

# **TENDER DOCUMENTS**

## **Solar Thermal Power Plants Technologies** **(Demonstration Units)**

## 1. **Introduction**

Solar energy is abundantly available, environmentally sustainable and technically feasible to produce electricity through solar thermal technologies. These technologies are already feeding the grid with 354 MW of electricity for the last 20 years and many more plants are in the process of being installed in both the developed and developing countries. Pakistan is interested to introduce solar thermal technologies by installing two small power plants for demonstration purpose using parabolic trough and dish Sterling concepts.

## 2. **Location of Project**

The villages' selection based on the criteria of being remote, inaccessible and energy starved are selected in collaboration with National Rural Support Program and Provincial Governments. The area proposed for the project site is in the Balochistan and lower Sindh. The project will also be introduced to the students of University of Balochistan. The villages selected in Balochistan and lower Sindh has the highest solar potential and lying in the Sunbelt regions.

## 3. **Solar Parabolic Trough Technology**

The Parabolic trough consists of long parallel rows of identical concentrator modules, typically using trough-shaped glass mirrors, tracking the sun from east to west by rotation on one axis. The solar radiation incident on the parabolic trough is reflected on to a receiver tube in which flows the working fluid. This fluid is heated up to 350 C. This fluid is further used to produce steam to run the steam turbine. Steam cycle power plants up to 80 MW capacity using parabolic trough collectors have been in commercial operation for more than 15 years, providing electricity at a cost of about 10-12 cents/kWh. This plant is proposed to be 25 to 50 KW installed capacity.

### 3.1 **Technical Specifications**

- 3.1.1 Nominal output power 25-50 kwe.
- 3.1.2 Operate on steam cycle with backup natural gas-fired or biomass capability to supplement the solar output during periods of low radiation.
- 3.1.3 Advanced structural collectors design along with next generation receiver tubes for the reduced thermal losses and increased reliability.
- 3.1.4 Durable evacuated absorber tubes.
- 3.1.5 Highly efficient steam turbine.
- 3.1.6 Direct solar steam generation at 100 bar and 375 C.
- 3.1.7 Parabolic concentrating trough with reflection coefficient of at least 90%.
- 3.1.8 Computer controlled sun tracking.
- 3.1.9 Thermal Storage for at least 3 hours.
- 3.1.10 Control panel to indicate the status of the power plant with data logging system.

- 3.1.11 Technical details consisting of drawings, materials used, process of manufacturing, Project Management Plan including transportation, installation, commissioning, testing and manpower training etc would be submitted in the technical proposals.
- 3.1.12 Performance parameters would also be given in the technical proposals.
- 3.1.13 Correct and verifiable performance and technical parameters must be specified.
- 3.1.14 Minimum warranty must be 5 years.

#### 4. **Solar Dish Sterling Engine Technology**

Dish concentrators are relatively small units that have a motor-generator in the focal point of the reflector which heats the working gas to run the Sterling engine. The mechanical power from the Sterling engine is fed to an electric generator to get electrical power. The motor-generator unit may be based on a Sterling engine or small gas turbine. Their size typically ranges from 5-15 meter of diameter or 10-25 KW of power respectively. Like all concentrating systems, they can additionally be powered by fossil fuel or biomass, providing firm capacity at any time. Because of their size, they are particularly well suited for decentralized power supply and remote stand alone power systems.

##### 4.1 **Technical Specifications**

- 4.1.1 Nominal output power of 10-25 kwe.
- 4.2.2 Additionally powered by natural gas or biomass for providing firm capacity at all time.
- 4.2.3 A Parabolic solar concentrating dish.
- 4.2.4 Ideal point focusing parabolic optics and dual axis sun tracking control.
- 4.2.5 Excellent potential for high conversion efficiencies.
- 4.2.6 Control panel to indicate the status of the plant with data logging system
- 4.2.7 Technical details consisting of drawings, materials used, process of manufacturing, Project Management Plan including transportation, installation, commissioning, testing and manpower training costs etc would be submitted in the technical proposals.
- 4.2.8 Correct and verifiable performance and technical parameters must be specified.
- 4.2.9 Performance parameters would also be given in the technical proposals.
- 4.2.10 All components must be non-corrosive.
- 4.1.11 Minimum warranty must be 5 years.

**5. General Instructions**

- 5.1 Supplied items and installation job would be guaranteed for 5 year against faulty equipment / material / workmanship.
- 5.2 GST and Custom Duty is exempted on renewable Energy Products on imported items. The certificate for clearance of the imported items will be provided by AEDB.
- 5.3 The prices must be quoted on FOR site basis. The supplier will procure the Goods, transport them to the sites and install the equipment in the selected villages.
- 5.4 Price of each item and work / job must be mentioned separately.
- 5.5 Operational and maintenance instructions must be issued to the villagers.

# TENDER NOTICE

The Board intends to invite tenders from national and international firms under the scope of project “Solar Thermal Power Plants Technologies (Demonstration Units)” for the following:

S No.	Items	Description	Qty
1.	Parabolic Trough Power Plant nominal output Power 25-50 kwe	<ul style="list-style-type: none"> <li>• Solar steam generation at 100 bar and 375 ° C</li> <li>• Complete with parabolic reflectors, evacuated tubes, tracking system.</li> <li>• Steam turbine and generator.</li> <li>• Thermal Storage for at least 3 hours</li> <li>• Additionally powered by natural gas or biomass for providing firm capacity (if possible)</li> <li>• The bid should include the transportation, installation, commissioning &amp; manpower training costs.</li> <li>• Warranty of at least 5 years.</li> </ul>	01
2.	Two Parabolic Dish Sterling Power Plant nominal output power rating of each plant 10-25 kwe.	<ul style="list-style-type: none"> <li>• Complete with concentrator, Sterling engine and generator.</li> <li>• Additionally powered by natural gas or biomass for providing firm capacity (if possible)</li> <li>• Ideal point focusing parabolic optics and dual axis sun tracking control.</li> <li>• The bid should include transportation, installation, commissioning &amp; manpower training costs.</li> <li>• Warranty of at least 5 years.</li> </ul>	02

- a. Both Registration and Tender Documents containing details of items and other terms/conditions may be obtained from Alternative Energy Development Board office on any working day at the payment of Rs. 5000/- each or can be downloaded from AEDB’s website ([www.aedb.org](http://www.aedb.org)).
- b. The Tenders should reach the office of Assistant Director (Admin) AEDB Islamabad with in two weeks of the publication of this advertisement. Bid shall comprise a single package containing two separate sealed envelopes of technical and financial proposals. Envelops shall be marked as “Technical Proposal and Financial Proposal” in bold and legible letters.
- c. Price of each item and work / job must be mentioned separately.
- d. All or individual bids of any items can be submitted but they should be clearly marked.
- e. AEDB reserves the right to reject any or all Tenders, without assigning any reason. Decision of the Board will be binding and final in all matters.
- f. Technical Proposals will be evaluated first and technically short listed companies will be informed accordingly for opening of financial bids. The financial offers will be opened in Conference Room of AEDB in the presence of the short listed bidders who choose to be present.

# **TERMS AND CONDITIONS**

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1. Payment would be made in Pak Rupees as per Government procurement procedures.
2. Technical and Financial offers must be submitted separately in sealed envelopes. Financial offers of only technically accepted proposals would be opened and considered.
3. 1% of cost of bid price will be deducted per month of delay for the project.
4. Interested parties may contact AEDB for any clarification before submission of bids. Photocopy of receipt of Tender documents from AEDB office must be attached with the technical offer.
5. Documents indicating conformance of firm to all other legal requirements for government procurement like payment of professional tax and sales tax must be attached with the technical offer.
6. Delivery has to be completed immediately after the order.
7. Delivery schedule and milestones (dates) for completion of different phases as Project Management Plan must be specified.
8. Details of manufacturing facility along-with technical manpower must be provided.
9. Test of supplied equipment would be carried out by AEDB.