



National Electric Power Regulatory Authority
Islamic Republic of Pakistan

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No. NEPRA/Consultant(RE/Tech)/LAG-05/1565-1567
January 27, 2022

Subject: **Order of the Authority in the matter of Review Motion on Decision of the Authority on Heat Rate for 248 MW Korangi Combined Cycle Power Plant (KCCP) on K-Electric Limited**

Dear Sir,

Enclosed please find herewith the subject Order/Decision of the Authority (06 Pages) in the matter of Review Motion on Decision of the Authority on Heat Rate for 248 MW Korangi Combined Cycle Power Plant (KCCP) on K-Electric Limited.

2. The Order/Decision 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 within 30 days from the intimation of this Order/Decision. In the event the Federal Government fails to notify the subject Order/Decision or refer the matter to the Authority for reconsideration, within the time period specified in Section 31(7), then the Authority shall notify the same in the official Gazette pursuant to Section 31(7) of NEPRA Act.

Enclosure: As above

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(Syed Safer 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.

National Electric Power Regulatory Authority
(NEPRA)

January 12, 2022

ORDER of the Authority in the matter of Review Motion on 'Decision of the Authority on Heat Rate for 248MW Korangi Combined Cycle Power Plant (KCCP) of K-Electric Limited'

The Authority in the matter of "Approval of Heat Rate for 248MW Korangi Combined Cycle Power Plant (KCCP) of K-Electric Limited" issued its decision on September 02, 2020. K-Electric ('KE') being aggrieved with the decision of the Authority filed the application for Review before the Authority and requested an opportunity of being heard.

2. The Authority allowed admission of the review and provided an opportunity of Hearing to KE. Accordingly, the hearing in the matter was held on December 15, 2020 at NEPRA Tower, Islamabad.

3. It is important to highlight that Heat Rate test was conducted in June/July 2019 – however in view of seven year control period under Multi Year Tariff (MYT) i.e. FY 2017-23, Heat Rate was determined for following periods.

- July 2016 to May 2019 (before the conduct of Test)
- June 2019 till June 2023 (after the conduct of Test)

GROUND FOR REVIEW

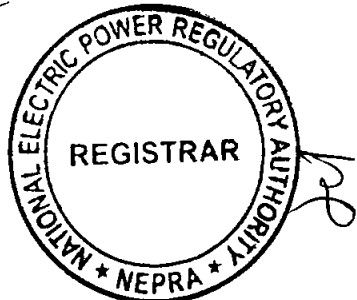
4. K-Electric has sought the review of the allowed Heat Rate numbers in both periods i.e. July 2016 to May 2019 and June 2019 till June 2023. KE has raised concerns on following accounts:

I. Heat Rate determination by NEPRA vs determination by NESPAK (IE):

5. KE has raised concern on determination of the Heat Rate numbers by NEPRA. KE is of the view that since Independent Engineer has already provided Heat Rate numbers for all the period i.e. before - as well as after the conduct of Test – therefore the same numbers should be taken.

18

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6. With regards to the concern of KE, reference is drawn to determination of Authority in the matter of Reconsideration Request dated July 5, 2018, wherein the Authority decided "...The adjustment in heat rates will be made based on the results of the performance (Heat Rate) test." It is important to highlight here that Heat Rate test of KCCP was conducted in June/July 2019. Accordingly, NEPRA has taken the result of the subject Heat Rate test as reference and has worked out the Heat Rate numbers for the control period i.e. FY 2017-FY 2023, based on the results of the Heat Rate test and other parameters.

7. While determining, the Authority observed that IE has also used similar approach and has used the results of the test date i.e. June/July 2019 to work out Heat Rate numbers for the whole control period (FY 2017-23) using its judgement and certain parameters including Operating Hours (OH), major Overhaul (MOH), etc. IE did not conduct any further tests for evaluating Heat Rate numbers for the stated period. Therefore, the Authority concludes that NEPRA's approach for evaluating Heat Rate numbers is prudent and justified.

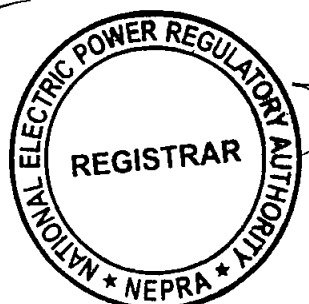
II. Assumptions in treatment of Major Overhaul in determining Heat Rate:

8. KE has raised a concern over treatment of major overhaul and its impact on Heat Rate numbers during the period July 2016 to May 2019. KE has stated that NEPRA has assumed that major overhaul was conducted prior to start of control period, whereas, in actual, major overhaul for machines were carried out from January 2017 to August 2017 except one Gas Turbine for which major overhaul was carried out in January 2016.

9. Regarding, operating hours of the turbines at the time of MYT and treatment of major overhaul in determining Heat Rate number by NEPRA in period July 2016 to May 2019, it is noted that at the time of determination of Heat Rate number, NEPRA did not have actual data on operating hours of Gas Turbines corresponding to start of MYT period, therefore had estimated degradation (and thereby Heat Rate numbers) considering major overhauls in initial period of MYT. It is further highlighted that IE's correspondence dated Dec 16, 2019 containing information on Operating Hours was not available with NEPRA at the time of determination of numbers¹. Therefore, in light of the stated submissions / new information presented by KE, the Authority considers

¹ KE's request of Heat Rate numbers was made in Sep. 2019 chronologically prior to IE's correspondence of Dec 2019.

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that adjustment needs to be made in the earlier determined Heat Rate numbers for the period July 2016 to May 2019.

10. Further, Authority notes that the data provided by KE regarding Operating Hours vis-à-vis data provided vide IE mutually corroborates and the same is taken into account.

HEAT RATE for Period July 2016- May 2019

11. Accordingly, Heat Rate for the period July 2016 to May 2019 (prior to test) is adjusted as shown by taking applicable degradation factors from the information provided by IE for the relevant periods of operation.

| Corrected RSC Base Load Degraded ¹ Heat rate (net HHV) (Btu / kWh) | | Part load adjustment factor @ 85% | Corrected RSC 85% Part Load Degraded Heat rate (net HHV) (Btu / kWh) | | Corresponding Efficiency | |
|---|-----------------------|-----------------------------------|--|-----------------------|---------------------------------|-----------------------|
| A | | B | C = A x B | | - | |
| Earlier ¹ determined | Adjusted ² | 1.0232 | Earlier ¹ determined | Adjusted ² | Earlier ¹ determined | Adjusted ² |
| 8062.9985 | 8110.35 ³ | | 8250.06 | 8,298.51 | 41.36% | 41.12% |

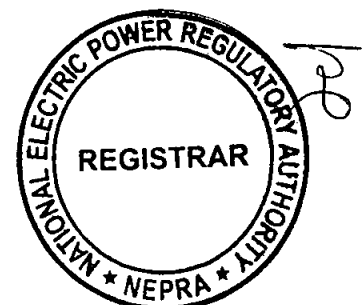
1. Determined vide decision dated September 2, 2020
2. Determined under current review motion
3. Average Heat Rate Degradation taken in view of degradation from EPC value, adjusted for degradation loss and MOH

12. It is highlighted that the Performance test by IE was conducted in June 2019, therefore, the same has been allowed for the period i.e. June 2019.

Linear degradation for period FY 2020-23:

13. KE has objected over NEPRA’s treatment of degradation while determining Heat Rate numbers for period FY 2020 to 2023. KE is of the view that year-wise degradation as indicated by IE should be taken instead of straight line degradation as taken by NEPRA. The Authority notes that the degradation numbers evaluated by NEPRA are

14 



derived based on IE's evaluated average degradation factor for remaining life of the plant as given in IE's report, adjusted for the period FY 2020-23. The Authority further noted that IE's evaluated Heat Rate numbers for FY 2020 to FY 2023 are also based on certain assumptions (Operating hours, etc.).

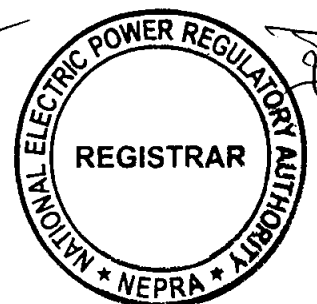
14. While considering the request of KE (May 2021), the Authority further noted that since June 2019 almost two years have already passed, therefore actual average operating hours and degradation curve / table be used instead of IE proposed hours, for the period June 2019 to June 2021 to derive Heat Rate numbers for the period. Similarly, to evaluate Heat Rate numbers for the period FY 2022 and FY 2023, the operating hours may be estimated based on the actual data used for the period June 2019 to May 2021.

15. Accordingly, KE was asked to provide required data including Operating hours, etc. KE in response provided IE's calculated Heat Rate numbers for the period June 2019 to June 2023. The Authority has also noted that IE has evaluated Heat Rate at base load as well as at loading position of 85%. The Authority in its earlier decisions regarding KCCP has allowed Heat Rate corresponding to loading position of 85% to KE. Therefore, the Authority has considered the submissions of IE as made by KE and has approved the Heat Rate number corresponding to 85% loading position of KCCP Plant.

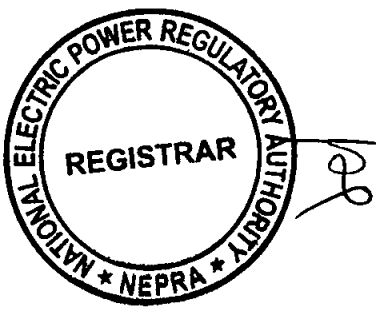
16. Additionally, it is important to highlight that under separate regulatory proceedings, the Authority allowed KE to operate KCCP plant on an alternate fuel i.e. HSD. Under those proceedings, KE was directed to conduct a Performance test (Heat Rate and Capacity test) of the plant on HSD fuel. In compliance to the directions of the Authority, KE through IE-NESPAK, has conducted the Performance test and has submitted the report to the Authority for consideration.

17. In its report, IE has submitted net Heat Rate numbers (HHV) on annual basis taking into account both fuels. From the report, the Authority has noted that the Heat Rate numbers of FY 2021 and onwards have changed due to impact of HSD operation as compared to the numbers as calculated by IE and submitted by KE vide Review Motion for KCCP. Keeping in view the recent submissions, the Authority has decided to approve

17



Heat Rate numbers of KCCP plant on Gas fuel before FY 2021 (before impact/operation of HSD). For FY 2021-2023, a separate decision will be awarded after reviewing the Heat Rate test report of IE on HSD fuel.



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Decision of the Authority:

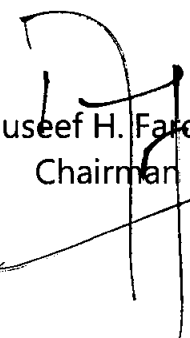
Based on the Heat Rate tests conducted by the Independent Engineer for KCCP, the Authority decides as follows;

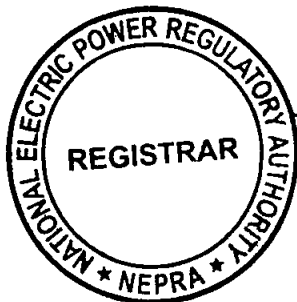
- i. For the period from July 2016 to May 2019, the heat rate of 8,298.51 Btu/kWh - net HHV, corresponding to 41.12% efficiency is approved.
- ii. For June 2019 the heat rate of 8,367.972 Btu/kWh - net HHV corresponding to 40.78% efficiency is approved.
- iii. For the period from July 2019 to June 2020, the Heat Rate of 8421.4351 Btu/kWh - net HHV corresponding to 40.52% efficiency is approved.
- iv. The above Heat Rate numbers are approved without any further adjustment for degradation or partial loading, etc.
- v. KE is required to conduct maintenance including Major Overhaul of its plants / units as per prudent utility practices and recommendations of OEM.
- vi. In case of non-requirement of Gas Compressors – the relevant capacity and heat rates would be adjusted. For such a scenario, relevant capacity and heat rates calculated during the present tests would be used.



(Engr. Maqsood Anwar Khan)
Member


(Rafique Ahmed Shaikh)
Member


(Rehmatullah Baloch)
Member


(Tauseef H. Farooqi)
Chairman




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