

**PETITION FOR TARIFF DETERMINATION**

**ON BEHALF OF**

**CHINA MACHINERY ENGINEERING CORPORATION**

**IN RESPECT OF**

**A LOCAL COAL FIRED POWER PROJECT OF 1X300MW (NET) IN PIND**

**DADAN KHAN, SALT RANGE, PUNJAB**

**DATED: JANUARY 22, 2015**

**Financial Advisor**

**Ernst & Young 'EY'**

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## GLOSSARY

BTU	British Thermal Unit
COD	Commercial Operation Date
Company/Petitioner	China Machinery Engineering Corporation
CPI	Consumer Price Index
CPP	Capacity Purchase Price
CMEC	China Machinery Engineering Corporation
EPC	Engineering, Procurement and Construction
EPP	Energy Purchase Price
E&M	Electrical & Mechanical
FCC	Fuel Cost Component
FGD	Flue Gas Desulfurization
GOP	Government of Pakistan
GWh	Giga Watt hour (1,000,000 kilowatt hour)
IA	Implementation Agreement
IDC	Interest During Construction
IFC	International Finance Corporation
IPP	Independent Power Producer
IRR	Internal Rate of Return
KIBOR	Karachi Interbank Offered Rate
kW	Kilowatt
kWh	Kilowatt hour
LIBOR	London Interbank Offered Rate
L/C	Letter of Credit
MW	Mega Watt (1,000 kilowatts)
MWh	Mega Watt Hour
NEPRA/Authority	National Electric Power Regulatory Authority
NTDC/Power Purchaser	National Transmission and Dispatch Company Limited
O&M	Operation & Maintenance
Power Policy 2002	GOP's Policy for Power Generation, 2002 as amended from time to time
Project	1x300MW Coal Fired Power Plant at Pind Dadan Khan of Salt Range, Punjab based on indigenous coal
PKR	Pakistan Rupee, Legal Currency of Pakistan
PPA	Power Purchase Agreement
PPIB	Private Power & Infrastructure Board
ROE	Return on Equity
ROEDC	Return on Equity during Construction
Ton	Metric Tonne i.e. 1000 kg
USD/\$	United States Dollars, legal currency of USA
CPI	Consumer Price Index
WPI	Wholesale Price Index

## I. Summary of the Tariff Petition

<b>Petitioner</b>	
Petitioner/ Sponsor	China Machinery Engineering Corporation
<b>Project Profile</b>	
Project Description	Subcritical Coal Power Plant
Capacity	1x330 MW (Goss, Mean Site Conditions)
Location	Pind Dadan Khan, Salt Range, Punjab
Fuel:	Indigenous Coal in Salt Range
<b>Capital Cost</b>	
Estimated capital cost:	US\$ 588.98 million
<b>Capital Structure</b>	
Debt Equity Ratio	75:25
Source of Financing	Debt is to be financed primarily from Chinese banks under Sinosure insurance coverage. Equity would be raised by CMEC either with its own funds or via equity loan.

## II. Main Body of the Tariff Petition

### 1. NAME, ADDRESS AND INTRODUCTION OF THE PETITIONER

China Machinery Engineering Corporation

Address in China: No. 178 Guang An Men Wai Street, Xicheng District, Beijing 100055, China

Address in Pakistan: House No. 8, Street No. 41, F-7/1, Islamabad.

#### **Introduction of China Machinery Engineering Corporation (CMEC)**

- 1.1. Founded in 1978, China Machinery Engineering Corporation (CMEC) is the first large import & export company in China and has evolved into an internationally reputed and domestically leading engineering contractor mainly engaged in international projects, trade and investment. In 2012, CMEC was listed on the Hong Kong Stock Exchange.
- 1.2. CMEC's business covers a diversified portfolio of industries, with key strength and focus on power, transportation and telecommunications. CMEC is a pioneer and a leader in turnkey contracts for international power projects, with 20 GW installed capacity worldwide.

- 1.3. The average turnover of CMEC stands at around US\$ 3.5 billion in the last three years, with paid in capital of Rmb 4,125.7 Million Yuan (or US\$ 670.8 Million).
- 1.4. In 1983, CMEC contracted the 210MW Guddu Thermal Power Plant under the export seller's credit, the first of its kind in China, and thus opened the door to the energy cooperation between China and Pakistan.
- 1.5. Since 1983, CMEC has completed over 10 power projects in Pakistan, with total installed capacity around 1.5 GW inclusive of Guddu Unit No. 4, Jamshoro Unit No. 2, 3 and 4, Muzaffargarh Unit No. 4 and Saif Power. CMEC is currently executing the 4x245MW Neelum Jhelum Hydropower Project which is called the "Three Gorges" in Pakistan.
- 1.6. CMEC's expertise and experiences in power sector and its long-time experiences in Pakistan will enable it to better manage the construction risks. The size and credibility of CMEC will make the achievement of financial closing a lot easier and quicker.

## **2. GROUNDS AND FACTS FORMING THE BASIS FOR THE TARIFF PETITION**

### **Legal Regime**

- 2.1. Under the Regulations of Generation, Transmission and Distribution of Electric Power Act (Act No. XL) of 1997 (the "NEPRA Act"), the Authority is mandated to determine tariffs and other terms and conditions for the supply of electricity through generation, transmission and distribution.
- 2.2. This Tariff Petition is being filed before National Electric Power Regulatory Authority (the "NEPRA" or the "Authority") pursuant to Rule 3 of the NEPRA (Tariff Standards and Procedure) Rules, 1998 (the "Tariff Rules") read with paragraph 1.3 of the Guidelines for Determination of Tariff for Independent Power Producers issued by the Government of Pakistan in November 2005 and the applicable provisions of the "Guidelines for Setting Up of Private Power Projects under Short Term Capacity Addition Initiative -August 2010" read with the Government of Pakistan's Policy for Power Generation Projects, 2002 (the "2002 Power Policy").

### **Project Background**

- 2.3. CMEC has been keen in investing as IPP sponsor in the power sector in Pakistan and has started evaluating and working on the local coal based power project in Salt Range, Punjab, Pakistan since March 2014.
- 2.4. In August 2014, the 300MW local coal based power plant was included as one of the actively promoted projects under the China Pakistan Economic Corridor and in November 2014, it was formally included as one of the actively promoted projects in the Agreement on the China-Pakistan Economic Corridor Energy Project Cooperation between the Government

of the People's Republic of China and the Government of the Islamic Republic of Pakistan.

- 2.5. On 27 October 2014, the National Transmission & Despatch Co., Ltd. (NTDC) via its letter with reference no. GM/WPPO/NTDCL/10255-58 (a copy of which is appended herewith as Annex-A) has agreed to off take the power generated by the Project.
- 2.6. On 27 October 2014, CMEC submitted its application to the Private Power Infrastructure Board (the "PPIB"), Ministry of Water & Water of the Government of Pakistan (the "GOP") for its firm interest of setting up 1x300MW (net) Coal Fired Power Plant at Pind Dadan Khan of Salt Range, Punjab based on indigenous coal (hereinafter referred to as the Project). A copy of the application is attached as Annex-B hereto.
- 2.7. In response thereto, the GOP through the PPIB, issued the Notice to Proceed to CMEC (a copy of which is appended herewith as Annex-C) on 29 October 2014 on a fast track basis.
- 2.8. On 19 November 2014, the GOP through the PPIB, issued the Letter of Intent to CMEC (a copy of which is appended herewith as Annex-D).
- 2.9. As per the Letter of Intent issued by PPIB, CMEC is required to submit, within three (3) months from the Notice to Proceed, petitions before National Electric Power Regulatory Authority (NEPRA) to obtain tariff determination and generation license under Regulation of Generation, Transmission and Distribution of Electric Power Act 1997 (NEPRA Act 1997).
- 2.10. The Tariff, to be determined by the Authority, will be integrated into the Power Purchase Agreement (the "PPA") to be entered between CMEC and the Power Purchaser.

#### **Key Technical Features of the Project**

- 2.11. Project Description: Subcritical Coal Power Plant
- 2.12. Project Site: Pind Dadan Khan, Punjab
- 2.13. Fuel: Indigenous Coal in Salt Range
- 2.14. No. of Units and Configuration of Power Plant: 1 x 330MW (Gross, Mean Site Conditions)
- 2.15. Capacity of the Power Plant:
  - Gross Plant Capacity (at Mean Site Conditions):330MW (TMCR)
  - Net Plant Capacity (at Mean Site Conditions):303.6MW (TMCR)
- 2.16. Auxiliary Consumption: 8%

2.17. Net Efficiency of Power Plant (at Mean Site Conditions) : 37% (TMCR)

2.18. Main Equipment Descriptions:

✓ Steam Turbine :

Tandem compound, single reheat, regenerative, condensing, multi cylinder design with combined HP-IP and separate LP casing(s), directly coupled with generator suitable for indoor installation.

✓ Boiler: Direct pulverized coal fired, sub-critical, single drum, and single reheat, radiant, outdoor arrangement, completely hanging construction, balanced draft type.

✓ Generator: The stator winding are water inner-cooled, while the rotor winding is hydrogen inner-cooled and stator core hydrogen cooled.

The main equipment will be sourced from leading manufacturers in China, having vast experiences in supplying this type of equipment, given the fact that the total installed capacity in China amounted to 1250GW as of the end of 2013, out of which 70% is generated from coal-fired power plants.

2.19. Annual availability of Power Plant: 85%. This is the 5-year average value. Allowances shall be granted in the PPA for first year after COD and major maintenance year during operation.

#### **Special Technical Features of the Project**

2.20. This Project is based on indigenous coal from Salt Range. There are peculiarities with the indigenous coal, i.e.,

- 1) Due to the features of the coal resources (underground mining, thin to super thin coal seam, high ash, high sulphur, relatively low calorific value, among other features), the mining challenges and coal mining costs will be higher.
- 2) In addition, the production scale of the proposed mechanized or semi-mechanized coal mines will be limited from estimated 150,000 tons/year to 510,000 tons/year, as restricted by the limited new mining lease area available and the seam of the coal. This will increase the per-ton capital investment costs and operation & maintenance costs of the coal mines, as these costs will go up when the production scale of coal mines decreases.
- 3) as coal will come from multiple resources/locations within Salt Range, coal screening is needed to make the coal quality consistent. This will add to the cost of coal.
- 4) coal crushing and beneficiation/washing is required to reduce the

sulphur content down to the acceptable limits (below 2.5-3%) before it's allowed to enter into the boiler. This will also add to the cost of coal.

5) coal will be transported via trucks or conveyor belts to the Project from different locations with average estimated distance of 50 km. There should be allowances of transportation costs and transportation loss in the coal price.

2.21. To ensure the coal supply stability and security, CMEC, as sponsor of the Project, will also invest in large-scale coal mining in the local area, using mechanized or semi-mechanized technologies. This Project is in fact part of the "mine-mouth" Mine & Power Project, similar in nature to the Thar Coal Mine & Power Project in Sindh Government.

2.22. Given the two facts stated above, the coal price in Salt Range cannot be linked directly to the international coal price. Instead, a coal pricing mechanism will be set up by the Government of Punjab, taking into account the peculiar features of coal in Salt Range and the captive coal mines with mechanized or semi-mechanized technologies. CMEC has also requested the Government of Punjab to facilitate with the Authority in this regard.

2.23. Due to the prevalent nature of captive coal mines dedicated to supply coal to the Project and the significant capital investment required for these captive coal mines, Two Parts Fuel Cost Component (FCC) for covering coal costs is requested, which has already been granted to Thar Coal based power projects.

2.24. As sulphur content of 2.5-3% of beneficiated coal is still much higher than the typical value of 1%, this will increase cost for the boiler due to the additional anti-corrosion measures, and will increase investment for FGD.

2.25. This Project will conform to the environmental protection laws, regulations and standards of Pakistan and World Bank/IFC standards of environmental protection, which are higher than Pakistan standards, to ensure compliance with conditions likely to be stipulated by lending banks and also to reduce pollution in the local area. Additional investment is required in this regard.

2.26. Since this Project is 1x300MW coal fired power plant, its costs per MW especially in the balance of plants and civil works is higher than the costs per MW for 2x300MW coal fired power plant.



- 2.27. This Project will intake water from the River Jhelum. Water wells will be drilled along the river bank and water pump stations as well as water pipelines will be installed to supply water to the Project. The distance between the water pump stations and the site of the Project is around 3-4 km. This will increase investment as compared with other projects.
- 2.28. As this Project is located in remote areas away from cities, housing facilities are required to provide accommodation for the employees. This will also increase investment as compared with other projects.
- 2.29. Compared with coal based power projects in Sindh Province, the inland transportation costs during construction for this Project will be higher, due to the longer inland transportation distance.
- 2.30. Given the special technical features of this Project, the existing upfront tariffs are not directly applicable to this Project and a new tariff therefore is needed for this Project.

#### **Construction Schedule of the Project**

- 2.31. The Project is expected to be completed within 40 months after the Financial Close, which is in line with the requirements specified by NEPRA for plants of this capacity.

#### **Financial Plan of the Project**

- 2.32. The project would be financed in a debt to equity ratio of 75:25. CMEC intends to arrange debt financing from Chinese banks in US\$ under the coverage of Sinasure insurance. If financing from local banks or other international banks is also required, adjustments shall be made accordingly. Equity would be raised by CMEC either with its own funds or via equity loan.
- 2.33. The repayment period of the loan is 10 years, which is in line with the requirements of NEPRA.
- 2.34. The debt repayment will commence from the COD.

### **3. KEY FACTORS UNDERLYING THE CALCULATIONS OF THE PROPOSED TARIFF**

#### **ASSUMPTIONS ON PROJECT COST**

##### **3.1. Estimated Capital Costs including EPC Cost**

Following is the estimated capital cost the Project,

<b>Project Cost Heads</b>	<b>Million US\$</b>
<b>Capital Expenditure</b>	<b>487.62</b>
EPC Cost	450.09
Customs Duties (5% of Plant and Equipment)	11.25
<b>Non-EPC Costs</b>	
- Land Acquisition	3.78
- Project Development Cost Prior to Financial Close	6.00
- Sponsor's Costs during Construction	8.00
- Start-up Expenses and Utilities Costs	8.50
<b>Financial Charges</b>	<b>101.36</b>
Financing Fees & Charges	18.56
Interest During Construction	44.03
Sinosure	38.77
<b>Total Capital Cost of the Project</b>	<b>588.98</b>

**Item-wise Explanation of the Capital Cost is as follows,**

### **3.2. EPC Cost**

3.2.1 The above EPC cost includes cost of Main Plant Equipment System, Boiler including Auxiliaries, Steam Turbine Generator (STG) & Auxiliaries, Balance of Plant Equipment System, Other Mechanical Equipment System, Electrical Equipment System and Control & Instrument System, Coal Handling Infrastructure, Engineering & Project Management, Erection & Commissioning, site development and civil works, transportation and transmission cost up to the first gantry of 132kV outgoing line within the boundary of the Project. The reasons for the variation of the EPC cost from what has been determined by NEPRA have been elaborated in Section 2.24 to 2.29.

3.2.2 The above EPC cost also includes insurance premiums (other than Sinosure insurance premium) prior to COD, the Emergency & Safety Spare Parts during commissioning, housing colony for employees and training prior to COD.

3.2.3 The above EPC cost is based on Chinese standards, with main plant equipment to be sourced from leading Chinese manufacturers.

3.2.4 The Government of Punjab shall be responsible for the financing and construction of the access roads to the Project which can also be used by the general public.

3.2.5 Power Purchaser shall be exclusively responsible for the financing,

construction, operation and maintenance of the Interconnection and Transmission Facilities from the first gantry of the 132kV outgoing line within the power complex to the grid.

3.2.6 Main energy meter and electronic recorder for continuous recording of readings will be provided by Power Purchaser at its own cost.

3.2.7 No cost of utilizing NTDC telecommunication media is assumed. Any costs incurred with regard thereto will be treated as "pass-through".

### **3.3. Customs Duties and Withholding Tax**

3.3.1 Customs duty at the rate of 5% on the import of plant and equipment is assumed. Withholding tax of 7% for local services has been included in the EPC cost. Any duties, charges or taxes in excess thereof (or any new taxes, charges or duties) shall be treated as "pass through" items to the Power Purchaser.

### **3.4. Land Acquisition Costs**

3.4.1 The total estimated land area required for this Project is 86 hectare, including the power complex, ash yard and river-side water pump stations and pipelines outside the power complex.

3.4.2 The total estimated land acquisition costs are 3.8 Million US\$, covering the purchase of land, together with stamp duty, registration fees, withholding tax, capital value tax, corporation tax, the fees of the broker and the legal consultants. Any costs in excess of this shall be treated as "pass-through" to the Power Purchaser.

3.4.3 The Government of Punjab shall facilitate the purchase of land.

### **3.5. Project Development Costs prior to Financial Close**

3.5.1 This cost includes the cost of bankable, technical and financial feasibility study, the load flow and system stability study, EIA report, fees of technical, legal and financial consultants both for the sponsor and the lending banks, the bank charges for the guarantees to be issued in favor of PPIB and the Power Purchaser and the fees payable to the PPIB and NEPRA. It also covers traveling expenses and administrative expenses incurred by the sponsor prior to the Financial Close.

3.5.2 The total estimated project development cost prior to the Financial

Close is 6 Million US\$. Any government levies in excess of what is prescribed at the time of this petition shall be treated as "pass-through" to the Power Purchaser.

### **3.6. Sponsor's Costs during Construction**

3.6.1 This covers the expenses of the sponsor prior to COD including the sponsor's offices in China and Pakistan (together with the establishment costs), fees payable to the Independent Engineer during construction, training and inspection at the manufacturer's factory as well as the administrative expenses incurred by the sponsor during construction.

### **3.7. Start-up Expenses and Utilities Costs**

3.7.1 It includes costs associated with fuel cost, cost of chemicals and other consumables for testing and start-up together with utilities expenses (i.e., electricity, water) required to back feed the power complex during testing and commissioning prior to COD.

3.7.2 After synchronization to the grid, fuel cost component for energy delivered to the grid during reliability test and other tests before COD and all the testing after COD shall be paid by the Power Purchaser to CMEC. Capacity Payments and Energy Payments shall be made during Annual Testing.

### **3.8. Financing Fees and Charges**

3.8.1 This covers arrangement fee and commitment fee payable to the lending banks. The arrangement fee is calculated per 2% of the debt as one-time fee and the commitment fee is calculated per 1.5% of the remaining balance of the debt not drawn down as recurring fees. These fee rates are in line with the general offer of Chinese banks.

3.8.2 The arrangement fee and commitment fee are subject to adjustments based on the firm offer from the lending banks after the signing of the PPA, IA and Coal Supply Agreement and the drawn down schedules confirmed by the lending banks.

### **3.9. Interests during Construction (IDC)**

3.9.1 IDC has been calculated on the basis of financing from Chinese banks at tentative 6-month LIBOR of 0.45%, spread over LIBOR of 4.5% per annum, and the projected debt drawn down schedule on quarterly basis,

Year	Debt Drawdown %
1 <sup>st</sup> year	33.30%
2 <sup>nd</sup> year	33.30%
3 <sup>rd</sup> year	20.00%
4 <sup>th</sup> year	13.40%

3.9.2 Interests during construction shall be subject to adjustments based on firm offer from lending banks after the signing of the PPA, IA and Coal Supply Agreement and the drawdown schedules confirmed by the lending banks.

3.9.3 At the time of COD, IDC shall be reestablished on the basis of indexed capital cost, actual custom duties, withholding tax on contracts/services, actual premium on LIBOR and the impact of Sinosure fee, if any.

3.9.4 In addition, interests shall be subjected to adjustment for variation in the 6-month LIBOR on quarterly basis. IDC shall be recalculated on the basis of weighted average 6-month LIBOR during the construction period plus actual premium.

3.9.5 The adjustment shall be made on 1st July, 1st October, 1st January and 1st April based on latest available TT&OD selling rate notified by the National Bank of Pakistan and Reuters for the purpose of LIBOR.

### 3.10 Sinosure Insurance Premium

3.10.1 As the sponsor intends to get financing from Chinese banks, upfront Sinosure insurance premium @7% on the total debt servicing needs to be included in the project cost. Project cost will be adjusted at the time of COD on the basis of actual Sinosure fee.

## **ASSUMPTIONS ON CAPITAL STRUCTURE AND FINANCING COSTS**

### 3.11 Capital Structure of the Project

The capital structure of the Project is as follows,

Capital Structure	Million US\$
Equity	147.24
Debt	441.74
Total Project Cost	<b>588.98</b>
Debt: Equity Ratio	75:25

### 3.12 Assumptions on Financing Costs

3.12.1 The repayment period of the loan is set as 10 years, in line with NEPRA's requirements.

3.12.2 The principal of the loan will be repaid quarterly in equal installments.

3.12.3 The interests of the loan are calculated on the basis of financing from Chinese banks at tentative 6-month LIBOR of 0.45%, spread over LIBOR of 4.5% per annum, subject to firm offer from the lending banks after signing of the PPA, IA and Coal Supply Agreement.

3.12.4 Subsequent adjustments shall be made, subject to adjustment for variation in 6-month LIBOR on quarterly basis.

### 3.13 Return on Equity

3.13.1 This Project is indigenous coal based power plant. Two reference Return on Equity values have been determined by NEPRA, i.e., 30.65% per annum (or Equity IRR of 20%) for Thar coal based power plants having construction period of 40 months, and 26.5% per annum (or Equity IRR of 18%) for other local coal based power plants having construction period of 40 months.

3.13.2 To date, there's no reference of local coal based power plants other than the on-going Thar Coal based power projects and the Salt Range coal based power project. Given the significance of this Project and its similarities to Thar Coal based power projects, the Return on Equity for this Project is set at 30.65% per annum (or Equity IRR of 20%), on an unbiased basis.

### ASSUMPTIONS ON FUEL COST AND O&M COSTS

The following items are included in the O&M costs,

Items
Fuel Cost
Variable O&M Cost
• Variable O & M - Local
• Variable O & M - Foreign
• Ash Disposal Cost
• Limestone
Fixed O&M Cost

<ul style="list-style-type: none"> <li>• Fixed O &amp; M Amount – Local</li> </ul>
<ul style="list-style-type: none"> <li>• Fixed O &amp; M Amount – Foreign</li> </ul>
Insurance during Operation

Item-wise explanation of the O&M Costs is as follows

### 3.13 Fuel Cost for the Project

3.13.1 As mentioned before, as the entire production of the captive coal mines will be dedicated to supply coal to the Project and significant capital investment is required for these captive coal mines, Two Parts Fuel Cost Component (FCC) for covering the fixed and variable costs is requested to make the coal mines bankable, which has already been granted to Thar Coal based power projects. This is also in line with the stipulations in Power Policy 2002 under Section 6.2 (54), which states,

*“For Projects requiring substantial investment in dedicated production and/or transportation facilities for indigenous fuel, expenses would be accounted for in the power tariff in the form of capacity and energy charges”.*

3.13.2 CMEC has proposed cost-plus coal pricing mechanism to the Government of Punjab for the captive coal mines, and has requested the Government of Punjab to liaise with the Authority in this regard. Under the proposed cost-plus pricing mechanism, the Mining Project will also be based on guaranteed IRR and cost pass-through like the current IPP structure for power projects, therefore, the fixed and variable costs of the coal mines will be fully reflected in the fixed charges and variable charges of the coal price.

3.13.3 For the purpose of this proposed upfront tariff, the following levelized coal price (based on discount rate of 10% and load factor of 85%) for coal mines of 150,000 tons/year, 400,000 tons/ year and 510,000 tons/year is applied, calculated on the proposed coal pricing mechanism, levelized coal prices based on 100% load are provided below for reference :

Year from COD	Variable Charge US\$ per Ton	Fixed Charge US\$ per Ton	Total Coal Price US\$ per Ton @85% Load Factor
1	17.20	115.26	132.46
2	17.20	113.48	130.68
3	17.20	111.71	128.91
4	17.20	109.94	127.14
5	17.20	108.17	125.37
6	17.20	106.40	123.60
7	17.20	104.63	121.83
8	17.20	102.86	120.06
9	17.20	101.09	118.29
10	17.20	99.32	116.52
Year 11 -30	17.20	68.45	85.65
Levelized Coal Price US\$/Ton (Discount Rate @10%)			111.86

Year from COD	Variable Charge US\$ per Ton	Fixed Charge US\$ per Ton	Total Coal Price US\$ per Ton @100% Load Factor
1	17.20	97.97	115.17
2	17.20	96.46	113.66
3	17.20	94.96	112.16
4	17.20	93.45	110.65
5	17.20	91.95	109.15
6	17.20	90.44	107.64
7	17.20	88.94	106.14
8	17.20	87.43	104.63
9	17.20	85.93	103.13
10	17.20	84.42	101.62
Year 11 -30	17.20	58.19	75.39
Levelized Coal Price US\$/Ton (Discount Rate @10%)			97.66

3.13.4 The above coal price has also included beneficiation costs and the transportation costs from the individual coal mines to the beneficiation plant.

3.13.5 The coal price will go down if the production scales of individual coal mines can be increased based on the available mining lease area and further geological survey.



3.13.6 The coal price will be a determined price by the Government of Punjab as per pre-determined coal pricing mechanism and will be trued up at the time of COD of the Mining Project. Subsequent adjustments will be made to the coal price based on indexation.

### 3.14. Estimated O&M Costs

#### 3.14.1 Summary of Estimated O&M Costs

Item	Estimated Costs
Variable O&M Cost	4.2 Million US\$
Variable O & M - Local	40.00%
Variable O & M - Foreign	60.00%
Ash Disposal Cost	242 PKR/MWh
Limestone	90 PKR/MWh
Fixed O&M Cost	9.8 Million US\$
Fixed O & M Amount – Local	40.00%
Fixed O & M Amount – Foreign	60.00%

3.14.2 Unlike hydro power plants or gas or oil fired power plants, coal fired power plants are still new to Pakistan. To ensure the guaranteed performance of the power plant, skilled operation and maintenance personnel from China are needed especially during the initial years of operation. Hence, the total O&M costs will be much higher than other similar power plants where local workers will be hired.

3.14.3 The ash content of the coal in Salt Range is in the range of 30-40%, much higher than average. Hence, ash disposal cost of this Project is 10% higher than what has been determined by NEPRA, as ash disposal cost is linear to the weight of ash. Ash Transportation cost is based on Rs.1000.00/metric ton, in line with NEPRA's previous determination. The cost of Ash Disposal will be adjusted on actual basis at the time of COD.

3.14.4 As mentioned before, the sulphur content of the coal in Salt Range, even after beneficiation, is estimated to be in the range of 2.5% -3%, which is still much higher than average 1%. Hence, limestone consumption in the FGD will be much higher than other similar power plants. For the time being, the estimated cost of limestone is set as 90 PKR/MWh, based on limestone price of Rs. 1250/metric ton, to be in line with NEPRA. The cost of Lime Stone will be adjusted on actual basis at the time of COD.

### 3.15. Insurance during Operation

3.15.1 Insurance premium is estimated to be 1% of the EPC cost, in line with NEPRA's previous determination.

3.15.2 Subsequent adjustments to the insurance premium shall be made, for variations in the insurance market. These adjustments shall be treated as "pass-through" to the Power Purchaser.

### **GENERAL ASSUMPTIONS**

In addition to the above assumptions, the following has been assumed while calculating the proposed tariff. Any changes to these assumptions will result in a change to the proposed tariff.

#### **3.16. Taxes and Duties**

The taxes and duties of this Project is based on the following assumptions,

3.16.1 As per regulations of *Policy for Power Generation Projects Year 2002*, the following incentives have been offered to IPPs,

(a) Customs duty at the rate of 5% on the import of plant and equipment not manufactured locally.

(b) No levy of sales tax on such plant, machinery and equipment.

(c) Exemption from income tax including turnover rate tax and withholding tax on imports.

(d) Non-Muslims and Non-residents shall be exempted from payment of Zakat on dividends paid by the company.

3.16.2 Only 7% withholding tax on local services is assumed. No withholding tax on foreign contractors, sub-contractors, supervisory services and technical services provided by foreign (non-residents) entities has been assumed. No other taxes on payments to be made to the local services or foreign contractor or subcontractors are assumed.

3.16.3 Only 7.5% withholding tax on dividend payment is assumed.

3.16.4 Any change in the aforesaid tax regime or levy of any other taxes, duties, charges shall be treated as "pass-through" to the Power Purchaser.

#### **3.17. Currency and Exchange Rate**

3.17.1 Both Debt and Equity is assumed in US\$.

3.17.2 The base exchange rate is taken as 97.1 PKR per USD to keep in line with NEPRA.

3.17.3 Tariff components shall be adjusted and indexed against exchange rate variation to ensure that the tariff in US\$ remains unaffected by the exchange rate variation, so as to ensure the Sponsor's obligations towards its lending banks and equity return.

### **3.18. Escalation**

#### **3.18.1 Capital Cost Indexation Mechanism**

As per the *Policy for Power Generation Projects Year 2002*, "Any legitimate cost escalation between the date of application to NEPRA for tariff determination and the Financial Closing, should be accounted for in the NEPRA-determined tariff".

#### **3.18.2 O&M Cost Indexation Mechanism**

a. 40% of the fixed O&M expenses shall be indexed with local CPI whereas 60% shall be indexed with China CPI and Exchange rate (PKR/US\$) variation, which is in line with NEPRA except the adoption of China CPI vs USCPI. As the offshore portion of the O&M expenses, especially, manpower and spare parts will be sourced from China, it only makes sense that these expenses are indexed with China CPI, instead of the US CPI.

b. 40% of the variable O&M shall be indexed with local CPI whereas 60% shall be indexed with China CPI and exchange rate (PKR/US\$) variation, which is in line with NEPRA expect the adoption of China CPI vs USCPI.

c. The reference Pakistan CPI and China CPI is December 2014.

#### **3.18.3 Fuel Cost**

The price of local coal will be adjusted based on costs indexation similar to this tariff petition. The cost of coal shall be pass-through to the Power Purchaser.

Transportation cost of coal together with the changes to the costs shall also be pass-through to the Power Purchaser.

As per NEPRA's determination, the power producer shall be allowed losses on transportation of local coal up to 1%. If the Coal Supply Agreement caters for the transportation losses in the price, there will be no adjustment in coal pricing on account of transportation losses.

### **3.19. Adjustments to LIBOR**

3.19.1 Unless otherwise required by the lending banks, IDC and interest of the debt/loan shall be recalculated quarterly on the basis of weighted average of 6-month LIBOR, to be in line with NEPRA's previous determination.

3.19.2 Adjustment to LIBOR shall be made on 1st July, 1st October, 1st January and 1st April based on latest available TT&OD selling rate notified by the Reuters, to be in line with NEPRA's previous determination.

### **3.20. Reserves**

3.20.1 No Project Contingency Reserve, Debt Service Reserve, O&M reserve, Fuel Price Payment Reserve or any other Reserve amount has been considered in the proposed Tariff Model. In case CMEC is required to do so, the financial impact shall be "pass-through" to the Power Purchaser.

### **3.21. Source of Debt**

3.21.1 100% debt from Chinese banks is assumed. If financing from local banks or other international banks is required, adjustments shall be made accordingly.

### **3.22. Political Risk Insurance**

3.22.1 Project contingencies, debt service reserves and maintenance reserves are not included in tariff calculations.

### **3.23. Payment from the Power Purchaser**

3.23.1 Timely payment from the Power Purchaser on monthly billings is assumed.

### **3.24. Hedging Cost**

3.24.1 No hedging cost has been assumed for exchange rate fluctuations

during construction.

### **3.25. Principal Amount of Working Capital**

3.25.1 The principal amount of the working capital has not been included as part of the project cost.

3.25.2 Interest on working capital has been included in the project costs, calculated as follows,

The Working Capital requirement has been worked out in accordance with the following:

*A. Inventory will be equivalent to 30 days at 100% plant load.*

*B. Receivables equivalent to 45 days of fuel charges at 100% plant load.*

Interest on Working Capital has been calculated on the basis of quarterly-KIBOR of 11.91% plus 200 basis point, which will be adjusted for variation in quarterly-KIBOR and weighted average cost of coal inventory.

### **3.26. Cost of Security**

3.26.1 No cost of security is included in the Tariff Model. In case CMEC is required to pay for the security, this cost should be treated as "pass-through" to the Power Purchaser.

### **3.27. Cost of Water Charges**

3.27.1 No cost of water charges is included in the Tariff Model. In case CMEC is required to pay for the water charges, this cost should be treated as "pass-through" to the Power Purchaser.

### **3.28. Secondary or Backup Fuel**

3.28.1 The plant will not have any secondary or backup fuel. However, heavy furnace oil (HFO) and diesel fuels will be used for start-up purposes.

### **3.29. Base Load**

3.29.1 The Project is designed as base load power plant. The calculations

of the proposed tariff is also based on base load assumptions. This is also critical to ensure that the plant is able to support its obligations of paying capacity price to the integrated coal mines.

**3.30. Load Factor and Partial Loading**

3.30.1 Load factor of 100% is assumed for the purpose of calculation of the proposed tariff and for the payment of capacity purchase price. Partial loading shall be compensated as per the performance curves.

**3.31. Black Start Facility**

3.31.1 Cost of black start facility has not been assumed as part of the Project Costs.

**3.32. Start-ups**

3.32.1 No free startups are assumed. In case of startups required by the Power Purchaser or as per the dispatch order of the grid, the start ups shall be compensated for the additional costs, in addition to the regular tariff.

**3.33. Equal Treatment**

3.33.1 Any incentives given to any other project of similar technology and/or similar nature shall also be given to CMEC.

**TARIFF SUMMARY**

**3.34.** The proposed tariff has a typical two-part structure with an EPP for the energy actually dispatched and a CPP based on the available capacity.

**3.35.** The proposed tariff figures appended herein below are the results of a detailed financial analysis. The levelized tariff is based on a notional 85% plant factor as per NEPRA's requirement and a 30-year PPA term.

**3.36.** Based on net output of 303.6MW (mean site conditions) and detailed financial analysis, the following tariff has been established.

Components	CPP US Cents/kWh at 85% Availability	EPP US Cents/kWh	Total Tariff US Cents/kWh	Total Tariff PKR/kWh
Levelized Tariff (at 10% discount rate)	10.8746	1.5277	12.4023	12.0426

The reference generation tariff for this Project is appended herewith at Annex E – Table of Proposed Tariff

#### 4. DETERMINATION SOUGHT

- 4.1. In light of the foregoing submissions, CMEC requests the learned Authority to kindly approve the proposed generation tariff together with the pertinent indexations to remain effective for a period of 30 years from COD.
- 4.2. Considering the urgent need for power in the country, CMEC requests the learned Authority to approve the proposed generation tariff together with the pertinent indexations on a fast-track basis.
- 4.3. CMEC submitted application for a second LOI to PPIB on 30 December 2014 for another 1x330MW in the same region with similar features. Once this proposed tariff is approved, we kindly request the learned Authorities to apply the approved tariff for the second 1x330MW as well.
- 4.4. CMEC would be pleased to provide any further information, clarification or explanation that may be required by the Authority during its evaluation process.

#### 5. COMPARATIVE SCHEDULE OF CHARGES, COSTS, UNITS, PRICE AND OTHER ITEMS COMPRISING THE EXISTING TARIFF AND PROPOSED TARIFF

- 5.1. Following is a brief comparison between the existing upfront tariff and the proposed tariff.

	Existing Upfront Tariff		Proposed Tariff
	Local Coal	Thar Coal	Salt Range Coal
Gross Capacity	220MW	330MW	330MW
Net Capacity	200MW	300MW	303.6MW
Auxiliary	9%	9%	8%
Efficiency	37.0%	37.0%	37.0%
Calorific Value LHV(Btu/kg)	22,046.00	11,005.00	16,666.67
Coal Price	103.17		

Variable Levelized (US\$/M. Ton)		14.30	17.20
Fixed Levelized (US\$/M. Ton)		31.80	34.65
Project Cost Foreign Financing (US\$ Million /MW)	1.51	1.51	1.78
Project Cost Local Financing (US\$ Million /MW)	1.62	1.62	n/a
Exchange Rate (Rs/\$)	97.10	97.10	97.10
Debt Equity Ratio			
Debt	75%	75%	75%
Equity	25%	25%	25%
Kibor/LIBOR	11.91%/0.45%	11.91%/0.45%	11.91%/0.45%
Premium Kibor/LIBOR	3.5%/4.5%	3.5%/4.5%	3.5%/4.5%
ROE	26.5%	30.65%	30.65%
Equity IRR	18%	20%	20%
Project Drawdown			
1st year of construction	40%	40%	40%
2nd year of construction	30%	30%	30%
3rd year of construction	20%	20%	20%
4th year of construction	10%	10%	10%
Debt Drawdown			
1st year of construction	33%	33%	33%
2nd year of construction	33%	33%	33%
3rd year of construction	20%	20%	20%
4th year of construction	13%	13%	13%
Equity Drawdown			
1st year of construction	60%	60%	60%
2nd year of construction	20%	20%	20%
3rd year of construction	20%	20%	20%

**5.2.** From the above schedules, it can be seen that the key assumptions underlying the calculation of the existing upfront tariff and the proposed tariff are almost the same. The major differences, e.g., in the coal price and project cost are due to the special features of this Project, as described in the preceding paragraphs.

**5.3.** It also needs to be noted, that the real differences between the existing upfront tariff and the proposed tariff may not be that significant, if all assumptions especially the pass-through items are set in the same manner.



**6. COMPARATIVE TABLE OF THE EXISTING TARIFF DESIGN AND THE PROPOSED TARIFF DESIGN**

6.1. Following is a brief comparison between the existing upfront tariff and the proposed tariff regarding tariff design.

Existing Upfront Tariff		Proposed Tariff
Local Coal	Thar Coal	Salt Range Coal
<b>i. Energy Purchase Price</b> a) Fuel Cost Component b) Variable O&M Cost Local c) Variable O&M Cost Foreign d) Cost of Limestone e) Cost of Ash Disposal	<b>i. Energy Purchase Price</b> a) Variable Fuel Cost Component b) Variable O&M Cost Local c) Variable O&M Cost Foreign d) Cost of Limestone e) Cost of Ash Disposal f) Cost of Water Charges	<b>i. Energy Purchase Price</b> a) Variable Fuel Cost Component b) Variable O&M Cost Local c) Variable O&M Cost Foreign d) Cost of Limestone e) Cost of Ash Disposal
<b>ii. Capacity Purchase Price</b> a) Fixed O&M (Local) b) Fixed O&M (Foreign) c) Insurance Cost d) Cost of Working Capital e) Return on Equity f) Debt Service (Principal repayment and interest charges)	<b>ii. Capacity Purchase Price</b> a) Fixed Fuel Cost Component b) Fixed O&M (Local) c) Fixed O&M (Foreign) d) Insurance Cost e) Cost of Working Capital e) Return on Equity f) Debt Service (Principal repayment and interest charges)	<b>ii. Capacity Purchase Price</b> a) Fixed Fuel Cost Component b) Fixed O&M (Local) c) Fixed O&M (Foreign) d) Insurance Cost e) Cost of Working Capital e) Return on Equity f) Return on Equity during Construction g) Withholding Tax on Dividend h) Debt Service (Principal repayment and interest charges)

6.2. It can be seen from the above comparison, that the tariff design of the existing upfront tariff and the proposed tariff is almost the same.

6.3. Two Parts Fuel Cost Component (FCC) for covering coal costs is requested in the proposed tariff, which has already been granted to Thar Coal based power projects.

As mentioned before, this is also in line with the stipulations in Power Policy 2002 under Section 6.2 (54), which states, *“For Projects requiring substantial investment in dedicated production and/or transportation facilities for indigenous fuel, expenses would be accounted for in the power tariff in the form of capacity and energy charges”*.

In light of the fact that this is a base load power plant and there’s severe

power shortage in the country, this split of the Fuel Coal Component will not affect the tariff level.

- 6.4. As revealed in the previous petitions by the Government of Pakistan, NEPRA has allowed Return on Equity during Construction and Withholding Tax @ 7.5% on Dividends in the previous twelve (12) IPPs commissioned under Power Policy 2002. Otherwise, the real Equity IRR will be much less than the nominal value allowed by NEPRA. IRR is a commonly recognized and easy-to-use benchmark for lending banks and the consultants to evaluate the risks analysis of the projects. It's requested that these two items be added back in the tariff model.

In light of the foregoing submissions, CMEC requests the learned Authority to kindly approve the proposed generation tariff together with the pertinent indexations to remain effective for a period of 30 years from COD, on a fast-track basis.

CMEC would be pleased to provide any further information, clarification or explanation that may be required by the Authority during its evaluation process.

Su Guang Lei  
Principal Officer of Islamabad Office  
China Machinery Engineering Corporation

Date: 22 January 2015

## Annex E- Table of Proposed Tariff

### CHINA MACHINERY ENGINEERING CORPORATION Reference Tariff Schedule Based on Integrated Coal Mining Setup

Year	Energy Purchase Price-EPP (PKR/kWh)						Capacity Purchase Price-CPP (PKR/kWh)													Capacity Charge @ 85% load factor		Total Tariff	
	Fuel Cost		Ash Disposal	Limestone	Variable O&M		Total	Fuel Cost		Fixed O&M		Cost of W/C	Insurance	ROEDC	ROE	Withholding Tax	Loan Re-payment	Interest Charges	Sub-total (Exclude Fixed FCC)	PKR/kWh	PKR/ kWh	US ¢ per kWh	
	Variable FCC				Variable O&M (Foreign)	Variable O&M (Local)		Fixed FCC @ 85% load factor	Fixed FCC @ 100% load factor	Fixed O&M (Foreign)	Fixed O&M (Local)												
1	0.971	0.242	0.090	0.108	0.072	1.483	6.506	5.530	0.253	0.168	0.292	0.193	0.567	1.270	0.138	1.897	0.904	5.682	13.191	14.674	15.113		
2	0.971	0.242	0.090	0.108	0.072	1.483	6.406	5.445	0.253	0.168	0.288	0.193	0.567	1.270	0.138	1.897	0.810	5.584	12.976	14.459	14.891		
3	0.971	0.242	0.090	0.108	0.072	1.483	6.306	5.360	0.253	0.168	0.284	0.193	0.567	1.270	0.138	1.897	0.716	5.487	12.761	14.244	14.670		
4	0.971	0.242	0.090	0.108	0.072	1.483	6.206	5.275	0.253	0.168	0.280	0.193	0.567	1.270	0.138	1.897	0.622	5.389	12.546	14.029	14.448		
5	0.971	0.242	0.090	0.108	0.072	1.483	6.106	5.190	0.253	0.168	0.276	0.193	0.567	1.270	0.138	1.897	0.528	5.291	12.331	13.814	14.227		
6	0.971	0.242	0.090	0.108	0.072	1.483	6.006	5.105	0.253	0.168	0.272	0.193	0.567	1.270	0.138	1.897	0.434	5.193	12.116	13.599	14.005		
7	0.971	0.242	0.090	0.108	0.072	1.483	5.906	5.020	0.253	0.168	0.268	0.193	0.567	1.270	0.138	1.897	0.340	5.095	11.901	13.384	13.784		
8	0.971	0.242	0.090	0.108	0.072	1.483	5.806	4.935	0.253	0.168	0.264	0.193	0.567	1.270	0.138	1.897	0.247	4.998	11.686	13.169	13.562		
9	0.971	0.242	0.090	0.108	0.072	1.483	5.706	4.850	0.253	0.168	0.260	0.193	0.567	1.270	0.138	1.897	0.153	4.900	11.471	12.954	13.341		
10	0.971	0.242	0.090	0.108	0.072	1.483	5.606	4.766	0.253	0.168	0.257	0.193	0.567	1.270	0.138	1.897	0.059	4.802	11.256	12.739	13.120		
11	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
12	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
13	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
14	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
15	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
16	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
17	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
18	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
19	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
20	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
21	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
22	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
23	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
24	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
25	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
26	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
27	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
28	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
29	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
30	0.971	0.242	0.090	0.108	0.072	1.483	3.864	3.285	0.253	0.168	0.189	0.193	0.567	1.270	0.138	-	-	2.778	7.132	8.616	8.873		
Levelized	0.9709	0.2420	0.0900	0.1082	0.0722	1.4833	5.3435	4.5419	0.2526	0.1684	0.2463	0.1933	0.5669	1.2703	0.1378	1.2367	0.3612	4.4334	10.5593	12.0426	12.4023		