



OMS (Private) Limited

Reference No. OMS/TE/KE/BQPS-III/24/11/01

Dated: 15.11.2024

Aamir Fayyaz Khan

Plant Head 900MW BQPS-III

K-Electric, 39-B Sunset Boulevard

Phase-IV, DHA, Karachi

SUBJECT: VETTING OF DOCUMENTS FOR KE 900 MW CCPP BQPS-III

UNIT-I & UNIT-II

Ref: KE's PO # 7200001007 dated 15.11.2024

With reference to the subject mentioned above, KE has engaged OMS (Private) Limited as third party to vet the Combined Cycle (Plant) and Open Cycle (Gas Turbine) Degradation Correction Tables, Startup and Black-Start Costs, and Part Load Correction Tables (RLNG) as per the requirement of NEPRA.

OMS has carried out the technical review and vetted the aforementioned documents in accordance with the requirements of the purchase order. The required documents, duly signed and stamped, are enclosed herewith for further action at your end.

On behalf of Independent Engineer - OMS (Private) Ltd.



Abu Adil

Director Power Generation

OMS Private Limited



Enclosed: As under

01	CC HR Degradation Table (at 2000 hours interval) for Gas	06	OC Degradation curve & table
02	CC Output Degradation Table (at 2000 hours interval) for Gas	07	OC HR Degradation Table (at 2000 hours interval) for HSD
03	Part Load Table for Gas (at 1% intervals)	08	OC Output Degradation Table (at 2000 hours interval) for HSD
04	Startup and Black Start Cost for Gas	09	OC HR Degradation Table (at 2000 hours interval) for Gas
05	Startup and Black Start Cost for HSD	10	OC Output Degradation Table (at 2000 hours interval) for Gas

CCPP Start-up Cost-Gas	BQPS-III UNIT (1+1+1)							
Backfeed charges (Upto GT Synchron)	Hot Startup (2 to 8 hrs)		Warm-I Startup (8 to 48 hrs)		Warm-II Startup (48 to 150 hrs)		Cold Startup (> 150 hrs)	
Backfeed import duration	89	min	89	min	89	min	89	min
Power import	7.69	MW	7.69	MW	7.69	MW	7.69	MW
Power import rate	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh
Backfeed charges	281,428.79	PKR	281,428.79	PKR	281,428.79	PKR	281,428.79	PKR
Gas price (HHV)	2929.79	PKR/MMBtu	2929.79382	PKR/MMBtu	2929.79382	PKR/MMBtu	2929.79382	PKR/MMBtu
Gas HHV	1070	Btu/Scf	1070	Btu/Scf	1070	Btu/Scf	1070	Btu/Scf
Upto GT Synchronization								
Operation from FIRE ON to FSNL	7	min	7	min	7	min	7	min
Gas consumption from FIRE ON to FSNL	11.5	MMSCFD	11.5	MMSCFD	11.5	MMSCFD	11.5	MMSCFD
Fuel gas cost for operation from FIRE ON to FSNL	175,248.47	PKR	175,248.47	PKR	175,248.47	PKR	175,248.47	PKR
From GT Synchronization up to ST Synchron								
Operation from GT Synchron to ST Synchron	75	min	170	min	240	min	390	min
Load from GT Synchron to ST Synchron (MW) - Net	90	MW	70	MW	70	MW	70	MW
Baseload GT efficiency (HHV) - Net	34.18%		34.18%		34.18%		34.18%	
Part load GT efficiency heat rate ratio	1.49		1.75		1.75		1.75	
Fuel cost from GT Synchron to ST Synchron	4,898,249	PKR	10,177,473	PKR	14,368,197	PKR	23,348,320	PKR
Total Start-up Charges	5,354,926	PKR	10,634,150	PKR	14,824,874	PKR	23,804,998	PKR
Net Revenue								
From GT Synchronization up to ST Synchron								
Operation from GT Synchron to ST Synchron	75	min	170	min	240	min	390	min
Load from GT Synchron to ST Synchron (MW) - Net	90	MW	70	MW	70	MW	70	MW
Baseload Unit efficiency (HHV) - Net	53.42%		53.42%		53.42%		53.42%	
Revenue from GT Synchron to ST Synchron	2,105,328	PKR	3,711,615	PKR	5,239,927	PKR	8,514,881	PKR
Net Revenue	3,249,599	PKR	6,922,535	PKR	9,584,948	PKR	15,290,116	PKR

Note 1: Formula for start up charges is given in petition which includes MDI charge and Start up charge. Calculation of start up charge is given above

Note 2: Start up charge is to be indexed due to change in fuel prices and Per unit charge for import based on latest applicable Consumer tariff rates and adjustments notified by GoP

Note 3: Efficiencies used above represent Base year efficiencies, which shall be updated based on applicable degradation as per the curve. Curves for Open Cycle are under discussion with EPC/OEM and will be submitted to the Authority in due course.

Note 4: Startup Costs for HSD will be provided post finalization of Heat Rate Results and relevant documentation from OEM regarding the same.



CCPP Black Start-up Cost-Gas	BQPS-III UNIT (1+1+1)		BQPS-III UNIT (1+1+1)		BQPS-III UNIT (1+1+1)		BQPS-III UNIT (1+1+1)		BQPS-III UNIT (1+1+1)	
Backfeed charges (Upto GT Synch)	Hot Startup (2 to 8 hrs)		Warm-I Startup (8 to 48 hrs)		Warm-II Startup (48 to 150 hrs)		Cold Startup (> 150 hrs)		Without ST	
Auxiliary requirement duration	89	min	89	min	89	min	89	min	89	min
Rate HSD Flow for One BSDG	207.7	g/KWh	207.7	g/KWh	207.7	g/KWh	207.7	g/KWh	207.7	g/KWh
Auxiliary requirement	9	MW	9	MW	9	MW	9	MW	9	MW
Density	0.83	kg/L	0.8334	kg/L	0.8334	kg/L	0.8334	kg/L	0.8334	kg/L
HSD consumed in BSDG	4449	Lt	4449	Lt	4449	Lt	4449	Lt	4449	Lt
Cost of HSD per Litre	219.94	PKR/ Lt	219.94	PKR/ Lt	219.94	PKR/ Lt	219.94	PKR/ Lt	219.94	PKR/ Lt
Cost of HSD consumed in BSDG	978,420	PKR	978,420	PKR	978,420	PKR	978,420	PKR	978,420	PKR
Gas price (HHV)	2929.79	PKR/MMBtu	2929.79382	PKR/MMBtu	2929.79382	PKR/MMBtu	2929.79382	PKR/MMBtu	2929.79382	PKR/MMBtu
Gas HHV	1070	Btu/Scf	1070	Btu/Scf	1070	Btu/Scf	1070	Btu/Scf	1070	Btu/Scf
Upto GT Synchronization										
Operation from FIRE ON to FSNL (+1.4 min considered for synch)	7	min	7	min	7	min	7	min	7	min
Gas consumption from FIRE ON to FSNL	11.5	MMSCFD	11.5	MMSCFD	11.5	MMSCFD	11.5	MMSCFD	11.5	MMSCFD
Fuel gas cost for operation from FIRE ON to FSNL	175,248.47	PKR	175,248.47	PKR	175,248.47	PKR	175,248.47	PKR	175,248.47	PKR
GT Synch to Dead Bus / Grid Energization										
Operation from GT synch to Grid Energizing	30	min	30	min	30	min	30	min	30	min
Gas consumption at FSNL - Note 1	20.00	MMSCFD	20.00	MMSCFD	20.00	MMSCFD	20.00	MMSCFD	20.00	MMSCFD
Fuel gas cost for operation of Dead Bus Synch	1,306,199.74	PKR	1,306,199.74	PKR	1,306,199.74	PKR	1,306,199.74	PKR	1,306,199.74	PKR
Total Start-up Charges	2,459,868	PKR	2,459,868	PKR	2,459,868	PKR	2,459,868	PKR	2,459,868	PKR
From Grid Energization up to ST Synch										
Operation from GT Synch to ST Synch	75	min	170	min	240	min	390	min		
Load from GT Synch to ST Synch (MW) - Net	90	MW	70	MW	70	MW	70	MW		
Baseload GT efficiency (HHV) - Net	34.18%		34.18%		34.18%		34.18%			
Part load GT efficiency heat rate ratio	1.49		1.75		1.75		1.75			
Fuel cost from GT Synch to ST Synch	4,898,249	PKR	10,177,473	PKR	14,368,197	PKR	23,348,320	PKR		
Total Start-up Charges *	7,358,118	PKR	12,637,341	PKR	16,828,066	PKR	25,808,189	PKR		
Net Revenue										
From GT Synchronization up to ST Synch										
Operation from GT Synch to ST Synch	75	min	170	min	240	min	390	min		
Load from GT Synch to ST Synch (MW) - Net	90	MW	70	MW	70	MW	70	MW		
Baseload Unit efficiency (HHV) - Net	53.42%		53.42%		53.42%		53.42%			
Revenue from GT Synch to ST Synch	2,105,328	PKR	3,711,615	PKR	5,239,927	PKR	8,514,881	PKR		
Net Revenue	5,252,790	PKR	8,925,727	PKR	11,588,139	PKR	17,293,308	PKR		

Note 1: 30 mins of parallel operation of GT has been assumed at FSNL to ensure GT reliability while complete auxiliary load is kept on EDG (being stable equipment).

Note 2: Black Start Costs for HSD will be provided post finalization of Heat Rate Results and relevant documentation from OEM regarding the same.



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CCPP Start-up Cost-HSD	BQPS-III UNIT (1+1+1)							
	Hot Startup (2 to 8 hrs)		Warm-I Startup (8 to 48 hrs)		Warm-II Startup (48 to 150 hrs)		Cold Startup (> 150 hrs)	
Backfeed charges (Upto GT Synchron)								
Backfeed import duration	185	min	185	min	185	min	185	min
Power import	6.92	MW	6.92	MW	6.92	MW	6.92	MW
Power import rate	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh
Backfeed charges	526,770.68	PKR	526,770.68	PKR	526,770.68	PKR	526,770.68	PKR
HSD price	219.94	PKR / Liter	219.94	PKR/MMBtu	219.94	PKR/MMBtu	219.94	PKR/MMBtu
HSD GCV	36415	Btu/L	36415	Btu/L	36415	Btu/L	36415	Btu/L
Upto GT Synchronization								
Operation from FIRE ON to FSNL	7	min	7	min	7	min	7	min
Gas consumption from FIRE ON to FSNL	150.0	LPM	150.0	LPM	150.0	LPM	150.0	LPM
Fuel gas cost for operation from FIRE ON to FSNL	230,937.00	PKR	230,937.00	PKR	230,937.00	PKR	230,937.00	PKR
From GT Synchronization up to ST Synchron								
Operation from GT Synchron to ST Synchron	95	min	190	min	260	min	410	min
Load from GT Synchron to ST Synchron (MW) - Net	90	MW	70	MW	70	MW	70	MW
Baseload GT efficiency (HHV) - Net	33.25%		33.25%		33.25%		33.25%	
Part load GT efficiency heat rate ratio	1.45		1.63		1.63		1.63	
Fuel cost from GT Synchron to ST Synchron	12,787,312	PKR	22,356,901	PKR	30,593,654	PKR	48,243,839	PKR
Total Start-up Charges	13,545,019	PKR	23,114,609	PKR	31,351,362	PKR	49,001,547	PKR
Net Revenue								
From GT Synchronization up to ST Synchron								
Operation from GT Synchron to ST Synchron	95	min	190	min	260	min	410	min
Load from GT Synchron to ST Synchron (MW) - Net	90	MW	70	MW	70	MW	70	MW
Baseload Unit efficiency (HHV) - Net	50.63%		50.63%		50.63%		50.63%	
Revenue from GT Synchron to ST Synchron	5,800,198	PKR	9,022,530	PKR	12,346,620	PKR	19,469,670	PKR
Net Revenue	7,744,821	PKR	14,092,079	PKR	19,004,742	PKR	29,531,877	PKR

Note 1: Formula for start up charges is given in petition which includes MDI charge and Start up charge. Calculation of start up charge is given above

Note 2: Start up charge is to be indexed due to change in fuel prices and Per unit charge for import based on latest applicable Consumer tariff rates and adjustments notified by GoP

Note 3: Efficiencies used above represent Base year efficiencies, which shall be updated based on applicable degradation as per the curve.



CCPP Black Start-up Cost-HSD	BQPS-III UNIT (1+1+1)		BQPS-III UNIT (1+1+1)		BQPS-III UNIT (1+1+1)		BQPS-III UNIT (1+1+1)		BQPS-III UNIT (1+1+1)	
Auxiliary Requirement	Hot Startup (2 to 8 hrs)		Warm-I Startup (8 to 48 hrs)		Warm-II Startup (48 to 150 hrs)		Cold Startup (> 150 hrs)		Without ST	
Auxiliary requirement duration	230	min	230	min	230	min	230	min	230	min
Rate HSD Flow for One BSDG	207.7	g/KWh	207.7	g/KWh	207.7	g/KWh	207.7	g/KWh	207.7	g/KWh
Auxiliary requirement	9	MW	9	MW	9	MW	9	MW	9	MW
Density	0.83	kg/L	0.8334	kg/L	0.8334	kg/L	0.8334	kg/L	0.8334	kg/L
HSD consumed in BSDG	9720	Lt	9720	Lt	9720	Lt	9720	Lt	9720	Lt
Cost of HSD per Litre	219.94	PKR/ Lt	219.94	PKR/ Lt	219.94	PKR/ Lt	219.94	PKR/ Lt	219.94	PKR/ Lt
Cost of HSD consumed in BSDG	2,137,725	PKR	2,137,725	PKR	2,137,725	PKR	2,137,725	PKR	2,137,725	PKR
HSD price	219.94	PKR / Liter	219.94	PKR / Liter	219.94	PKR / Liter	219.94	PKR / Liter	219.94	PKR / Liter
HSD GCV	36415	Btu/L	36415	Btu/L	36415	Btu/L	36415	Btu/L	36415	Btu/L
Upto GT Synchronization										
Operation from FIRE ON to FSNL (+1.4 min considered for synch)	7	min	7	min	7	min	7	min	7	min
HSD consumption from FIRE ON to FSNL	150.0	LPM	150.0	LPM	150.0	LPM	150.0	LPM	150.0	LPM
HSD cost for operation from FIRE ON to FSNL	230,937.00	PKR	230,937.00	PKR	230,937.00	PKR	230,937.00	PKR	230,937.00	PKR
GT Synch to Dead Bus / Grid Energization										
Operation from GT synch to Grid Energizing	30	min	30	min	30	min	30	min	30	min
HSD consumption at FSNL - Note 1	312.50	LPM	312.50	LPM	312.50	LPM	312.50	LPM	312.50	LPM
HSD cost for operation of Dead Bus Synch	2,061,937.50	PKR	2,061,937.50	PKR	2,061,937.50	PKR	2,061,937.50	PKR	2,061,937.50	PKR
Total Start-up Charges	4,430,599	PKR	4,430,599	PKR	4,430,599	PKR	4,430,599	PKR	4,430,599	PKR
From Grid Energization up to ST Synch										
Operation from GT Synch to ST Synch	95	min	190	min	260	min	410	min		
Load from GT Synch to ST Synch (MW) - Net	90	MW	70	MW	70	MW	70	MW		
Baseload GT efficiency (HHV) - Net	33.25%		33.25%		33.25%		33.25%			
Part load GT efficiency heat rate ratio	1.45		1.63		1.63		1.63			
Fuel cost from GT Synch to ST Synch	12,787,312	PKR	22,356,901	PKR	30,593,654	PKR	48,243,839	PKR		
Total Start-up Charges *	17,217,911	PKR	26,787,500	PKR	35,024,253	PKR	52,674,438	PKR		
Net Revenue										
From GT Synchronization up to ST Synch										
Operation from GT Synch to ST Synch	95	min	190	min	260	min	410	min		
Load from GT Synch to ST Synch (MW) - Net	90	MW	70	MW	70	MW	70	MW		
Baseload Unit efficiency (HHV) - Net	50.63%		50.63%		50.63%		50.63%			
Revenue from GT Synch to ST Synch	5,800,158	PKR	9,022,530	PKR	12,346,620	PKR	19,469,670	PKR		
Net Revenue	11,417,713	PKR	17,764,970	PKR	22,677,633	PKR	33,204,768	PKR		

Note 1: 30 mins of parallel operation of GT has been assumed at FSNL to ensure GT reliability while complete auxiliary load is kept on EDG (being stable equipment).
Note 2: Black Start Costs for HSD will be updated post finalization of Heat Rate Results.



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10.4 IMPACT OF PART LOAD OPERATIONS

All thermal power plants, including the Combined Cycle Power Plants operate at maximum efficiency near to their rated capacity. When these are operated at below rated capacity, their efficiency starts decreasing with corresponding decline in Capacity. The OEM/ EPC contractors develop heat rate correction curves for part load operation of the plant which are used for assessing the efficiency loss and thereby increased fuel cost with reference to the different partial loads. Same is the case with BQPS-III Unit-I, where EPC Contractor has provided a Net Heat Rate correction curve versus part load operation as shown below and EPC document is enclosed in APPENDIX N.

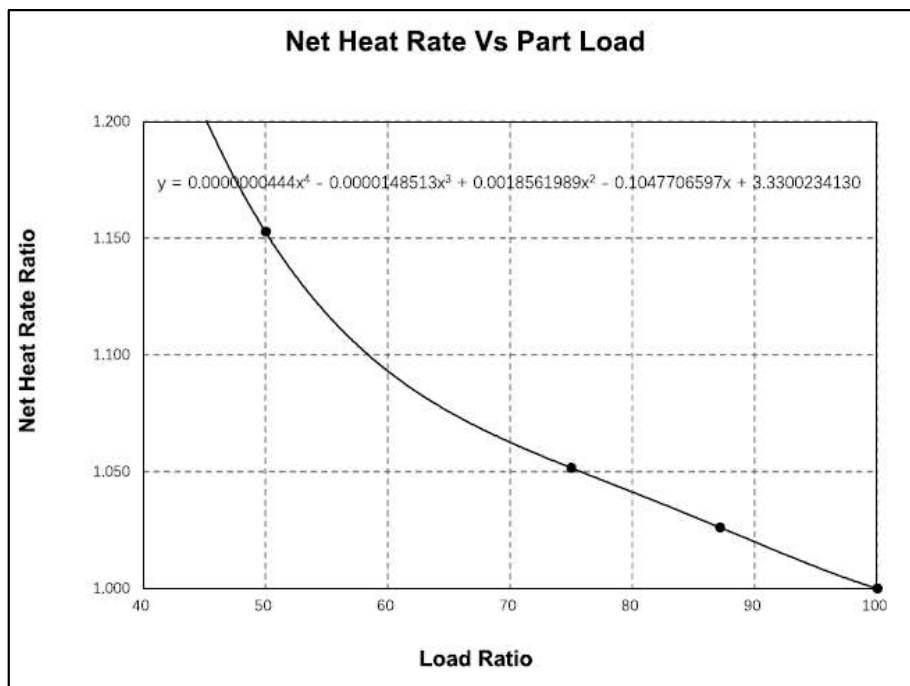


Figure 8. Combined Cycle Net Heat Rate vs. Part Load.

IE has reviewed the Net Heat Rate vs Part Load curve for BQPS-III plant and is of the opinion that the impact of part load shown in the correction curve seems reasonable. A table of Net Heat Rate correction factor vs Part Load operations has also been derived from available correction curve and is given below.

10.4 IMPACT OF PART LOAD OPERATIONS

All thermal power plants, including the Combined Cycle Power Plants operate at maximum efficiency near to their rated capacity. When these are operated at below rated capacity, their efficiency starts decreasing with corresponding decline in Capacity. The OEM/ EPC contractors develop heat rate correction curves for part load operation of the plant which are used for assessing the efficiency loss and thereby increased fuel cost with reference to the different partial loads. Same is the case with BQPS-III Unit-II, where EPC Contractor has provided a Net Heat Rate correction curve versus part load operation as shown below and EPC document is enclosed in APPENDIX N.

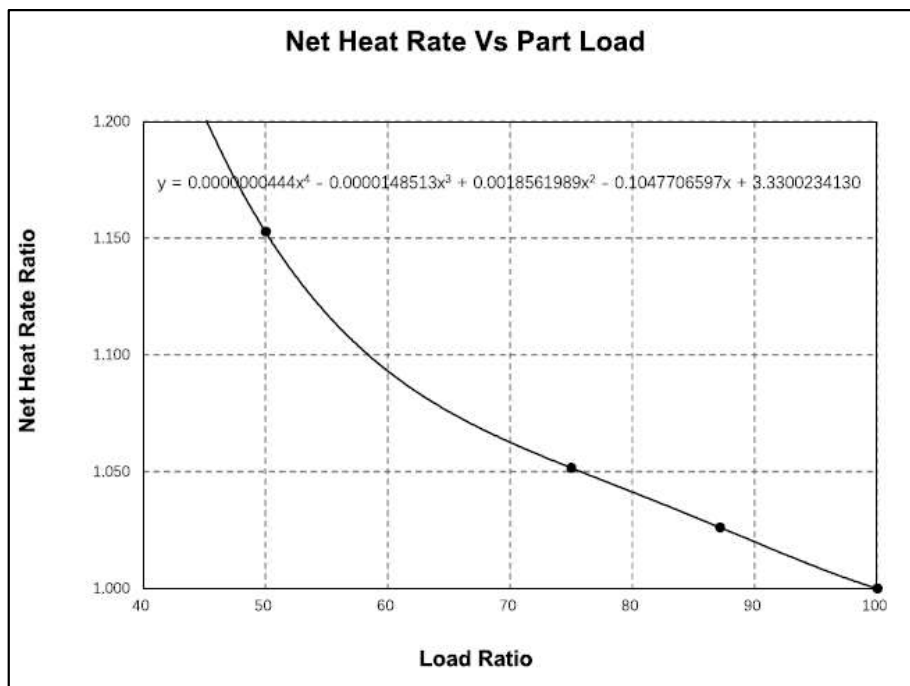


Figure 8. Combined Cycle Net Heat Rate vs. Part Load.

IE has reviewed the Net Heat Rate vs Part Load curve for BQPS-III plant and is of the opinion that the impact of part load shown in the correction curve seems reasonable. A table of Net Heat Rate correction factor vs Part Load operations has also been derived from available correction curve and is given below.



APPENDIX L. NET HEAT RATE CORRECTION CURVE (EPC CONTRACTOR)

BQPS-III Net Heat Rate Vs Part Load (on HSD)

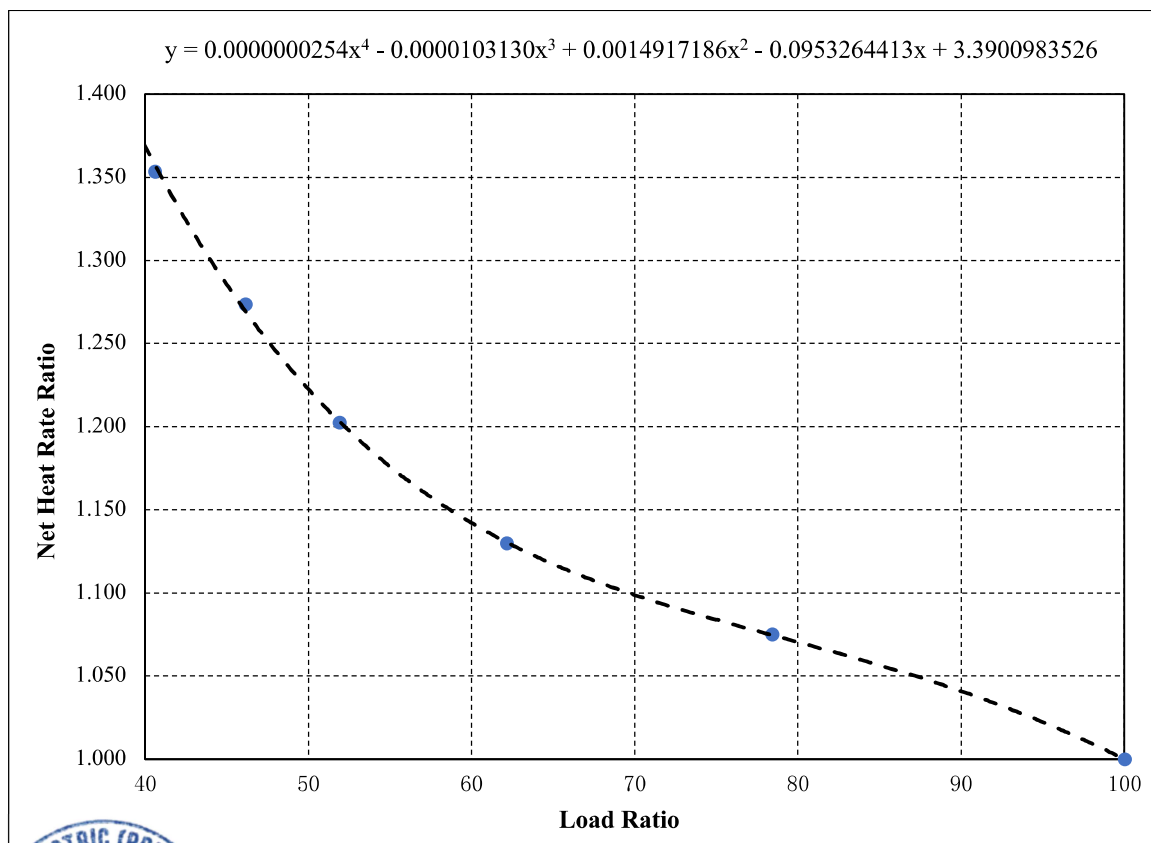


Fig. 13 FO-13





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OMS has carried out the technical review and vetted the aforementioned documents in accordance with the requirements of the purchase order. The required documents, duly signed and stamped, are enclosed herewith for further action at your end.

On behalf of Independent Engineer - OMS (Private) Ltd.



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Enclosed: As under

01	CC HR Degradation Table (at 2000 hours interval) for Gas	06	OC Degradation curve & table
02	CC Output Degradation Table (at 2000 hours interval) for Gas	07	OC HR Degradation Table (at 2000 hours interval) for HSD
03	Part Load Table for Gas (at 1% intervals)	08	OC Output Degradation Table (at 2000 hours interval) for HSD
04	Startup and Black Start Cost for Gas	09	OC HR Degradation Table (at 2000 hours interval) for Gas
05	Startup and Black Start Cost for HSD	10	OC Output Degradation Table (at 2000 hours interval) for Gas

BQPS-III Part Load Correction Factors for Net Heat Rate on RLNG Fuel for Unit-I & Unit-II

Part Load	Partial Load Correction Factor
100%	1.0000
99%	1.0052
98%	1.0068
97%	1.0086
96%	1.0104
95%	1.0123
94%	1.0142
93%	1.0162
92%	1.0182
91%	1.0203
90%	1.0224
89%	1.0244
88%	1.0265
87%	1.0286
86%	1.0307
85%	1.0327
84%	1.0348
83%	1.0368
82%	1.0388
81%	1.0408
80%	1.0428
79%	1.0448
78%	1.0468
77%	1.0488
76%	1.0508
75%	1.0528
74%	1.0548
73%	1.0569
72%	1.0591
71%	1.0612
70%	1.0635
69%	1.0658
68%	1.0683
67%	1.0709
66%	1.0736
65%	1.0764
64%	1.0794
63%	1.0826
62%	1.0861
61%	1.0897
60%	1.0936
59%	1.0978
58%	1.1024
57%	1.1072
56%	1.1124
55%	1.1180
54%	1.1241
53%	1.1306



BQPS-III Part Load Correction Factors for Net Heat Rate on RLNG Fuel for Unit-I & Unit-II

Part Load	Partial Load Correction Factor
52%	1.1375
51%	1.1450
50%	1.1531
49%	1.1617
48%	1.1710
47%	1.1809
46%	1.1915
45%	1.2029
44%	1.2150
43%	1.2280
42%	1.2418
41%	1.2566
40%	1.2723
39%	1.2890
38%	1.3067
37%	1.3256
36%	1.3456
35%	1.3668
34%	1.3892
33%	1.4129
32%	1.4380
31%	1.4645
30%	1.4925
29%	1.5219
28%	1.5530
27%	1.5857
26%	1.6200
25%	1.6562
24%	1.6941
23%	1.7340
22%	1.7757
21%	1.8195
20%	1.8654
19%	1.9134
18%	1.9636
17%	2.0161
16%	2.0710
15%	2.1282

* The correction factor for part load percentage less than 40% is extrapolated from polynomial equation provided in EPC Part Load Curve.

Sh. Ash



IE has reviewed the Net Heat Rate Vs Part Load curve for BQPS-III plant and is of the opinion that the impact of part load shown in the correction curve seems reasonable. A table of Net Heat Rate correction factor vs Part Load operations has also been derived from available correction curve and is given below in Table 10.

Table 10. Net Heat Rate Correction Factor vs Part Load Percentage

Part Load	Part Load Correction Factor
100%	1.0000
99%	1.0063
98%	1.0109
97%	1.0153
96%	1.0195
95%	1.0236
94%	1.0275
93%	1.0313
92%	1.0350
91%	1.0385
90%	1.0420
89%	1.0453
88%	1.0484
87%	1.0515
86%	1.0545
85%	1.0574
84%	1.0603
83%	1.0631
82%	1.0658
81%	1.0685
80%	1.0711
79%	1.0737
78%	1.0764
77%	1.0790
76%	1.0817
75%	1.0844
74%	1.0872
73%	1.0900
72%	1.0930
71%	1.0960



Part Load	Part Load Correction Factor
70%	1.0992
69%	1.1025
68%	1.1060
67%	1.1096
66%	1.1135
65%	1.1176
64%	1.1219
63%	1.1266
62%	1.1315
61%	1.1367
60%	1.1423
59%	1.1482
58%	1.1546
57%	1.1613
56%	1.1685
55%	1.1762
54%	1.1844
53%	1.1931
52%	1.2024
51%	1.2122
50%	1.2227
49%	1.2338
48%	1.2456
47%	1.2582
46%	1.2715
45%	1.2855
44%	1.3004
43%	1.3161
42%	1.3327
41%	1.3503
40%	1.3688
39%	1.3883
38%	1.4088
37%	1.4304
36%	1.4531
35%	1.4770

Part Load	Part Load Correction Factor
34%	1.5020
33%	1.5283
32%	1.5559
31%	1.5847
30%	1.6150
29%	1.6466
28%	1.6797
27%	1.7143
26%	1.7504
25%	1.7880
24%	1.8274
23%	1.8683
22%	1.9110
21%	1.9555
20%	2.0018
19%	2.0500
18%	2.1001
17%	2.1521
16%	2.2062
15%	2.2623

* The correction factor for part load percentage less than 40% is extrapolated from polynomial equation provided in OEM/ EPC Part Load Curve.

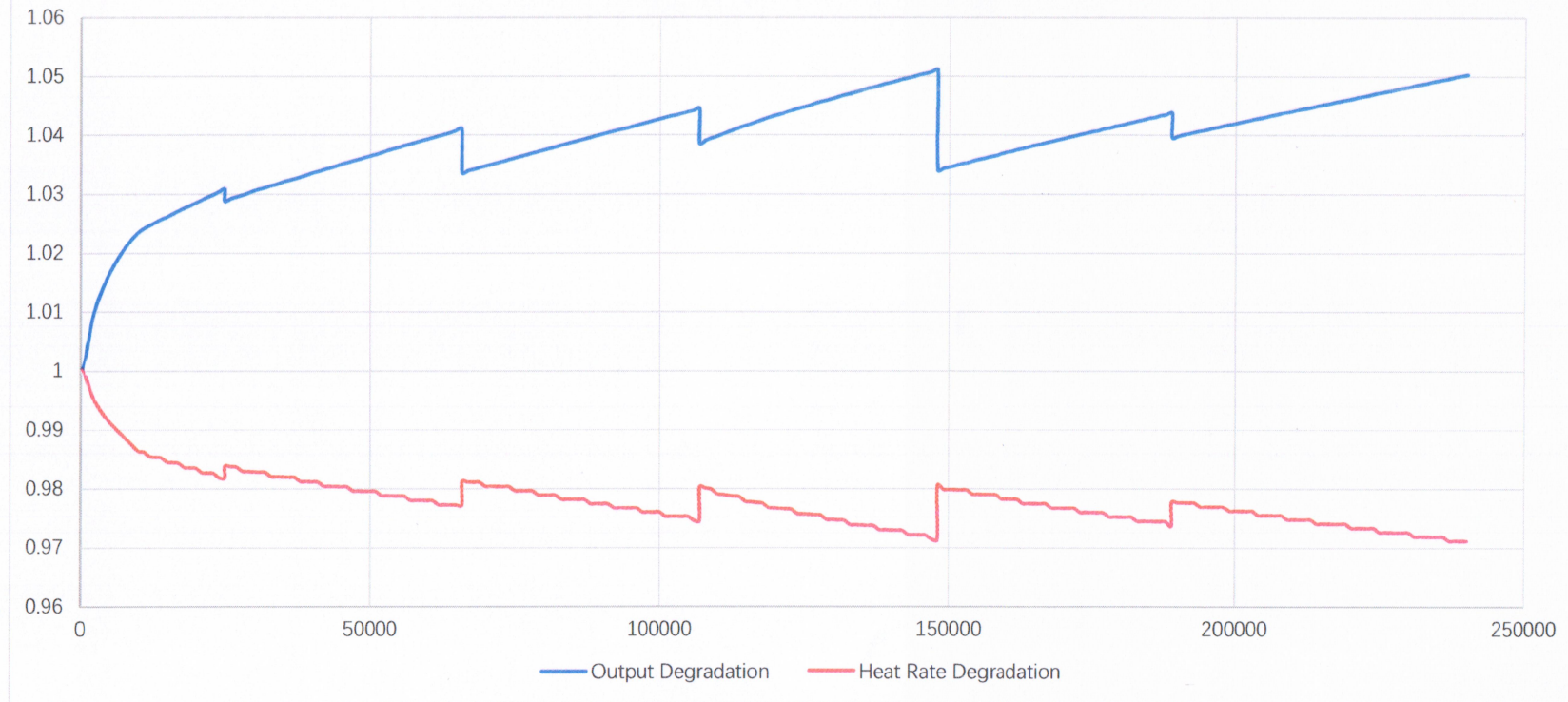
11.5 EFFECT OF GRID INSTABILITY AND FREQUENCY VARIATIONS

11.5.1 Effects of Grid Instability and Frequency Variation

As KE power system network is interconnected with that of NTDC network which in turn is a comparatively huge system, and the frequency in NTDC network including KE network is governed by the NTDC National Power Control Center, As the Grid instability (system voltages disturbances, breakdowns and frequency fluctuations) increases the number of trips/forced outages, which will result in the increase of the Heat rate and reduction in the generating capability of the plant A report on Grid Instability provided by KE is attached at APPENDIX M.

Large frequency deviations can be a problem which may lead to equipment damage and even blackouts. Large frequency deviations are usually caused by sudden, unexpected changes in load due to tripping of EHV transmission lines and tripping of large power stations. The impact of the

Combined Cycle Degradation Curve for BQPS-III 900MW CCPP



Degradation Factors for information only

Combined Cycle Degradation Correction Factor for BQPS-III 900MW CCPP



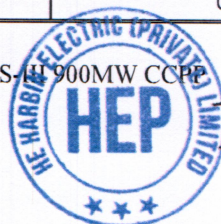
OPERATING HOURS	COMBINED CYCLE OUTPUT DEGRADATION	COMBINED CYCLE HEAT RATE DEGRADATION
200	1	1
1000	1.00258	0.99834
2000	1.00798	0.99549
3000	1.01148	0.99362
4000	1.01411	0.99218
5000	1.01629	0.99098
6000	1.01813	0.98992
7000	1.01973	0.98894
8000	1.02114	0.98797
9000	1.02241	0.98700
10000	1.02334	0.98604
11000	1.02404	0.98593
12000	1.02456	0.98517
13000	1.02509	0.98506
14000	1.02561	0.98496
15000	1.02603	0.98422
16000	1.02654	0.98413
17000	1.02704	0.98405
18000	1.02753	0.98331
19000	1.02794	0.98324
20000	1.02843	0.98317
21000	1.02891	0.98245
22000	1.02940	0.98238
23000	1.02980	0.98231
24000	1.03028	0.98159
24999	1.03077	0.98153
25000	1.02876	0.98350
26000	1.02915	0.98344
27000	1.02946	0.98338
28000	1.02977	0.98267
29000	1.03007	0.98261
30000	1.03046	0.98256
31000	1.03076	0.98252
32000	1.03105	0.98247
33000	1.03134	0.98177
34000	1.03161	0.98175
35000	1.03199	0.98172

Combined Cycle Degradation Correction Factor for BQPS-H 900MW CCPP



OPERATING HOURS	COMBINED CYCLE OUTPUT DEGRADATION	COMBINED CYCLE HEAT RATE DEGRADATION
36000	1.03228	0.98168
37000	1.03256	0.98164
38000	1.03285	0.98095
39000	1.03314	0.98091
40000	1.03351	0.98088
41000	1.03379	0.98084
42000	1.03408	0.98015
43000	1.03436	0.98012
44000	1.03464	0.98009
45000	1.03501	0.98006
46000	1.03529	0.98003
47000	1.03557	0.97934
48000	1.03585	0.97931
49000	1.03613	0.97928
50000	1.03641	0.97926
51000	1.03668	0.97923
52000	1.03696	0.97855
53000	1.03732	0.97852
54000	1.03760	0.97849
55000	1.03787	0.97847
56000	1.03815	0.97845
57000	1.03843	0.97776
58000	1.03870	0.97774
59000	1.03897	0.97772
60000	1.03925	0.97769
61000	1.03952	0.97767
62000	1.03979	0.97699
63000	1.04007	0.97697
64000	1.04034	0.97695
65000	1.04070	0.97693
65999	1.04097	0.97691
66000	1.03361	0.98085
67000	1.03388	0.98082
68000	1.03415	0.98080
69000	1.03442	0.98078
70000	1.03469	0.98011
71000	1.03496	0.98009
72000	1.03523	0.98007

Combined Cycle Degradation Correction Factor for BQPS-41900MW CCPP



OPERATING HOURS	COMBINED CYCLE OUTPUT DEGRADATION	COMBINED CYCLE HEAT RATE DEGRADATION
73000	1.03550	0.98005
74000	1.03577	0.98003
75000	1.03604	0.97936
76000	1.03631	0.97934
77000	1.03658	0.97932
78000	1.03685	0.97930
79000	1.03712	0.97863
80000	1.03738	0.97861
81000	1.03765	0.97860
82000	1.03792	0.97858
83000	1.03819	0.97791
84000	1.03846	0.97789
85000	1.03872	0.97787
86000	1.03899	0.97786
87000	1.03926	0.97784
88000	1.03952	0.97717
89000	1.03979	0.97715
90000	1.04005	0.97714
91000	1.04032	0.97712
92000	1.04059	0.97645
93000	1.04085	0.97644
94000	1.04103	0.97642
95000	1.04130	0.97641
96000	1.04157	0.97639
97000	1.04183	0.97572
98000	1.04210	0.97571
99000	1.04236	0.97569
100000	1.04262	0.97568
101000	1.04289	0.97501
102000	1.04315	0.97500
103000	1.04333	0.97498
104000	1.04360	0.97497
105000	1.04386	0.97496
106000	1.04413	0.97429
106999	1.04439	0.97428
107000	1.03855	0.97995
108000	1.03897	0.97979
109000	1.03938	0.97963

Combined Cycle Degradation Correction Factor for BQPS-III 900MW CCGT



OPERATING HOURS	COMBINED CYCLE OUTPUT DEGRADATION	COMBINED CYCLE HEAT RATE DEGRADATION
110000	1.03969	0.97883
111000	1.04008	0.97869
112000	1.04047	0.97855
113000	1.04084	0.97843
114000	1.04120	0.97832
115000	1.04156	0.97755
116000	1.04184	0.97745
117000	1.04220	0.97734
118000	1.04255	0.97724
119000	1.04289	0.97649
120000	1.04322	0.97641
121000	1.04347	0.97633
122000	1.04380	0.97625
123000	1.04412	0.97618
124000	1.04444	0.97545
125000	1.04468	0.97538
126000	1.04499	0.97532
127000	1.04531	0.97525
128000	1.04563	0.97519
129000	1.04586	0.97447
130000	1.04617	0.97441
131000	1.04647	0.97435
132000	1.04678	0.97430
133000	1.04700	0.97359
134000	1.04730	0.97354
135000	1.04760	0.97349
136000	1.04790	0.97344
137000	1.04810	0.97341
138000	1.04837	0.97273
139000	1.04866	0.97269
140000	1.04887	0.97265
141000	1.04916	0.97261
142000	1.04945	0.97258
143000	1.04965	0.97189
144000	1.04993	0.97185
145000	1.05022	0.97182
146000	1.05042	0.97178
147000	1.05070	0.97110

Combined Cycle Degradation Correction Factor for BQPS-II 300 MW CCGP



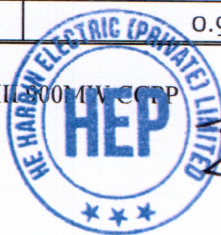
OPERATING HOURS	COMBINED CYCLE OUTPUT DEGRADATION	COMBINED CYCLE HEAT RATE DEGRADATION
147999	1.05098	0.97106
148000	1.03401	0.98025
149000	1.03429	0.97957
150000	1.03449	0.97954
151000	1.03477	0.97951
152000	1.03505	0.97948
153000	1.03524	0.97945
154000	1.03552	0.97877
155000	1.03580	0.97874
156000	1.03599	0.97871
157000	1.03627	0.97869
158000	1.03646	0.97866
159000	1.03674	0.97798
160000	1.03701	0.97796
161000	1.03720	0.97793
162000	1.03748	0.97791
163000	1.03767	0.97723
164000	1.03794	0.97720
165000	1.03822	0.97718
166000	1.03841	0.97716
167000	1.03868	0.97714
168000	1.03887	0.97646
169000	1.03914	0.97644
170000	1.03933	0.97642
171000	1.03960	0.97640
172000	1.03979	0.97638
173000	1.04006	0.97570
174000	1.04025	0.97568
175000	1.04052	0.97566
176000	1.04070	0.97564
177000	1.04097	0.97562
178000	1.04116	0.97495
179000	1.04143	0.97493
180000	1.04161	0.97491
181000	1.04188	0.97489
182000	1.04207	0.97488
183000	1.04233	0.97420
184000	1.04252	0.97419

Combined Cycle Degradation Correction Factor for BQPS-III 980MW COGS

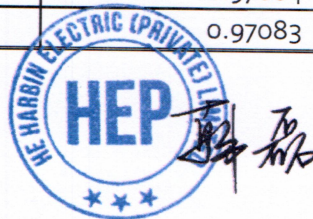


OPERATING HOURS	COMBINED CYCLE OUTPUT DEGRADATION	COMBINED CYCLE HEAT RATE DEGRADATION
185000	1.04279	0.97417
186000	1.04297	0.97415
187000	1.04324	0.97414
188000	1.04342	0.97412
188999	1.04369	0.97345
189000	1.03959	0.97738
190000	1.03977	0.97737
191000	1.04004	0.97735
192000	1.04022	0.97734
193000	1.04049	0.97732
194000	1.04067	0.97665
195000	1.04086	0.97663
196000	1.04112	0.97662
197000	1.04130	0.97661
198000	1.04157	0.97659
199000	1.04175	0.97592
200000	1.04193	0.97591
201000	1.04220	0.97589
202000	1.04238	0.97588
203000	1.04264	0.97586
204000	1.04282	0.97519
205000	1.04300	0.97518
206000	1.04327	0.97517
207000	1.04345	0.97515
208000	1.04371	0.97514
209000	1.04389	0.97447
210000	1.04407	0.97446
211000	1.04434	0.97444
212000	1.04452	0.97443
213000	1.04470	0.97442
214000	1.04496	0.97375
215000	1.04514	0.97374
216000	1.04532	0.97373
217000	1.04558	0.97371
218000	1.04576	0.97370
219000	1.04594	0.97369
220000	1.04612	0.97302
221000	1.04638	0.97301

Combined Cycle Degradation Correction Factor for BQPS-III 800MW CCP



OPERATING HOURS	COMBINED CYCLE OUTPUT DEGRADATION	COMBINED CYCLE HEAT RATE DEGRADATION
222000	1.04656	0.97300
223000	1.04674	0.97299
224000	1.04700	0.97297
225000	1.04718	0.97231
226000	1.04736	0.97230
227000	1.04754	0.97228
228000	1.04780	0.97227
229000	1.04798	0.97226
230000	1.04816	0.97225
231000	1.04842	0.97159
232000	1.04860	0.97158
233000	1.04878	0.97156
234000	1.04904	0.97155
235000	1.04922	0.97154
236000	1.04940	0.97153
237000	1.04958	0.97087
238000	1.04984	0.97086
239000	1.05002	0.97084
240000	1.05020	0.97083



Combined Cycle Degradation Correction Factor for BQPS-III 900MW CAPP



OMS (Private) Limited

Reference No. OMS/TE/KE/BQPS-III/24/11/01

Dated: 15.11.2024

Aamir Fayyaz Khan

Plant Head 900MW BQPS-III

K-Electric, 39-B Sunset Boulevard

Phase-IV, DHA, Karachi

SUBJECT: VETTING OF DOCUMENTS FOR KE 900 MW CCPP BQPS-III
UNIT-I & UNIT-II

Ref: KE's PO # 7200001007 dated 15.11.2024

With reference to the subject mentioned above, KE has engaged OMS (Private) Limited as third party to vet the Combined Cycle (Plant) and Open Cycle (Gas Turbine) Degradation Correction Tables, Startup and Black-Start Costs, and Part Load Correction Tables (RLNG) as per the requirement of NEPRA.

OMS has carried out the technical review and vetted the aforementioned documents in accordance with the requirements of the purchase order. The required documents, duly signed and stamped, are enclosed herewith for further action at your end.

On behalf of Independent Engineer - OMS (Private) Ltd.


Abu Adil

Director Power Generation

OMS Private Limited



Enclosed: As under

01	CC HR Degradation Table (at 2000 hours interval) for Gas	06	OC Degradation curve & table
02	CC Output Degradation Table (at 2000 hours interval) for Gas	07	OC HR Degradation Table (at 2000 hours interval) for HSD
03	Part Load Table for Gas (at 1% intervals)	08	OC Output Degradation Table (at 2000 hours interval) for HSD
04	Startup and Black Start Cost for Gas	09	OC HR Degradation Table (at 2000 hours interval) for Gas
05	Startup and Black Start Cost for HSD	10	OC Output Degradation Table (at 2000 hours interval) for Gas

BQPS-III RLNG Combined Cycle Net Efficiency Degradation Factors (Guaranteed)

BQPS-III UNIT-I			
Interval	CC Net Efficiency RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	%	%	Factor
0	53.42%	53.42%	1.0000
FY-23 (Test Date)	53.42%	53.21%	1.0039
FY-23 (End)	53.42%	53.08%	1.0065
+2000	53.42%	52.94%	1.0091
+4000	53.42%	52.83%	1.0112
+6000	53.42%	52.73%	1.0132
+8000	53.42%	52.67%	1.0143
+10000	53.42%	52.63%	1.0152
+12000	53.42%	52.58%	1.0160
+14000	53.42%	52.57%	1.0162
+16000	53.42%	52.53%	1.0170
+18000	53.42%	52.49%	1.0179
+20000	53.42%	52.48%	1.0180
+22000	53.42%	52.54%	1.0168
+24000	53.42%	52.53%	1.0169
+26000	53.42%	52.49%	1.0177
+28000	53.42%	52.49%	1.0178
+30000	53.42%	52.45%	1.0186
+32000	53.42%	52.45%	1.0186
+34000	53.42%	52.44%	1.0187
+36000	53.42%	52.40%	1.0195
+38000	53.42%	52.40%	1.0196
+40000	53.42%	52.36%	1.0203
+42000	53.42%	52.36%	1.0203
+44000	53.42%	52.32%	1.0211
+46000	53.42%	52.32%	1.0212
+48000	53.42%	52.31%	1.0212
+50000	53.42%	52.28%	1.0220
+52000	53.42%	52.27%	1.0220
+54000	53.42%	52.24%	1.0227
+56000	53.42%	52.23%	1.0228
+58000	53.42%	52.23%	1.0229
+60000	53.42%	52.19%	1.0236
+62000	53.42%	52.19%	1.0236
+64000	53.42%	52.40%	1.0196
+66000	53.42%	52.40%	1.0196
+68000	53.42%	52.36%	1.0203
+70000	53.42%	52.36%	1.0204
+72000	53.42%	52.32%	1.0211
+74000	53.42%	52.32%	1.0211
+76000	53.42%	52.28%	1.0218
+78000	53.42%	52.28%	1.0219
+80000	53.42%	52.24%	1.0226
+82000	53.42%	52.24%	1.0226
+84000	53.42%	52.24%	1.0227
+86000	53.42%	52.20%	1.0234
+88000	53.42%	52.20%	1.0234
+90000	53.42%	52.17%	1.0241
+92000	53.42%	52.16%	1.0242
+94000	53.42%	52.13%	1.0249
+96000	53.42%	52.13%	1.0249
+98000	53.42%	52.09%	1.0256
+100000	53.42%	52.09%	1.0257
+102000	53.42%	52.08%	1.0257

BQPS-III UNIT-II			
Interval	CC Net Efficiency RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	%	%	Factor
0	53.41%	53.41%	1.0000
FY-23 (Test Date)	53.41%	53.32%	1.0017
FY-23 (End)	53.41%	53.05%	1.0068
+2000	53.41%	52.92%	1.0094
+4000	53.41%	52.81%	1.0115
+6000	53.41%	52.71%	1.0134
+8000	53.41%	52.65%	1.0145
+10000	53.41%	52.61%	1.0152
+12000	53.41%	52.57%	1.0161
+14000	53.41%	52.55%	1.0164
+16000	53.41%	52.52%	1.0171
+18000	53.41%	52.48%	1.0179
+20000	53.41%	52.46%	1.0182
+22000	53.41%	52.53%	1.0168
+24000	53.41%	52.52%	1.0171
+26000	53.41%	52.48%	1.0177
+28000	53.41%	52.48%	1.0178
+30000	53.41%	52.44%	1.0186
+32000	53.41%	52.44%	1.0186
+34000	53.41%	52.42%	1.0189
+36000	53.41%	52.39%	1.0195
+38000	53.41%	52.38%	1.0197
+40000	53.41%	52.35%	1.0203
+42000	53.41%	52.35%	1.0204
+44000	53.41%	52.31%	1.0211
+46000	53.41%	52.31%	1.0212
+48000	53.41%	52.29%	1.0214
+50000	53.41%	52.27%	1.0220
+52000	53.41%	52.26%	1.0220
+54000	53.41%	52.23%	1.0228
+56000	53.41%	52.22%	1.0228
+58000	53.41%	52.21%	1.0230
+60000	53.41%	52.18%	1.0236
+62000	53.41%	52.18%	1.0236
+64000	53.41%	52.39%	1.0196
+66000	53.41%	52.38%	1.0198
+68000	53.41%	52.35%	1.0203
+70000	53.41%	52.35%	1.0204
+72000	53.41%	52.31%	1.0211
+74000	53.41%	52.31%	1.0211
+76000	53.41%	52.27%	1.0218
+78000	53.41%	52.27%	1.0219
+80000	53.41%	52.23%	1.0226
+82000	53.41%	52.23%	1.0226
+84000	53.41%	52.22%	1.0229
+86000	53.41%	52.19%	1.0234
+88000	53.41%	52.18%	1.0236
+90000	53.41%	52.16%	1.0241
+92000	53.41%	52.15%	1.0242
+94000	53.41%	52.12%	1.0249
+96000	53.41%	52.12%	1.0249
+98000	53.41%	52.08%	1.0256
+100000	53.41%	52.08%	1.0257
+102000	53.41%	52.07%	1.0259



BQPS-III RLNG Combined Cycle Net Efficiency Degradation Factors (Guaranteed)

BQPS-III UNIT-I			
Interval	CC Net Efficiency RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	%	%	Factor
+104000	53.42%	52.35%	1.0205
+106000	53.42%	52.33%	1.0208
+108000	53.42%	52.29%	1.0218
+110000	53.42%	52.27%	1.0221
+112000	53.42%	52.22%	1.0230
+114000	53.42%	52.21%	1.0232
+116000	53.42%	52.17%	1.0241
+118000	53.42%	52.16%	1.0242
+120000	53.42%	52.15%	1.0244
+122000	53.42%	52.11%	1.0252
+124000	53.42%	52.10%	1.0254
+126000	53.42%	52.06%	1.0262
+128000	53.42%	52.05%	1.0263
+130000	53.42%	52.01%	1.0271
+132000	53.42%	52.01%	1.0272
+134000	53.42%	52.00%	1.0273
+136000	53.42%	51.96%	1.0281
+138000	53.42%	51.96%	1.0282
+140000	53.42%	51.92%	1.0289
+142000	53.42%	51.92%	1.0290
+144000	53.42%	51.88%	1.0298
+146000	53.42%	52.33%	1.0209
+148000	53.42%	52.33%	1.0209
+150000	53.42%	52.32%	1.0210
+152000	53.42%	52.29%	1.0217
+154000	53.42%	52.29%	1.0218
+156000	53.42%	52.25%	1.0225
+158000	53.42%	52.24%	1.0226
+160000	53.42%	52.21%	1.0233
+162000	53.42%	52.20%	1.0234
+164000	53.42%	52.20%	1.0234
+166000	53.42%	52.17%	1.0241
+168000	53.42%	52.16%	1.0242
+170000	53.42%	52.13%	1.0249
+172000	53.42%	52.12%	1.0249
+174000	53.42%	52.12%	1.0250
+176000	53.42%	52.08%	1.0257
+178000	53.42%	52.08%	1.0258
+180000	53.42%	52.05%	1.0265
+182000	53.42%	52.04%	1.0265
+184000	53.42%	52.04%	1.0265
+186000	53.42%	52.22%	1.0231
+188000	53.42%	52.21%	1.0232
+190000	53.42%	52.21%	1.0232
+192000	53.42%	52.18%	1.0239
+194000	53.42%	52.17%	1.0240
+196000	53.42%	52.14%	1.0247
+198000	53.42%	52.14%	1.0247
+200000	53.42%	52.13%	1.0248
+202000	53.42%	52.10%	1.0255
+204000	53.42%	52.10%	1.0255
+206000	53.42%	52.06%	1.0262
+208000	53.42%	52.06%	1.0262
+210000	53.42%	52.06%	1.0263
+212000	53.42%	52.02%	1.0270

BQPS-III UNIT-II			
Interval	CC Net Efficiency RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	%	%	Factor
+104000	53.41%	52.34%	1.0205
+106000	53.41%	52.31%	1.0210
+108000	53.41%	52.27%	1.0218
+110000	53.41%	52.26%	1.0221
+112000	53.41%	52.21%	1.0230
+114000	53.41%	52.20%	1.0232
+116000	53.41%	52.16%	1.0241
+118000	53.41%	52.15%	1.0243
+120000	53.41%	52.13%	1.0246
+122000	53.41%	52.10%	1.0253
+124000	53.41%	52.09%	1.0254
+126000	53.41%	52.05%	1.0262
+128000	53.41%	52.04%	1.0263
+130000	53.41%	52.00%	1.0271
+132000	53.41%	52.00%	1.0272
+134000	53.41%	51.98%	1.0275
+136000	53.41%	51.95%	1.0281
+138000	53.41%	51.95%	1.0282
+140000	53.41%	51.91%	1.0289
+142000	53.41%	51.91%	1.0290
+144000	53.41%	51.87%	1.0298
+146000	53.41%	52.32%	1.0209
+148000	53.41%	52.32%	1.0209
+150000	53.41%	52.31%	1.0212
+152000	53.41%	52.28%	1.0217
+154000	53.41%	52.28%	1.0218
+156000	53.41%	52.24%	1.0225
+158000	53.41%	52.23%	1.0226
+160000	53.41%	52.20%	1.0233
+162000	53.41%	52.19%	1.0234
+164000	53.41%	52.18%	1.0236
+166000	53.41%	52.16%	1.0241
+168000	53.41%	52.15%	1.0242
+170000	53.41%	52.12%	1.0249
+172000	53.41%	52.11%	1.0250
+174000	53.41%	52.10%	1.0252
+176000	53.41%	52.07%	1.0257
+178000	53.41%	52.07%	1.0258
+180000	53.41%	52.04%	1.0265
+182000	53.41%	52.03%	1.0265
+184000	53.41%	52.03%	1.0266
+186000	53.41%	52.21%	1.0231
+188000	53.41%	52.20%	1.0232
+190000	53.41%	52.19%	1.0234
+192000	53.41%	52.17%	1.0239
+194000	53.41%	52.16%	1.0240
+196000	53.41%	52.13%	1.0247
+198000	53.41%	52.13%	1.0247
+200000	53.41%	52.11%	1.0249
+202000	53.41%	52.09%	1.0255
+204000	53.41%	52.09%	1.0255
+206000	53.41%	52.05%	1.0262
+208000	53.41%	52.05%	1.0262
+210000	53.41%	52.04%	1.0264
+212000	53.41%	52.01%	1.0270



BQPS-III RLNG Combined Cycle Net Efficiency Degradation Factors (Guaranteed)

BQPS-III UNIT-I			
Interval	CC Net Efficiency RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	%	%	Factor
+214000	53.42%	52.02%	1.0270
+216000	53.42%	52.02%	1.0270
+218000	53.42%	51.98%	1.0277
+220000	53.42%	51.98%	1.0278
+222000	53.42%	51.94%	1.0285
+224000	53.42%	51.94%	1.0285
+226000	53.42%	51.94%	1.0285
+228000	53.42%	51.91%	1.0292
+230000	53.42%	51.90%	1.0293
+232000	53.42%	51.90%	1.0293

Note:

- * FY 23 (Test Date): 9th May 2023; Operating Hours: 1790
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,040 hours
- * HHV/LHV Ratio considered as of test date: 1.10868

BQPS-III UNIT-II			
Interval	CC Net Efficiency RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	%	%	Factor
+214000	53.41%	52.01%	1.0270
+216000	53.41%	52.00%	1.0272
+218000	53.41%	51.97%	1.0277
+220000	53.41%	51.97%	1.0278
+222000	53.41%	51.93%	1.0285
+224000	53.41%	51.93%	1.0285
+226000	53.41%	51.93%	1.0285
+228000	53.41%	51.90%	1.0292
+230000	53.41%	51.89%	1.0293
+232000	53.41%	51.89%	1.0293

Note:

- * FY 23 (Test Date): 28th Feb 2023; Operating Hours: 1024
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,276 hours
- * HHV/LHV Ratio considered as of test date: 1.10889





OMS (Private) Limited

Reference No. OMS/TE/KE/BQPS-III/24/11/01

Dated: 15.11.2024

Aamir Fayyaz Khan

Plant Head 900MW BQPS-III

K-Electric, 39-B Sunset Boulevard

Phase-IV, DHA, Karachi

SUBJECT: VETTING OF DOCUMENTS FOR KE 900 MW CCPP BQPS-III

UNIT-I & UNIT-II

Ref: KE's PO # 7200001007 dated 15.11.2024

With reference to the subject mentioned above, KE has engaged OMS (Private) Limited as third party to vet the Combined Cycle (Plant) and Open Cycle (Gas Turbine) Degradation Correction Tables, Startup and Black-Start Costs, and Part Load Correction Tables (RLNG) as per the requirement of NEPRA.

OMS has carried out the technical review and vetted the aforementioned documents in accordance with the requirements of the purchase order. The required documents, duly signed and stamped, are enclosed herewith for further action at your end.

On behalf of Independent Engineer - OMS (Private) Ltd.



Abu Adil

Director Power Generation

OMS Private Limited



Enclosed: As under

01	CC HR Degradation Table (at 2000 hours interval) for Gas	06	OC Degradation curve & table
02	CC Output Degradation Table (at 2000 hours interval) for Gas	07	OC HR Degradation Table (at 2000 hours interval) for HSD
03	Part Load Table for Gas (at 1% intervals)	08	OC Output Degradation Table (at 2000 hours interval) for HSD
04	Startup and Black Start Cost for Gas	09	OC HR Degradation Table (at 2000 hours interval) for Gas
05	Startup and Black Start Cost for HSD	10	OC Output Degradation Table (at 2000 hours interval) for Gas

BQPS-III RLNG Combined Cycle Net Power Output Degradation Factors (Guaranteed)

BQPS-III UNIT-I			
Interval	CC Net Power Output RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	MW	MW	Factor
0	449.8	449.8	1.0000
FY-23 (Test Date)	449.8	446.7	1.0068
FY-23 (End)	449.8	444.6	1.0116
+2000	449.8	442.6	1.0164
+4000	449.8	441.1	1.0198
+6000	449.8	439.9	1.0224
+8000	449.8	439.2	1.0241
+10000	449.8	438.8	1.0251
+12000	449.8	438.4	1.0261
+14000	449.8	437.9	1.0271
+16000	449.8	437.6	1.0280
+18000	449.8	437.2	1.0289
+20000	449.8	436.8	1.0298
+22000	449.8	437.2	1.0288
+24000	449.8	436.9	1.0295
+26000	449.8	436.7	1.0301
+28000	449.8	436.4	1.0308
+30000	449.8	436.1	1.0314
+32000	449.8	435.9	1.0320
+34000	449.8	435.6	1.0326
+36000	449.8	435.4	1.0332
+38000	449.8	435.1	1.0338
+40000	449.8	434.9	1.0344
+42000	449.8	434.6	1.0350
+44000	449.8	434.3	1.0356
+46000	449.8	434.1	1.0361
+48000	449.8	433.9	1.0367
+50000	449.8	433.6	1.0373
+52000	449.8	433.4	1.0379
+54000	449.8	433.1	1.0384
+56000	449.8	432.9	1.0390
+58000	449.8	432.7	1.0395
+60000	449.8	432.5	1.0401
+62000	449.8	432.2	1.0407
+64000	449.8	435.1	1.0339
+66000	449.8	434.8	1.0344
+68000	449.8	434.6	1.0350
+70000	449.8	434.4	1.0355
+72000	449.8	434.1	1.0361
+74000	449.8	433.9	1.0366
+76000	449.8	433.7	1.0371
+78000	449.8	433.5	1.0377
+80000	449.8	433.2	1.0382
+82000	449.8	433.0	1.0387
+84000	449.8	432.8	1.0393
+86000	449.8	432.6	1.0398
+88000	449.8	432.4	1.0403
+90000	449.8	432.1	1.0409

BQPS-III UNIT-II			
Interval	CC Net Power Output RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	MW	MW	Factor
0	449.8	449.8	1.0000
FY-23 (Test Date)	449.8	448.6	1.0027
FY-23 (End)	449.8	444.4	1.0122
+2000	449.8	442.4	1.0168
+4000	449.8	440.9	1.0201
+6000	449.8	439.8	1.0227
+8000	449.8	439.2	1.0242
+10000	449.8	438.7	1.0252
+12000	449.8	438.3	1.0262
+14000	449.8	437.9	1.0272
+16000	449.8	437.5	1.0281
+18000	449.8	437.1	1.0290
+20000	449.8	436.7	1.0299
+22000	449.8	437.2	1.0289
+24000	449.8	436.9	1.0295
+26000	449.8	436.6	1.0302
+28000	449.8	436.3	1.0308
+30000	449.8	436.1	1.0314
+32000	449.8	435.8	1.0321
+34000	449.8	435.6	1.0326
+36000	449.8	435.3	1.0332
+38000	449.8	435.1	1.0339
+40000	449.8	434.8	1.0344
+42000	449.8	434.6	1.0351
+44000	449.8	434.3	1.0356
+46000	449.8	434.1	1.0362
+48000	449.8	433.9	1.0368
+50000	449.8	433.6	1.0374
+52000	449.8	433.4	1.0379
+54000	449.8	433.1	1.0385
+56000	449.8	432.9	1.0390
+58000	449.8	432.7	1.0396
+60000	449.8	432.4	1.0401
+62000	449.8	432.2	1.0408
+64000	449.8	435.0	1.0340
+66000	449.8	434.8	1.0345
+68000	449.8	434.6	1.0350
+70000	449.8	434.3	1.0356
+72000	449.8	434.1	1.0361
+74000	449.8	433.9	1.0367
+76000	449.8	433.7	1.0372
+78000	449.8	433.4	1.0377
+80000	449.8	433.2	1.0383
+82000	449.8	433.0	1.0388
+84000	449.8	432.8	1.0393
+86000	449.8	432.6	1.0399
+88000	449.8	432.3	1.0404
+90000	449.8	432.1	1.0409



BQPS-III RLNG Combined Cycle Net Power Output Degradation Factors (Guaranteed)

BQPS-III UNIT-I			
Interval	CC Net Power Output RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	MW	MW	Factor
+92000	449.8	432.0	1.0413
+94000	449.8	431.7	1.0418
+96000	449.8	431.5	1.0424
+98000	449.8	431.3	1.0429
+100000	449.8	431.1	1.0433
+102000	449.8	430.9	1.0439
+104000	449.8	433.1	1.0386
+106000	449.8	432.8	1.0394
+108000	449.8	432.5	1.0401
+110000	449.8	432.1	1.0409
+112000	449.8	431.8	1.0416
+114000	449.8	431.6	1.0422
+116000	449.8	431.3	1.0429
+118000	449.8	431.1	1.0435
+120000	449.8	430.8	1.0441
+122000	449.8	430.6	1.0447
+124000	449.8	430.3	1.0453
+126000	449.8	430.1	1.0459
+128000	449.8	429.8	1.0465
+130000	449.8	429.6	1.0470
+132000	449.8	429.4	1.0476
+134000	449.8	429.2	1.0481
+136000	449.8	428.9	1.0487
+138000	449.8	428.7	1.0492
+140000	449.8	428.5	1.0497
+142000	449.8	428.3	1.0502
+144000	449.8	428.1	1.0507
+146000	449.8	434.9	1.0343
+148000	449.8	434.7	1.0348
+150000	449.8	434.5	1.0353
+152000	449.8	434.3	1.0358
+154000	449.8	434.1	1.0363
+156000	449.8	433.9	1.0368
+158000	449.8	433.7	1.0372
+160000	449.8	433.5	1.0377
+162000	449.8	433.2	1.0382
+164000	449.8	433.0	1.0387
+166000	449.8	432.9	1.0391
+168000	449.8	432.7	1.0396
+170000	449.8	432.5	1.0401
+172000	449.8	432.3	1.0405
+174000	449.8	432.1	1.0410
+176000	449.8	431.9	1.0414
+178000	449.8	431.7	1.0419
+180000	449.8	431.5	1.0423
+182000	449.8	431.3	1.0428
+184000	449.8	431.2	1.0432
+186000	449.8	432.7	1.0396
+188000	449.8	432.5	1.0400

BQPS-III UNIT-II			
Interval	CC Net Power Output RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	MW	MW	Factor
+92000	449.8	431.9	1.0414
+94000	449.8	431.7	1.0419
+96000	449.8	431.5	1.0424
+98000	449.8	431.3	1.0430
+100000	449.8	431.1	1.0434
+102000	449.8	430.9	1.0439
+104000	449.8	433.1	1.0387
+106000	449.8	432.7	1.0395
+108000	449.8	432.4	1.0402
+110000	449.8	432.1	1.0409
+112000	449.8	431.8	1.0416
+114000	449.8	431.5	1.0423
+116000	449.8	431.3	1.0430
+118000	449.8	431.0	1.0436
+120000	449.8	430.8	1.0442
+122000	449.8	430.5	1.0448
+124000	449.8	430.3	1.0454
+126000	449.8	430.0	1.0459
+128000	449.8	429.8	1.0466
+130000	449.8	429.6	1.0471
+132000	449.8	429.3	1.0477
+134000	449.8	429.1	1.0482
+136000	449.8	428.9	1.0487
+138000	449.8	428.7	1.0492
+140000	449.8	428.5	1.0497
+142000	449.8	428.3	1.0503
+144000	449.8	428.1	1.0508
+146000	449.8	434.9	1.0343
+148000	449.8	434.7	1.0348
+150000	449.8	434.5	1.0353
+152000	449.8	434.2	1.0359
+154000	449.8	434.0	1.0363
+156000	449.8	433.8	1.0368
+158000	449.8	433.6	1.0373
+160000	449.8	433.4	1.0377
+162000	449.8	433.2	1.0383
+164000	449.8	433.0	1.0387
+166000	449.8	432.8	1.0392
+168000	449.8	432.6	1.0397
+170000	449.8	432.5	1.0401
+172000	449.8	432.3	1.0406
+174000	449.8	432.1	1.0410
+176000	449.8	431.9	1.0415
+178000	449.8	431.7	1.0419
+180000	449.8	431.5	1.0424
+182000	449.8	431.3	1.0428
+184000	449.8	431.1	1.0433
+186000	449.8	432.6	1.0396
+188000	449.8	432.5	1.0401



BQPS-III RLNG Combined Cycle Net Power Output Degradation Factors (Guaranteed)

BQPS-III UNIT-I			
Interval	CC Net Power Output RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	MW	MW	Factor
+190000	449.8	432.3	1.0405
+192000	449.8	432.1	1.0409
+194000	449.8	432.0	1.0413
+196000	449.8	431.8	1.0418
+198000	449.8	431.6	1.0422
+200000	449.8	431.4	1.0426
+202000	449.8	431.3	1.0430
+204000	449.8	431.1	1.0435
+206000	449.8	430.9	1.0439
+208000	449.8	430.7	1.0443
+210000	449.8	430.5	1.0447
+212000	449.8	430.4	1.0451
+214000	449.8	430.2	1.0456
+216000	449.8	430.0	1.0459
+218000	449.8	429.9	1.0464
+220000	449.8	429.7	1.0468
+222000	449.8	429.5	1.0472
+224000	449.8	429.4	1.0476
+226000	449.8	429.2	1.0480
+228000	449.8	429.0	1.0484
+230000	449.8	428.9	1.0488
+232000	449.8	428.7	1.0492

Note:

- * FY 23 (Test Date): 9th May 2023; Operating Hours: 1790
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,040 hours

BQPS-III UNIT-II			
Interval	CC Net Power Output RLNG		Degradation Factor
	Guaranteed	Revised (Degraded)	
Hours	MW	MW	Factor
+190000	449.8	432.3	1.0405
+192000	449.8	432.1	1.0409
+194000	449.8	431.9	1.0414
+196000	449.8	431.8	1.0418
+198000	449.8	431.6	1.0422
+200000	449.8	431.4	1.0427
+202000	449.8	431.2	1.0431
+204000	449.8	431.0	1.0435
+206000	449.8	430.9	1.0439
+208000	449.8	430.7	1.0444
+210000	449.8	430.5	1.0448
+212000	449.8	430.4	1.0452
+214000	449.8	430.2	1.0456
+216000	449.8	430.0	1.0460
+218000	449.8	429.8	1.0464
+220000	449.8	429.7	1.0468
+222000	449.8	429.5	1.0472
+224000	449.8	429.4	1.0476
+226000	449.8	429.2	1.0480
+228000	449.8	429.0	1.0485
+230000	449.8	428.8	1.0489
+232000	449.8	428.7	1.0493

Note:

- * FY 23 (Test Date): 28th Feb 2023; Operating Hours: 1024
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,276 hours





11.2 DEGRADATION OF TESTED CAPACITY AND HEAT RATE DUE TO AGING

The degradation for Combined Cycle Operation of Unit-I till end of Tariff Controlled Period (30 years) are projected by IE based on EPC developed Combined Cycle degradation tables received from KE. The EPC degradation tables are provided in APPENDIX J.

The results of performance test conducted by IE on 9th January 2024, are utilized to evaluate the annual degradation of the Unit-I on combined cycle mode through the EPC degradation tables for every 2000 hours interval starting from the end of FY-23.

The resultant degradation of unit Net Output, Net Heat Rate (HHV) and Net Efficiency (HHV) are provided in Table 8 and Table 9.

The regain of performance parameters in certain intervals in the degradation tables are due to occurrence of major maintenance of the plant, this has been verified against the maintenance schedule of gas turbine furnished by OEM/EPC and found to be coherent.

As per the data provided by KE, the maintenance schedule recommended by OEM is given below

- **Hot Gas Path Inspection (HGPI)** is required at intervals of 25K hours.
- **Extended Hot Gas Path Inspection (eHGPI)** is required at intervals of 66K hours.
- **Major Inspection (MI)** is required at intervals of 107K hours.

The fuel severity factor for HSD operation is '2' as per OEM recommendations. Thus, the indicative maintenance intervals will be escalated by a factor of '2' when the Unit operates on HSD fuel. Please note that the fuel severity factor is dependent on fuel specifications criteria and may change upon OEM advisory if any.

The unit will complete the above Maintenance cycle i.e., HGPI followed by eHGPI followed by MI, after which the maintenance cycle will start again in the same sequence.

Table 8. Net Output Degradation (MW)

Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
Hours	MW	MW	Factor
0	357.5	359.0	1.00000
FY-2023 End (OH=3040)	353.4	354.8	1.01159



Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
+2000 *	351.7	353.2	1.01636
+3158 (HSD Test)	351.0	352.5	1.01845
+4000	350.5	352.0	1.01979
+6000	349.6	351.1	1.02245
+8000	349.1	350.5	1.02406
+10000	348.7	350.2	1.02511
+12000	348.4	349.8	1.02605
+14000	348.1	349.5	1.02706
+16000	347.8	349.2	1.02796
+18000	347.4	348.9	1.02893
+20000	347.1	348.6	1.02982
+22000	347.5	348.9	1.02878
+24000	347.2	348.7	1.02947
+26000	347.0	348.5	1.03009
+28000	346.8	348.2	1.03077
+30000	346.6	348.0	1.03135
+32000	346.4	347.8	1.03200
+34000	346.2	347.6	1.03257
+36000	346.0	347.4	1.03315
+38000	345.8	347.2	1.03380
+40000	345.6	347.0	1.03437
+42000	345.4	346.8	1.03502
+44000	345.2	346.6	1.03558
+46000	345.0	346.4	1.03614
+48000	344.8	346.3	1.03669
+50000	344.6	346.0	1.03733
+52000	344.4	345.9	1.03788
+54000	344.2	345.7	1.03844
+56000	344.1	345.5	1.03898
+58000	343.9	345.3	1.03953
+60000	343.7	345.1	1.04008
+62000	343.5	344.9	1.04071
+64000	345.8	347.2	1.03389
+66000	345.6	347.0	1.03443
+68000	345.4	346.8	1.03497



Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
+70000	345.2	346.6	1.03551
+72000	345.0	346.5	1.03605
+74000	344.9	346.3	1.03659
+76000	344.7	346.1	1.03713
+78000	344.5	345.9	1.03766
+80000	344.3	345.7	1.03820
+82000	344.1	345.6	1.03873
+84000	344.0	345.4	1.03927
+86000	343.8	345.2	1.03980
+88000	343.6	345.0	1.04033
+90000	343.4	344.9	1.04086
+92000	343.3	344.7	1.04131
+94000	343.1	344.5	1.04184
+96000	342.9	344.4	1.04237
+98000	342.8	344.2	1.04290
+100000	342.6	344.0	1.04334
+102000	342.5	343.9	1.04387
+104000	344.2	345.6	1.03857
+106000	343.9	345.4	1.03939
+108000	343.7	345.1	1.04010
+110000	343.4	344.9	1.04085
+112000	343.2	344.6	1.04157
+114000	343.0	344.4	1.04221
+116000	342.8	344.2	1.04290
+118000	342.6	344.0	1.04348
+120000	342.4	343.8	1.04413
+122000	342.2	343.6	1.04469
+124000	342.0	343.4	1.04532
+126000	341.8	343.2	1.04587
+128000	341.6	343.0	1.04648
+130000	341.4	342.8	1.04701
+132000	341.2	342.6	1.04761
+134000	341.1	342.5	1.04811
+136000	340.9	342.3	1.04867
+138000	340.7	342.1	1.04917



Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
+140000	340.6	342.0	1.04966
+142000	340.4	341.8	1.05023
+144000	340.2	341.6	1.05071
+146000	345.6	347.1	1.03430
+148000	345.5	346.9	1.03478
+150000	345.3	346.7	1.03525
+152000	345.1	346.5	1.03581
+154000	345.0	346.4	1.03628
+156000	344.8	346.2	1.03675
+158000	344.7	346.1	1.03721
+160000	344.5	345.9	1.03768
+162000	344.3	345.7	1.03823
+164000	344.2	345.6	1.03869
+166000	344.0	345.4	1.03915
+168000	343.9	345.3	1.03961
+170000	343.7	345.1	1.04007
+172000	343.6	345.0	1.04053
+174000	343.4	344.8	1.04098
+176000	343.3	344.7	1.04144
+178000	343.1	344.5	1.04189
+180000	343.0	344.4	1.04234
+182000	342.8	344.2	1.04280
+184000	342.7	344.1	1.04325
+186000	343.9	345.3	1.03960
+188000	343.7	345.1	1.04005
+190000	343.6	345.0	1.04050
+192000	343.4	344.9	1.04087
+194000	343.3	344.7	1.04131
+196000	343.2	344.6	1.04176
+198000	343.0	344.4	1.04221
+200000	342.9	344.3	1.04265
+202000	342.7	344.2	1.04301
+204000	342.6	344.0	1.04346
+206000	342.4	343.9	1.04390
+208000	342.3	343.7	1.04435

Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
+210000	342.2	343.6	1.04471
+212000	342.0	343.5	1.04515
+214000	341.9	343.3	1.04559
+216000	341.8	343.2	1.04595
+218000	341.6	343.0	1.04639
+220000	341.5	342.9	1.04675
+222000	341.4	342.8	1.04719
+224000	341.3	342.7	1.04755
+226000	341.1	342.5	1.04799
+228000	341.0	342.4	1.04843
+230000	340.8	342.3	1.04879
+232000	340.7	342.1	1.04923

* All incremental intervals are with reference to actual hours at the end of FY-23

Table 9. Net Heat Rate Degradation (HHV)

Interval	Guaranteed Net Thermal Efficiency corrected for Degradation Factor	Corrected RSC Net Thermal Efficiency (HHV)	Corrected RSC Net Heat Rate (HHV)	Degradation Factor
Hours	%	%	Btu/kWh	Factor
0	50.64%	51.22%	6661.85	1.00000
FY-2023 End (OH=3040)	50.31%	50.89%	6705.01	1.00648
+2000 *	50.18%	50.76%	6722.77	1.00915
+3158 (HSD Test)	50.12%	50.69%	6731.00	1.01038
+4000	50.07%	50.65%	6736.61	1.01122
+6000	49.98%	50.55%	6749.85	1.01321
+8000	49.92%	50.50%	6757.12	1.01430
+10000	49.88%	50.45%	6762.91	1.01517
+12000	49.84%	50.41%	6768.68	1.01604
+14000	49.83%	50.40%	6770.03	1.01624
+16000	49.79%	50.36%	6775.42	1.01705
+18000	49.75%	50.32%	6780.87	1.01787
+20000	49.74%	50.31%	6782.01	1.01804
+22000	49.80%	50.37%	6773.63	1.01678



Interval	Guaranteed Net Thermal Efficiency corrected for Degradation Factor	Corrected RSC Net Thermal Efficiency (HHV)	Corrected RSC Net Heat Rate (HHV)	Degradation Factor
+24000	49.79%	50.37%	6774.63	1.01693
+26000	49.76%	50.33%	6779.76	1.01770
+28000	49.75%	50.32%	6780.38	1.01779
+30000	49.71%	50.29%	6785.55	1.01857
+32000	49.71%	50.28%	6785.90	1.01862
+34000	49.71%	50.28%	6786.64	1.01873
+36000	49.67%	50.24%	6791.50	1.01946
+38000	49.66%	50.24%	6792.17	1.01956
+40000	49.63%	50.20%	6796.98	1.02028
+42000	49.63%	50.20%	6797.39	1.02035
+44000	49.59%	50.16%	6802.39	1.02110
+46000	49.59%	50.16%	6802.80	1.02116
+48000	49.58%	50.15%	6803.34	1.02124
+50000	49.55%	50.12%	6808.09	1.02195
+52000	49.55%	50.12%	6808.44	1.02200
+54000	49.51%	50.08%	6813.38	1.02275
+56000	49.51%	50.08%	6813.66	1.02279
+58000	49.50%	50.07%	6814.19	1.02287
+60000	49.47%	50.04%	6818.89	1.02357
+62000	49.47%	50.04%	6819.17	1.02362
+64000	49.66%	50.24%	6792.12	1.01956
+66000	49.66%	50.23%	6792.58	1.01962
+68000	49.63%	50.20%	6797.18	1.02032
+70000	49.63%	50.20%	6797.46	1.02036
+72000	49.59%	50.16%	6802.25	1.02108
+74000	49.59%	50.16%	6802.53	1.02112
+76000	49.55%	50.12%	6807.32	1.02184
+78000	49.55%	50.12%	6807.53	1.02187
+80000	49.52%	50.09%	6812.34	1.02259
+82000	49.52%	50.09%	6812.61	1.02263
+84000	49.51%	50.08%	6813.00	1.02269
+86000	49.48%	50.05%	6817.63	1.02338
+88000	49.48%	50.05%	6818.02	1.02344
+90000	49.44%	50.01%	6822.59	1.02413
+92000	49.44%	50.01%	6822.80	1.02416



Interval	Guaranteed Net Thermal Efficiency corrected for Degradation Factor	Corrected RSC Net Thermal Efficiency (HHV)	Corrected RSC Net Heat Rate (HHV)	Degradation Factor
+94000	49.41%	49.98%	6827.62	1.02488
+96000	49.41%	49.97%	6827.83	1.02492
+98000	49.37%	49.94%	6832.59	1.02563
+100000	49.37%	49.94%	6832.80	1.02566
+102000	49.37%	49.94%	6833.13	1.02571
+104000	49.62%	50.19%	6798.19	1.02047
+106000	49.60%	50.17%	6800.59	1.02083
+108000	49.56%	50.13%	6806.94	1.02178
+110000	49.54%	50.11%	6808.74	1.02205
+112000	49.50%	50.07%	6814.87	1.02297
+114000	49.49%	50.06%	6816.33	1.02319
+116000	49.45%	50.01%	6822.26	1.02408
+118000	49.44%	50.01%	6823.38	1.02425
+120000	49.43%	50.00%	6824.61	1.02443
+122000	49.39%	49.96%	6830.02	1.02524
+124000	49.38%	49.95%	6830.93	1.02538
+126000	49.34%	49.91%	6836.40	1.02620
+128000	49.34%	49.91%	6837.23	1.02633
+130000	49.30%	49.87%	6842.57	1.02713
+132000	49.29%	49.86%	6843.27	1.02723
+134000	49.29%	49.86%	6844.01	1.02735
+136000	49.25%	49.82%	6848.90	1.02808
+138000	49.25%	49.82%	6849.46	1.02816
+140000	49.21%	49.78%	6854.54	1.02892
+142000	49.21%	49.78%	6855.03	1.02900
+144000	49.17%	49.74%	6860.11	1.02976
+146000	49.60%	50.17%	6800.79	1.02086
+148000	49.60%	50.17%	6801.21	1.02092
+150000	49.59%	50.17%	6801.81	1.02101
+152000	49.56%	50.13%	6806.56	1.02172
+154000	49.56%	50.13%	6806.91	1.02178
+156000	49.52%	50.09%	6811.85	1.02252
+158000	49.52%	50.09%	6812.20	1.02257
+160000	49.48%	50.05%	6817.08	1.02330
+162000	49.48%	50.05%	6817.42	1.02335



Interval	Guaranteed Net Thermal Efficiency corrected for Degradation Factor	Corrected RSC Net Thermal Efficiency (HHV)	Corrected RSC Net Heat Rate (HHV)	Degradation Factor
+164000	49.48%	50.05%	6817.89	1.02342
+166000	49.44%	50.01%	6822.59	1.02413
+168000	49.44%	50.01%	6822.87	1.02417
+170000	49.41%	49.97%	6827.77	1.02491
+172000	49.40%	49.97%	6828.05	1.02495
+174000	49.40%	49.97%	6828.51	1.02502
+176000	49.37%	49.94%	6833.16	1.02572
+178000	49.36%	49.93%	6833.44	1.02576
+180000	49.33%	49.90%	6838.28	1.02648
+182000	49.33%	49.90%	6838.49	1.02652
+184000	49.33%	49.89%	6838.70	1.02655
+186000	49.49%	50.06%	6816.03	1.02314
+188000	49.49%	50.06%	6816.24	1.02318
+190000	49.49%	50.06%	6816.63	1.02323
+192000	49.45%	50.02%	6821.26	1.02393
+194000	49.45%	50.02%	6821.40	1.02395
+196000	49.42%	49.99%	6826.22	1.02467
+198000	49.42%	49.98%	6826.43	1.02471
+200000	49.41%	49.98%	6826.83	1.02477
+202000	49.38%	49.95%	6831.40	1.02545
+204000	49.38%	49.95%	6831.61	1.02548
+206000	49.34%	49.91%	6836.38	1.02620
+208000	49.34%	49.91%	6836.59	1.02623
+210000	49.34%	49.91%	6836.92	1.02628
+212000	49.31%	49.87%	6841.51	1.02697
+214000	49.30%	49.87%	6841.72	1.02700
+216000	49.30%	49.87%	6842.04	1.02705
+218000	49.27%	49.84%	6846.64	1.02774
+220000	49.27%	49.84%	6846.78	1.02776
+222000	49.23%	49.80%	6851.57	1.02848
+224000	49.23%	49.80%	6851.78	1.02851
+226000	49.23%	49.80%	6851.92	1.02853
+228000	49.20%	49.76%	6856.65	1.02924
+230000	49.20%	49.76%	6856.86	1.02927
+232000	49.19%	49.76%	6857.00	1.02929

*All incremental intervals are with reference to actual hours at the end of FY-23



The resultant degradation of unit Net Output, Net Heat Rate (HHV) and Net Efficiency (HHV) are provided in Table 8 and Table 9.

The regain of performance parameters in certain intervals in the degradation tables are due to occurrence of major maintenance of the plant, this has been verified against the maintenance schedule of gas turbine furnished by OEM/EPC and found to be coherent.

As per the data provided by KE, the maintenance schedule recommended by OEM is given below

- **Hot Gas Path Inspection (HGPI)** is required at intervals of 25K hours.
- **Extended Hot Gas Path Inspection (eHGPI)** is required at intervals of 66K hours.
- **Major Inspection (MI)** is required at intervals of 107K hours.

The fuel severity factor for HSD operation is '2' as per OEM recommendations. Thus, the indicative maintenance intervals will be escalated by a factor of '2' when the Unit operates on HSD fuel. Please note that the fuel severity factor is dependent on fuel specifications criteria and may change upon OEM advisory if any.

The unit will complete the above Maintenance cycle i.e., HGPI followed by eHGPI followed by MI, after which the maintenance cycle will start again in the same sequence.

Table 8. Net Output Degradation (MW)

Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
Hours	MW	MW	Factor
0	357.5	356.4	1.00000
FY-2023 End (OH=3276)	353.2	352.1	1.01221
+2000 *	351.6	350.5	1.01680
+2218 (HSD Test)	351.4	350.4	1.01720
+4000	350.4	349.4	1.02012
+6000	349.6	348.5	1.02267
+8000	349.0	348.0	1.02418
+10000	348.7	347.6	1.02523
+12000	348.4	347.3	1.02617
+14000	348.0	347.0	1.02718
+16000	347.7	346.7	1.02808



Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
+18000	347.4	346.4	1.02905
+20000	347.1	346.1	1.02993
+22000	347.4	346.4	1.02887
+24000	347.2	346.2	1.02955
+26000	347.0	346.0	1.03018
+28000	346.8	345.8	1.03084
+30000	346.6	345.6	1.03141
+32000	346.4	345.3	1.03207
+34000	346.2	345.2	1.03264
+36000	346.0	345.0	1.03324
+38000	345.8	344.7	1.03387
+40000	345.6	344.6	1.03444
+42000	345.4	344.3	1.03509
+44000	345.2	344.2	1.03565
+46000	345.0	344.0	1.03621
+48000	344.8	343.8	1.03676
+50000	344.6	343.6	1.03740
+52000	344.4	343.4	1.03795
+54000	344.2	343.2	1.03850
+56000	344.0	343.0	1.03905
+58000	343.9	342.8	1.03959
+60000	343.7	342.7	1.04014
+62000	343.5	342.5	1.04077
+64000	345.7	344.7	1.03395
+66000	345.6	344.5	1.03449
+68000	345.4	344.4	1.03503
+70000	345.2	344.2	1.03557
+72000	345.0	344.0	1.03611
+74000	344.8	343.8	1.03665
+76000	344.7	343.6	1.03719
+78000	344.5	343.5	1.03772
+80000	344.3	343.3	1.03826
+82000	344.1	343.1	1.03879
+84000	344.0	342.9	1.03933
+86000	343.8	342.8	1.03986

Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
+88000	343.6	342.6	1.04039
+90000	343.4	342.4	1.04090
+92000	343.3	342.3	1.04137
+94000	343.1	342.1	1.04190
+96000	342.9	341.9	1.04243
+98000	342.8	341.7	1.04296
+100000	342.6	341.6	1.04340
+102000	342.4	341.4	1.04393
+104000	344.2	343.2	1.03867
+106000	343.9	342.9	1.03947
+108000	343.7	342.6	1.04019
+110000	343.4	342.4	1.04094
+112000	343.2	342.2	1.04164
+114000	343.0	342.0	1.04230
+116000	342.7	341.7	1.04298
+118000	342.6	341.5	1.04356
+120000	342.3	341.3	1.04421
+122000	342.2	341.1	1.04477
+124000	342.0	340.9	1.04540
+126000	341.8	340.8	1.04595
+128000	341.6	340.6	1.04656
+130000	341.4	340.4	1.04708
+132000	341.2	340.2	1.04768
+134000	341.0	340.0	1.04817
+136000	340.9	339.9	1.04872
+138000	340.7	339.7	1.04924
+140000	340.5	339.5	1.04973
+142000	340.4	339.4	1.05028
+144000	340.2	339.2	1.05078
+146000	345.6	344.6	1.03435
+148000	345.4	344.4	1.03485
+150000	345.3	344.3	1.03532
+152000	345.1	344.1	1.03585
+154000	344.9	343.9	1.03632
+156000	344.8	343.8	1.03681

Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
+158000	344.6	343.6	1.03728
+160000	344.5	343.5	1.03774
+162000	344.3	343.3	1.03827
+164000	344.1	343.1	1.03873
+166000	344.0	343.0	1.03919
+168000	343.8	342.8	1.03965
+170000	343.7	342.7	1.04011
+172000	343.5	342.5	1.04057
+174000	343.4	342.4	1.04102
+176000	343.2	342.2	1.04148
+178000	343.1	342.1	1.04193
+180000	342.9	341.9	1.04238
+182000	342.8	341.8	1.04284
+184000	342.6	341.6	1.04329
+186000	343.8	342.8	1.03964
+188000	343.7	342.7	1.04009
+190000	343.6	342.5	1.04054
+192000	343.4	342.4	1.04093
+194000	343.3	342.3	1.04137
+196000	343.1	342.1	1.04180
+198000	343.0	342.0	1.04225
+200000	342.8	341.8	1.04269
+202000	342.7	341.7	1.04307
+204000	342.6	341.6	1.04352
+206000	342.4	341.4	1.04394
+208000	342.3	341.3	1.04439
+210000	342.2	341.1	1.04477
+212000	342.0	341.0	1.04519
+214000	341.9	340.9	1.04563
+216000	341.8	340.7	1.04599
+218000	341.6	340.6	1.04643
+220000	341.5	340.5	1.04681
+222000	341.4	340.3	1.04723
+224000	341.2	340.2	1.04761
+226000	341.1	340.1	1.04803

Interval	Guaranteed Net Power Output Corrected for Degradation Factor	Corrected RSC Base Load Degraded Output	Degradation Factor
+228000	341.0	339.9	1.04847
+230000	340.8	339.8	1.04885
+232000	340.7	339.7	1.04927

* All incremental intervals are with reference to actual hours at the end of FY-23

Table 9. Net Heat Rate Degradation (HHV)

Interval	Guaranteed Net Thermal Efficiency corrected for Degradation Factor	Corrected RSC Net Thermal Efficiency (HHV)	Corrected RSC Net Heat Rate (HHV)	Degradation Factor
Hours	%	%	Btu/kWh	Factor
0	50.63%	51.07%	6681.86	1.00000
FY-2023 End (OH=3276)	50.28%	50.72%	6727.45	1.00682
+2000 *	50.16%	50.59%	6744.67	1.00940
+2218 (HSD Test)	50.14%	50.58%	6746.24	1.00964
+4000	50.05%	50.49%	6758.41	1.01146
+6000	49.96%	50.39%	6771.68	1.01344
+8000	49.91%	50.34%	6778.65	1.01449
+10000	49.87%	50.30%	6783.39	1.01520
+12000	49.83%	50.26%	6789.16	1.01606
+14000	49.81%	50.24%	6791.57	1.01642
+16000	49.78%	50.21%	6795.89	1.01707
+18000	49.74%	50.17%	6801.35	1.01788
+20000	49.72%	50.15%	6803.56	1.01821
+22000	49.79%	50.22%	6794.07	1.01679
+24000	49.78%	50.21%	6796.14	1.01710
+26000	49.75%	50.18%	6800.21	1.01771
+28000	49.74%	50.17%	6800.83	1.01781
+30000	49.70%	50.13%	6805.97	1.01857
+32000	49.70%	50.13%	6806.35	1.01863
+34000	49.69%	50.12%	6808.15	1.01890
+36000	49.66%	50.09%	6811.95	1.01947
+38000	49.65%	50.08%	6813.70	1.01973



Interval	Guaranteed Net Thermal Efficiency corrected for Degradation Factor	Corrected RSC Net Thermal Efficiency (HHV)	Corrected RSC Net Heat Rate (HHV)	Degradation Factor
+40000	49.62%	50.05%	6817.44	1.02029
+42000	49.62%	50.05%	6817.86	1.02035
+44000	49.58%	50.01%	6822.87	1.02110
+46000	49.58%	50.01%	6823.27	1.02116
+48000	49.57%	50.00%	6824.89	1.02141
+50000	49.54%	49.97%	6828.59	1.02196
+52000	49.54%	49.97%	6828.92	1.02201
+54000	49.50%	49.93%	6833.88	1.02275
+56000	49.50%	49.93%	6834.18	1.02280
+58000	49.49%	49.92%	6835.78	1.02304
+60000	49.46%	49.89%	6839.41	1.02358
+62000	49.46%	49.89%	6839.69	1.02362
+64000	49.66%	50.09%	6812.56	1.01956
+66000	49.65%	50.07%	6814.08	1.01979
+68000	49.62%	50.05%	6817.63	1.02032
+70000	49.62%	50.05%	6817.91	1.02036
+72000	49.58%	50.01%	6822.71	1.02108
+74000	49.58%	50.01%	6822.99	1.02112
+76000	49.55%	49.97%	6827.80	1.02184
+78000	49.54%	49.97%	6828.01	1.02187
+80000	49.51%	49.94%	6832.83	1.02259
+82000	49.51%	49.94%	6833.09	1.02263
+84000	49.50%	49.92%	6834.57	1.02286
+86000	49.47%	49.90%	6838.13	1.02339
+88000	49.46%	49.89%	6839.61	1.02361
+90000	49.43%	49.86%	6843.12	1.02413
+92000	49.43%	49.86%	6843.33	1.02417
+94000	49.40%	49.83%	6848.15	1.02489
+96000	49.40%	49.82%	6848.36	1.02492
+98000	49.36%	49.79%	6853.14	1.02563
+100000	49.36%	49.79%	6853.35	1.02566
+102000	49.35%	49.78%	6854.77	1.02588
+104000	49.61%	50.04%	6818.88	1.02051
+106000	49.59%	50.01%	6822.33	1.02102
+108000	49.55%	49.98%	6827.62	1.02181



Interval	Guaranteed Net Thermal Efficiency corrected for Degradation Factor	Corrected RSC Net Thermal Efficiency (HHV)	Corrected RSC Net Heat Rate (HHV)	Degradation Factor
+110000	49.53%	49.96%	6829.37	1.02208
+112000	49.49%	49.92%	6835.50	1.02299
+114000	49.48%	49.91%	6836.97	1.02321
+116000	49.44%	49.86%	6842.88	1.02410
+118000	49.43%	49.86%	6844.01	1.02427
+120000	49.41%	49.84%	6846.31	1.02461
+122000	49.38%	49.81%	6850.63	1.02526
+124000	49.37%	49.80%	6851.55	1.02540
+126000	49.33%	49.76%	6857.03	1.02622
+128000	49.33%	49.76%	6857.85	1.02634
+130000	49.29%	49.72%	6863.21	1.02714
+132000	49.29%	49.71%	6863.91	1.02725
+134000	49.27%	49.70%	6865.70	1.02751
+136000	49.24%	49.67%	6869.54	1.02809
+138000	49.24%	49.67%	6870.08	1.02817
+140000	49.20%	49.63%	6875.19	1.02893
+142000	49.20%	49.63%	6875.69	1.02901
+144000	49.16%	49.59%	6880.79	1.02977
+146000	49.59%	50.02%	6821.27	1.02086
+148000	49.59%	50.02%	6821.69	1.02093
+150000	49.58%	50.01%	6823.36	1.02118
+152000	49.55%	49.98%	6827.06	1.02173
+154000	49.55%	49.98%	6827.40	1.02178
+156000	49.51%	49.94%	6832.34	1.02252
+158000	49.51%	49.94%	6832.69	1.02257
+160000	49.47%	49.90%	6837.61	1.02331
+162000	49.47%	49.90%	6837.94	1.02336
+164000	49.46%	49.89%	6839.49	1.02359
+166000	49.43%	49.86%	6843.12	1.02413
+168000	49.43%	49.86%	6843.40	1.02418
+170000	49.40%	49.82%	6848.31	1.02491
+172000	49.40%	49.82%	6848.59	1.02495
+174000	49.38%	49.81%	6850.13	1.02518
+176000	49.36%	49.79%	6853.72	1.02572
+178000	49.36%	49.78%	6853.98	1.02576

Interval	Guaranteed Net Thermal Efficiency corrected for Degradation Factor	Corrected RSC Net Thermal Efficiency (HHV)	Corrected RSC Net Heat Rate (HHV)	Degradation Factor
+180000	49.32%	49.75%	6858.83	1.02649
+182000	49.32%	49.75%	6859.06	1.02652
+184000	49.32%	49.74%	6859.28	1.02655
+186000	49.48%	49.91%	6836.52	1.02315
+188000	49.48%	49.91%	6836.73	1.02318
+190000	49.47%	49.90%	6838.21	1.02340
+192000	49.44%	49.87%	6841.77	1.02393
+194000	49.44%	49.87%	6841.93	1.02396
+196000	49.41%	49.84%	6846.74	1.02468
+198000	49.41%	49.83%	6846.96	1.02471
+200000	49.40%	49.82%	6848.44	1.02493
+202000	49.37%	49.80%	6851.94	1.02545
+204000	49.37%	49.80%	6852.15	1.02549
+206000	49.34%	49.76%	6856.93	1.02620
+208000	49.33%	49.76%	6857.14	1.02623
+210000	49.32%	49.75%	6858.57	1.02645
+212000	49.30%	49.72%	6862.07	1.02697
+214000	49.30%	49.72%	6862.28	1.02700
+216000	49.29%	49.71%	6863.71	1.02722
+218000	49.26%	49.69%	6867.22	1.02774
+220000	49.26%	49.69%	6867.38	1.02777
+222000	49.23%	49.65%	6872.17	1.02848
+224000	49.22%	49.65%	6872.38	1.02851
+226000	49.22%	49.65%	6872.52	1.02853
+228000	49.19%	49.61%	6877.26	1.02924
+230000	49.19%	49.61%	6877.47	1.02928
+232000	49.19%	49.61%	6877.61	1.02930

*All incremental intervals are with reference to actual hours at the end of FY-23

11.3 IMPACT OF ENVIRONMENT AND AMBIENT SITE CONDITIONS

11.3.1 Impact of Environmental Conditions

The inlet differential pressure drop is affected by the particulate matter, which ultimately leads to a decrease in power output and a decrease in efficiency, this relationship is available in the curve provided by gas turbine OEM (appended below as Figure 1).



OMS (Private) Limited

Reference No. OMS/TE/KE/BQPS-III/24/11/01

Dated: 15.11.2024

Aamir Fayyaz Khan

Plant Head 900MW BQPS-III

K-Electric, 39-B Sunset Boulevard

Phase-IV, DHA, Karachi

SUBJECT: VETTING OF DOCUMENTS FOR KE 900 MW CCPP BQPS-III

UNIT-I & UNIT-II

Ref: KE's PO # 7200001007 dated 15.11.2024

With reference to the subject mentioned above, KE has engaged OMS (Private) Limited as third party to vet the Combined Cycle (Plant) and Open Cycle (Gas Turbine) Degradation Correction Tables, Startup and Black-Start Costs, and Part Load Correction Tables (RLNG) as per the requirement of NEPRA.

OMS has carried out the technical review and vetted the aforementioned documents in accordance with the requirements of the purchase order. The required documents, duly signed and stamped, are enclosed herewith for further action at your end.

On behalf of Independent Engineer - OMS (Private) Ltd.



Abu Adil

Director Power Generation

OMS Private Limited



Enclosed: As under

01	CC HR Degradation Table (at 2000 hours interval) for Gas	06	OC Degradation curve & table
02	CC Output Degradation Table (at 2000 hours interval) for Gas	07	OC HR Degradation Table (at 2000 hours interval) for HSD
03	Part Load Table for Gas (at 1% intervals)	08	OC Output Degradation Table (at 2000 hours interval) for HSD
04	Startup and Black Start Cost for Gas	09	OC HR Degradation Table (at 2000 hours interval) for Gas
05	Startup and Black Start Cost for HSD	10	OC Output Degradation Table (at 2000 hours interval) for Gas

BQPS-III RLNG Net Power Output Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I (GT-1)			
Interval	Gas Turbine OC Net Power Output RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
0	287.8	287.8	1.0000
FY-23 (End)	287.8	283.3	1.0158
+2000	287.8	281.7	1.0216
+4000	287.8	280.7	1.0254
+6000	287.8	280.0	1.0281
+8000	287.8	279.5	1.0297
+10000	287.8	279.3	1.0304
+12000	287.8	279.2	1.0310
+14000	287.8	279.0	1.0317
+16000	287.8	278.7	1.0328
+18000	287.8	278.3	1.0343
+20000	287.8	277.9	1.0356
+22000	287.8	278.3	1.0341
+24000	287.8	278.1	1.0351
+26000	287.8	277.8	1.0360
+28000	287.8	277.5	1.0371
+30000	287.8	277.3	1.0379
+32000	287.8	277.0	1.0389
+34000	287.8	276.8	1.0398
+36000	287.8	276.6	1.0406
+38000	287.8	276.3	1.0416
+40000	287.8	276.1	1.0425
+42000	287.8	275.8	1.0434
+44000	287.8	275.6	1.0443
+46000	287.8	275.4	1.0451
+48000	287.8	275.2	1.0459
+50000	287.8	274.9	1.0469
+52000	287.8	274.7	1.0477
+54000	287.8	274.5	1.0486
+56000	287.8	274.3	1.0494
+58000	287.8	274.1	1.0502
+60000	287.8	273.9	1.0510
+62000	287.8	273.6	1.0520
+64000	287.8	276.3	1.0417
+66000	287.8	276.1	1.0425
+68000	287.8	275.9	1.0434
+70000	287.8	275.7	1.0442
+72000	287.8	275.4	1.0450
+74000	287.8	275.2	1.0458
+76000	287.8	275.0	1.0466
+78000	287.8	274.8	1.0474
+80000	287.8	274.6	1.0482
+82000	287.8	274.4	1.0490
+84000	287.8	274.2	1.0498
+86000	287.8	274.0	1.0506
+88000	287.8	273.8	1.0514
+90000	287.8	273.6	1.0522
+92000	287.8	273.4	1.0529

BQPS-III UNIT-II (GT-2)			
Interval	Gas Turbine OC Net Power Output RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
0	287.8	287.8	1.0000
FY-23 (End)	287.8	283.1	1.0166
+2000	287.8	281.6	1.0221
+4000	287.8	280.6	1.0257
+6000	287.8	279.9	1.0284
+8000	287.8	279.5	1.0297
+10000	287.8	279.3	1.0305
+12000	287.8	279.2	1.0311
+14000	287.8	279.0	1.0318
+16000	287.8	278.6	1.0330
+18000	287.8	278.2	1.0345
+20000	287.8	277.9	1.0358
+22000	287.8	278.3	1.0342
+24000	287.8	278.0	1.0352
+26000	287.8	277.8	1.0362
+28000	287.8	277.5	1.0372
+30000	287.8	277.3	1.0380
+32000	287.8	277.0	1.0390
+34000	287.8	276.8	1.0399
+36000	287.8	276.6	1.0408
+38000	287.8	276.3	1.0417
+40000	287.8	276.1	1.0426
+42000	287.8	275.8	1.0435
+44000	287.8	275.6	1.0444
+46000	287.8	275.4	1.0452
+48000	287.8	275.2	1.0460
+50000	287.8	274.9	1.0470
+52000	287.8	274.7	1.0478
+54000	287.8	274.5	1.0487
+56000	287.8	274.3	1.0495
+58000	287.8	274.0	1.0503
+60000	287.8	273.8	1.0511
+62000	287.8	273.6	1.0521
+64000	287.8	276.3	1.0418
+66000	287.8	276.1	1.0426
+68000	287.8	275.8	1.0435
+70000	287.8	275.6	1.0443
+72000	287.8	275.4	1.0451
+74000	287.8	275.2	1.0459
+76000	287.8	275.0	1.0467
+78000	287.8	274.8	1.0475
+80000	287.8	274.6	1.0483
+82000	287.8	274.4	1.0491
+84000	287.8	274.1	1.0499
+86000	287.8	273.9	1.0507
+88000	287.8	273.7	1.0515
+90000	287.8	273.5	1.0523
+92000	287.8	273.3	1.0530



BQPS-III RLNG Net Power Output Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I (GT-1)			
Interval	Gas Turbine OC Net Power Output RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
+94000	287.8	273.2	1.0537
+96000	287.8	273.0	1.0545
+98000	287.8	272.8	1.0553
+100000	287.8	272.6	1.0559
+102000	287.8	272.4	1.0567
+104000	287.8	274.4	1.0488
+106000	287.8	274.1	1.0500
+108000	287.8	273.8	1.0510
+110000	287.8	273.6	1.0522
+112000	287.8	273.3	1.0533
+114000	287.8	273.0	1.0542
+116000	287.8	272.8	1.0553
+118000	287.8	272.5	1.0561
+120000	287.8	272.3	1.0571
+122000	287.8	272.1	1.0579
+124000	287.8	271.8	1.0589
+126000	287.8	271.6	1.0597
+128000	287.8	271.4	1.0606
+130000	287.8	271.2	1.0614
+132000	287.8	270.9	1.0623
+134000	287.8	270.8	1.0631
+136000	287.8	270.5	1.0639
+138000	287.8	270.3	1.0647
+140000	287.8	270.2	1.0654
+142000	287.8	269.9	1.0662
+144000	287.8	269.8	1.0670
+146000	287.8	276.1	1.0424
+148000	287.8	275.9	1.0431
+150000	287.8	275.8	1.0438
+152000	287.8	275.5	1.0446
+154000	287.8	275.3	1.0453
+156000	287.8	275.2	1.0460
+158000	287.8	275.0	1.0467
+160000	287.8	274.8	1.0474
+162000	287.8	274.6	1.0482
+164000	287.8	274.4	1.0489
+166000	287.8	274.2	1.0496
+168000	287.8	274.0	1.0503
+170000	287.8	273.9	1.0510
+172000	287.8	273.7	1.0517
+174000	287.8	273.5	1.0524
+176000	287.8	273.3	1.0531
+178000	287.8	273.2	1.0537
+180000	287.8	273.0	1.0544
+182000	287.8	272.8	1.0551
+184000	287.8	272.6	1.0558
+186000	287.8	274.0	1.0503
+188000	287.8	273.9	1.0510

BQPS-III UNIT-II (GT-2)			
Interval	Gas Turbine OC Net Power Output RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
+94000	287.8	273.1	1.0538
+96000	287.8	272.9	1.0545
+98000	287.8	272.7	1.0553
+100000	287.8	272.6	1.0560
+102000	287.8	272.4	1.0568
+104000	287.8	274.4	1.0489
+106000	287.8	274.1	1.0501
+108000	287.8	273.8	1.0512
+110000	287.8	273.5	1.0523
+112000	287.8	273.2	1.0534
+114000	287.8	273.0	1.0543
+116000	287.8	272.7	1.0554
+118000	287.8	272.5	1.0562
+120000	287.8	272.3	1.0572
+122000	287.8	272.0	1.0580
+124000	287.8	271.8	1.0590
+126000	287.8	271.6	1.0598
+128000	287.8	271.3	1.0607
+130000	287.8	271.1	1.0615
+132000	287.8	270.9	1.0624
+134000	287.8	270.7	1.0632
+136000	287.8	270.5	1.0640
+138000	287.8	270.3	1.0648
+140000	287.8	270.1	1.0655
+142000	287.8	269.9	1.0663
+144000	287.8	269.7	1.0671
+146000	287.8	276.1	1.0424
+148000	287.8	275.9	1.0432
+150000	287.8	275.7	1.0439
+152000	287.8	275.5	1.0447
+154000	287.8	275.3	1.0454
+156000	287.8	275.1	1.0461
+158000	287.8	275.0	1.0468
+160000	287.8	274.8	1.0475
+162000	287.8	274.6	1.0483
+164000	287.8	274.4	1.0490
+166000	287.8	274.2	1.0497
+168000	287.8	274.0	1.0504
+170000	287.8	273.8	1.0511
+172000	287.8	273.7	1.0518
+174000	287.8	273.5	1.0524
+176000	287.8	273.3	1.0531
+178000	287.8	273.1	1.0538
+180000	287.8	273.0	1.0545
+182000	287.8	272.8	1.0552
+184000	287.8	272.6	1.0558
+186000	287.8	274.0	1.0504
+188000	287.8	273.9	1.0510

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BQPS-III RLNG Net Power Output Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I (GT-1)			
Interval	Gas Turbine OC Net Power Output RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
+190000	287.8	273.7	1.0517
+192000	287.8	273.5	1.0522
+194000	287.8	273.4	1.0529
+196000	287.8	273.2	1.0535
+198000	287.8	273.0	1.0542
+200000	287.8	272.9	1.0549
+202000	287.8	272.7	1.0554
+204000	287.8	272.5	1.0561
+206000	287.8	272.4	1.0568
+208000	287.8	272.2	1.0574
+210000	287.8	272.1	1.0580
+212000	287.8	271.9	1.0586
+214000	287.8	271.7	1.0593
+216000	287.8	271.6	1.0598
+218000	287.8	271.4	1.0605
+220000	287.8	271.3	1.0610
+222000	287.8	271.1	1.0617
+224000	287.8	271.0	1.0622
+226000	287.8	270.8	1.0629
+228000	287.8	270.6	1.0635
+230000	287.8	270.5	1.0641
+232000	287.8	270.3	1.0647

Note:

- * Rated net power output has been taken from EPC Heat Mass Balance Diagram (HMBD)
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,040 hours

BQPS-III UNIT-II (GT-2)			
Interval	Gas Turbine OC Net Power Output RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
+190000	287.8	273.7	1.0517
+192000	287.8	273.5	1.0523
+194000	287.8	273.3	1.0530
+196000	287.8	273.2	1.0536
+198000	287.8	273.0	1.0543
+200000	287.8	272.8	1.0549
+202000	287.8	272.7	1.0555
+204000	287.8	272.5	1.0562
+206000	287.8	272.4	1.0568
+208000	287.8	272.2	1.0575
+210000	287.8	272.0	1.0581
+212000	287.8	271.9	1.0587
+214000	287.8	271.7	1.0593
+216000	287.8	271.6	1.0599
+218000	287.8	271.4	1.0605
+220000	287.8	271.2	1.0611
+222000	287.8	271.1	1.0617
+224000	287.8	270.9	1.0623
+226000	287.8	270.8	1.0629
+228000	287.8	270.6	1.0636
+230000	287.8	270.5	1.0642
+232000	287.8	270.3	1.0648

Note:

- * Rated Net Power Output has been taken from EPC Heat Mass Balance Diagram (HMBD)
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,276 hours

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BQPS-III RLNG Net Efficiency Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I (GT-1)			
Interval	Gas Turbine OC Net Efficiency RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
0	34.18%	34.18%	1.0000
FY-23 (End)	34.18%	33.91%	1.0081
+2000	34.18%	33.82%	1.0108
+4000	34.18%	33.76%	1.0125
+6000	34.18%	33.71%	1.0141
+8000	34.18%	33.68%	1.0149
+10000	34.18%	33.67%	1.0154
+12000	34.18%	33.65%	1.0158
+14000	34.18%	33.67%	1.0153
+16000	34.18%	33.64%	1.0163
+18000	34.18%	33.60%	1.0175
+20000	34.18%	33.59%	1.0178
+22000	34.18%	33.65%	1.0159
+24000	34.18%	33.64%	1.0161
+26000	34.18%	33.60%	1.0173
+28000	34.18%	33.60%	1.0174
+30000	34.18%	33.56%	1.0186
+32000	34.18%	33.56%	1.0187
+34000	34.18%	33.55%	1.0188
+36000	34.18%	33.52%	1.0199
+38000	34.18%	33.51%	1.0201
+40000	34.18%	33.48%	1.0212
+42000	34.18%	33.47%	1.0213
+44000	34.18%	33.44%	1.0224
+46000	34.18%	33.43%	1.0225
+48000	34.18%	33.43%	1.0226
+50000	34.18%	33.39%	1.0237
+52000	34.18%	33.39%	1.0237
+54000	34.18%	33.36%	1.0249
+56000	34.18%	33.35%	1.0249
+58000	34.18%	33.35%	1.0250
+60000	34.18%	33.32%	1.0261
+62000	34.18%	33.31%	1.0262
+64000	34.18%	33.51%	1.0201
+66000	34.18%	33.51%	1.0202
+68000	34.18%	33.48%	1.0212
+70000	34.18%	33.47%	1.0213
+72000	34.18%	33.44%	1.0223
+74000	34.18%	33.44%	1.0224
+76000	34.18%	33.40%	1.0235
+78000	34.18%	33.40%	1.0235
+80000	34.18%	33.36%	1.0246
+82000	34.18%	33.36%	1.0247
+84000	34.18%	33.36%	1.0248
+86000	34.18%	33.32%	1.0258
+88000	34.18%	33.32%	1.0259
+90000	34.18%	33.29%	1.0269
+92000	34.18%	33.29%	1.0270

BQPS-III UNIT-II (GT-2)			
Interval	Gas Turbine OC Net Efficiency RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
0	34.18%	34.18%	1.0000
FY-23 (End)	34.18%	33.89%	1.0085
+2000	34.18%	33.81%	1.0110
+4000	34.18%	33.75%	1.0127
+6000	34.18%	33.69%	1.0144
+8000	34.18%	33.67%	1.0151
+10000	34.18%	33.66%	1.0153
+12000	34.18%	33.65%	1.0158
+14000	34.18%	33.66%	1.0155
+16000	34.18%	33.63%	1.0163
+18000	34.18%	33.59%	1.0176
+20000	34.18%	33.57%	1.0180
+22000	34.18%	33.64%	1.0159
+24000	34.18%	33.63%	1.0164
+26000	34.18%	33.60%	1.0173
+28000	34.18%	33.59%	1.0174
+30000	34.18%	33.55%	1.0186
+32000	34.18%	33.55%	1.0187
+34000	34.18%	33.54%	1.0191
+36000	34.18%	33.51%	1.0199
+38000	34.18%	33.50%	1.0203
+40000	34.18%	33.47%	1.0212
+42000	34.18%	33.47%	1.0213
+44000	34.18%	33.43%	1.0224
+46000	34.18%	33.43%	1.0225
+48000	34.18%	33.42%	1.0228
+50000	34.18%	33.39%	1.0237
+52000	34.18%	33.39%	1.0237
+54000	34.18%	33.35%	1.0249
+56000	34.18%	33.35%	1.0249
+58000	34.18%	33.34%	1.0253
+60000	34.18%	33.31%	1.0261
+62000	34.18%	33.31%	1.0262
+64000	34.18%	33.51%	1.0201
+66000	34.18%	33.49%	1.0204
+68000	34.18%	33.47%	1.0212
+70000	34.18%	33.47%	1.0213
+72000	34.18%	33.43%	1.0224
+74000	34.18%	33.43%	1.0224
+76000	34.18%	33.39%	1.0235
+78000	34.18%	33.39%	1.0236
+80000	34.18%	33.36%	1.0246
+82000	34.18%	33.35%	1.0247
+84000	34.18%	33.34%	1.0250
+86000	34.18%	33.32%	1.0258
+88000	34.18%	33.31%	1.0262
+90000	34.18%	33.28%	1.0270
+92000	34.18%	33.28%	1.0270

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BQPS-III RLNG Net Efficiency Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I (GT-1)			
Interval	Gas Turbine OC Net Efficiency RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
+94000	34.18%	33.25%	1.0281
+96000	34.18%	33.25%	1.0281
+98000	34.18%	33.21%	1.0292
+100000	34.18%	33.21%	1.0293
+102000	34.18%	33.21%	1.0293
+104000	34.18%	33.47%	1.0214
+106000	34.18%	33.45%	1.0220
+108000	34.18%	33.40%	1.0234
+110000	34.18%	33.39%	1.0238
+112000	34.18%	33.34%	1.0252
+114000	34.18%	33.33%	1.0255
+116000	34.18%	33.29%	1.0269
+118000	34.18%	33.28%	1.0271
+120000	34.18%	33.27%	1.0274
+122000	34.18%	33.23%	1.0286
+124000	34.18%	33.23%	1.0288
+126000	34.18%	33.19%	1.0301
+128000	34.18%	33.18%	1.0303
+130000	34.18%	33.14%	1.0315
+132000	34.18%	33.14%	1.0316
+134000	34.18%	33.13%	1.0318
+136000	34.18%	33.10%	1.0329
+138000	34.18%	33.09%	1.0330
+140000	34.18%	33.05%	1.0342
+142000	34.18%	33.05%	1.0343
+144000	34.18%	33.01%	1.0355
+146000	34.18%	33.45%	1.0220
+148000	34.18%	33.45%	1.0221
+150000	34.18%	33.44%	1.0222
+152000	34.18%	33.41%	1.0233
+154000	34.18%	33.40%	1.0234
+156000	34.18%	33.37%	1.0245
+158000	34.18%	33.36%	1.0246
+160000	34.18%	33.33%	1.0257
+162000	34.18%	33.33%	1.0258
+164000	34.18%	33.32%	1.0259
+166000	34.18%	33.29%	1.0269
+168000	34.18%	33.29%	1.0270
+170000	34.18%	33.25%	1.0281
+172000	34.18%	33.25%	1.0282
+174000	34.18%	33.24%	1.0283
+176000	34.18%	33.21%	1.0293
+178000	34.18%	33.21%	1.0294
+180000	34.18%	33.17%	1.0305
+182000	34.18%	33.17%	1.0305
+184000	34.18%	33.17%	1.0306
+186000	34.18%	33.34%	1.0255
+188000	34.18%	33.33%	1.0255

BQPS-III UNIT-II (GT-2)			
Interval	Gas Turbine OC Net Efficiency RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
+94000	34.18%	33.24%	1.0281
+96000	34.18%	33.24%	1.0281
+98000	34.18%	33.21%	1.0292
+100000	34.18%	33.21%	1.0293
+102000	34.18%	33.20%	1.0296
+104000	34.18%	33.46%	1.0215
+106000	34.18%	33.43%	1.0223
+108000	34.18%	33.40%	1.0235
+110000	34.18%	33.38%	1.0239
+112000	34.18%	33.34%	1.0252
+114000	34.18%	33.33%	1.0256
+116000	34.18%	33.28%	1.0269
+118000	34.18%	33.27%	1.0272
+120000	34.18%	33.26%	1.0277
+122000	34.18%	33.23%	1.0287
+124000	34.18%	33.22%	1.0289
+126000	34.18%	33.18%	1.0301
+128000	34.18%	33.17%	1.0303
+130000	34.18%	33.13%	1.0315
+132000	34.18%	33.13%	1.0317
+134000	34.18%	33.12%	1.0321
+136000	34.18%	33.09%	1.0329
+138000	34.18%	33.08%	1.0331
+140000	34.18%	33.05%	1.0342
+142000	34.18%	33.04%	1.0343
+144000	34.18%	33.01%	1.0355
+146000	34.18%	33.44%	1.0220
+148000	34.18%	33.44%	1.0221
+150000	34.18%	33.43%	1.0225
+152000	34.18%	33.40%	1.0233
+154000	34.18%	33.40%	1.0234
+156000	34.18%	33.36%	1.0245
+158000	34.18%	33.36%	1.0246
+160000	34.18%	33.32%	1.0257
+162000	34.18%	33.32%	1.0258
+164000	34.18%	33.31%	1.0261
+166000	34.18%	33.28%	1.0270
+168000	34.18%	33.28%	1.0270
+170000	34.18%	33.24%	1.0281
+172000	34.18%	33.24%	1.0282
+174000	34.18%	33.23%	1.0285
+176000	34.18%	33.20%	1.0293
+178000	34.18%	33.20%	1.0294
+180000	34.18%	33.17%	1.0305
+182000	34.18%	33.16%	1.0306
+184000	34.18%	33.16%	1.0306
+186000	34.18%	33.33%	1.0255
+188000	34.18%	33.33%	1.0255

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BQPS-III RLNG Net Efficiency Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I (GT-1)			
Interval	Gas Turbine OC Net Efficiency RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
+190000	34.18%	33.33%	1.0256
+192000	34.18%	33.30%	1.0266
+194000	34.18%	33.30%	1.0267
+196000	34.18%	33.26%	1.0278
+198000	34.18%	33.26%	1.0278
+200000	34.18%	33.26%	1.0279
+202000	34.18%	33.22%	1.0289
+204000	34.18%	33.22%	1.0290
+206000	34.18%	33.19%	1.0301
+208000	34.18%	33.19%	1.0301
+210000	34.18%	33.18%	1.0302
+212000	34.18%	33.15%	1.0312
+214000	34.18%	33.15%	1.0313
+216000	34.18%	33.15%	1.0314
+218000	34.18%	33.11%	1.0324
+220000	34.18%	33.11%	1.0324
+222000	34.18%	33.08%	1.0335
+224000	34.18%	33.07%	1.0336
+226000	34.18%	33.07%	1.0336
+228000	34.18%	33.04%	1.0347
+230000	34.18%	33.04%	1.0347
+232000	34.18%	33.04%	1.0348

Note:

- * Rated Net Heat Rate has been taken from EPC Heat Mass Balance Diagram (HMBD)
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,040 hours
- * HHV/LHV Ratio cosidered: 1.10868

BQPS-III UNIT-II (GT-2)			
Interval	Gas Turbine OC Net Efficiency RLNG		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
+190000	34.18%	33.32%	1.0258
+192000	34.18%	33.29%	1.0266
+194000	34.18%	33.29%	1.0267
+196000	34.18%	33.25%	1.0278
+198000	34.18%	33.25%	1.0278
+200000	34.18%	33.24%	1.0282
+202000	34.18%	33.22%	1.0289
+204000	34.18%	33.22%	1.0290
+206000	34.18%	33.18%	1.0301
+208000	34.18%	33.18%	1.0301
+210000	34.18%	33.17%	1.0304
+212000	34.18%	33.14%	1.0312
+214000	34.18%	33.14%	1.0313
+216000	34.18%	33.13%	1.0316
+218000	34.18%	33.11%	1.0324
+220000	34.18%	33.10%	1.0324
+222000	34.18%	33.07%	1.0335
+224000	34.18%	33.07%	1.0336
+226000	34.18%	33.07%	1.0336
+228000	34.18%	33.03%	1.0347
+230000	34.18%	33.03%	1.0347
+232000	34.18%	33.03%	1.0348

Note:

- * Rated Net Heat Rate has been taken from EPC Heat Mass Balance Diagram (HMBD)
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,276 hours
- * HHV/LHV Ratio cosidered: 1.10889

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OMS (Private) Limited

Reference No. OMS/TE/KE/BQPS-III/24/11/01

Dated: 15.11.2024

Aamir Fayyaz Khan

Plant Head 900MW BQPS-III

K-Electric, 39-B Sunset Boulevard

Phase-IV, DHA, Karachi

SUBJECT: VETTING OF DOCUMENTS FOR KE 900 MW CCPP BQPS-III
UNIT-I & UNIT-II

Ref: KE's PO # 7200001007 dated 15.11.2024

With reference to the subject mentioned above, KE has engaged OMS (Private) Limited as third party to vet the Combined Cycle (Plant) and Open Cycle (Gas Turbine) Degradation Correction Tables, Startup and Black-Start Costs, and Part Load Correction Tables (RLNG) as per the requirement of NEPRA.

OMS has carried out the technical review and vetted the aforementioned documents in accordance with the requirements of the purchase order. The required documents, duly signed and stamped, are enclosed herewith for further action at your end.

On behalf of Independent Engineer - OMS (Private) Ltd.


Abu Adil

Director Power Generation

OMS Private Limited



Enclosed: As under

01	CC HR Degradation Table (at 2000 hours interval) for Gas	06	OC Degradation curve & table
02	CC Output Degradation Table (at 2000 hours interval) for Gas	07	OC HR Degradation Table (at 2000 hours interval) for HSD
03	Part Load Table for Gas (at 1% intervals)	08	OC Output Degradation Table (at 2000 hours interval) for HSD
04	Startup and Black Start Cost for Gas	09	OC HR Degradation Table (at 2000 hours interval) for Gas
05	Startup and Black Start Cost for HSD	10	OC Output Degradation Table (at 2000 hours interval) for Gas

BQPS-III HSD Net Power Output Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I			
Interval	Gas Turbine Net Power Output HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
0	235.0	235.0	1.0000
FY-23 (End)	235.0	231.3	1.0158
+2000	235.0	230.0	1.0216
+4000	235.0	229.2	1.0254
+6000	235.0	228.6	1.0281
+8000	235.0	228.2	1.0297
+10000	235.0	228.1	1.0304
+12000	235.0	227.9	1.0310
+14000	235.0	227.8	1.0317
+16000	235.0	227.5	1.0328
+18000	235.0	227.2	1.0343
+20000	235.0	226.9	1.0356
+22000	235.0	227.2	1.0341
+24000	235.0	227.0	1.0351
+26000	235.0	226.8	1.0360
+28000	235.0	226.6	1.0371
+30000	235.0	226.4	1.0379
+32000	235.0	226.2	1.0389
+34000	235.0	226.0	1.0398
+36000	235.0	225.8	1.0406
+38000	235.0	225.6	1.0416
+40000	235.0	225.4	1.0425
+42000	235.0	225.2	1.0434
+44000	235.0	225.0	1.0443
+46000	235.0	224.8	1.0451
+48000	235.0	224.7	1.0459
+50000	235.0	224.5	1.0469
+52000	235.0	224.3	1.0477
+54000	235.0	224.1	1.0486
+56000	235.0	223.9	1.0494
+58000	235.0	223.8	1.0502
+60000	235.0	223.6	1.0510
+62000	235.0	223.4	1.0520
+64000	235.0	225.6	1.0417
+66000	235.0	225.4	1.0425
+68000	235.0	225.2	1.0434
+70000	235.0	225.0	1.0442
+72000	235.0	224.9	1.0450
+74000	235.0	224.7	1.0458
+76000	235.0	224.5	1.0466
+78000	235.0	224.4	1.0474
+80000	235.0	224.2	1.0482
+82000	235.0	224.0	1.0490
+84000	235.0	223.8	1.0498
+86000	235.0	223.7	1.0506
+88000	235.0	223.5	1.0514
+90000	235.0	223.3	1.0522
+92000	235.0	223.2	1.0529
+94000	235.0	223.0	1.0537

BQPS-III UNIT-II			
Interval	Gas Turbine Net Power Output HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
0	235.0	235.0	1.0000
FY-23 (End)	235.0	231.2	1.0166
+2000	235.0	229.9	1.0221
+4000	235.0	229.1	1.0257
+6000	235.0	228.5	1.0284
+8000	235.0	228.2	1.0297
+10000	235.0	228.0	1.0305
+12000	235.0	227.9	1.0311
+14000	235.0	227.7	1.0318
+16000	235.0	227.5	1.0330
+18000	235.0	227.2	1.0345
+20000	235.0	226.9	1.0358
+22000	235.0	227.2	1.0342
+24000	235.0	227.0	1.0352
+26000	235.0	226.8	1.0362
+28000	235.0	226.6	1.0372
+30000	235.0	226.4	1.0380
+32000	235.0	226.2	1.0390
+34000	235.0	226.0	1.0399
+36000	235.0	225.8	1.0408
+38000	235.0	225.6	1.0417
+40000	235.0	225.4	1.0426
+42000	235.0	225.2	1.0435
+44000	235.0	225.0	1.0444
+46000	235.0	224.8	1.0452
+48000	235.0	224.6	1.0460
+50000	235.0	224.4	1.0470
+52000	235.0	224.3	1.0478
+54000	235.0	224.1	1.0487
+56000	235.0	223.9	1.0495
+58000	235.0	223.7	1.0503
+60000	235.0	223.6	1.0511
+62000	235.0	223.4	1.0521
+64000	235.0	225.5	1.0418
+66000	235.0	225.4	1.0426
+68000	235.0	225.2	1.0435
+70000	235.0	225.0	1.0443
+72000	235.0	224.8	1.0451
+74000	235.0	224.7	1.0459
+76000	235.0	224.5	1.0467
+78000	235.0	224.3	1.0475
+80000	235.0	224.2	1.0483
+82000	235.0	224.0	1.0491
+84000	235.0	223.8	1.0499
+86000	235.0	223.6	1.0507
+88000	235.0	223.5	1.0515
+90000	235.0	223.3	1.0523
+92000	235.0	223.2	1.0530
+94000	235.0	223.0	1.0538

ALJ



BQPS-III HSD Net Power Output Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I			
Interval	Gas Turbine Net Power Output HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
+96000	235.0	222.8	1.0545
+98000	235.0	222.7	1.0553
+100000	235.0	222.5	1.0559
+102000	235.0	222.4	1.0567
+104000	235.0	224.1	1.0488
+106000	235.0	223.8	1.0500
+108000	235.0	223.6	1.0510
+110000	235.0	223.3	1.0522
+112000	235.0	223.1	1.0533
+114000	235.0	222.9	1.0542
+116000	235.0	222.7	1.0553
+118000	235.0	222.5	1.0561
+120000	235.0	222.3	1.0571
+122000	235.0	222.1	1.0579
+124000	235.0	221.9	1.0589
+126000	235.0	221.7	1.0597
+128000	235.0	221.6	1.0606
+130000	235.0	221.4	1.0614
+132000	235.0	221.2	1.0623
+134000	235.0	221.0	1.0631
+136000	235.0	220.9	1.0639
+138000	235.0	220.7	1.0647
+140000	235.0	220.6	1.0654
+142000	235.0	220.4	1.0662
+144000	235.0	220.2	1.0670
+146000	235.0	225.4	1.0424
+148000	235.0	225.3	1.0431
+150000	235.0	225.1	1.0438
+152000	235.0	224.9	1.0446
+154000	235.0	224.8	1.0453
+156000	235.0	224.6	1.0460
+158000	235.0	224.5	1.0467
+160000	235.0	224.3	1.0474
+162000	235.0	224.2	1.0482
+164000	235.0	224.0	1.0489
+166000	235.0	223.9	1.0496
+168000	235.0	223.7	1.0503
+170000	235.0	223.6	1.0510
+172000	235.0	223.4	1.0517
+174000	235.0	223.3	1.0524
+176000	235.0	223.1	1.0531
+178000	235.0	223.0	1.0537
+180000	235.0	222.9	1.0544
+182000	235.0	222.7	1.0551
+184000	235.0	222.6	1.0558
+186000	235.0	223.7	1.0503
+188000	235.0	223.6	1.0510
+190000	235.0	223.4	1.0517
+192000	235.0	223.3	1.0522

BQPS-III UNIT-II			
Interval	Gas Turbine Net Power Output HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
+96000	235.0	222.8	1.0545
+98000	235.0	222.7	1.0553
+100000	235.0	222.5	1.0560
+102000	235.0	222.4	1.0568
+104000	235.0	224.0	1.0489
+106000	235.0	223.8	1.0501
+108000	235.0	223.5	1.0512
+110000	235.0	223.3	1.0523
+112000	235.0	223.1	1.0534
+114000	235.0	222.9	1.0543
+116000	235.0	222.7	1.0554
+118000	235.0	222.5	1.0562
+120000	235.0	222.3	1.0572
+122000	235.0	222.1	1.0580
+124000	235.0	221.9	1.0590
+126000	235.0	221.7	1.0598
+128000	235.0	221.5	1.0607
+130000	235.0	221.4	1.0615
+132000	235.0	221.2	1.0624
+134000	235.0	221.0	1.0632
+136000	235.0	220.9	1.0640
+138000	235.0	220.7	1.0648
+140000	235.0	220.5	1.0655
+142000	235.0	220.4	1.0663
+144000	235.0	220.2	1.0671
+146000	235.0	225.4	1.0424
+148000	235.0	225.3	1.0432
+150000	235.0	225.1	1.0439
+152000	235.0	224.9	1.0447
+154000	235.0	224.8	1.0454
+156000	235.0	224.6	1.0461
+158000	235.0	224.5	1.0468
+160000	235.0	224.3	1.0475
+162000	235.0	224.2	1.0483
+164000	235.0	224.0	1.0490
+166000	235.0	223.9	1.0497
+168000	235.0	223.7	1.0504
+170000	235.0	223.6	1.0511
+172000	235.0	223.4	1.0518
+174000	235.0	223.3	1.0524
+176000	235.0	223.1	1.0531
+178000	235.0	223.0	1.0538
+180000	235.0	222.8	1.0545
+182000	235.0	222.7	1.0552
+184000	235.0	222.6	1.0558
+186000	235.0	223.7	1.0504
+188000	235.0	223.6	1.0510
+190000	235.0	223.4	1.0517
+192000	235.0	223.3	1.0523



BQPS-III HSD Net Power Output Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I			
Interval	Gas Turbine Net Power Output HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
+194000	235.0	223.2	1.0529
+196000	235.0	223.0	1.0535
+198000	235.0	222.9	1.0542
+200000	235.0	222.8	1.0549
+202000	235.0	222.6	1.0554
+204000	235.0	222.5	1.0561
+206000	235.0	222.4	1.0568
+208000	235.0	222.2	1.0574
+210000	235.0	222.1	1.0580
+212000	235.0	222.0	1.0586
+214000	235.0	221.8	1.0593
+216000	235.0	221.7	1.0598
+218000	235.0	221.6	1.0605
+220000	235.0	221.5	1.0610
+222000	235.0	221.3	1.0617
+224000	235.0	221.2	1.0622
+226000	235.0	221.1	1.0629
+228000	235.0	220.9	1.0635
+230000	235.0	220.8	1.0641
+232000	235.0	220.7	1.0647

Note:

* Rated net power output has been taken from EPC Heat Mass Balance Diagram (HMBD)

* All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)

* Operating hours at end of FY23: 3,040 hours

BQPS-III UNIT-II			
Interval	Gas Turbine Net Power Output HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	MW	MW	Factor
+194000	235.0	223.2	1.0530
+196000	235.0	223.0	1.0536
+198000	235.0	222.9	1.0543
+200000	235.0	222.7	1.0549
+202000	235.0	222.6	1.0555
+204000	235.0	222.5	1.0562
+206000	235.0	222.4	1.0568
+208000	235.0	222.2	1.0575
+210000	235.0	222.1	1.0581
+212000	235.0	222.0	1.0587
+214000	235.0	221.8	1.0593
+216000	235.0	221.7	1.0599
+218000	235.0	221.6	1.0605
+220000	235.0	221.4	1.0611
+222000	235.0	221.3	1.0617
+224000	235.0	221.2	1.0623
+226000	235.0	221.1	1.0629
+228000	235.0	220.9	1.0636
+230000	235.0	220.8	1.0642
+232000	235.0	220.7	1.0648

Note:

* Rated net power output has been taken from EPC Heat Mass Balance Diagram (HMBD)

* All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)

* Operating hours at end of FY23: 3,276 hours



BQPS-III HSD Net Efficiency Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I			
Interval	Gas Turbine Net Efficiency HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
0	33.26%	33.26%	1.0000
FY-23 (End)	33.26%	32.99%	1.0081
+2000	33.26%	32.90%	1.0108
+4000	33.26%	32.85%	1.0125
+6000	33.26%	32.79%	1.0141
+8000	33.26%	32.77%	1.0149
+10000	33.26%	32.75%	1.0154
+12000	33.26%	32.74%	1.0158
+14000	33.26%	32.75%	1.0153
+16000	33.26%	32.72%	1.0163
+18000	33.26%	32.68%	1.0175
+20000	33.26%	32.67%	1.0178
+22000	33.26%	32.74%	1.0159
+24000	33.26%	32.73%	1.0161
+26000	33.26%	32.69%	1.0173
+28000	33.26%	32.69%	1.0174
+30000	33.26%	32.65%	1.0186
+32000	33.26%	32.65%	1.0187
+34000	33.26%	32.64%	1.0188
+36000	33.26%	32.61%	1.0199
+38000	33.26%	32.60%	1.0201
+40000	33.26%	32.57%	1.0212
+42000	33.26%	32.56%	1.0213
+44000	33.26%	32.53%	1.0224
+46000	33.26%	32.52%	1.0225
+48000	33.26%	32.52%	1.0226
+50000	33.26%	32.49%	1.0237
+52000	33.26%	32.48%	1.0237
+54000	33.26%	32.45%	1.0249
+56000	33.26%	32.45%	1.0249
+58000	33.26%	32.44%	1.0250
+60000	33.26%	32.41%	1.0261
+62000	33.26%	32.41%	1.0262
+64000	33.26%	32.60%	1.0201
+66000	33.26%	32.60%	1.0202
+68000	33.26%	32.57%	1.0212
+70000	33.26%	32.56%	1.0213
+72000	33.26%	32.53%	1.0223
+74000	33.26%	32.53%	1.0224
+76000	33.26%	32.49%	1.0235
+78000	33.26%	32.49%	1.0235
+80000	33.26%	32.46%	1.0246
+82000	33.26%	32.45%	1.0247
+84000	33.26%	32.45%	1.0248
+86000	33.26%	32.42%	1.0258
+88000	33.26%	32.42%	1.0259
+90000	33.26%	32.38%	1.0269
+92000	33.26%	32.38%	1.0270

BQPS-III UNIT-II			
Interval	Gas Turbine Net Efficiency HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
0	33.25%	33.25%	1.0000
FY-23 (End)	33.25%	32.97%	1.0085
+2000	33.25%	32.89%	1.0110
+4000	33.25%	32.83%	1.0127
+6000	33.25%	32.78%	1.0144
+8000	33.25%	32.76%	1.0151
+10000	33.25%	32.75%	1.0153
+12000	33.25%	32.73%	1.0158
+14000	33.25%	32.74%	1.0155
+16000	33.25%	32.72%	1.0163
+18000	33.25%	32.68%	1.0176
+20000	33.25%	32.66%	1.0180
+22000	33.25%	32.73%	1.0159
+24000	33.25%	32.71%	1.0164
+26000	33.25%	32.69%	1.0173
+28000	33.25%	32.68%	1.0174
+30000	33.25%	32.64%	1.0186
+32000	33.25%	32.64%	1.0187
+34000	33.25%	32.63%	1.0191
+36000	33.25%	32.60%	1.0199
+38000	33.25%	32.59%	1.0203
+40000	33.25%	32.56%	1.0212
+42000	33.25%	32.56%	1.0213
+44000	33.25%	32.52%	1.0224
+46000	33.25%	32.52%	1.0225
+48000	33.25%	32.51%	1.0228
+50000	33.25%	32.48%	1.0237
+52000	33.25%	32.48%	1.0237
+54000	33.25%	32.44%	1.0249
+56000	33.25%	32.44%	1.0249
+58000	33.25%	32.43%	1.0253
+60000	33.25%	32.40%	1.0261
+62000	33.25%	32.40%	1.0262
+64000	33.25%	32.60%	1.0201
+66000	33.25%	32.59%	1.0204
+68000	33.25%	32.56%	1.0212
+70000	33.25%	32.56%	1.0213
+72000	33.25%	32.52%	1.0224
+74000	33.25%	32.52%	1.0224
+76000	33.25%	32.49%	1.0235
+78000	33.25%	32.49%	1.0236
+80000	33.25%	32.45%	1.0246
+82000	33.25%	32.45%	1.0247
+84000	33.25%	32.44%	1.0250
+86000	33.25%	32.41%	1.0258
+88000	33.25%	32.40%	1.0262
+90000	33.25%	32.38%	1.0270
+92000	33.25%	32.38%	1.0270



BQPS-III HSD Net Efficiency Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I			
Interval	Gas Turbine Net Efficiency HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
+94000	33.26%	32.35%	1.0281
+96000	33.26%	32.35%	1.0281
+98000	33.26%	32.31%	1.0292
+100000	33.26%	32.31%	1.0293
+102000	33.26%	32.31%	1.0293
+104000	33.26%	32.56%	1.0214
+106000	33.26%	32.54%	1.0220
+108000	33.26%	32.50%	1.0234
+110000	33.26%	32.48%	1.0238
+112000	33.26%	32.44%	1.0252
+114000	33.26%	32.43%	1.0255
+116000	33.26%	32.39%	1.0269
+118000	33.26%	32.38%	1.0271
+120000	33.26%	32.37%	1.0274
+122000	33.26%	32.33%	1.0286
+124000	33.26%	32.32%	1.0288
+126000	33.26%	32.29%	1.0301
+128000	33.26%	32.28%	1.0303
+130000	33.26%	32.24%	1.0315
+132000	33.26%	32.24%	1.0316
+134000	33.26%	32.23%	1.0318
+136000	33.26%	32.20%	1.0329
+138000	33.26%	32.19%	1.0330
+140000	33.26%	32.16%	1.0342
+142000	33.26%	32.15%	1.0343
+144000	33.26%	32.12%	1.0355
+146000	33.26%	32.54%	1.0220
+148000	33.26%	32.54%	1.0221
+150000	33.26%	32.53%	1.0222
+152000	33.26%	32.50%	1.0233
+154000	33.26%	32.50%	1.0234
+156000	33.26%	32.46%	1.0245
+158000	33.26%	32.46%	1.0246
+160000	33.26%	32.42%	1.0257
+162000	33.26%	32.42%	1.0258
+164000	33.26%	32.42%	1.0259
+166000	33.26%	32.38%	1.0269
+168000	33.26%	32.38%	1.0270
+170000	33.26%	32.35%	1.0281
+172000	33.26%	32.34%	1.0282
+174000	33.26%	32.34%	1.0283
+176000	33.26%	32.31%	1.0293
+178000	33.26%	32.31%	1.0294
+180000	33.26%	32.27%	1.0305
+182000	33.26%	32.27%	1.0305
+184000	33.26%	32.27%	1.0306
+186000	33.26%	32.43%	1.0255
+188000	33.26%	32.43%	1.0255

BQPS-III UNIT-II			
Interval	Gas Turbine Net Efficiency HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
+94000	33.25%	32.34%	1.0281
+96000	33.25%	32.34%	1.0281
+98000	33.25%	32.31%	1.0292
+100000	33.25%	32.31%	1.0293
+102000	33.25%	32.30%	1.0296
+104000	33.25%	32.55%	1.0215
+106000	33.25%	32.53%	1.0223
+108000	33.25%	32.49%	1.0235
+110000	33.25%	32.48%	1.0239
+112000	33.25%	32.43%	1.0252
+114000	33.25%	32.42%	1.0256
+116000	33.25%	32.38%	1.0269
+118000	33.25%	32.37%	1.0272
+120000	33.25%	32.36%	1.0277
+122000	33.25%	32.32%	1.0287
+124000	33.25%	32.32%	1.0289
+126000	33.25%	32.28%	1.0301
+128000	33.25%	32.27%	1.0303
+130000	33.25%	32.24%	1.0315
+132000	33.25%	32.23%	1.0317
+134000	33.25%	32.22%	1.0321
+136000	33.25%	32.19%	1.0329
+138000	33.25%	32.19%	1.0331
+140000	33.25%	32.15%	1.0342
+142000	33.25%	32.15%	1.0343
+144000	33.25%	32.11%	1.0355
+146000	33.25%	32.53%	1.0220
+148000	33.25%	32.53%	1.0221
+150000	33.25%	32.52%	1.0225
+152000	33.25%	32.49%	1.0233
+154000	33.25%	32.49%	1.0234
+156000	33.25%	32.45%	1.0245
+158000	33.25%	32.45%	1.0246
+160000	33.25%	32.42%	1.0257
+162000	33.25%	32.41%	1.0258
+164000	33.25%	32.40%	1.0261
+166000	33.25%	32.38%	1.0270
+168000	33.25%	32.38%	1.0270
+170000	33.25%	32.34%	1.0281
+172000	33.25%	32.34%	1.0282
+174000	33.25%	32.33%	1.0285
+176000	33.25%	32.30%	1.0293
+178000	33.25%	32.30%	1.0294
+180000	33.25%	32.27%	1.0305
+182000	33.25%	32.26%	1.0306
+184000	33.25%	32.26%	1.0306
+186000	33.25%	32.42%	1.0255
+188000	33.25%	32.42%	1.0255



BQPS-III HSD Net Efficiency Degradation Factors for Gas Turbine Only

BQPS-III UNIT-I			
Interval	Gas Turbine Net Efficiency HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
+190000	33.26%	32.43%	1.0256
+192000	33.26%	32.39%	1.0266
+194000	33.26%	32.39%	1.0267
+196000	33.26%	32.36%	1.0278
+198000	33.26%	32.36%	1.0278
+200000	33.26%	32.35%	1.0279
+202000	33.26%	32.32%	1.0289
+204000	33.26%	32.32%	1.0290
+206000	33.26%	32.29%	1.0301
+208000	33.26%	32.28%	1.0301
+210000	33.26%	32.28%	1.0302
+212000	33.26%	32.25%	1.0312
+214000	33.26%	32.25%	1.0313
+216000	33.26%	32.24%	1.0314
+218000	33.26%	32.21%	1.0324
+220000	33.26%	32.21%	1.0324
+222000	33.26%	32.18%	1.0335
+224000	33.26%	32.18%	1.0336
+226000	33.26%	32.17%	1.0336
+228000	33.26%	32.14%	1.0347
+230000	33.26%	32.14%	1.0347
+232000	33.26%	32.14%	1.0348

Note:

- * Rated Net Heat Rate has been taken from EPC Heat Mass Balance Diagram (HMBD)
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,040 hours
- * HHV/LHV Ratio considered: 1.06718

BQPS-III UNIT-II			
Interval	Gas Turbine Net Efficiency HSD		Degradation Factor
	Rated	Revised (Degraded)	
Hours	%	%	Factor
+190000	33.25%	32.41%	1.0258
+192000	33.25%	32.39%	1.0266
+194000	33.25%	32.39%	1.0267
+196000	33.25%	32.35%	1.0278
+198000	33.25%	32.35%	1.0278
+200000	33.25%	32.34%	1.0282
+202000	33.25%	32.32%	1.0289
+204000	33.25%	32.31%	1.0290
+206000	33.25%	32.28%	1.0301
+208000	33.25%	32.28%	1.0301
+210000	33.25%	32.27%	1.0304
+212000	33.25%	32.24%	1.0312
+214000	33.25%	32.24%	1.0313
+216000	33.25%	32.23%	1.0316
+218000	33.25%	32.21%	1.0324
+220000	33.25%	32.21%	1.0324
+222000	33.25%	32.17%	1.0335
+224000	33.25%	32.17%	1.0336
+226000	33.25%	32.17%	1.0336
+228000	33.25%	32.14%	1.0347
+230000	33.25%	32.13%	1.0347
+232000	33.25%	32.13%	1.0348

Note:

- * Rated Net Heat Rate has been taken from EPC Heat Mass Balance Diagram (HMBD)
- * All incremental intervals are with reference to actual hours at the end of FY-23 (30th June 2023)
- * Operating hours at end of FY23 : 3,276 hours
- * HHV/LHV Ratio considered: 1.06735





OMS (Private) Limited

Reference No. OMS/TE/KE/BQPS-III/24/11/01

Dated: 15.11.2024

Aamir Fayyaz Khan

Plant Head 900MW BQPS-III

K-Electric, 39-B Sunset Boulevard

Phase-IV, DHA, Karachi

SUBJECT: VETTING OF DOCUMENTS FOR KE 900 MW CCPP BQPS-III
UNIT-I & UNIT-II

Ref: KE's PO # 7200001007 dated 15.11.2024

With reference to the subject mentioned above, KE has engaged OMS (Private) Limited as third party to vet the Combined Cycle (Plant) and Open Cycle (Gas Turbine) Degradation Correction Tables, Startup and Black-Start Costs, and Part Load Correction Tables (RLNG) as per the requirement of NEPRA.

OMS has carried out the technical review and vetted the aforementioned documents in accordance with the requirements of the purchase order. The required documents, duly signed and stamped, are enclosed herewith for further action at your end.

On behalf of Independent Engineer - OMS (Private) Ltd.


Abu Adil

Director Power Generation

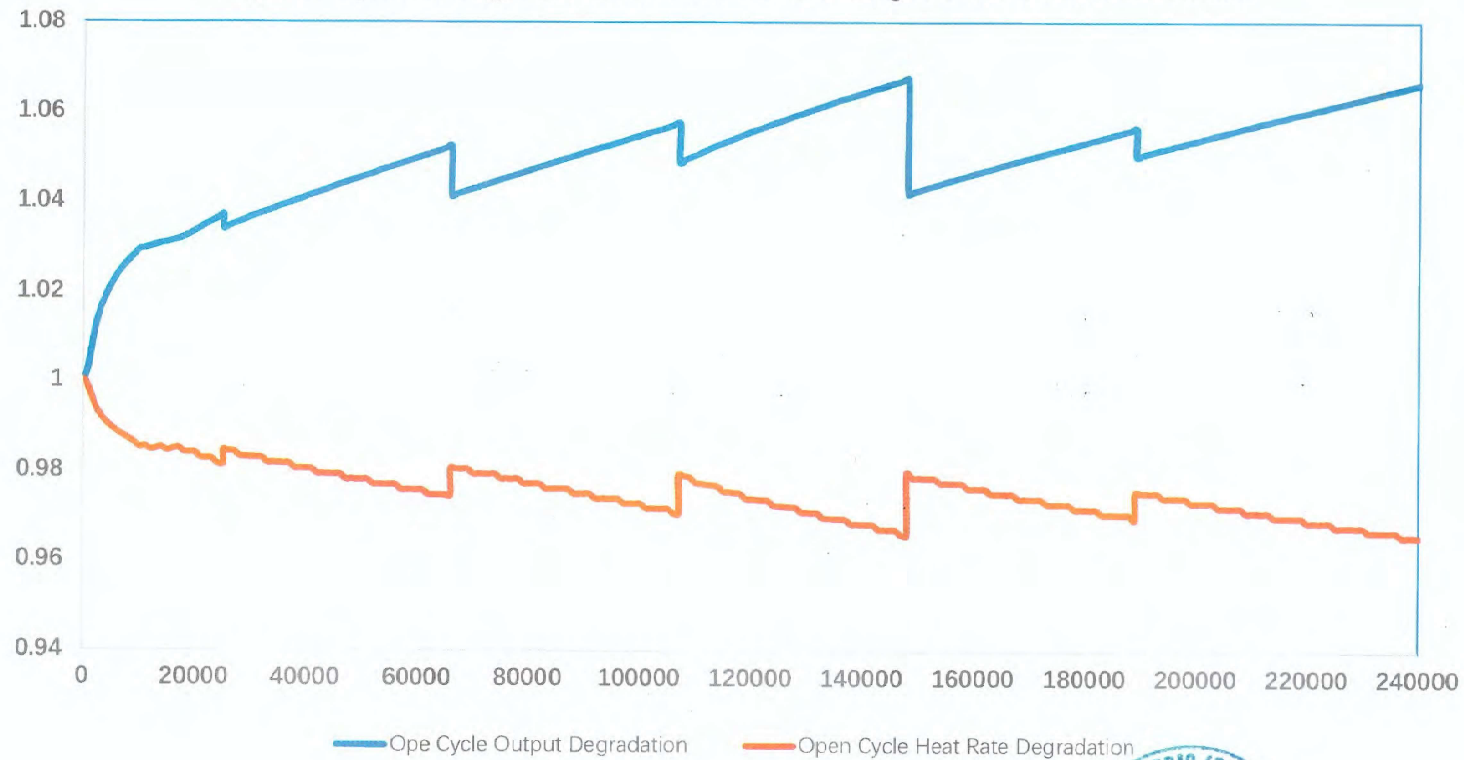
OMS Private Limited



Enclosed: As under

01	CC HR Degradation Table (at 2000 hours interval) for Gas	06	OC Degradation curve & table
02	CC Output Degradation Table (at 2000 hours interval) for Gas	07	OC HR Degradation Table (at 2000 hours interval) for HSD
03	Part Load Table for Gas (at 1% intervals)	08	OC Output Degradation Table (at 2000 hours interval) for HSD
04	Startup and Black Start Cost for Gas	09	OC HR Degradation Table (at 2000 hours interval) for Gas
05	Startup and Black Start Cost for HSD	10	OC Output Degradation Table (at 2000 hours interval) for Gas

Open Cycle Degradation Curve for BQPS-III 900MW CCPP



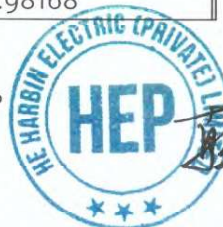
Degradation Factors for information only

Open Cycle Degradation Correction Curves for BQPS-III 900MW CCPP

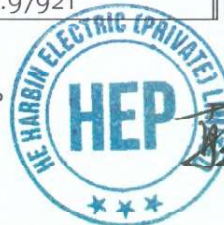


OPERATING HOURS	OPEN CYCLE OUTPUT DEGRADATION	OPEN CYCLE HEAT RATE DEGRADATION
200	1	1
1000	1.00369	0.99769
2000	1.01110	0.99410
3000	1.01567	0.99198
4000	1.01893	0.99051
5000	1.02151	0.98939
6000	1.02359	0.98849
7000	1.02530	0.98770
8000	1.02673	0.98693
9000	1.02802	0.98610
10000	1.02938	0.98507
11000	1.02964	0.98532
12000	1.03001	0.98459
13000	1.03039	0.98483
14000	1.03076	0.98509
15000	1.03098	0.98439
16000	1.03133	0.98467
17000	1.03167	0.98496
18000	1.03220	0.98407
19000	1.03281	0.98396
20000	1.03355	0.98386
21000	1.03427	0.98278
22000	1.03500	0.98267
23000	1.03560	0.98257
24000	1.03632	0.98149
24999	1.03706	0.98140
25000	1.03404	0.98435
26000	1.03463	0.98426
27000	1.03509	0.98417
28000	1.03556	0.98311
29000	1.03601	0.98302
30000	1.03659	0.98294
31000	1.03704	0.98288
32000	1.03748	0.98281
33000	1.03791	0.98176
34000	1.03832	0.98173
35000	1.03889	0.98168

Open Cycle Degradation Correction Factor for BQPS-III 900MW CCPP



OPERATING HOURS	OPEN CYCLE OUTPUT DEGRADATION	OPEN CYCLE HEAT RATE DEGRADATION
36000	1.03932	0.98162
37000	1.03974	0.98156
38000	1.04018	0.98053
39000	1.04061	0.98047
40000	1.04117	0.98042
41000	1.04159	0.98036
42000	1.04202	0.97933
43000	1.04244	0.97928
44000	1.04286	0.97924
45000	1.04342	0.97919
46000	1.04384	0.97915
47000	1.04426	0.97811
48000	1.04468	0.97807
49000	1.04510	0.97802
50000	1.04552	0.97799
51000	1.04592	0.97795
52000	1.04634	0.97693
53000	1.04688	0.97688
54000	1.04730	0.97684
55000	1.04771	0.97681
56000	1.04813	0.97678
57000	1.04855	0.97574
58000	1.04895	0.97571
59000	1.04936	0.97568
60000	1.04978	0.97564
61000	1.05018	0.97561
62000	1.05059	0.97459
63000	1.05101	0.97456
64000	1.05141	0.97453
65000	1.05195	0.97450
65999	1.05236	0.97447
66000	1.04132	0.98038
67000	1.04172	0.98033
68000	1.04213	0.98030
69000	1.04253	0.98027
70000	1.04294	0.97927
71000	1.04334	0.97924
72000	1.04375	0.97921



OPERATING HOURS	OPEN CYCLE OUTPUT DEGRADATION	OPEN CYCLE HEAT RATE DEGRADATION
73000	1.04415	0.97918
74000	1.04456	0.97915
75000	1.04496	0.97814
76000	1.04537	0.97811
77000	1.04577	0.97808
78000	1.04618	0.97805
79000	1.04658	0.97705
80000	1.04697	0.97702
81000	1.04738	0.97700
82000	1.04778	0.97697
83000	1.04819	0.97597
84000	1.04859	0.97594
85000	1.04898	0.97591
86000	1.04939	0.97589
87000	1.04979	0.97586
88000	1.05018	0.97486
89000	1.05059	0.97483
90000	1.05098	0.97481
91000	1.05138	0.97478
92000	1.05179	0.97378
93000	1.05218	0.97376
94000	1.05245	0.97373
95000	1.05285	0.97372
96000	1.05326	0.97369
97000	1.05365	0.97268
98000	1.05405	0.97267
99000	1.05444	0.97264
100000	1.05483	0.97262
101000	1.05524	0.97162
102000	1.05563	0.97160
103000	1.05590	0.97157
104000	1.05630	0.97156
105000	1.05669	0.97154
106000	1.05710	0.97054
106999	1.05749	0.97052
107000	1.04873	0.97903
108000	1.04936	0.97879
109000	1.04997	0.97855



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OPERATING HOURS	OPEN CYCLE OUTPUT DEGRADATION	OPEN CYCLE HEAT RATE DEGRADATION
110000	1.05044	0.97735
111000	1.05102	0.97714
112000	1.05161	0.97693
113000	1.05216	0.97675
114000	1.05270	0.97658
115000	1.05324	0.97543
116000	1.05366	0.97528
117000	1.05420	0.97511
118000	1.05473	0.97496
119000	1.05524	0.97384
120000	1.05573	0.97372
121000	1.05611	0.97360
122000	1.05660	0.97348
123000	1.05708	0.97337
124000	1.05756	0.97228
125000	1.05792	0.97217
126000	1.05839	0.97208
127000	1.05887	0.97198
128000	1.05935	0.97189
129000	1.05969	0.97081
130000	1.06016	0.97072
131000	1.06061	0.97063
132000	1.06107	0.97055
133000	1.06140	0.96949
134000	1.06185	0.96941
135000	1.06230	0.96934
136000	1.06275	0.96926
137000	1.06305	0.96922
138000	1.06346	0.96820
139000	1.06389	0.96814
140000	1.06421	0.96808
141000	1.06464	0.96802
142000	1.06508	0.96797
143000	1.06538	0.96694
144000	1.06580	0.96688
145000	1.06623	0.96683
146000	1.06653	0.96677
147000	1.06695	0.96575

Open Cycle Degradation Correction Factor for BQPS-III 900MW CCPP



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OPERATING HOURS	OPEN CYCLE OUTPUT DEGRADATION	OPEN CYCLE HEAT RATE DEGRADATION
147999	1.06737	0.96569
148000	1.04192	0.97948
149000	1.04234	0.97846
150000	1.04264	0.97841
151000	1.04306	0.97837
152000	1.04348	0.97832
153000	1.04376	0.97828
154000	1.04418	0.97726
155000	1.04460	0.97721
156000	1.04489	0.97717
157000	1.04531	0.97714
158000	1.04559	0.97709
159000	1.04601	0.97607
160000	1.04642	0.97604
161000	1.04670	0.97600
162000	1.04712	0.97597
163000	1.04741	0.97495
164000	1.04781	0.97490
165000	1.04823	0.97487
166000	1.04852	0.97484
167000	1.04892	0.97481
168000	1.04921	0.97379
169000	1.04961	0.97376
170000	1.04990	0.97373
171000	1.05030	0.97370
172000	1.05059	0.97367
173000	1.05099	0.97265
174000	1.05128	0.97262
175000	1.05168	0.97259
176000	1.05195	0.97256
177000	1.05236	0.97253
178000	1.05264	0.97153
179000	1.05305	0.97150
180000	1.05332	0.97147
181000	1.05372	0.97144
182000	1.05401	0.97142
183000	1.05440	0.97040
184000	1.05468	0.97039

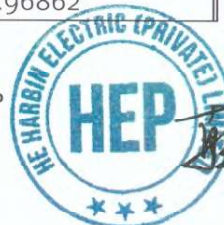
Open Cycle Degradation Correction Factor for BQPS-III 900MW CCPP



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OPERATING HOURS	OPEN CYCLE OUTPUT DEGRADATION	OPEN CYCLE HEAT RATE DEGRADATION
185000	1.05509	0.97036
186000	1.05536	0.97033
187000	1.05576	0.97031
188000	1.05603	0.97028
188999	1.05644	0.96928
189000	1.05029	0.97517
190000	1.05056	0.97516
191000	1.05096	0.97513
192000	1.05123	0.97511
193000	1.05164	0.97508
194000	1.05191	0.97408
195000	1.05219	0.97405
196000	1.05258	0.97403
197000	1.05285	0.97402
198000	1.05326	0.97399
199000	1.05353	0.97298
200000	1.05380	0.97297
201000	1.05420	0.97294
202000	1.05447	0.97292
203000	1.05486	0.97289
204000	1.05513	0.97189
205000	1.05540	0.97187
206000	1.05581	0.97186
207000	1.05608	0.97183
208000	1.05647	0.97181
209000	1.05674	0.97081
210000	1.05701	0.97079
211000	1.05741	0.97076
212000	1.05768	0.97075
213000	1.05795	0.97073
214000	1.05834	0.96973
215000	1.05861	0.96971
216000	1.05888	0.96970
217000	1.05927	0.96967
218000	1.05954	0.96965
219000	1.05981	0.96964
220000	1.06008	0.96863
221000	1.06047	0.96862



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OPERATING HOURS	OPEN CYCLE OUTPUT DEGRADATION	OPEN CYCLE HEAT RATE DEGRADATION
222000	1.06074	0.96860
223000	1.06101	0.96859
224000	1.06140	0.96856
225000	1.06167	0.96757
226000	1.06194	0.96755
227000	1.06221	0.96752
228000	1.06260	0.96751
229000	1.06287	0.96749
230000	1.06314	0.96748
231000	1.06353	0.96649
232000	1.06380	0.96647
233000	1.06407	0.96644
234000	1.06446	0.96643
235000	1.06473	0.96641
236000	1.06500	0.96640
237000	1.06527	0.96541
238000	1.06566	0.96539
239000	1.06593	0.96536
240000	1.06620	0.96535

