

The selected subcontractor shall notify the Offeror, Grantee and USTDA if any of the representations included in this proposal are no longer true and correct at the time of the Offeror's entry into a contract with the Grantee.

Signed: \_\_\_\_\_  
(Authorized Representative)

Print Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_