National Electric Power Regulatory Authority
Islamic Republic of Pakistan

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No. NEPRA/TRF-304/NPGCL-2015/832-834
January 22, 2016

Subject: **Determination of the Authority in the matter of Tariff Petition filed by Northern Power Generation Company Ltd. (NPGCL) for the Determination of its Generation Tariff for the FY 2014-15 [Case # NEPRA/TRF-304/NPGCL-2015]**

Dear Sir,

Please find enclosed herewith the subject Determination of the Authority (36 pages) in Case No. NEPRA/TRF-304/NPGCL-2015.

2. The Determination is being intimated to the Federal Government for the purpose of notification in the official gazette pursuant to Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

Enclosure: As above

22-01-16
(Syed Safeer Hussain)

Secretary
Ministry of Water & Power
'A' Block, Pak Secretariat
Islamabad

CC:
1. Secretary, Cabinet Division, Cabinet Secretariat, Islamabad.
2. Secretary, Ministry of Finance, 'Q' Block, Pak Secretariat, Islamabad.

National Electric Power Regulatory Authority

(NEPRA)

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Determination of the Authority

In the matter of Tariff Petition filed by

Northern Power Generation Company Limited (NPGCL)

For the Period of Three Years i.e. FY 2014-15, 2015-16 & 2016-17

(NO: NEPR/TRF-304/NPGCL-2015)

Islamabad

Determination of the Authority in the matter of Petition filed by Northern Power Generation Company Limited (NPGCL) for Determination of its Generation Tariff for the FY 2014-15

Case No. NEPRA/TRF-304/NPGCL-2015

Petitioner

Northern Power Generation Company Limited, Thermal Power Station Muzaffargarh, Punjab.

INTERVENER

Anwar Kamal Law Associates (AKLA)

COMMENTATOR

CPPA-G

The Authority in exercise of the powers conferred on it under Section 7(3) (a) read with Section 31 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, Tariff Standards & Procedure Rules – 1998, and all other powers enabling it in this behalf, and after taking into considering all the submissions made by the parties, issues raised, evidence / record produced during hearing, and all other relevant material, hereby issues this determination.

AUTHORITY

(Khawaja Muhammad Naeem)
Member

(Syed Masood-ul-Hassan Naqvi)
Member

(Himayat Ullah Khan)
Member

(Major (R) Haroon Rashid)
Vice Chairman

Brig (R) Tariq Saddozai
Chairman

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22.01.16

1 Brief Facts:

1.1 Northern Power Generation Company (NPGCL) herein after referred as "Petitioner " is generation license of NEPRA with a cumulative Installed Capacity of 1921.00 MW for its four (04) distinctly located Generation Facilities at Thermal Power Station Muzaffargarh (TPS Muzaffargarh), Natural Gas Power Station, Multan (NGPS Multan), Steam Turbine Power Station Faisalabad (SPS Faisalabad) and Gas Turbine Power Station, Faisalabad (GTPS Faisalabad).

1.2 TPS Muzaffargarh of the Petitioner has an installed capacity of 1350.00 MW, consisting of six (06) Conventional Steam Units (3 x 210.00 MW + 1 x 320.00 MW + 2 x 200.00 MW), installed between 1993 and 1997. NGPS Multan with a total installed capacity of 195.00 MW, comprising of 3 x 65 MW Conventional Steam Turbines was set up during 1960 and 1963 SPS Faisalabad comprising of two (02) Steam Turbine Units of 66.00 MW each was commissioned during the year 1967. Whereas, GTPS Faisalabad of the Petitioner has an Installed Capacity of 244.00 MW, consisting of a total of Nine (09) units set up during the period from 1975 to 1994. Later on, Generation License of Petitioner was modified while excluding three units of NGPS Multan i.e. Unit No. 1, 3 & 4 each of 65.00 MW) which had completed their useful lives (set up during the period from 1960-63) and were of lower efficiency.

1.3 The Petitioner has filed a Petition dated 04-03-2015 for the revision/modification of already granted generation tariff of May 02, 2006. The Petitioner has stated that the requested revised Tariff is presented for the approval by the Authority on the basis of stated facts, circumstances and assumptions for next thirteen (13) years upto June 30, 2027, subject to indexation/adjustments as tabulated at page 30 of the tariff petition. The petitioner has further requested to approve the Company's generation tariff, along-with the pertinent indexations, in accordance with the parameters & assumptions mentioned in the tariff petition. Grounds of the petition are as under:

- Revision in fuel cost component based on the latest heat rate test.
- Transformation and switchyard losses
- Ambient conditions correction factor
- Partial load adjustment charges (PLAC)
- Calorific Values of fuel purchased
- Increase in variable O&M
- Decrease in Net Dependable Capacity
- Decommissioning of old Block 7 and use of facility by NTDC
- Sustainability charges of GTPS Shahdra (Block-8)
- Compensation for System Usage Charges at Muzaffargarh

1.4 According to Petitioner the proposed tariff is typical two-part structure comprising of Energy Purchase Price based on net generation in kWh and Capacity Purchase Price (CPP) based on the Net Dependable Capacity available for dispatch. The Petitioner has requested to allow following tariff:

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Capacity Charge

Description	Existing Tariff Rs./kW/hr	Reqs. Tariff Rs./kW/hr	Variance %age
Escalable Component	0.1328	0.2990	125
Non-Escalable Component	0.2495	0.3160	27
Total	0.3823	0.6150	61

Description	Unit	Fuel	Existing Tariff Rs./kWh	Requested Tariff Rs./kWh
Block-I (TPS Mzg)	1	RFO	10.3121	11.0636
	2			11.1604
	3			10.8202
		Gas	6.3457	-
Block-II (TPS Mzg)	4	RFO	10.2201	10.8118
		Gas	6.2893	-
Block-III (TPS Mzg)	5			11.5132
	6	RFO	11.6216	11.7560
		Gas	7.1515	-
Block-IV (GTPS Fsd)	5-9	Gas	5.0551	6.302 & 9.453
		HSD	22.0674	-
Block-V (SPS Fsd)	1-2	RFO	13.9189	13.9831
		Gas	8.4515	-
Block-VI (GTPS Fsd)	1-4	Gas	9.0387	9.826
		HSD	39.4564	-

Variable O&M – Rs./kWh

Description	Unit	Existing Tariff Rs./kWh	Requested Tariff Rs./kWh
Block-I (TPS Mzg)	1	0.0250	0.2100
	2	0.0250	0.2040
	3	0.0250	0.2040
Block-II (TPS Mzg)	4	0.0250	0.1430
Block-III (TPS Mzg)	5	0.0250	0.2150
	6	0.0250	0.2180
Block-IV (GTPS Fsd)	5-9	0.0250	0.2500
Block-V (SPS Fsd)	1-2	0.0250	0.1680
Block-VI (GTPS Fsd)	1-4	0.0250	0.2660

1.5 The requested tariff is based on the following assumptions:

- RFO price of Rs. 39,000/M.Ton, Gas Price of Rs. 588.23/MMBtu and HSD price of Rs. 90/Litre.
- No provision for working capital has been assumed on account of delays in payments from NTDC.

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- Any taxes on any income of the Company, including taxes on sale proceeds from NTDC, general sales tax and all other corporate taxes shall be treated as pass-through.
- Withholding tax on supply of plant & equipment or spares has been assumed at Zero.
- The Company has not assumed any costs that may be incurred for the Worker's Welfare Fund or Workers Profit Participatory fund. Any such cost shall be considered as pass through items in the terms and conditions of the PPA.
- It has been assumed that any benefit, concessions or incentives made available to other Independent Power Producers (IPPs) or projects, shall also be made available to the Company.
- Any additional costs incurred to cater for modification or additions required by the Power Purchaser shall be assumed to be pass through.
- Any changes in these assumptions shall result in a change to the tariff proposed in this document.
- Plant factor has been assumed at 60%.

2 Proceedings

The Petition was admitted on 19.3.2015 in term of Rules of the Tariff Standards & Procedure Rules – 1998 (herein after referred as "Rules") and notice of admission was published in the newspaper seeking of comments, intervention request or reply from the interested/affected parties with 7 days.

3 Issues

Based on the information provided by the Petitioner following issues were framed for input of the stakeholders:

- Whether the decrease in net dependable capacity is justified?
- Whether request of NPGCL for use of old Block 7 by NTDC is justified?
- Whether the sustainability charges of GTPS Shahdra (Block-8) is justified?
- Whether the compensation for System Usage Charges at Muzaffargarh of 220 kV transmission line by NTDC is justified?
- Whether the request with respect to adjustment of transformation and switchyard losses, and ambient conditions corrector factor is justified?
- Whether the Partial Load Adjustment Charges (PLAC) is justified?
- Whether Revision in fuel cost component based on the latest heat rate test is justified?
- Whether the requested Calorific Value of fuel purchase is justified?
- Whether the Revenue Requirement is justified?
- Whether the control period till 30th June 2027 is justified?

4 Notice of Hearing

In term of Rule 5 of the Tariff Rules – 1998 notice of hearing in the matter was published on 25.4.2015. Individual letters were also communicated to the stakeholders. In response one intervention request from Anwar Kamal Law Associate was submitted which was approved by the Authority. The power purchaser also submitted the comments. Hearing in the matter was held on 12.5.2015 at NEPRA Tower which was attended by the representative of the Petitioner and other stakeholders. The AKLA did not attend the hearing.

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5 Comments of CPPA

5.1 The comments of CPPA are as under:

- There is no precedent of Part-Load Adjustment Factor (PLAC), start-up charges & system usage charges in the tariff of other GENCOs. These factors should also be kept in view while finalizing the tariff determination of NPGCL.
- NPGCL is already in practice of billing EPP invoices after application of indexed tariff of fuel. The reasons for revision of tariff therefore are not understandable in case of fuel charges.
- There is huge change in the proposed tariff in respect of Variable O&M charges i.e. more than 700%. Even though tariff is being revised after so long period, nevertheless, the change should not exceed the maximum rate of more than 10% per annum.

6 Having considered the submissions of the petitioner, audited accounts for the FY 2013-14, available record with NEPRA, the issue wise discussion and decision are given in the succeeding paragraphs.

7 Whether the Decrease in Net Dependable Capacity is justified?

7.1 For the purpose of this tariff petition, the table below indicates the installed and present Dependable Capacities of the Petitioner as per report of Pakistan Engineering Services (PES hired by the USAID as Independent Engineer) for Blocks 1, 2, and 3 and NEPRA determination for Blocks 4, 5 and 6.

Blocks	Description	Installed Capacity	Last Net Dependable Capacity as per NEPRA	Present Net Dependable Capacity
		MW		
1	Muzaffargarh Units 1-3	630	558	556
2	Muzaffargarh Units 4	320	270	272.2
3	Muzaffargarh Units 5-6	400	360	355.32
4	GTPS Faisalabad Units 5-9	144	117	117
5	SPS Faisalabad Units 1-2	132	97	97
6	GTPS Faisalabad Units 1-4	100	75	75

7.2 The Petitioner submitted that the Capacity Purchase Price in this Revised Tariff Petition is worked out on the basis of Current Net Dependable Capacity of 1472.52 MW. According to the Petitioner, the Current Dependable Capacity (CDC) and heat rate tests of Thermal Power Station M/garh blocks 1-3 (Units 1-6) had been carried out by Independent Engineer (PES) in 2014. The Petitioner has proposed the same dependable capacity for blocks 4-6, for tariff calculations, as determined / allowed by NEPRA in the previous determination (2006).

7.3 Since the dependable capacity of Units 1-6, as proposed by the Petitioner in its tariff petition, has been achieved as results of CDC tests, carried out by independent Engineer (PES), therefore, the request for considering these capacities in tariff calculations seems logical. The Authority accordingly approved the above net capacity and calculated the generation tariff on the same.

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8 Whether request of NPGCL for use of old Block 7 by NTDC is justified?

8.1 The Authority vide letter no. NEPRA /R/LAG-03/3943-49 dated April 18, 2014 modified Generation License (GL/03/2002) and decided to decommission Block 7, NPGS, Multan. The details of design data of decommissioning units are presented as below;

Blocks	Description	Installed Capacity	De-rated Capacity
		MW	
7	NPGS Multan Units 1, 3 & 4	195	91

8.2 The Petitioner submitted that in order to ensure operations of NGPS Multan, as switchyard for smooth transmission and distribution of Electricity by NTDC, a minimum manpower, equipment, Auxiliary consumption etc are being incurred on these plants, which if withdrawn will effect operation of NTDC in proper dispatch of the electricity to the system The Petitioner seeks Sustainability Charges relating to Piraghaib (Multan). These charges have been worked out in Tariff structure. The Authority is hereby requested to approve the sustainability charges of NGPS Piranghaib Multan.

8.3 The Authority considered the request of the Petitioner for allowing sustainability charges for NGPS Piranghaib Multan which is utilized by the NTDC. The Authority considers that being not part of the generation license of NEPRA such cost cannot be passed on to the end-consumer in the instant case. However, if the system is used by the NTDC and the Petitioner is incurring cost on this, then both Petitioner and NTDC shall approach NEPRA with mutual agreement describing the details of system usage. The Authority while determining the transformation and transmission tariff shall consider the same. Accordingly such cost, if any, shall be reflected in the NTDC's tariff and the same shall be paid to the Petitioner by NTDC.

9 Whether the sustainability charges of GTPS Shahdra (Block-8) is justified?

9.1 The Petitioner has been maintaining the GTPS Shahdara which was not included in generation license issued by the Authority on dated 01 July 2002 due to low efficiency. In order to ensure operations of GTPS Shahdara, as switchyard for smooth transmission and distribution of Electricity by NTDC, a minimum manpower, equipment's Auxiliary consumption etc are being incurred on these plants, which if withdrawn will affect operation of NTDC in proper dispatch of the electricity to the system. The Petitioner seeks Sustainability Charges relating to GTPS Shahdara, Lahore. These charges have been worked out in Tariff structure.

9.2 Shahdra was never part of the Petitioner's license therefore no such cost for maintaining the same was allowed previously. In the instant case the Authority decided to maintain its earlier decision. However, in line with the Pirghaib issue, the Petitioner and NTDC shall approach NEPRA with mutual consent and the same will be considered while processing of NTDC's tariff.

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10 Whether the compensation for System Usage Charges at Muzaffargarh of 220 kV transmission line by NTDC is justified?

10.1 The Petitioner submitted that the NTDCL has been using switchyard of TPS Muzaffargarh to serve 15 different feeders for transmission of electricity. The Petitioner requested NEPRA to allow compensation to the Petitioner on account of system usage charges in line with similar compensation being provided to few identical facilities of DISCOs e.g., MEPCO. The 220 kV switchyard is operated and maintained by the Petitioner. The Import and Export energy readings of all above feeders are recorded and net Export of TPS M/garh has been calculated as follows:

Net Electrical Output of TPS M/garh = Total Export Energy - Total Import Energy

10.2 It transpires from the above relation that, the routing of energy by NTDCL through its 15 different feeders by using the switchyard of TPS M/garh, will affect the net electrical output of TPS M/garh. The Petitioner has not provided details about quantum of Energy (GWh), which is routed through these 15 feeders and its impact on the net Export of TPS M/garh. MEPCO was also directed to bring its case separately for Use of System Charge regarding the system utilized by NTDC (reference: MEPCO's tariff determination for FY 2014-15). The request made by the Petitioner makes sense however, by considering the nature of the matter the Petitioner is directed to bring this issue separately with complete technical details. The matter will be considered based on the submitted information and analysis separately.

11. Whether the request with respect to adjustment of transformation and switchyard losses, and ambient conditions corrector factor is justified?

11.1 The Petitioner requested to allow 1.84% on account of adjustment of transformation and switchyard losses. While justifying the request the Petitioner submitted that, the heat rate tests were to be carried out according to the applicable international codes and standards i.e., ASME PTC- 46 or ASME PTC – 6. At the time of test, the reading of energy meters installed at generator terminal were taken to calculate Net energy exported to NTDC, due to unavailability of Revenue Grade Meters at each unit after the transformer. However as a standard practice net energy export is recorded at the outgoing gantry of power plant switchyard. The issue was taken up with Independent Engineer (IE) and they agreed with the standard. Based on the information provided by the Petitioner, the Independent Engineer came out with the conclusion that the difference in Net Generation at Generator Terminal and the Net invoiced energy, (including losses of transformer + switchyard + human error + metering error of more than 33 meters) on average comes out to be 1.84 %. M/s PES, the Independent Engineer vide letter dated 28.01.2015, has agreed for incorporation of 1.84% transformer and switchyard losses, based on historical record. This difference of 1.84 % in Net Generation at Generator Terminal and Net invoiced energy is because of construction and design of 220 KV Switchyard at TPS Muzaffargarh, in addition to losses of transformer + switchyard + human error + metering error of more than 33 meters. Moreover this construction is quite different as compared to that of IPPs,

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where only generator feeders are being fed to 220 KV Transmission Line, whereas, at TPS Muzaffargarh the switchyard is being used by NTDC for routing of energy to/from different feeders. At present, monthly joint Energy Meter reading is recorded at the meters installed on the 15 Nos. outgoing/incoming feeders which are connected /routed through the 220KV switch yard. The import and export energy readings of all above feeders are recorded and Net Export of TPS Muzaffargarh is calculated as follows;

Net Electrical Output of TPS M-Garh = Total Export Energy-Total Import Energy

11.2 All the meters are being regularly tested and calibrated by TSG of NTDC. The details provided by the Petitioner regarding adjusted heat rates and auxiliary consumptions, after incorporating the effect of transformer and switchyard losses is tabulated below;

Breakup of Transformer Losses to BTU conversion: At 100 % MCR*

Unit No	Annex of Test Report	Net Output (KWh)	BTUs Consumed	1.84 % Transformer & Other Losses (KWh)	Net Output Less Transformer Losses (KWh)	Net Heat Rate Before Transformer (LHV)	Net Heat Rate After Transformer (LHV)	Diff. (LHV)
		kWh	BTU	kWh	kWh	BTU/ kWh	BTU/ kWh	BTU/ kWh
1	D (3)	175810	1839834873.47	3234.90	172575.10	10464.90	10661.07	196.16
2	E (3)	169108	1793682877.59	3111.60	165997.00	10606.69	10805.51	198.82
3	F (3)	171352	1754623503.20	3152.88	168199.37	10239.86	10431.81	191.95
4	G (3)	247200	2527535562.01	4548.48	242651.52	10224.66	10416.32	191.66
5	H (3)	168091	1830043023.52	3092.89	164998.96	10887.16	11091.24	204.08
6	I (3)	158878	1777054712.96	2923.36	155954.74	11185.02	11394.68	209.66

At 50 % MCR

Unit No	Annex of Test Report	Net Output	BTUs Consumed	1.84 % Transformer and other Losses)	Net Output Less Transformer Losses)	Net Heat Rate Before Transformer (LHV)	Net Heat Rate After Transformer (LHV)	Diff. (LHV)
		kWh	BTU	kWh	kWh	BTU/ kWh	BTU/ kWh	BTU/ kWh
1	D (3)	98696.00	1118029459.00	1816.01	96879.99	11328.01	11540.35	212.34
2	E (3)	95100.20	1125607986.00	1749.84	93350.36	11836.02	12057.89	221.87
3	F (3)	99350.10	1094732490.00	1828.04	97522.06	11018.94	11225.49	206.55
4	G (3)	145350.00	1662496245.00	2674.44	142675.56	11437.88	11652.28	214.40
5	H (3)	97040.36	1197687090.00	1785.54	95254.82	12342.15	12573.51	231.35
6	1 (3)	97749.11	1187690754.00	1798.58	95950.53	12150.40	12378.16	227.76

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Heat Rates of TPS Muzaffargarh after Losses

Unit No	As per Heat Rate Test Report LHV				After 1.84 % Losses as per Independent Engineer LHV		
	Efficiency (%)	HR (BTU/KWh)	CV (LHV) BTU/Lb	CV (LHV) BTU/Kg RFO	Efficiency (%)	HR (BTU/KWh)	CV (LHV) RFO BTU/KG
At 100 % MCR							
1	32.61	10464.90	17288.00	38102.75	32.01	10661.06	38102.75
2	32.17	10606.69	17367.00	38276.87	31.58	10805.51	38276.87
3	33.32	10239.86	17302.00	38133.61	32.71	10431.81	38133.61
4	33.37	10224.66	17290.00	38107.16	32.76	10416.32	38107.16
5	31.34	10887.16	17274.00	38071.90	30.76	11091.24	38071.90
6	30.51	11185.02	17374.00	38292.30	29.95	11394.68	38292.30
At 50% MCR							
1	30.12	11,328.01	17,288.00	38102.75	29.57	11540.35	38102.75
2	28.83	11,836.02	17,367.00	38276.87	28.30	12057.89	38276.87
3	30.96	11,018.94	17,302.00	38133.61	30.40	11225.49	38133.61
4	29.83	11,437.88	17,290.00	38107.16	29.28	11652.28	38107.16
5	27.65	12,342.15	17,274.00	38071.90	27.14	12573.50	38071.90
6	28.08	12,150.40	17,374.00	38292.30	27.57	12378.16	38292.30

Effect of Transformer Losses on Auxiliary Consumption - At 100 % MCR

Unit No.	Annex of Test Report	Gross Output (KWh)	Net Output (KWh)	Auxiliary Cons. (KWh)	%age Auxiliary Cons. Excluding transformer and switchyard losses (%)	Aux. Consumption with Transformer and Switchyard Losses (KWh)	%age Auxiliary Cons. including transformer and switchyard losses (%)
	1	2	3	4	5	6	7
1	D (3)	190000.00	175810.002	14190.00	7.47	17424.90	9.17
2	E (3)	182500.00	169108.60	13391.40	7.34	16503.00	9.04
3	F (3)	183500.00	171352.25	12147 75	6.62	15300.63	8.34
4	G (3)	272200.00	247200.00	25000 00	9.18	29548.48	10.86
5	H (3)	181440.00	168091.85	13348 15	7.36	16441.04	9.06
6	I (3)	173880.00	158878.10	15001.90	8.63	17925.26	10.31

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At 50 % MCR

Unit No.	Annex of Test Report	Gross Output (KWh)	Net Output (KWh)	Auxiliary Cons. (KWh)	%age Auxiliary Cons. Excluding transformer and switchyard losses (%)	Aux. Consumption with Transformer and Switchyard Losses (KWh)	%age Auxiliary Cons. including transformer and switchyard losses (%)
	1	2	3	4	5	6	7
1	D (3)	111500.00	98696.00	12804.00	11.48	14620.01	13.11
2	E (3)	107000.00	95100.20	11899.80	11.12	13649.64	12.76
3	F (3)	110000.00	99350.10	10649.90	9.68	12477.94	11.34
4	G (3)	162050.00	145350.00	16700.00	10.31	19374.44	11.96
5	H (3)	107730.00	97040.36	10689.64	9.92	12475.18	11.58
6	I (3)	109620.00	97749.11	11870.89	10.83	13669.47	12.47

11.3 The Petitioner submitted that the tests of Thermal Power Station Muzaffargarh were carried out during the month of January 2014 for which the atmospheric conditions to operate the steam power plant are ideal and CW inlet temperature was about 32 degree centigrade whereas in summer this temperature goes up to 50 degree Celsius which severely affects efficiency of the power plant. The applicable international codes and standards i.e., ASME PTC- 46 or ASME PTC – 6, the correction factor for environmental conditions like Atmospheric Pressure, Ambient temperature, humidity and different correction curves as per ASME PTC 46 defines correction factor to be applied on various CW in-let temperatures. From the OEM provided curves, Independent Engineer also concluded an increase of 148 BTU/KWh as correction factor of CW in-let Temperature. The Petitioner requested NEPRA for adjustment of Heat Rate keeping in view the ambient conditions correction factor as tabulated below;

Unit No	HR - LHV As per Test Report (BTU/KWh)	HR - LHV After Transformer and S/yard Losses as per 3.3 above (BTU/KWh)	HR - LHV correction on 38 degree cetigrade CW temp. by PES(BTU/KWh)	Heat Rate - LHV After CW temp correction (BTU/KWh)	Final Heat Rate - LHV(BTU/KWh) Used for FCC
At 100 % MCR					
1	10464.90	10661.06	148.00	10809.064	10809.06
2	10606.69	10805.51	148.00	10953.511	10953.51
3	10239.86	10431.81	148.00	10579.805	10579.81
4	10224.66	10416.32	148.00	10564.320	10564.32
5	10887.16	11091.24	148.00	11239.239	11239.24
6	11185.02	11394.68	148.00	11542.682	11542.68
At 50%MCR					
1	11,328.01	11540.35	148.00	11688.353	11688.35
2	11,836.02	12057.89	148.00	12205.885	12205.89

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3	11,018.94	11225.49	148.00	11373.489	11373.49
4	11,437.88	11652.28	148.00	11800.282	11800.28
5	12,342.15	12573.50	148.00	12721.503	12721.50
6	12,150.40	12378.16	148.00	12526.158	12526.16

11.4 The Petitioner requested NEPRA for adjustment of Heat Rate, keeping in view the ambient conditions correction factor.

11.5 The request made by the Petitioner for incorporating 1.84% transformation and switchyard losses in the cost of production has been analyzed. The Petitioner estimated a difference of 1.84% (on average basis) by using the generation data of TPS M/garh (units 1-6) for the period w.e.f. July 2013 - June 2014. The difference in net generation at generator terminal and net invoiced energy (1.84%) includes losses of transformer, switch yard, human error and metering error etc as mentioned by the Petitioner in its tariff petition. The Authority considers that losses due to human error or metering error may not be transferred to the cost of production, as, this reflects the Petitioner's inefficiency for not replacing its defective meters well in time. The Petitioner also took up the above issue of transformation and switchyard losses with Independent Engineer/Pakistan Engineering Services (PES), and the generation data of TPS M/garh for the period 2013-14 was also provided to Independent Engineer by the Petitioner. It is mentioned in the Independent Engineer's Report, that, *"according to historical data (2013-14) provided by the Petitioner, the transformer losses and other losses are about 1.84%, however, according to prudent practice/name plate data of transformers, the transformer losses should not be more than 0.5%"*. The Authority therefore decided to not allow the losses due to in-accurate metering or human error etc to the Petitioner, as this is in-efficiency for which end-consumer cannot be burdened. The Petitioner's submissions agreed by the Independent Engineer that as per applicable international codes and standards, (ASME PTC-46 or ASME PTC-6), losses of generator transformer to be counted for in the heat rate test results has been considered. The Authority considers that the large transformers have the highest efficiencies with figures of around 99.75% at full load and there is a slight loss of power during transformation. The Authority therefore decided to allow 0.25% transformation losses on this account. The Petitioner is also directed to immediately replace its defective meters with proper accuracy class meters, as it is very essential for measuring accurate net electrical output and reducing the energy losses of TPS M/garh.

11.6 As regards the ambient temperature conditions correction factor the same has been mentioned in Methodology and Test Procedure for Dependable Capacity and Heat Rate Tests, adopted by Independent Engineer and shared with NEPRA on 06.05.2013 (section 1.2.19), that the measured results of the test, recorded at site ambient conditions, will be corrected from the weighted average of these readings. It is observed that application of correction factors on the test results achieved at site ambient condition is a standard practice, and Independent Engineer (PES), on the basis of correction curve provided by the Petitioner, concluded an increase of 148 Btu/kWh, as correction factor of cooling water inlet temperature (average 38 degree centigrade on yearly basis). It is noted that, the TPS M/garh of the Petitioner, having installed capacity of 1350 MW, comprises of, six

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units (steam turbines) of different manufacturers. Units 1, 2 and 3 have manufactured by TPE Company (Russia), whereas, unit 4 is manufactured by Shanghai Power Equipment (China). Similarly, Units 5 & 6 of TPS M/garh are manufactured by Harbin (China). The Petitioner has six generating units (steam turbines) have different manufacturers therefore, it is not logical to estimate the heat rate variation with rise in cooling water temperature by using a single graph (correction curve). For justification of the requested claim, the Authority directed the Petitioner to provide correction curves of all units of TPS M/garh for analysis purpose (because units are manufactured by different companies). However, the Petitioner was failed to provide documentary evidence in this regard. Since the Petitioner was unable to substantiate its claim through documentary evidence, the Authority has therefore decided not to allow ambient conditions correction factor to the Petitioner.

12. **Whether the Partial Load Adjustment Charges (PLAC) is justified?**

12.1 The Petitioner submitted that the units of TPS Muzaffargarh are designed to be operated on Duel Firing i-e; Gas/Furnace Oil but due to non-availability of Fuel Gas since 2007 and onward, the units are being operated on single fuel against the design i-e; High Sulphur Furnace Oil. The continuous operation of the units on Furnace Oil has created problems and has affected the boiler including heating surfaces of Super Heaters, Flue gas ducts, regenerative Air Heater etc. Boiler heating surface are prone to scale and slag formation due to continuous oil firing and the equipment in flue gas path like regenerative air pre-heaters choke frequently due to continuous oil firing which forces to operate the plant at part load resulting adverse impact on efficiency and the heat rates. In addition the NPCC who is responsible for despatch of plant frequently orders the plant operator to increase or decrease load on specific machines under operation. This also results into heat rate deterioration The average loading of the units for the year 2013-14 is as under:

Block	Block 1			Block 2	Block 3	
Unit	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5	Unit-6
Load (MW)	167	167	170	250	160	158

12.2 The Petitioner submitted that the reduced load operation increases auxiliary consumption on one hand and heat rate causing decreased efficiency of the machine on the other. This result in high per unit cost of electricity produced. Moreover reduced load causes frequent choking of RAH elements due to less Flue Gases outlet temperature, which in turn aggravates the situation. In the recent Heat Rate test conducted by the independent engineer M/s PES are as under:

Block		Block 1			Block 2	Block 3	
Unit		Unit-1	Unit-2	Unit-3	Unit-4	Unit-5	Unit-6
Dependable Capacity (MW)	MCR	190.00	182.50	183.50	272.20	181.44	173.88
	50 %	111.50	107.00	110.00	162.05	107.73	109.62
Net Heat Rate (BTU/kWh) - LHV	MCR	10,464.9	10606.69	10,239.86	10,224.66	10,887.16	11,185.02
	50 %	11,328.01	11,836.02	11,018.94	11,437.88	12,342.15	12,149.2

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12.3 The Petitioner requested to allow Part Load Adjustment Charges as per the curves and equations mentioned on graphs.

12.4 In order to analyze the claim of the Petitioner regarding part load adjustment charges, the hourly dispatch data of TPS Muzaffargarh units 1-6, for the month of January, 2015, was obtained which is as under:

	Unit No. 1	*Unit No. 2*	*Unit No. 3*	*Unit No. 4*	*Unit No. 5*	*Unit No. 6*
Tested Capacity Gross (MW)	190	182.50	183.50	272.20	181.44	173.88
Tested Capacity Net (MW)	175.81	169.108	171.352	247.20	168.11	158.89
Operation in January, 2015	- 62% of the time unit operated at 102.4% of tested capacity - 18% of the time unit operated at 90.4% of the tested capacity - 20% of the time unit operated at 73.4% of the tested capacity	- 74% of the time unit operated at 106.4% of the tested capacity - 26% of the time unit operated at 94% of the tested capacity.	- 80% of the time unit operated at 105.1% of the tested capacity. - 20% of the time unit operated at 99.2% of the tested capacity.	*85% of the time unit operated at 44.5% of the tested capacity - 15% of the time unit operated at 40.4% of the tested capacity	- 76% of the time unit operated at 107.1% of the tested capacity - 24% of the time unit operated at 104.1% of the tested capacity	- 96% of the time unit operated at 106.9% of the tested capacity - 04% of the time unit operated at 69.2% of the tested capacity

Unit 4 remained on outage for 27 days (87.77%) and available for only 04 days (12.23%).

12.5 From the above, it is noted that, except unit 4, all other units of TPS M/garh was dispatched at more than 100% of the tested capacity. As far as, unit 4 is concerned, it was observed that 87.77% of the time (27 days) during the January, 2015, the unit remained on outage and was available for only 04 days. The above comparison for part load adjustment charges was made by excluding the shutdown/stand by periods of the units and based on net tested capacity of the units. The Petitioner was directed to provide the relevant documentary evidence in support for part load adjustment. Accordingly the Petitioner vide letter dated 17.12.2015 provided the same which were reviewed. The Authority keeping in view the documentary evidence considers that the Petitioner's request for part-load adjustment seems legitimate. Based on the OEM data and partial loading curves the correction factor are being determined for part load operation of the Petitioner's units 1-6 which are as under

Correction Factors on Various loadings as Per OEM Data Provided by NPGCL

Unit 1		Unit 2		Unit 3		Unit 4		Unit 5		Unit 6	
% Loading	Correction Factor	% Loading	Correction Factor	% Loading	Correction Factor	% Loading	Correction Factor	% Loading	Correction Factor	% Loading	Correction Factor
100	1.0000	100	1.0000	100	1.0000	100	1.0000	100	1.0000	100	1.0000
								95	1.0093	95	1.0093

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90	1.0002	90	1.0002	90	1.0002			90	1.0188	90	1.0188
								85	1.0283	85	1.0283
80	1.0068	80	1.0068	80	1.0068			80	1.0380	80	1.0380
						75	1.0003	75	1.0477	75	1.0477
70	1.0200	70	1.0200	70	1.0200	70	1.0057	70	1.0575	70	1.0575
						65	1.0129	65	1.0675	65	1.0675
60	1.0397	60	1.0397	60	1.0397	60	1.0219	60	1.0776	60	1.0776
						55	1.0326	55	1.0877	55	1.0877
50	1.0659	50	1.0659	50	1.0659	50	1.0451	50	1.0980	50	1.0980

12.6 The above adjustment of partial loading will be made, if the Petitioner's units are dispatched on partial load as per instructions of system operator (NPCC). On the other hand the Petitioner will not be entitled for partial loading, if the units are dispatch on part load due to various maintenance issues or in-efficiency on the part of the Petitioner.

13. **Whether Revision in fuel cost component based on the latest heat rate test.**

13.1 The Petitioner submitted that the units of Thermal Power Station Muzaffargarh have been commissioned during 1993 to 1997. Since then the units are being operated on dual fuel as per their design till 2007. The routine maintenance had been carried out as recommended by OEM, however these had been deferred by NPCC most of the time due to system constraints. Accordingly, as a natural process, Heat rate of the machines had been deteriorated due to natural wear and tear. In addition due to shortage of gas, these units were mostly being run on furnace oil which had not only adversely affected the loading capability but also affected the heat rate thereby increase in the production cost. This in fact was recognized in the determination dated May 02 2006. However, the company's delay to comply with the decision of the Authority is primarily due to financial constraints and certain other reasons including but not limited to inadequate fuel stock, non- availability of Gas, delays in major overhauling and annual Boiler inspections. However, the heat rate of all units has now been tested by an Independent consultant hired by USAID, under the grant available from USAID, besides other rehabilitation works that has been done to recapture the loading capability of these units. As per the directions of the Authority, Heat Rates tests were conducted by Pakistan Engineering Services (PES) for block 1, 2 and 3 of Muzaffargarh Plant under USAID Energy Power Policy after the rehabilitation of the plant. The details of tested heat rates are presented as below:

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Blocks	Description	Net Heat Rate as per PES Report at 100% MCR
		Btu/kWh
1	Muzaffargarh Units 1	10464.90
1	Muzaffargarh Units 2	10606.69
1	Muzaffargarh Units 3	10239.86
2	Muzaffargarh Units 4	10224.66
3	Muzaffargarh Units 5	10887.16
3	Muzaffargarh Units 6	11185.02

13.2 The Authority considered the submissions of the Petitioner. It was observed that in accordance with the Authority's directions, Heat Rate tests of TPS M/garh (Units 1-6) were conducted by independent Engineer (PES), under USAID Energy Policy Program, after the rehabilitation of the plant. The results of the Heat Rate tests are presented in the table below:

Blocks	Description	Heat Rates as Per Previous Determination (BTU/kWh)	Net Heat Rate (LHV) as Per PES Report at 100% MCR
1	M/garh Unit 1	10788	10464.90
1	M/garh Unit 2	10788	10606.69
1	M/garh Unit 3	10788	10239.86
2	M/garh Unit 4	10692	10224.66
3	M/garh Unit 5	12158	10887.16
3	M/garh Unit 6	12158	11185.02

13.3 Since the heat rate test have been carried out in compliance of the Authority directions therefore the Authority has decided to approve the above heat rates of the Petitioner. The heat rates of the Petitioner all block are as under:

Blocks	Description	Net Heat Rate (LHV) as 100% MCR
1	M/garh Unit 1	10464.90
1	M/garh Unit 2	10606.69
1	M/garh Unit 3	10239.86
2	M/garh Unit 4	10224 66
3	M/garh Unit 5	10887 16
3	M/garh Unit 6	11185 02
4	GTPS Faisalabad Units 5-9	7,759
5	SPS Faisalabad Units 1-4	12,967 (Gas) 13,679(RFO)
6	GTPS Faisalabad Units 1-4	13,874

14. **Whether the requested Calorific Value of fuel purchase is justified?**

14.1 With reference to determination No. NEPRA/TRF-46/NPGCL- 2006 dated May 02, 2006, the Petitioner submitted that the calorific value of furnace oil taken was 40,800 for

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calculation of Fuel Cost Component (FCC). However, under the Fuel Supply Agreement (FSA) between the Petitioner and Pakistan State Oil (PSO) on the directions of Ministry of Water & Power, the fuel supplier offered fuel with the specification of minimum calorific values of 39,672 Btu/ Kg for local and 40,112.8 Btu/ kg for imported fuel with an average calorific value of 39,892.4 BTU/kg. On actual, the Petitioner received blend of local and imported furnace oil having different calorific values ranging from 40,040 to 40,200 Btu/ Kg. The Petitioner has also got 3rd party testing results of the calorific values of the furnace oil received since 2011 to date, which comes out to be average 40,250 BTU/Kg at tankers level. As the actual CV of Furnace Oil, being received by TPS Muzaffargarh is averagely 40,191 Btu/Kg at tankers level for last 4 years, and as the decantation of furnace oil requires steaming of tankers/ tank wagons, steaming of storage tanks and tracing of furnace oil pipelines for flow of dense fluid, which lowers the CV of the F.O up to 40,040 on average at boiler inlet; at burner level. The CV of F.O tested by PES at the time of test is also tabulated below, which provides the ground realities as explained above NEPRA is requested to approve the actual on ground calorific values of furnace oil as above, approved by historical record and Heat Rate report.

Blocks	Description	Calorific Value HHV (Btu/ Kg)	Calorific Value – LHV (Btu/ Kg)
1	Muzaffargarh Units 1	39,755.75	38,103
1	Muzaffargarh Units 2	39,995.99	38,277
1	Muzaffargarh Units 3	39,797.63	38,134
2	Muzaffargarh Units 4	39,762.36	38,107
3	Muzaffargarh Units 5	39,713.88	38,072
3	Muzaffargarh Units 6	40,020.23	38,292

14.2 The Authority considered the submissions of the Petitioner's regarding Calorific Value. The Authority already determined the minimum benchmark of calorific value for the furnace oil as 18,200 Btus/lb (40,123.72 Btu/kg) for imported furnace oil and 18,000 Btus/lb (39,682.8 Btu/kg) for local furnace oil. Accordingly the same has been adopted in the instant case. The Petitioner shall maintain and submit, annually a detailed record of consignment wise CV of the oil received and consumed for power generation for the adjustment on account of variation against the reference calorific value duly supported with the copies of test reports certified by the fuel supplier.

15. Whether the Revenue Requirement is justified?

15.1 The Petitioner submitted that under its existing tariff has been incurring significant losses owing to the fact that the tariff determined on a cost plus basis does not fully reflect the actual costs that the company has borne over the past 8 years. A summary of such losses has been tabulated below:

Financial Years	EPP Variance	CPP Variance	Profit / (Loss) before taxation
	PKR	PKR	PKR
2014	(6,900,725,738)	1 953,058,130	(4,947,667,608)
2013	(5,813,086,627)	1 388,063,319	(4,425,023,308)

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2012	(6,667,837,465)	1,774,748,278	(4,893,089,187)
2011	(7,883,484,764)	586,351,810	(7,297,132,954)
2010	(6,714,020,791)	3,766,074,959	(2,947,945,832)
2009	(4,578,848,761)	1,934,074,184	(2,644,774,577)
2008	(2,234,180,277)	3,418,809,986	1,184,629,709
2007	(2,110,359,435)	2,258,571,860	148,212,425

15.2 According to the Petitioner lower heat rates, transformer, switchyard and metering losses, lower CV, no partial loading and less variable O&M are the causes of the above losses. The Petitioner requested NEPRA for a revised tariff which has been structured in the following manner:

Capacity Purchase Price		Req. Tariff Rs /kW/hr	Indexation
Net Dependable Capacity		1472.52 MW	
Fixed O&M		0.2990	CPI
• Administration & Establishment cost		0.2995	CPI
• Insurance and Regulatory cost		0.0041	CPI
• Other income		(0.0046)	CPI
Depreciation		0.0830	NIL
Interest cost		0.0022	NIL
Return on Equity		0.2308	NIL
Total Capacity Purchase Price (A+B)		0.6150	

Energy Purchase Price		Fuel	Variable O&M	Total
Blocks	Unit			
		Rs. kWh		
Block 1	Unit 1	11.0636	0.210	11.2736
	Unit 2	11.1604	0.204	11.3644
	Unit 3	10.8202	0.204	11.0242
Block 2	Unit 4	10.8118	0.143	10.9548
Block 3	Unit 5	11.5132	0.215	11.7282
	Unit 6	11.7560	0.218	11.974
Block 4	Units 5 – 9*	6.302	0.250	6.552
	Units 5 – 8	9.453		9.453
Block 5	Units 1 – 2	13.9831	0.168	14.1511
Block 6	Units 1 – 4	9.826	0.266	10.092

**Unit 9 is Combined Cycle Plant*

15.3 The Petitioner stated that the proposed tariff has a typical two-part structure comprising of Energy Purchase Price (EPP) based on net generation in kWh and Capacity Purchase Price (CPP) based on the Net Dependable Capacity available for dispatch. Energy Purchase Price (EPP) of the tariff consists of the following cost components;

a) Fuel Cost Component
b) Variable O&M Component.

15.4 Capacity Purchase Price (CPP) of the tariff consists of the following cost components;

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a) Escalable Cost Component
b) Non-Escalable Cost Component

15.5 The Petitioner requested following items to be considered as pass-through items;

a) Fuel price fluctuations
b) Indexation of Variable O&M of the Energy Purchase Price and Escalable Cost Component of the Capacity Purchase Price
c) Payments to Workers Welfare and Profit Participation Funds
d) Expenditure on modification or expansion of Protective Devices required by NTDC
e) General Sales Tax
f) Actual Income/ Turnover tax
g) Additional Insurance Cost due to change in policy
h) Electricity duty on in-house consumption of electricity
i) Any other cost if agreed and identified in the Power Purchase Agreement.

15.6 The Petitioner submitted that Fuel Cost Component and Energy Cost Component have been computed on the basis of reference fuel rates provided below. Fuel rates are subject to adjustment on a fortnightly basis.

Furnace Oil Price	Rs 39,000/ M. Ton
Gas Price	Rs 588 23/ MMBtu
HSD Price	Rs 90/ Liter

15.7 The Petitioner further submitted that due to non-availability of natural gas for generation, it has been assumed that the power plants shall be run on Furnace Oil only, however the plants are designed on dual fuel.

16. ENERGY PURCHASE PRICE

16.1 The Petitioner submitted that the Fuel Cost Component for Thermal Power Station Muzaffargarh has been calculated using the revised Net Heat Rates at Lower Heating Value (100% MCR) provided in the recently carried out Current Dependable Capacity and Heat Rate Tests after taking into account transformer and switchyard losses and incorporation of CW inlet temperature correction factor as explained in clause 4.2 and 4.3 of this petition.

Block	Name of Power Plant	Fuel	Present Heat Rate as per PES-LHV (BTU/KWh)	CV as per actual at the time of test - LHV (BTU/Kg)
1	TPS Muzaffargarh Unit 1	RFO/Gas	10,809.064	38,103
1	TPS Muzaffargarh Unit 2	RFO/Gas	10,953.511	38,277
1	TPS Muzaffargarh Unit 3	RFO/Gas	10,579.805	38,134
2	TPS Muzaffargarh Unit 4	RFO/Gas	10,564.32	38,107
3	TPS Muzaffargarh Unit 5	RFO/Gas	11,239.239	38,072
3	TPS Muzaffargarh Unit 6	RFO/Gas	11,542.682	38,292

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16.2 According to the Petitioner, the Fuel Cost Components for Gas Turbine Power Station (GTPS) Faisalabad blocks 4 and 6 has been calculated on historical grounds taking into consideration the respective Heat Rates in accordance with the Present Determination (2006).

Block	Name of Power Plant	Fuel	Present Heat Rate- LHV (BTU/KWh)	CV as per actual - LHV (BTU/CFT & BTU/Kg)
4	GTPS Faisalabad Unit 5-9 with CCP	Gas	8,903	831*
4	GTPS Faisalabad Unit 5-9 without CCP	Gas	13,355	831*
5	SPS Faisalabad Units 1-2	RFO	12,979	38,164
6	GTPS Faisalabad Units 1-4 Open Cycle	Gas	13,881	831

16.3 According to the Petitioner, Fuel Cost Components (FCC) for all RFO and Gas based units/ blocks have been computed based on the aforementioned Heat Rates and Calorific Values. The heat rate variation with load curves as provided will be used for partial load heat rate calculation and payment in case the plant load falls below 100 % of tested MCR, as per precedent set by NEPRA in the tariff determination of HUBCO Case No. NEPRA/TRF-92/HUBCO-2008 dated 23.05.2008. The requirement for RFO and Gas per annum has been computed in-line with the general practice of computing the Net Generation produced from heating the respective fuel required in order to achieve the energy output of the plant based on the thermal efficiency. Net Generation has been computed using a notional 60% plant factor.

Fuel Cost Component Thermal Power Station Muzaffargarh		
Block	Unit	Fuel Cost Component (Rs. Per kWh)
1	1	11.0636
	2	11.1604
	3	10.8202
2	4	10.8118
3	5	11.5132
	6	11.7560
Gas Turbine Power Station Faisalabad		
4	5 – 9 with CCP	6.302
4	5 – 9 without CCP	9.453
6	1 – 4	9.826
Steam Power Station Faisalabad		
5	1 – 4	13.983

16.4 While determining the fuel cost component of the Petitioner in 2004 and in 2006, the issue of heat rates was discussed in detail. At that point of time technical expert with respect to heat rate was also hired. After detailed discussion based on the historical actual

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heat rates and technical expert report, the following heat rates were approved by the Authority:

Blocks	Description	Heat Rates as Per Previous Determination (BTU/kWh)	Efficiency as Per Previous Determination (%)
1	M/garh Unit 1	10788	31.63%
1	M/garh Unit 2	10788	31.63%
1	M/garh Unit 3	10788	31.63%
2	M/garh Unit 4	10692	31.92%
3	M/garh Unit 5	12158	28.07%
3	M/garh Unit 6	12158	28.07%
5-9	GTPS Faisalabad	8594	39.71%
1-4	SPS Faisalabad	14367	23.76%
1-4	GTPS Faisalabad	15367	22.21%

16.5 The calorific value was taken as 40,800 in case of RFO, 950 ct in case of gas and 35,614 in case of HSD. The issue of LHV was not discussed at that time since this issue was raised by the IPPs in later stage in 2007-2009. NPGCL was directed to conduct heat rate tests. Previously for Unit 1- 3 one heat rate of 10788 Btu/kWh was given whereas now the Petitioner claimed separate heat rates for each unit. After averaging the Unit 1 -3, it has been noted that heat rates are deteriorated. Similarly Unit -4 heat rates are also deteriorated whereas the plant number 5-6 heat rates have been improved. In compliance of the Authority's directions the heat rate tests of Unit 1-6 were carried out by the Petitioner in 2014. Considering the same reasonable has been approved by the Authority. The Petitioner has proposed LHV calorific value of gas of 831 Btu/Cft for the purpose of calculation of fuel cost component. The gas supplier bills the generation companies on the basis of MMBTU having taken the impact of calorific value. The gas is measured in terms of MMCFT and then converted into MMBTU by taking the calorific value Btus/Cft, therefore, for the purpose of calculation of fuel cost component, the calorific value of gas is not relevant as calculated by the Petitioner. However, correction due to CV in the Block-5 for RFO has been made. Keeping in view the aforesaid, after adjustment of the 0.25% losses due to transformation losses the following heat rates have been allowed:

Blocks	*Description*	*Net Heat Rate (LHV) as Per PES Report at 100% MCR*	*Net Heat Rate (LHV) with correction factor requested by NPGCL at 100% MCR*	*Approved Net Heat Rates (LHV) After 0.25% correction factor Heat Rates at 100% MCR*
1	*M/garh Unit 1*	10465	10,809	10491
1	*M/garh Unit 2*	10607	10,953	10633
1	*M/garh Unit 3*	10240	10,580	10265
2	*M/garh Unit 4*	10225	10,564	10250
3	*M/garh Unit 5*	10887	11,239	10914
3	*M/garh Unit 6*	11185	11,543	11213

16.6 Accordingly based on the above, the approved fuel cost component are as under:

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Description		Reference Tariff		
Blocks	Units	RFO FCC	Gas FCC	Variable O&M
Block-1	1	10.6113	-	0.1300
	2	10.7551	-	0.1300
	3	10.3831	-	0.1300
Block-2	4	10.3677	-	0.1300
Block-3	5	11.0395	-	0.1300
	6	11.3415	-	0.1300
Block-4	5-9*	-	5.0551	0.1300
Block-5	1-4	13.7930	8.4515	0.1300
Block-6	1-4	-	9.0387	0.1300

16.7 The approved rates are based on the following assumptions:

RFO Price	=	Rs. 39,000/M.Ton
Gas Price –LHV	=	Rs. 651.52/MMBTUs
HSD	=	Rs. 90/Litre

17. Variable O&M

17.1 The Petitioner submitted that Variable Operations & Maintenance (O&M) costs incurred by the Company have been projected on the basis of approved annual budget. These include Repairs & Maintenance; Start-up Costs; and Chemical & Fuel Additives. Repairs and Maintenance Costs are the costs required to maintain the plant's present efficiency. These costs are a part of the annual budget of the Petitioner. While justifying the requested claim the Petitioner submitted that the budget is prepared by technical experts after a careful analysis of the plant's physical conditions and the expected expenditures required in the future for maintaining the plant's efficiency. The budget is then approved by the Board of the Company. The requested per unit cost is as under:

Variable O&M Cost Component: Thermal Power Station Muzaffargarh		
Block	Unit	Variable O&M Cost Component Rs. Per kWh
1	1	0.210
	2	0.204
	3	0.204
2	4	0.143
3	5	0.215
	6	0.218
Gas Turbine Power Station Faisalabad		
4	5 – 9	0.250
6	1 – 4	0.266
Steam Power Station Faisalabad		
5	1 – 4	0.168

17.2 The Petitioner provided the following breakup on account of variable O&M:

Variable O&M Snapshot	Muzaffargarh						Faisalabad			NPGCL
	Block 1		Block 2		Block 3		Block 4 (GTPS)	Block 5 (SPS)	Block 6 (GTPS)	ALL BLOCKS
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 5 -9	Unit 1- 2	Unit 1 - 4	TOTAL
	Rs. in Million									
Startup Costs	54	41	45	48	52	45	125	22	80	512
Repairs & Maintenance	112	112	112	112	112	112	17	38	17	744
Chemicals & Fuel Additives	25	25	25	25	25	25	3	17	3	173
Total	191	178	182	185	190	182	145	77	100	1430
Variable O&M Per kWh / Block	0.210	0.204	0.204	0.143	0.215	0.218	0.250	0.168	0.266	

17.3 The actual cost for the FY 2011-12, FY 2012-13 & FY 2013-14 is as under:

Description	Rs. in Million		
	FY 2011-12	FY 2012-13	FY 2013-14
Start Up Cost	-	167.28	122.41
Repair & Maintenance	244.81	302.05	352.50
Total	244.81	469.33	474.91
Generation	4,514,746,320	5,288,702,832	4,385,753,568
Rs./kWh	0.05	0.09	0.11

17.4 Under the FARA program the Petitioner was granted US$ 15 million for repair & maintenance and rehabilitation of the Muzaffargarh program in FY 2010-11, FY 2011-12, FY 2012-13 & FY 2013-14. During this period repair & maintenance and asset was built through this grant. The major overhaul of the power plant was made during this period. The Current Dependable Capacity tests were carried out in December 2013 & January 2014. Similarly the heat rate tests were also carried out during this period. The Petitioner's power plants are older and required frequent repair & maintenance. The average amount requested by the Petitioner is Rs. 1,430 million or Rs. 0.18/kWh. It was observed that the amount requested on account of gas based unit 5-9 was on higher side. Keeping in view the past trend and actual data for the last year the requested amount seems on higher side. However, the variable O&M of GENCOs is on lower side as compared to the IPPs. The Authority considers that for continuous availability and generation, repair and maintenance of the plant is mandatory which was neglected during the past by the management of the Petitioner due to which the dependable capacity was deteriorated and efficiency was decreased. Due to this reason the plant was not able to operate on full load. The Ministry being owner of the Petitioner should conduct inquiry for non-maintenance of the power plant by the Petitioner's management.

17.5 Keeping in view the old conditions of the Petitioner's power plant and previous actual figures, the variable O&M of Rs. 0.13/kWh has been assessed on account of variable O&M. However in order to ensure that the proper plant maintenance has been carried

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out, the Petitioner is directed to submit annual report to NEPRA. If it is established as a result of the annual report that the repair and maintenance has not been carried out by the Petitioner, then the same amount not utilized for repair and maintenance shall be subject to adjustment from the generation tariff. The variable O&M for each unit is as under:

Block	Unit	Variable O&M Cost Component Rs. Per kWh
1	1	0.1300
	2	0.1300
	3	0.1300
2	4	0.1300
3	5	0.1300
	6	0.1300
Gas Turbine Power Station Faisalabad		
4	5 – 9	0.1300
6	1 – 4	0.1300
Steam Power Station Faisalabad		
5	1 – 4	0.1300

18. CAPACITY PURCHASE PRICE

18.1 The Petitioner requested for allow following tariff as against reference tariff:

Capacity Purchase Price	Reference Tariff Rs /kW/hr	Present Tariff Rs/kW/hr	Requested Tariff Rs /kW/hr
Net Dependable Capacity	1568 MW	1568 MW	1472.52 MW
Fixed O&M	0.0510	0.1328	0.2995
• Administration & Establishment	0.0577	0.1503	0.1826
• Insurance and Regulatory	0.0042	0.0109	0.0041
• Other income	-0.0109	-0.0285	-0.0046
Depreciation	0.0798	0.0798	0.0830
Interest cost	0.0091	0.0091	0.0022
Return on Equity	0.1606	0.1606	0.2308
Total Capacity Purchase Price	0.3005	0.3823	0.6150

18.2 The Escalable cost contains following sub components:

- Salaries, Wages and Fringe Benefits cost
- Administration cost
- Repair and Maintenance cost
- Insurance
- Regulatory fee
- Sustainability charge
- Other Operating costs
- Other income

18.3 Salaries, Wages and Fringe Benefits cost

18.3.1 The Petitioner submitted that the salary and wages expense include basic pay, ad-hoc allowance, cash medical allowance, conveyance allowance, dual charge allowance,

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entertainment allowance, deputation allowance, group life insurance, house rent allowance, job allowance, livery allowance, local compensatory allowance, special pay, other allowance, overtime , off day wages, qualification pay, shift allowance to the employees of the Company etc. This includes education and training, sports and recreational benefits, EOBI, social security charges, pension charges and free electricity etc. The estimate for the FY 2014-15 is Rs. 2,355 Million. This translates into Rs. 0.1826/kW/hr. The Breakup of Salaries wages and benefits has been tabulated below:

Description	PKR
Basic Pay:	
Annual Pay	695,986,766
Personal pay	752,760
Annual Increment	29,247,720
Total Annual Basic Pay	**725,987,246**
Allowances:	
House Rent Allow.	72,992,840
Cash Medical	2,320,800
Muzaffargarh Allow	3,271,932
Sr. Post Allow.	45,000
Conveyance	49,588,149
Qualification	129,500
Gen: Allow	77,678,350
Entertainment	130,600
Special Allow:	5,644,794
50% SRA-2010 (Freeze)	196,709,539
15% SRA-2011 (Freeze)	59,390,316
20% SRA-2012	100,567,903
10% SRA-2013	56,003,319
10% SRA-2014	56,003,319
Shift Allow:	5,012,700
G.L.I	397,586
Other Allowance + Company Secretary Fee	10,839,386
Total Allowances	**726,726,032**
Basic Pay & Allowance	**1,452,713,278**
Free Medical	26,026,994
Free Electricity	132,528,783
Leave Encashment	174,846,755
Pension Fund	561,807,005
Pensioners of 1999	6,948,376
Total Establishment Cost	2,354,871,191

18.3.2 The Petitioner provided the following sanctioned strength:

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Name of Formation	TPS, Muzaffargarh	GTPS, Faisalabad	SPS, Faisalabad	CTW, Faisalabad	Head Office	Total
No. of Employees	2307	339	548	120	87	3401

18.3.3 The Petitioner was directed to provide the comparison of the sanctioned vs. actual strength. Accordingly the Petitioner provided the following information:

Description	Sanctioned	Actual
TPS Muzaffargarh	2307	1596
SPS Faisalabad, CTW	459	564
NPGS Multan	548	290
Head Office	87	66
Total	3401	2516

18.3.4 According to the information provided by the Petitioner, the 66 employees are working in Shahdra and 290 in NGPS Multan. After excluding the 356 employees of NPGS Multan and Shahdra the remaining employees left are 2160 employees with a ratio of 2160 / 1472.52 = 1.47 per MW which is on higher side as against IPPs. The Petitioner is directed to chalk out plan for utilization of the available resources in other upcoming power plants and submit this plan to NEPRA.

18.3.5 The requested amount in the petition by the Petitioner for the FY 2014-15 is Rs. 2,355 million excluding employees cost of Shahdra and NGPS Multan. After including the amount of Shahdra and Pirangaib Multan employees the overall amount works out as Rs. 2,764 Million. The previous year expense on account of salaries, wages and benefits is as under:

Description	FY 2011-12	FY 2012-13	FY 2013-14	FY 2014-15 (Projected)
Salaries, Wages & Other Benefits	2,137	2,454	2,526	2,764

18.3.6 The amount on account of 356 employees cannot be allowed to the Petitioner since Shahdra and NGPS Multan are not included in the license. The Petitioner has claimed costs excluding the Shahdra and NGPS Multan employees therefore the amount requested as Rs. 2,355 million seems legitimate and is allowed on account of salaries, wages and other benefits. The tariff component on this account works out as Rs. 0.1826/kW/hr.

18.4 **Administration Cost**

18.4.1 According to the Petitioner, Administrative costs include power, light, gas and water, communication charges, office supplies, advertising, subscription and periodicals, refreshment &entertainment, traveling expenses, professional fees, consultancy fee and management fee etc. The Petitioner submitted that the average costs incurred during the past four years has been taken as the basis to calculate the current estimate this amounts to Rs. 827 Million and translates into Rs. 0.0641/kW/hr. The breakup is as under:

Administrative Expense	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	Average
Communications	2,320,098	3,059,529	3,229,800	3,573,506	3,045,733
Other supplies	2,726,733	4,739,402	5,248,740	5,677,692	4,598,142
Traveling and conveyance	12,093,773	10,658,360	18,511,293	21,413,509	15,669,234

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Transportation	54,940,963	57,999,270	63,422,533	71,984,598	62,086,841
Professional fees	9,719,284	4,324,844	4,226,519	2,320,150	5,147,699
Auditors' remuneration	800,000	950,000	1,250,000	1,100,000	1,025,000
Management fee	9,468,000	7,101,000	5,462,725	3,823,911	6,463,909
Advertisement and publicity	55,922,766	78,615,896	18,039,026	10,764,464	40,835,538
Taxes and licenses	11,021,620	12,740	581,160	812,929	3,107,112
Custom duty written off	557,033,903				557,033,903
Custom, excise, shipping charges	71,030,684	138,293,585			104,662,135
Miscellaneous expenses	8,789,008	33,405,808	36,548,466	15,543,846	23,571,782
Total	795,866,832	339,160,434	156,520,262	137,014,605	827,247,028

18.4.2 From the information submitted by Petitioner it was observed that the requested amount has been calculated on the basis of previous year average data wherein the cost of rental power plants was included. The RPPs have been declared by the Honourable Supreme Court of Pakistan vide ab initio therefore the cost claimed by the Petitioner on this account is not justified. After excluding the costs of RPPs, average cost for last four years works out as Rs. 148 million whereas the actual amount for the FY 2013-14 was Rs. 137 million. After taking into account inflation impact and adjusting the amount on account of Shahdra and Pirangiab Multan employees, the administrative expenses have been worked out as Rs. 148 million or Rs. 0.0115/kW/hr.

18.5 **Repair and Maintenance**

18.5.1 The Petitioner submitted that the Repair and Maintenance estimates include maintenance of civil works of the power house, general plant facility and the colony etc. The annual estimates of such repairs and maintenance is Rs. 269 Million. This translates into the proposed tariff component of Rs. 0.0208/kW/hr.

18.5.2 The Petitioner was directed to provide the relevant documentary evidence in support. According to the Petitioner the following is actual cost on account of repair and maintenance for the previous years:

Description	Rs. in Million
Repair & Maintenance Civil Works Power House	113.74
Repair & Maintenance General Plant	25.35
Repair & Maintenance Civil Works Housing Colony	129.64
Total	268.73

18.5.3 The actual amount incurred on account of repair & maintenance as per audited account is as under:

Description	FY 2011-2012	FY 2012-2013	FY 2013-2014
Actual	10,200,404	12,585,038	14,721,451

18.5.4 Keeping in view the actual trend the requested amount of Rs. 269 million is on higher side. The Petitioner was directed to submit the requisite plan for the above expense however no document in this regard was submitted. Since the actual figures of the last years have reflected that the Petitioner was not able to incur the expense on repair and maintenance therefore just on estimation basis the same amount cannot be allowed.

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Accordingly after taking into account the inflation impact, requirement of housing colony and other associated costs, repair and maintenance has been assessed as Rs. 24 million or Rs. 0.0019/kW/hr and the same is allowed to the Petitioner. However, if the Petitioner incurs additional cost on this account, the Company may approach NEPRA for adjustment of the prudently incurred cost on the basis of documentary evidence.

18.6 Insurance

18.6.1 The Petitioner submitted that the insurance premium is estimated to be Rs. 41.5 Million and the insurance component amounts to Rs. 2.345 per kW/Month based on the past four years average as tabulated below:

Description	FY 2010 - 2011	FY 2011 - 2012	FY 2012 - 2013	FY 2013 - 2014	Average
Actual Insurance	30,510,351	27,124,046	28,670,459	25,566,099	27,967,739

18.6.2 As per information provided by the Petitioner, it has been noticed that the insurance amount on average for the last four years is Rs. 27.97 million. It was also observed that NGPS Multan insurance amount has also been claimed which is not licensee of NEPRA. Accordingly after adjusting the amount of Rs. 1.61 million on this account the amount of Rs. 26.36 million or Rs. 0.0020/kW/hr has been assessed on account of insurance component and same is allowed to the Petitioner.

18.7 Regulatory fee

18.7.1 The Petitioner submitted that the regulatory fee includes annual Authority overheads and Generation license fee which is estimated to be Rs. 25 Million. This translates into proposed tariff of Rs. 0.0020/kW/hr per kW/hr.

18.7.2 The requested amount is Rs. 24.9 million which translates into Rs. 0.0019/kW/hr seems reasonable keeping in view the previous trend. Accordingly the same has been approved.

18.8 Sustainability Charge

18.8.1 The Petitioner seeks Sustainability Charges relating to Piraghaib (Multan) and Shahdra (Sheikhupura) in order to ensure operations of these complexes as switchyard for smooth transmission and distribution of Electricity by NTDC. These charges amount to Rs. 333 Million per annum which translates into the proposed tariff component of Rs. 18.8389 per kW / Month. The Petitioner submitted that the staff has been placed in the particular area due to requirement of the NTDC. Similarly the repair and maintenance of the particular are is also carried out by the Company.

18.8.2 The Authority considered the submissions of the Petitioner that for sustainability of the NTDC system the NGPS Multan and Shahdra are operated. The issue has already been discussed and addressed in the above Issue # 9 & 10.

18.9 Vehicle Expenses

18.9.1 The Petitioner requested to allow Rs. 79.6 million on account of vehicle expenses. The Petitioner further submitted that for sustainable operation of the power production the vehicle expenses are required.

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18.9.2 The Petitioner was directed to provide the documentary evidence in support of its claim. The Petitioner stated that this amount is incurred on the vehicle running expenses and other operating matters while operating the power plant. Previously in 2006, the Authority allowed Rs. 2.3 million to the Petitioner on this account. The Petitioner requested to allow Rs. 79.6 million on account of other operating expenses. The amount requested has not been properly justified by the Petitioner through documentary evidence. However, the other operating expenses i.e. vehicle expenses are part of the generation tariff. Based on the audited figures of the previous year, the Authority has decided to allow Rs. 9 million on account of other expenses i.e. vehicle expenses.

18.10 **Other Income**

18.10.1 The Petitioner requested to consider Rs. 58.70 million on account of other income. The Petitioner submitted that the other income of the company consists of interest income and sale of scrap. The Petitioner's management computed other income on the basis of average four year historical trend for the purpose of this tariff by excluding abnormal income i.e. recovery of interest on advance payments from rental power projects through Supreme Court and Nation Accountability Bureau. Details provided by the Petitioner are given in the table below:

Other Income	FY 2010 – 2011	FY 2011 - 2012	FY 2012 – 2013	FY 2013 - 2014	Average
			Rs.		
Sale of scrap	5,746,492	24,665,340	1,411,062	26,428,547	14,562,860
Miscellaneous Income	44,538,019	42,120,608	41,200,080	48,704,618	44,140,831
Total	50,284,511	66,785,948	42,611,142	75,133,165	58,703,692

18.10.2 The Petitioner was directed to provide the audited account. As per audited account the other income previous trend is as under:

Other Income	FY 2010 - 2011	FY 2011 – 2012	FY 2012 – 2013	FY 2013 - 2014
		Rs.		
Sale of scrap	5,746,492	24,665,340	1,411,062	26,428,547
Interest Income	44,173,284	13,004,139	69,680,330	161,806,120
Foreign Currency Exchange (Loss)/Gain	96,706,277	325,672,274	63,134,087	229,204
Exchange / loss from RPPs	(133,198,261)			
Grant Recognized as Income against Repair & Maintenance	14,499,687		-	18,867,186
Grant amortized by Depreciation against plant and equipment	12,820,069	14,059,337	17,686,888	29,946,141
Miscellaneous Income	44,538,019	42,120,608	41,200,080	48,704,618
Recoveries from Sahuwal		300,892,500		
Total	85,285,568	720,414,698	193,112,447	698,356,656

18.10.3 As per audited figures of the Petitioner, the actual amount for the FY 2010-11 is Rs. 94 million, for FY 2011-12 is Rs. 80 million, for FY 2012-13 is Rs. 112 million and for the FY 2012-13 is Rs. 237 million after excluding the depreciation taken as grant by US, interest

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from RPPs, exchange gain / loss on account of RPPs. The average of the last four years is Rs. 131 million whereas the requested amount is Rs. 58.703 million which is on lower side. Accordingly the average amount of last four years of Rs. 131 million has been taken as other income which works out as Rs. (0.0101/kW/hr). The amount of grant taken as other income has already been adjusted under the depreciation head.

18.11 **Non-Escalable Cost Component of CPP**

The Petitioner requested for following Non-Escalable cost components:

- Depreciation
- Interest Expense.
- Return on Equity.

18.12 **Depreciation**

18.12.1 The Petitioner submitted that depreciation is a component which may change as a result of additions or deletions and hence a levelized depreciation charge has been computed to account for the changes in fixed Assets over the tariff period. The depreciation cost is assessed as Rs. 1,070 million, translating into Rs. 0.0830/kW/hr. Moreover, the management intends to conduct revaluation of operating fixed assets, therefore, a final depreciation claim shall be requested to be adjusted subject to receipt of the final revaluation certificate.

18.12.2 While evaluating the information submitted by the Petitioner it was noticed that the Petitioner entered into a Fixed Amount Reimbursement Agreement (FARA) with United States Agency for International Development (USAID) on 20th April 2010 which was amended vide dated 9.4.2012 and activity agreement as 14.2.2013. Under this agreement the USAID provide US$ 15.778 million for repair and maintenance and rehabilitation of the Muzaffargarh Power Plant. Around 869 million were capitalized from the said grant. The Petitioner has taken this amount under the head of other income while calculating the amount incurred in the particular year and the amount which is capitalized. However this should be accounted for under the head of depreciation. Accordingly after adjusting the same the depreciation charge has been calculated on fixed assets over a life period has been worked out as Rs. 1,040 million or Rs. 0.0806/kW/hr.

18.13 **Interest Expense**

18.13.1 The Petitioner submitted that interest expense resulting from Cash development loans from the government and foreign re-lent loans has been taken on the actual Interest payments levelized over the remaining period of these loans. Subsequently, the Interest expense amounts Rs. 29 Million which translates into Rs. 0.0022/kW/hr.

18.13.2 The requested amount has been established through the documentary evidence provided in shape of audited accounts. Accordingly the interest expense amounts of Rs. 29 million or Rs. 0.0022/kW/hr is allowed to the Petitioner.

18.14 Return on Equity

18.14.1 The Petitioner submitted that using the Capital Asset Pricing Model (CAPM), ROE have been calculated as 15.95% using a historical beta of 0.43, market risk premium of 7% and a

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risk free rate of 12.94% (10-Year PIB). The Petitioner submitted that the same equity amount has been used as in the present tariff determination. Consequently, the ROE amounts to Rs. 2,977 Million translating into the tariff component of Rs 168.4957 per kW/Month for FY 2014-15.

18.14.2 According to the tariff standards, tariff should allow licensee a rate of return which promotes continued reasonable investment in equipment and facilities for improved services. While allowing the return on equity, the performance of the licensee to maintain/improve its generation equipment, effective and efficient utilization of resources and return allowed to other public sector GENCOs is considered. The Petitioner did not make any improvements rather failed to maintain the existing generation equipment. There has been significant reduction in net dependable capacity and heat rates over the year which resulted in wastage of the scarce resources. The Authority previously allowed 11.82% return on equity to the Petitioner.

18.14.3 The return requested by the Petitioner is on higher side. The Petitioner while calculating the ROE on Capital Asset Pricing Model (CAPM) used 10 years PIB risk free rate. The Authority, after careful evaluation of the Petitioner's submissions is of the view that selecting 10 years PIB Bond's rate as risk free premium is not in line with the approved Tariff Methodology in the case of Distribution Companies as the Methodology prescribes the linking of risk free instrument with the control period of tariff determination. Since the tariff control period has been allowed for three years therefore the PIB risk free rate of three years is relevant in the instant case. The petition was filed in the month of March 2015. Accordingly on the basis of weighted average yield on 03 Years Pakistan Investment Bond (PIB) as of March 26, 2015, which is 8.1871% has been taken as the risk free rate. The Authority also understands that since PIB Bonds cut off yield rate is determined through bidding process and is traded in Pak Rupees, hence it takes account of country risk and inflation.

18.14.4 The Authority understands that the expected return on any investment is the sum of the risk-free rate and an extra return to compensate for the risk. This extra return or 'risk premium' is the difference between market rate of return and risk free rate. Generally, the return on stock market index is taken as a measure of market rate of return. The Authority in the case of Distribution Companies considers Market Risk Premium of 7% as reasonable for calculation of cost of equity component. Taking into account the equity beta of 0.43, risk free rate of 7% and market premium of 8.1871%, the ROE have been calculated as 11.20%. Accordingly the Authority has decided to allow ROE on the basis of CAPM model as 11.20%. Based on the 11.20% return, the ROE works out as Rs. 2,091 million or Rs. 0.1621/kW/hr.

18.15 <u>Performance of the Petitioner</u>

18.15.1 The Petitioner plant factor was 35%, 41% and 34% during the FY 2012-13, FY 2013-14 and FY 2014-15. Even taking into account the element of not falling under the merit order of the Petitioner's power plants and on standby mode by power purchaser, the performance of the power plants is not up to the mark. Due to in-efficiency of the

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Petitioner the end-consumer is suffered due to non-availability of the electricity. As a matter of fairness, equity and justice, the Authority considers that the GENCO should be treated in line with the IPPs. In order to safeguard the interest of the end-consumer, the Authority has therefore directed the power purchaser to not pay capacity payment to the Petitioner in case the power plant is not available as per PPA's requirement. In this regard the capacity payment has been bifurcated as under:

Blocks	Description	Installed Capacity (MW)	Last Dependable Capacity (MW)	Present Dependable Capacity (MW)	Allowed Capacity Payment Rs./kW/hr
1	M/garh Units 1-3	630	558	556	0.4353
2	M/garh Units 4	320	270	272.2	0.4353
3	M/garh Units 5-6	400	360	355.32	0.4353
4	GTPS Faisalabad Units 5-9	144	117	117	0.4353
5	SPS Faisalabad Units 1-2	132	97	97	0.4353
6	GTPS Faisalabad Units 1-4	100	75	75	0.4353
	Total	1726	1477	1472.52	0.4353

18.15.2 The above capacity charge has been calculated on the basis of 100% plant availability. The Petitioner is entitled for the outages as agreed with the power purchaser in the PPA i.e. 21%. The Petitioner has to ensure that all the contracted capacity shall be available for 79% of the time in the entire year. The Petitioner shall be entitled for the capacity payment if it remains available but the power purchaser did not operate the power plant due to merit order constraints. However, if Petitioner availability remains less than the agreed capacity in PPA, then the above capacity charge shall be multiplied with the capacity declared by the Petitioner and number of hours remained available. Thus the Petitioner will not be able to recover the excess amount for the period the plant was not available beyond the agreed 21% outage. Keeping in view very low efficiency of the power plants in case of HSD, the Petitioner is directed to not operate the power plant on HSD until and unless the need for such operation is demonstrated.

19. Indexations

19.1 The Petitioner requested for indexation of fuel price adjustment, CPI indexation and tax adjustment. The Petitioner also requested to allow indexation on variable O&M.

19.2 The Authority considering the request of the Petitioner being legitimate decided to allow indexation on account of fuel price variation, CPI adjustment on fixed cost component and tax adjustments to the Petitioner. However, no adjustment is allowed on account of variable O&M.

20. Whether the control period till 30th June 2027 is justified?

20.1 The Petitioner vide the subject petition requested to allow the submitted tariff subject to the indexation, circumstances and assumptions for the period of 13 years till 2027.

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20.2 Keeping in view the inefficient power plants of the Petitioner, volatile generation due to different factors i.e. non availability of gas, inefficient machines tariff for the period of 13 years is not considered justified. In view thereof the Authority has decided to allow tariff for the control period of three years from the FY 2014-15, FY 2015-16 & FY 2016-17. However, the same generation tariff shall be applicable until new tariff is determined for the Petitioner.

21. **Order**

21.1 Northern Power Generation Company Limited (NPGCL) is allowed to charge the tariff as provided hereunder for sale of its electricity to the Central Power Purchasing Agency (Guaranteed by Limited), according to the following approved tariff:

Capacity Purchase Price	Reference Tariff Rs /kW/hr	Indexation
Net Dependable Capacity	1472.52 MW	
Fixed O&M	0.1904	CPI
- Administration & Establishment	0.1966	CPI
- Insurance & Regulatory Cost	0.0040	CPI
- Other income	-0.0101	CPI
Depreciation	0.0806	-
Interest cost	0.0022	-
Return on Equity	0.1621	-
Total Capacity Charge	0.4353	

21.2 The tariff has been calculated on the basis of following net capacity:

Blocks	Description	Installed Capacity	Present Net Dependable Capacity
1	Muzaffargarh Units 1-3	630	556
2	Muzaffargarh Units 4	320	272.2
3	Muzaffargarh Units 5-6	400	355.32
4	GTPS Faisalabad Units 5-9	144	117
5	SPS Faisalabad Units 1-2	132	97
6	GTPS Faisalabad Units 1-4	100	75

Note: The above capacity charge shall be applicable in accordance with the Power Purchase Agreement between the power producer and the power purchaser. In case the available capacity is established less than the agreed in the PPA, then the capacity payment Rs /kW/hr shall be paid according to the available capacity and excess amount paid shall be deducted from the generation tariff of the NPGCL. However, NPGCL shall be entitled for the capacity payments if it is available however however did not operated by the power purchaser due to merit order constraints.

21.3 The fuel cost component is as under:

Blocks	Description	Units	Energy Purchase Price (Rs./kWh)			
			Fuel			Variable O&M
			RFO	Gas	HSD	
I		1	10.6113	-	-	0.1300

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	Muzaffargarh	2	10.7551	-	-	0.1300
		3	10.3831	-	-	0.1300
II		4	10.3677	-	-	0.1300
III		5	11.0395	-	-	0.1300
		6	11.3415	-	-	0.1300
IV	GTPS Faisalabad	5-9	-	5.0551	-	0.1300
V	SPS Faisalabad	1-4	13.7930	8.4515	-	0.1300
VI	GTPS Faisalabad	1-4		9.0387	-	0.1300

Assumptions:

RFO Price = *Rs. 39,000/M.Ton*
Gas Price –LHV = *Rs. 651.52/MMBTUs*
CV (RFO) = *38557.8*

I. Indexation / Adjustments

Fuel cost component of Energy Charge part of tariff for each block will be adjusted on account of fuel price variation, according to the following formula:

$FCC_{(Rev)} = FCC_{(Ref)} * FP_{(Rev)} / FP_{(Ref)}$

Where:

$FCC_{(Rev)}$	=	The applicable fuel cost component as revised in accordance with revised fuel price
$FCC_{(Ref)}$	=	The fuel cost component as indicated in the reference tariff
$FP_{(Rev)}$	=	Revised applicable RFO / Gas price as the case may be
$FP_{(Ref)}$	=	The reference fuel price per unit of fuel (residual oil and natural gas) as mentioned below: Gas (For Block IV to VI): Rs. 651.52/MMBTU RFO: Rs. 39,000 / M.Ton (Ex-GST including freight)

For the purpose of fuel cost component adjustment, NPGCL would submit to the Authority relevant purchase orders, in case of change in furnace oil / gas prices.

II. CPI Indexation

The fixed O&M comprising of Administrative & Establishment Charges, Insurance & Regulatory Cost and other Income will be adjusted on account of Inflation (CPI) only, in future. Indexation adjustment due to inflation will be made twice a year on January 01 and July 01. The adjustment will be on the basis of the latest monthly CPI as notified by the Pakistan Bureau of Statistics (PBS). As per present practice according to which CPI is updated on 11th of every month, the indexation on January 01 will be based on CPI for preceding November while the indexation on July 01 will be based on CPI of preceding May. The CPI adjustment will be made according to the following formula:

$FO\&M_{(Rev)} = FO\&M_{(Ref)} * CPI_{(Rev)} / CPI_{(Ref)}$

Where:

$FO\&M_{(Rev)}$	=	The revised fixed O&M of the Capacity Charge
$FO\&M_{(Ref)}$	=	The reference fixed O&M of the Capacity Charge i.e. Rs. 0.1904/kW/hr
$CPI_{(Rev)}$	=	The revised Consumer Price Index (CPI) as notified by the Pakistan Bureau of Statistics.
$CPI_{(Ref)}$	=	The reference Consumer Price Index (CPI) as notified by the Pakistan Bureau of Statistics

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III. Adjustment on account of Calorific Value

The adjustment on account of variation in calorific value will be allowed as per the following mechanism:

a) The reference CV will be 18364 Btu/lb. There will however be no adjustment below the minimum limit of 18200 Btu/lb.

b) NPGCL shall maintain and submit, annually a detailed record of consignment wise CV of the oil received and consumed for power generation for the adjustment on account of variation against the reference calorific value duly supported with the copies of test reports certified by the fuel supplier.

IV. Taxes

The impact of taxes has not been accounted for in the tariff. In case NPGCL is obligated to pay any tax, the exact amount paid shall be reimbursed as per existing practice.

21.4 The determination is intimated to the Federal Government for notification in the official gazette under Section 31(4) of the NEPRA Act, 1997.

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