National Electric Power Regulatory Authority
Islamic Republic of Pakistan

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No. NEPRA/R/TRF-362/K-Electric-2016/01-03
January 01, 2020

Subject: **Decision of the Authority in the matter of Motion for Leave for Review filed by K-Electric Ltd. against Decision of NEPRA No. NEPRA/TRF-362/K-Electric-2016/8107 dated May 9, 2019 relating to Approval of Heat Rate for 560 MW Bin Qasim Power Station-II (BQPS-II) of K-Electric Ltd.** (Case No. TRF-362/K-Electric-2016/01-03)

Dear Sir,

Please find enclosed herewith subject Decision of the Authority (14 Pages) in the matter of Motion for Leave for Review filed by KE against Decision of NEPRA No. NEPRA/TRF-362/K-Electric-2016/8107 dated May 9, 2019 relating to Approval of Heat Rate for 560 MW Bin Qasim Power Station-II (BQPS-II) of K-Electric Ltd.

2. The subject Decision of the Authority is being intimated to the Federal Government for the purpose of notification in the official Gazette pursuant to Section 31(7) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

Enclosure: As above

01/01/20

(Syed Safeer Hussain)

Secretary
Ministry of Energy (Power Division)
'A' Block, Pak Secretariat,
Islamabad

CC:

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

DECISION OF THE AUTHORITY IN THE MATTER OF MOTION FOR LEAVE FOR REVIEW FILED BY KE AGAINST DECISION OF NEPRA NO. NEPRA/TRF-362/K-ELECTRIC-2016/8107 DATED MAY 9, 2019 RELATING TO APPROVAL OF HEAT RATE FOR 560 MW BIN QASIM POWER STATION – II (BQPS-II) OF K-ELECTRIC LIMITED

Background:

1. The Authority in the matter of "Approval of Heat Rate for 560 MW Bin Qasim Power Station-II (BQPS-II) of K-Electric Ltd" issued its decision (**'the Decision'**) on May 9, 2019. K-Electric ('KE') being aggrieved with the decision of the Authority filed the application for Review ('**Review Motion**') under Rule 16 (6) of the NEPRA (Tariff Standards and Procedure) Rules, 1998 (**'Tariff Rules'**) read with Regulation 3 (2) of the NEPRA (Review Procedures) Regulations, 2009(**'Review Regulations'**) dated May 16, 2019 before the Authority.

2. The Authority considered the Review Motion on June 13, 2019 and decided to admit the same. Later on, the Authority decided to provide an opportunity of Hearing to KE. Accordingly, the hearing in the matter was held on October 30th, 2019 at NEPRA Tower, Islamabad.

GROUNDS FOR REVIEW

3. K-Electric has mainly sought the review of the followings.

i. Part Load Factors;
ii. Heat Rate for July 2016 to May 2018;
iii. Degradation for June 2018 to June 2023.

4. K-Electric, requested NEPRA to review the decision considering the facts, evidences and grounds as detailed below:

"PART LOAD FACTOR

Independent Engineer – NESPAK ('IE') in its detailed performance test report of BQPS II Plant ('Performance Report') has concluded 85% part load adjustment factor of 1.0397 based on actual test results and application of correction factors for Reference Site Conditions ('RSC'). However, NEPRA has not considered the part load adjustment factor of 1.0397 provided by IE in its Performance Report based on actual test results, and has instead relied on the part load adjustment factor of 1.0125 derived from the part load curve prepared by Beijing Chinovela Engineering and Technology Co Ltd ('BCE&T')- 3rd party which was engaged by KE for preparation of curves.

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NEPRA has stated that although it accepts the RSC corrected number provided by IE for 100% loading, however, it has stated that IE has shown inability to derive such corrected number for 85% part load conditions and therefore, NEPRA has relied on the part load adjustment factor derived by the curve prepared by BCE&T.

Further, as a reference benchmark, NEPRA has referred to a report of Parsons Brinkerhoff prepared for Energy Market Authority (EMA) of Singapore for the period January 1, 2017 to December 31, 2018('Reference Report') which gives a part load factor of 1.0165 at 85% loading.

In this regard, KE would like to submit that IE has independently reviewed all the test results and curves in detail, as also confirmed to NEPRA's team in the joint meeting held between KE, IE and NEPRA's team on January 4, 2019, and has, after detailed review, concluded that the part load curve prepared by BCE&T cannot be relied upon for partial load adjustments.

Reasons for not using the part load curve prepared by BCE&T

In this regard, IE has provided detailed reasons for not using the curve prepared by BCE&T:

> *"The ratio (adjustment factor) of net heat rate (LHV) at 100% load (Actual) and heat rate at 85% load (actual) is 1.0431, whereas as per curve it comes out to be 1.0152[1] which is considerably less than the ratio of actual heat rates. Further, the partial load curve have been developed without referring to partial load curves of individual equipment due to their unavailability; it appears that this curve is not representative.*
>
> *The reasons not to use curve prepared by Beijing Chinovela Engineering and Technology co ltd are as follow;*
>
> *The use of one correction curve of Part Load vs Net Heat Rate disregarding the ambient conditions corrections at part load does not fall in the ambit of PTC 46. The GT OEM curves for impact of part load on exhaust gas temperature and exhaust gas flow were not available. Further individual curves for HRSGs & ST for part load correction were not available and so combined cycle part load correction curve was not verifiable.*

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[1] *As per the equation given with the curve provided by BCE&T, the part load factor at 85% is 1.0152. We understand that NEPRA has inadvertently applied a factor of 1.0125.*

iii. *As per GT OEM curve, the ratio (adjustment factor) of net heat rate (LHV) at 100% load and 85% load for GT is 1.0446 (Annexure A1). In view of foregoing, correction factor of 1.0152 at 85% load from the combined cycle curve prepared by Beijing Chinovela Engineering and Technology co ltd being substantially lower compared to GT OEM correction factor does not seem correct. The correction factor (1.0152) from the curve is not consistent with the factor obtained from actual Heat Rate Test on part load. The Factor for uncorrected Heat Rate at 100% to 85% comes to be 1.04314.*

iv. *The part load curves are for plant load prediction and not for the corrections of ASME PTC-46 testing results".*

It is evident from the above reasons that the curve prepared by BCE&T for part load adjustment cannot be relied upon and significantly differs from the actual part load factor of 1.04314 obtained from Uncorrected test results as well as the part load factor of 1.0446 derived from GT OEM curve. (Annexure A1). Accordingly, IE has normalized the actual test result for 85% loading, by applying all correction factors and arrived at a part load adjustment factor of 1.0397 to account for variation in reference conditions.

Comparison with Reference Report and other IPPs

Further, NEPRA has used the Reference Report by Parsons Brinkerhoff for comparison of the part load adjustment factor (Annexure A2). In this regard, KE would like to submit that the stated report is not comparable with BQPS II plant for the following reasons:

i. *The Reference Report is based upon data of CCGT units i.e. GT26 (Ansaldo), 9F.05 (General Electric), 701F4 (Mitsubishi Hitachi) and SGT5-4000F (Siemens). Hence, it is based on plants of different technologies and does not include data for 9E machines like BQPS II.*
ii. *The Gross Power of the machines referred vary from 405 to 454 MW and the Net Heat Rate from 6,490 to 6,503 Btu/kWh indicating this is a different class of CC configuration which is not comparable with 9E based CC Plants.*
iii. *The part load factor even within these 04 non 9E machines vary significantly from around 1.0030 to 1.0230which confirms that different technologies have different part load factors and therefore, average factor of these machines cannot be used as a benchmark for comparison of part load adjustment factor.*

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On the other hand, the part load adjustment factor derived from actual results is comparable with the part load factor derived from GT OEM curve, where the ratio (adjustment factor) of net heat rate (LHV) at 100% load and 85% load for GT is 1.0446 (Please see Annexure A1).

Further, part load adjustment factor of KE is also comparable with the part load adjustment factor for other Independent Power Producers (IPPs) of similar technology, in combined cycle operation. As an example, we are given to understand that part load factors for Hallmore, Bhikki, UCH II Power and KAPCO Block 2 fall in the range of 1.027 to 1.031.The difference in part load factor of KE's BQPS II and other IPPs in combined cycle operation is due to the different configuration and / or type of GT & ST and other balance of plant equipment. Despite the fact that the above IPPs do not operate in 3 plus 1 configuration like BQPS II does, still the IPPs based upon Frame 9E machines have part load adjustment factor significantly higher than 1.0125, used by NEPRA for KE's BQPS II plant. Though, the part load factor also varies between the IPPs due to different configurations, however, factors of above IPPs are still comparable to the factor as determined through actual test results of BQPSII by IE.

Therefore, KE would like to submit that the comparison of part load factor based on actual test results of BQPS II with average part load factor from published data for entirely different class of machines is not correct. Accordingly, the part load factor from actual test results should be compared with the part load factor provided in GT OEM curve and part load factor determined for other IPPs.

IE's conclusion

After reviewing all the results and curves in detail, IE concluded in its report as follows:

"Part load (85%) Heat rate (Un-Corrected) adjustment factor = 1.0431 (4.314% Refer Table – 2&3).

The Corrected RSC 85% Part load Heat Rate (HHV/LHV) determined, from Un-Corrected 85%-part load results obtained from Secondary Test # 1, by using the base load correction curves which are the best nearest estimates. The part load (85%) adjustment factor comes out to be 1.0397 and after applying this factor on Base load Net Heat Rate (HHV corrected), the part load (85%) Net Heat Rate (HHV Corrected) comes to be 8582.758 BTU/kWh (without degradation)."

Extract from IE's Performance Report (Executive Summary - Page 13)

Therefore, KE would like to submit that NEPRA's conclusion that IE has shown inability to provide corrected number at 85% loading is not correct. IE has adequately provided and explained the corrected part load adjustment factor for 85% load, as cited above. Further, IE has provided detailed reasons in its Performance Report for not considering the part load curve provided by BCE&T.

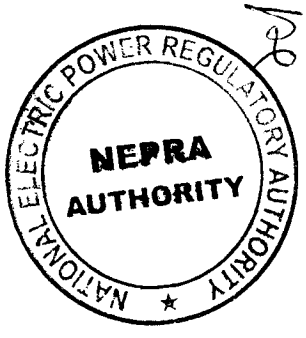
Accordingly, in view of the above submissions, KE would request NEPRA to consider the part load adjustment factor of 1.0397 as given in IE's Performance Report based on actual test results, which is also comparable with part load adjustment factor provided in GT OEM curve as well as the part load adjustment factor determined for other IPPs with similar technology.

With the part load factor 1.0397 applied on Corrected RSC base load heat rate of 8,255.255 btu / kWh (net HHV), the Corrected RSC 85% part load heat rate would be 8,582.758 btu / kWh (net HHV– without degradation), as provided by IE in Executive summary of the Performance Report (Point 4, Page 13).

HEAT RATE FOR JULY 2016 TO MAY 2018

NEPRA has determined the Heat rate for July 2016 to May 2018 same as the EPC guaranteed value without any partial load or degradation adjustment and has also not considered the actual test results.

In KE's Multi Year Tariff Determination for the control period FY 2017 – 2023 dated July 5, 2018 ('MTY Decision July 2018'),NEPRA directed to conduct Heat rate test for all the plants including BQPS II and stated that adjustment in heat rates will be made based on the results of the Heat rate test. Accordingly, below directive was included with respect to BQPS II:



"The heat rates of BQPS-II have been determined on the basis of heat rates guaranteed by the EPC contractor. K-Electric has already been directed to conduct heat rate test of BQPS-II and submit the same to the Authority for approval. The adjustment in heat rates will be made based on the results of the performance (Heat Rate) test."
(Clause VII, Para 34.1 of the MYT Decision July 5, 2018)

While, KE understands that for the period up till June 30, 2016, a flat heat rate may be determined as the tariff mechanism was different under the previous control period. However,

under the Multi Year Tariff for the control period starting July 01, 2016 ('New MYT'), NEPRA has rebased the tariff and completely changed the tariff structure. Under the New MYT, NEPRA has, while absorbing all efficiency gains in tariff, considered part load adjustment and degradation for setting of heat rate benchmark. Accordingly, NEPRA has considered the degradation and partial load adjustment for the heat rate for the period June 2018 and onwards. Therefore, NEPRA also needs to take into account a degradation and part load adjustment factor for the heat rate for the period July 2016 to May 2018.

As per the actual test results conducted in May 2018 and the degradation curve included in the IE's Performance Report, the heat rate for the period July 2016 to May 2018 comes out as follows:

Date	Average Operating hours of 3 GTs (Hours)	Degradation factor for Heat rate as per curve	Corrected RSC Base Load Degraded Heat rate (net HHV) (Btu / kWh)	Part load adjustment factor	Corrected RSC 85% Part Load Degraded Heat rate (net HHV) (Btu / kWh)
			a	b	c = a x b
May-18 (Test date)	48,341	1.01516[1]	8,255.26	1.0397	8,582.76
Jun-17[4]	41,780	1.01393[2]	8,245.32[3]	1.0397	8,572.43

1. *Provided in Table 27, Page 52 of IE's Performance Report*
2. *Derived from Degradation curve. Working attached as Annexure A3*
3. *8,255.26 / 1.01516 x 1.01393*
4. *June 2017 has been used as it represents the average for the period July 2016 to May 2018.*

Even at the EPC guaranteed value of 7,991 Btu / kWh (net HHV), with part-load adjustment factor of 1.0397 as given by IE and degradation adjustment of 1.01393 as per the degradation curve, the heat rate comes to 8,423.74 Btu / kWh (net HHV).

Accordingly, KE requests NEPRA to consider the heat rate for the period July 2016 to May 2018 by using the degradation curve and part load adjustment factor over actual results of May 2018 i.e. 8,572.43 btu / kWh (net HHV).

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DEGRADATION FOR JUNE 2018 TO JUNE 2023

NEPRA has compared the actual test results with EPC Guaranteed value and has stated that it implies 3.3% degradation and hence, KE should not be allowed any further degradation for this control period.

KE would like to submit that under the New MYT, NEPRA has while absorbing all efficiency gains in tariff, rebased the heat rate efficiency benchmark and has completely revised the tariff structure and returns in line with the methodology followed for other power sector entities. Accordingly, as degradation of plant over life is allowed to all other IPPs, NEPRA should consider future degradation using the degradation curve for KE as well.

Therefore, KE would request that degradation should be allowed for the above-mentioned period based on the degradation curve provided by IE in the Performance Report, being consistent with the practice followed for other IPPs.

With part load factor of 1.0397 and degradation curve provided in IE's Performance Report, the year wise Corrected RSC 85% part load degraded heat rates would be as follows, as provided in Executive Summary of the Performance Report (Page 13). Accordingly, NEPRA is requested to consider the following heat rates for BQPS II plant for the period June 2018 to June 2023.

Year	Corrected RSC 85% Part load Degraded Heat rate (btu / kWh - Net HHV)
2019	8,593.778
2020	8,586.574
2021	8,594.292
2022	8,600.201
2023	8,611.131

NEPRA is requested to review its findings, evaluations and analysis and it is therefore prayed that KE may be allowed an opportunity of being heard in keeping with the principles of natural justice"

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ANALYSIS:

PART LOAD FACTOR

5. The submissions made by KE in support of its claim have been reviewed and it is noted that the Authority has already discussed most of the queries/concerns raised by KE in its final/earlier order dated May 09, 2019.

6. Regarding the Int'l report as referred by the Authority in its decision dated May 09, 2019, it may be noted that the said report only discusses about the general pattern/trend followed by the combined cycle power plants having several types of gas turbines which is basically also comparable with BCE&T curve of BQPS-II in respect of part load based operation. On one hand, KE stated that comparison with different type of gas turbines as mentioned in int'l report may not be carried out by the Authority while on the other hand it requires from the Authority for a comparison to be made with Halmore and Bhikki power projects which have also different types of gas turbines like F and H class instead of E class. The submissions of KE are noted to be contradictory.

7. Regarding the statement in subject order that *"IE has shown inability to derive such corrected number for 85% part load conditions and therefore, NEPRA has relied on the part load adjustment factor derived by the curve prepared by BCE&T"* it is clarified that the same is available in Minutes of Meeting dated July 31, 2017 provided as part of heat rate test report by KE to the Authority. The Authority notes that the IE has computed 85% corrected heat rate results from base load correction curves which are best nearest estimates (emphasis added).

8. KE has now provided part load curves for its gas turbines (Frame 9E) only as provided by OEM instead of providing part load curves for whole complex so the same can't be used for overall plant operation.

9. Under KE MYT, the Authority directed KE to conduct heat rate tests of its own power plants. It is pertinent to mention here that, as per code PTC-46 (used for testing of overall plant performance), the heat rate test is basically conducted at base load i.e. 100% load only. In the presence of part load curve for operation of the power plant on various loads along with all other correction curves as prepared by BCE&T, the need to review / accept the secondary test of BQPS-II at 85% loading (in addition to primary/base load test @ 100% load) is not required by the Authority. Moreover, the Authority while finalizing heat rate test procedures in respect of BQPS-II informed KE vide its letter dated June 21, 2017that *"all corrections factors, if required, are to be applied as per OEM provided curves...."*

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10. The Authority further notes that in case of IPPs, the power purchase agreements contain Part load operation correction factors/curves which are based on OEM data and fixed at the time of commissioning, considering reference site conditions instead of actual operating scenarios of the power plants.

11. The Mechanism for Compensation for Degradation of Heat Rate, Aux Consumption and Secondary Fuel Oil Consumption, due to Part Load Operation and Multiple Start/Stop of Units as notified by Central Electricity Regulatory Commission states as follows:

"..... (iv) For Gas Stations degraded Station Heat Rate (SHR) and (Auxiliary Energy Consumption) AEC shall be decided based on the characteristic curve provided by ***manufacturer****.*

(v) The ***percentage loading*** *shall be used for getting increase in SHR and AEC in accordance with the Regulations and for* ***gas based thermal station*** *as per (IV) ....."*

12. From above, it is evident that for part load operation, reliance on OEM curves for gas based stations is a standard regulatory practice.

13. NEPRA had used a factor of 1.0125 whereas KE has requested to use 1.0152 instead. KE stated that the factor extracted from the part load curve is noted to be 1.0152 instead of 1.0125 as it is derived from the equation given with the curve provided by BCE&T. NEPRA had used the part load factor i.e. 1.0125 directly from the curve as drawn, without taking into account the equation available with the curve. The Authority considers that 1.0152 as suggested by KE as part load factor for adjustment purposes is reasonable and hence allowed instead of earlier approved part load factor i.e. 1.0125.

HEAT RATE FOR JULY 2016 TO MAY 2018

14. KE in its review motion submissions requested to consider the period for heat rate adjustment from July 2016 to June 2023 being a control period instead of Authority's determined May 2018 to June 2023. The Authority earlier considered this period in view of the heat rate test that was conducted in May 2018. However, the Authority considers that stance of KE, to allow heat rate for the total control period from July 2016 to May 2018 as reasonable and justified.

15. In order to allow a heat rate for the period starting from July 2016 till May 2018, there are two options before the Authority. Either to work out different heat rates for July 2016 (applicable for one year till June 2017) and for July 2017 applicable till May 2018 when the test was conducted. The second option is that a heat rate at the middle of the period in

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question is determined which is applicable from July 2016 to May 2018. The Authority has decided that one rate for June 2017 would be appropriate as no actual data is available before it. In this respect, the heat rate for May 2012 (EPC guaranteed) and the heat rate tested on May 2018 have been taken into account. It is noted that the Authority had allowed 3.31% degradation in heat rate from EPC guaranteed value over a period of six years which translates to 0.551% degradation per year. To calculate heat rate for June 2017 the heat rate as allowed on the test date is extrapolated to calculate the heat rate on June 2017.

16. KE had requested to use degradation curve as provided in heat rate test report. However the Authority notes that by using the degradation curve as suggested by KE leads to a number which would be different with the EPC guaranteed value. In view of the inconsistency arising out the Authority does not agree with KE's requested approach. Furthermore, in its review motion dated May 16, 2019, KE did not object NEPRA approved efficiency i.e. 42.70% net HHV for previous control period ending June 2016. Following table shows the average heat rate (i.e. June 2017) for the period July 2016 till May 2018.

Date	Average Operating hours of 3 GTs (Hours)	Degradation factor for Heat rate as per curve	Corrected RSC Base Load Degraded Heat rate (net HHV) (Btu / kWh)	Part load adjustment factor	Corrected RSC 85% Part Load Degraded Heat rate (net HHV) (Btu / kWh)	Corresponding Efficiency (%)
			a	b	c = a	
May-18 (Per KE)	48,341	1.01516	8,255.26	1.0397	8,582.76	39.76
Jun-17 (Requested-Per KE)	41,780	1.01393	8,245.32	1.0397	8,572.43	39.80
Jun-17 (Per NEPRA)	41,780	1.0055[1]	8,210.10[2]	1.0152	8,334.89	**40.94**

1. Average Heat Rate Degradation for 6 years (2012~2018)= (IE Tested Heat Rate/EPC Guaranteed Heat rate) = (8,255.26/7,991) = 3.31%;
   - ✓ Per year Heat Rate Degradation = (3.31/6) =0.551%;
   - ✓ Per year Heat Rate Degradation Factor ((0.551/100) +1) = 1.0055;
2. Heat Rate for June 2017 = (8,255.26 / 1.0055)

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DEGRADATION FOR JUNE 2018 TO JUNE 2023

17. In the absence of any new evidence provided by KE, the Authority maintains its earlier decision under this head.

TOTAL ADJUSTMENTS:

18. Following table shows the comparison between BQPS-II and UCH-II (having nearly similar size and technology gas turbines, Frame 9E) in respect of overall adjustments:

CCPP	Heat Rate Degradation (For life cycle of Project)	Part load @ 85%	Total Adjustments (For life cycle of Project)
BQPS-II (Requested after PES Test) 02-07-2012	5%		5%
BQPS-II (Requested) 16-05-2019	3.31% (2012~2018) + 0.95% (2018~2042) =4.26%	3.97%	8.23%
UCH-II (Allowed)	1.64% (2014~2039)	3.00%	4.64%
BQPS-II (Allowed)	3.31% (2018~2023)	1.52%	4.83%
CERC Benchmark	Up to 5%		Up to 5%

19. From above table it is evident that KE has been allowed reasonable total adjustments (degradation + part load) as compared to its earlier request dated 02-07-2012 and as well as compared to gas based IPP (UCH-II) operating in the NTDCL system.

HEAT RATES (SUMMARIZED):

20. The Heat rates for the periods approved by the Authority are shown below:

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Heat Rate for May 2012 ~ June 2016

CCPP	Net HHV Heat Rate (Btu/kWh) at RSC	Corresponding Efficiency (%)	Net HHV Heat Rate (Btu/kWh) at RSC	Corresponding Efficiency (%)
BQPS-II	Earlier Approved		Approved in Review Decision	
	7990.96[1]	42.70%	**7990.96[1]**	**42.70%**

1. Based on EPC Guaranteed values and no further adjustment for degradation and partial loading is allowed.

Heat Rate for July 2016 ~ May 2018

CCPP	Net HHV Heat Rate (Btu/kWh) at RSC	Corresponding Efficiency (%)	Net HHV Heat Rate (Btu/kWh) at RSC	Corresponding Efficiency (%)
BQPS-II	Earlier Approved		Approved in Review Decision	
	7990.96[1]	42.70%	**8334.89[2]**	**40.94%**

1. Based on EPC Guaranteed values and no further adjustment for degradation and partial loading is allowed.
2. Based on IE tested values and adjusted for degradation (1.0055) and Partial loading (1.0152) at 85%.

Heat Rate for June 2018 ~ June 2023

CCPP BQPS-II	Net HHV Heat Rate (Btu/kWh) at RSC	Corresponding Efficiency (%)
IE Test Results	8255.26[1]	41.33%
IE Test Results	8582.76[2]	39.76%
Requested by KE	8590.48[3]	39.72%
Earlier Approved	8358.45[4]	40.82%
Approved in Review Decision	**8380.74[5]**	**40.71%**

1. Based on IE test results at 100% load.
2. Based on IE test results with adjustment of Partial loading (1.0397) at 85%.

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3. Based on IE test results with adjustment of degradation (1.0009) and Partial loading (1.0397) at 85%.
4. Based on IE test results with adjustment of Partial loading (1.0125) at 85% only. No further degradation is allowed during the present MYT period as the complex has been allowed more than 3.31% degradation from the EPC guaranteed efficiency i.e. 42.70% at base load to the tested efficiency number i.e. 41.33% at base load therefore further inefficiency shall not be allowed to KE.
5. Based on IE test results with adjustment of Partial loading (1.0152) at 85% only. No further degradation is allowed during the present MYT period as the complex has been allowed more than 3.31% degradation from the EPC guaranteed efficiency i.e. 42.70% at base load to the tested efficiency number i.e. 41.33% at base load therefore further inefficiency shall not be allowed to KE.

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DECISION OF AUTHORITY:

21. The Authority after detailed deliberation on the heat rate test report and review motion petition decides as follows:

i. For the period from May 2012 to June 2016, the heat rate i.e. **7,990.96** Btu/kWh - net HHV, corresponding to 42.70% efficiency is approved and no further adjustment for degradation and partial loading is allowed;

ii. For the period from July 2016 to May 2018, the heat rate i.e. **8,334.89** Btu/kWh - net HHV, corresponding to 40.94% efficiency is approved and no further adjustment for degradation and partial loading is allowed;

iii. For the period from June 2018 to June 2023, the heat rate of **8,380.74** Btu/kWh - net HHV, corresponding to 40.71% efficiency is approved. This heat rate will be applicable for the control period on flat basis, without any additional adjustment for other parameters. The Authority may order fresh heat rate test, after the expiry of the control period of present MYT determination and after the Major Overhauling (MOH) of BQPS-II. Such test shall be conducted by an Independent Engineer in presence of NEPRA professionals as per procedure mentioned in MYT and other instructions issued by the Authority.

iv. Gas Compressors may not be required in case of natural gas/RLNG availability through dedicated pipeline or any alternative arrangement. For such a scenario, relevant capacity and heat rates calculated during the present tests will be used.

AUTHORITY:

Rafique Ahmed Shaikh
(Member)

Rehmatullah Baloch
(Member)

Saif Ullah Chattha
(Member)

30-12-2019

Engr. Bahadur Shah
(Member/Vice Chairman)

Tauseef H. Farooqi
(Chairman)

01/01/20

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