

TABLE-51. COMPARISON OF PRIMARY TEST # 5 PERFORMANCE PARAMETERS WITH/WITOUT COMPRESSORS' LOAD

Sr. No	Description of Performance Parameters	Test Results With Compressors Load		Test Results Without Compressors Load	
		Output (MW)		Output (MW)	
1	3 Compressors' Load	7.773			
2	Gross Power Output Un-Corrected	175.800		175.800	
3	Gross Power Output Corrected	184.468		184.468	
4	Net Power Output Un-Corrected	162.051		169.824	
5	Net Power Output Corrected	170.697		178.896	
		Heat Rate (BTU/kWh)	Thermal Efficiency %	Heat Rate (BTU/kWh)	Thermal Efficiency %
1	Gross Heat Rate Un-Corrected (LHV)	8883.704	38.409	8883.704	38.409
2	Gross Heat Rate Un-Corrected (HHV)	9845.588	34.657	9845.588	34.657
3	Gross Heat Rate Corrected (LHV)	8847.867	38.565	8847.867	38.565
4	Gross Heat Rate Corrected (HHV)	9805.871	34.797	9805.871	34.797
5	Net Heat Rate Un-Corrected (LHV)	9637.423	35.405	9196.309	37.103
6	Net Heat Rate Un-Corrected (HHV)	10680.92	31.946	10192.04	33.478
7	Net Plant Heat Rate Corrected (LHV)	9562.297	35.683	9124.030	37.397
8	Net Plant Heat Rate Corrected (HHV)	10597.66	32.197	10111.935	33.744

14.5. KPC Degradations (Item VI of MOM):

The key operational information/parameters (Operating hours) of the Plant (on the test date) as received from KPC are provided in Table-4 of this Report. These parameters are used to reach degradation factors for both Capacity and Heat Rate. The degradation for the remaining 25 years (from 57293.25 to 254393.25 Operating Hours) is provided in Annex-T (for 90 % availability), for Plant Output and Heat Rate. The reference performance parameters are taken as the Primary Test # 1 and 2 conducted by IE on June 15, 2019 and June 16, 2019 respectively.

14.6. Electrical Auxiliary List (Item VIII of MOM)

The list of Essential Plant Auxiliaries with rated load of each auxiliary as provided by KE are attached as Annex-C. Before conducting the tests it was ensured by IE that only essential auxiliaries are in operation

The below Table-52 shows the comparison of Auxiliary consumption at base loads and part load.

TABLE-52. COMPARISON OF AUXILIARY CONSUMPTIONS

Performance parameters	Unit	Primary Test # 1	Primary Test # 2	Primary Test # 3	Primary Test # 4	Primary Test # 5
Auxiliary Consumption	MW	16.225	16.235	10.457	10.033	13.749
Auxiliary Consumption Ratio	%	7.148	8.337	9.279	8.902	7.821

Korangi Combined Cycle Power Plant (KCCPP) Startup Cost - Gas

KCCPP Start-up Cost-Gas	FULL COMPLEX Startup			3 GT CC			2 GT CC			1 GT CC		
Backfeed charges (Up to GT Synchron)	Hot Startup	Warm Startup	Cold Startup	Hot Startup	Warm Startup	Cold Startup	Hot Startup	Warm Startup	Cold Startup	Hot Startup	Warm Startup	Cold Startup
Backfeed import duration	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min
Power import	9.17 MW	5.17 MW	5.17 MW	8.87 MW	8.87 MW	8.87 MW	7.98 MW	7.98 MW	7.98 MW	5.20 MW	5.20 MW	5.20 MW
Power import rate	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh
Backfeed charges	237,529.37 PKR	237,529.37 PKR	237,529.37 PKR	229,780.51 PKR	229,780.51 PKR	229,780.51 PKR	206,721.16 PKR	206,721.16 PKR	206,721.16 PKR	134,787.56 PKR	134,787.56 PKR	134,787.56 PKR
Gas price (HHV)	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu
GAS GCV	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF
Fuel Cost Up to GT Synchronization	59,041.75 \$/cf	59,041.75 \$/cf	59,041.75 \$/cf	44,281.31 \$/cf	44,281.31 \$/cf	44,281.31 \$/cf	29,520.87 \$/cf	29,520.87 \$/cf	29,520.87 \$/cf	14,760.44 \$/cf	14,760.44 \$/cf	14,760.44 \$/cf
Gas consumption from start to Synchron	195,700.80 PKR	195,700.80 PKR	195,700.80 PKR	146,775.60 PKR	146,775.60 PKR	146,775.60 PKR	97,850.40 PKR	97,850.40 PKR	97,850.40 PKR	48,925.20 PKR	48,925.20 PKR	48,925.20 PKR
Fuel cost for operation upto synchron												
Fuel Cost From GT Synchronization up to ST Synchronization	52 min	144 min	220 min	52 min	144 min	220 min	52 min	144 min	220 min	52 min	144 min	220 min
Operation from GT Synchron to ST Synchron	97 MW	57 MW	39 MW	73 MW	73 MW	73 MW	49 MW	49 MW	49 MW	24 MW	24 MW	24 MW
Load from GT Synchron to ST Synchron (MW)	170.70 MW	170.70 MW	170.70 MW	170.70 MW	170.70 MW	170.70 MW	170.70 MW	170.70 MW	170.70 MW	170.70 MW	170.70 MW	170.70 MW
Open Cycle Station base load												
Load (Range of base load of GT)	56.88%	56.88%	56.88%	42.60%	42.60%	42.60%	28.44%	28.44%	28.44%	14.22%	14.22%	14.22%
Base load GT Efficiency	32.20%	32.20%	32.20%	32.20%	32.20%	32.20%	32.20%	32.20%	32.20%	32.20%	32.20%	32.20%
Part load GT Efficiency/heat rate ratio	1.0466	1.0466	1.0466	1.0552	1.0552	1.0552	1.1683	1.1683	1.1683	1.4208	1.4208	1.4208
Fuel Cost from GT Synchron to ST Synchron	3,080,841 PKR	6,331,560 PKR	18,014,328 PKR	2,329,580 PKR	6,451,145 PKR	9,855,917 PKR	3,719,629 PKR	4,762,025 PKR	7,275,315 PKR	1,045,601 PKR	2,895,510 PKR	4,423,686 PKR
Start-up Charges (Gas fuel)	3,514,071 PKR	8,964,790 PKR	18,487,558 PKR	2,706,136 PKR	6,877,702 PKR	10,232,473 PKR	2,824,192 PKR	5,066,595 PKR	7,579,887 PKR	1,228,314 PKR	3,079,723 PKR	4,607,409 PKR
Net Revenue												
From GT Synchronization up to ST Synchron	52 min	144 min	220 min	52 min	144 min	220 min	52 min	144 min	220 min	52 min	144 min	220 min
Operation from GT Synchron to ST Synchron	97 MW	57 MW	39 MW	73 MW	73 MW	73 MW	49 MW	49 MW	49 MW	24 MW	24 MW	24 MW
Load from GT Synchron to ST Synchron (MW)												
Base load Unit efficiency (HHV)	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%	32%
Part load GT efficiency/heat rate ratio	1	1	1	1	1	1	1	1	1	1	1	1
Revenue from GT Synchron to ST Synchron	2,943,681 PKR	6,331,732 PKR	18,454,036 PKR	2,207,761 PKR	6,113,799 PKR	9,340,527 PKR	2,472,841 PKR	4,075,866 PKR	6,227,018 PKR	785,920 PKR	2,032,933 PKR	3,113,509 PKR
Net Revenue	570,390 PKR	818,058 PKR	3,013,322 PKR	498,376 PKR	713,802 PKR	891,546 PKR	552,351 PKR	990,793 PKR	1,352,869 PKR	498,393 PKR	1,041,290 PKR	1,493,900 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 GEP.
Note 3: Efficiencies used above represent Base year efficiencies, which shall be updated based on applicable degradation as per the curve.



Korangi Combined Cycle Power Plant (KCCPP) Startup Cost - Gas

KCCPP Startup Cost - Gas	FULL COMPLEX Startup			1 GT SC			2 GT CC (When 2 GTs already in CC Mode)			3 GT CC (When 2 GTs already in CC Mode)		
Backfeed charges (Up to GT Synchron)	Hot Startup	Warm Startup	Cold Startup	Hot Startup	Warm Startup	Cold Startup	Hot Startup	Warm Startup	Cold Startup	Hot Startup	Warm Startup	Cold Startup
Backfeed import duration	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min	63 min
Power import	9.17 MW	9.17 MW	9.17 MW	4.19 MW	4.19 MW	4.19 MW	7.98 MW	7.98 MW	7.98 MW	5.20 MW	5.20 MW	5.20 MW
Power import rate	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh	24.68 PKR/kWh
Backfeed charges	237,529.37 PKR	237,529.37 PKR	237,529.37 PKR	108,623.38 PKR	108,623.38 PKR	108,623.38 PKR	206,721.16 PKR	206,721.16 PKR	206,721.16 PKR	134,787.56 PKR	134,787.56 PKR	134,787.56 PKR
Gas price (HHV)	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu	3,300.82 PKR/MMBtu
GAS GCV	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF	1,004.18 BTU/SCF
Fuel Cost Up to GT Synchronization	59,041.75 \$cf	59,041.75 \$cf	59,041.75 \$cf	14,760.44 \$cf	14,760.44 \$cf	14,760.44 \$cf	29,520.87 \$cf	29,520.87 \$cf	29,520.87 \$cf	14,760.44 \$cf	14,760.44 \$cf	14,760.44 \$cf
Gas consumption from start to Synchron	395,700.80 PKR	395,700.80 PKR	395,700.80 PKR	48,925.20 PKR	48,925.20 PKR	48,925.20 PKR	97,850.40 PKR	97,850.40 PKR	97,850.40 PKR	48,925.20 PKR	48,925.20 PKR	48,925.20 PKR
Fuel cost for operation upto synchron												
Fuel Cost From GT Synchronization up to ST Synchronization												
Operation from GT Synchron to ST Synchron	52 min	144 min	220 min	52 min	144 min	220 min	52 min	144 min	220 min	52 min	144 min	220 min
Load from GT Synchron to ST Synchron (MW)	97 MW	97 MW	97 MW	97 MW	97 MW	97 MW	49 MW	49 MW	49 MW	24 MW	24 MW	24 MW
Open Cycle Station Base load	170.70	170.70	170.70	170.70	170.70	170.70	170.70	170.70	170.70	170.70	170.70	170.70
Load (Range of base load of GT)	56.88%	56.88%	56.88%				28.44%	28.44%	28.44%	14.22%	14.22%	14.22%
Base load GT efficiency	32.20%	32.20%	32.20%				32.20%	32.20%	32.20%	32.20%	32.20%	32.20%
Part load GT efficiency heat rate ratio	1.0466	1.0466	1.0466				1.1661	1.1661	1.1661	1.4208	1.4208	1.4208
Fuel Cost from GT Synchron to ST Synchron	3,080,843 PKR	8,531,580 PKR	13,034,328 PKR				1,273,620 PKR	4,762,023 PKR	7,275,315 PKR	1,045,608 PKR	2,895,510 PKR	4,428,696 PKR
Start-up Charges (Gas fuel)	3,514,071 PKR	8,964,790 PKR	13,467,558 PKR	157,549 PKR	157,549 PKR	157,549 PKR	2,024,192 PKR	5,066,596 PKR	7,575,887 PKR	1,229,316 PKR	3,079,223 PKR	4,407,409 PKR
Net Revenue:												
From GT Synchronization up to ST Synchron												
Operation from GT Synchron to ST Synchron	52 min	144 min	220 min	52 min	144 min	220 min	52 min	144 min	220 min	52 min	144 min	220 min
Load from GT Synchron to ST Synchron (MW)	97 MW	97 MW	97 MW	97 MW	97 MW	97 MW	49 MW	49 MW	49 MW	24 MW	24 MW	24 MW
Base load Unit efficiency (HHV)	32%	32%	32%				41.72%	41.72%	41.72%	41.72%	41.72%	41.72%
Part load GT efficiency heat rate ratio	1	1	1				1.0155	1.0155	1.0155	1.0449	1.0449	1.0449
Revenue from GT Synchron to ST Synchron	2,943,683 PKR	8,151,712 PKR	12,454,036 PKR				1,111,457 PKR	3,194,187 PKR	4,880,809 PKR	593,402 PKR	1,643,268 PKR	2,510,549 PKR
Net Revenue	570,390 PKR	813,058 PKR	1,013,522 PKR	157,549 PKR	157,549 PKR	157,549 PKR	876,735 PKR	1,872,409 PKR	2,699,878 PKR	615,911 PKR	1,435,954 PKR	2,096,860 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
Note 3: Efficiencies used above represent Base year efficiencies, which shall be updated based on applicable degradation as per the curve



Korangi Combined Cycle Power Plant (KCCPP) Startup Cost - HSD

KCCPP Start-up Cost-HSD	FULL COMPLEX Startup												3 GT CC						2 GT CC								
Backfeed charges (Upto GT Synch)	Hot Startup			Warm Startup			Cold Startup			Hot Startup			Warm Startup			Cold Startup			Hot Startup			Warm Startup			Cold Startup		
	63	min		63	min		63	min		63	min		63	min		63	min		63	min		63	min		63	min	
	3.70	MW		3.70	MW		3.70	MW		3.75	MW		3.75	MW		3.75	MW		2.50	MW		2.50	MW		2.50	MW	
	24.68	PKR/kWh		24.68	PKR/kWh		24.68	PKR/kWh		24.68	PKR/kWh		24.68	PKR/kWh		24.68	PKR/kWh		24.68	PKR/kWh		24.68	PKR/kWh		24.68	PKR/kWh	
	95,928.86	PKR		95,928.86	PKR		95,928.86	PKR		97,203.99	PKR		97,203.99	PKR		97,203.99	PKR		64,892.36	PKR		64,892.36	PKR		64,892.36	PKR	
	6,066.91	PKR/MMBtu		6,066.91	PKR/MMBtu		6,066.91	PKR/MMBtu		6,066.91	PKR/MMBtu		6,066.91	PKR/MMBtu		6,066.91	PKR/MMBtu		6,066.91	PKR/MMBtu		6,066.91	PKR/MMBtu		6,066.91	PKR/MMBtu	
	36,252.36	btu / liter		36,252.36	btu / liter		36,252.36	btu / liter		36,252.36	btu / liter		36,252.36	btu / liter		36,252.36	btu / liter		36,252.36	btu / liter		36,252.36	btu / liter		36,252.36	btu / liter	
	1,560.00	Liter		1,560.00	Liter		1,560.00	Liter		1,170.00	Liter		1,170.00	Liter		1,170.00	Liter		780.00	Liter		780.00	Liter		780.00	Liter	
	343,106.40	PKR		343,106.40	PKR		343,106.40	PKR		257,329.80	PKR		257,329.80	PKR		257,329.80	PKR		171,553.20	PKR		171,553.20	PKR		171,553.20	PKR	
	Fuel Cost Upto GT Synchronization on HSD consumption from start to Sync																										
Fuel cost for operation upto synch																											
Fuel Cost From GT Synchronization on up to ST Synchronization on																											
Operation from GT Synch to ST Synch	52	min		144	min		220	min		52	min		144	min		220	min		52	min		144	min		220	min	
Load from GT Synch to ST Synch (MW)	100	MW		100	MW		100	MW		75	MW		75	MW		75	MW		50	MW		50	MW		50	MW	
Open Cycle Station base load	174.38	MW		174.38	MW		174.38	MW		174.38	MW		174.38	MW		174.38	MW		174.38	MW		174.38	MW		174.38	MW	
Load (%age of base load of GT)	57.44%			57.44%			57.44%			43.08%			43.08%			43.08%			28.72%			28.72%			28.72%		
Baseload GT efficiency	34.18%			34.18%			34.18%			34.18%			34.18%			34.18%			34.18%			34.18%			34.18%		
Part load GT efficiency heat rate ratio	1.0349			1.0349			1.0349			1.0247			1.0247			1.0247			1.0829			1.0829			1.0829		
Fuel cost from GT Synch to ST Synch	5,441,069	PKR		15,067,576	PKR		23,019,908	PKR		4,040,279	PKR		11,188,464	PKR		17,093,487	PKR		2,846,515	PKR		7,882,658	PKR		12,042,949	PKR	
Start-up Charges (HSD fuel)	5,880,104	PKR		15,506,611	PKR		23,458,943	PKR		4,394,813	PKR		11,542,998	PKR		17,448,021	PKR		3,082,961	PKR		8,119,103	PKR		12,279,395	PKR	
Net Revenue																											
From GT Synchronization on up to ST Synch																											
Operation from GT Synch to ST Synch	52	min		144	min		220	min		52	min		144	min		220	min		52	min		144	min		220	min	
Load from GT Synch to ST Synch (MW)	100	MW		100	MW		100	MW		75	MW		75	MW		75	MW		50	MW		50	MW		50	MW	
Baseload Unit efficiency (HHV)	43.13%			43.13%			43.13%			43.13%			43.13%			43.13%			43.13%			43.13%			43.13%		
Part load GT efficiency heat rate ratio	1			1			1			1			1			1			1			1			1		
Revenue from GT Synch to ST Synch	4,166,668	PKR		11,538,464	PKR		17,628,209	PKR		3,125,001	PKR		8,653,848	PKR		13,221,157	PKR		2,083,334	PKR		5,769,232	PKR		8,814,105	PKR	
Net Revenue	1,713,437	PKR		3,968,147	PKR		5,830,734	PKR		1,269,812	PKR		2,889,150	PKR		4,226,864	PKR		999,627	PKR		2,349,871	PKR		3,465,290	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

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Korangi Combined Cycle Power Plant (KCCPP) Startup Cost - HSD

KCCPP Start-up Cost-HSD	1 GT CC						1 GT SC						2 GT CC (When 2 GTs already in CC Mode)						1 GT CC (When 2 GTs already in CC Mode)					
Backfeed charges (Upto GT Synch)	Hot Startup		Warm Startup		Cold Startup		Hot Startup		Warm Startup		Cold Startup		Hot Startup		Warm Startup		Cold Startup		Hot Startup		Warm Startup		Cold Startup	
Backfeed import duration	63	min	63	min	63	min	63	min	63	min	63	min	63	min	63	min	63	min	63	min	63	min	63	min
Power import	2.38	MW	2.38	MW	2.38	MW	1.40	MW	1.40	MW	1.40	MW	2.50	MW	2.50	MW	2.50	MW	2.38	MW	2.38	MW	2.38	MW
Power import rate	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh	24.68	PKR/kWh
Backfeed charges	61,754.17	PKR	61,754.17	PKR	61,754.17	PKR	36,374.08	PKR	36,374.08	PKR	36,374.08	PKR	64,892.36	PKR	64,892.36	PKR	64,892.36	PKR	61,754.17	PKR	61,754.17	PKR	61,754.17	PKR
HSD price (HHV)	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu	6,066.91	PKR/MMBtu
HSD GCV	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter	36,252.36	btu / liter
Fuel Cost Upto GT Synchronization on HSD consumption from start to Sync	390.00	Liter	390.00	Liter	390.00	Liter	390.00	Liter	390.00	Liter	390.00	Liter	780.00	Liter	780.00	Liter	780.00	Liter	390.00	Liter	390.00	Liter	390.00	Liter
Fuel cost for operation upto synch	85,776.60	PKR	85,776.60	PKR	85,776.60	PKR	85,776.60	PKR	85,776.60	PKR	85,776.60	PKR	171,553.20	PKR	171,553.20	PKR	171,553.20	PKR	85,776.60	PKR	85,776.60	PKR	85,776.60	PKR
Fuel Cost From GT Synchronization on up to ST Synchronization on Operation from GT Synch to ST Synch Load from GT Synch to ST Synch (MW) Open Cycle Station base load	52	min	144	min	220	min							52	min	144	min	220	min	52	min	144	min	220	min
	25	MW	25	MW	25	MW							50	MW	50	MW	50	MW	25	MW	25	MW	25	MW
	174.38	MW	174.38	MW	174.38	MW							174.38	MW	174.38	MW	174.38	MW	174.38	MW	174.38	MW	174.38	MW
Load (%age of base load of GT)	14.36%		14.36%		14.36%								28.72%		28.72%		28.72%		14.36%		14.36%		14.36%	
Baseload GT efficiency	34.18%		34.18%		34.18%								34.18%		34.18%		34.18%		34.18%		34.18%		34.18%	
Part load GT efficiency heat rate ratio	1.1906		1.1906		1.1906								1.0829		1.0829		1.0829		1.1906		1.1906		1.1906	
Fuel cost from GT Synch to ST Synch	1,564,884	PKR	4,333,524	PKR	6,620,662	PKR							2,846,515	PKR	7,882,658	PKR	12,042,949	PKR	1,564,884	PKR	4,333,524	PKR	6,620,662	PKR
Start-up Charges (HSD fuel)	1,712,415	PKR	4,481,055	PKR	6,768,193	PKR	122,151	PKR	122,151	PKR	122,151	PKR	3,082,961	PKR	8,119,103	PKR	12,279,395	PKR	1,712,415	PKR	4,481,055	PKR	6,768,193	PKR
Net Revenue																								
From GT Synchronization on up to ST Synch Operation from GT Synch to ST Synch Load from GT Synch to ST Synch (MW)	52	min	144	min	220	min							52	min	144	min	220	min	52	min	144	min	220	min
	25	MW	25	MW	25	MW							50	MW	50	MW	50	MW	25	MW	25	MW	25	MW
Baseload Unit efficiency (HHV)	43.13%		43.13%		43.13%								43.13%		43.13%		43.13%		43.13%		43.13%		43.13%	
Part load GT efficiency heat rate ratio	1		1		1								1.0118		1.0118		1.0118		1.0386		1.0386		1.0386	
Revenue from GT Synch to ST Synch	1,041,667	PKR	2,884,616	PKR	4,407,052	PKR							2,107,881	PKR	5,837,208	PKR	8,917,957	PKR	1,081,861	PKR	2,995,924	PKR	4,577,106	PKR
Net Revenue	670,748	PKR	1,596,439	PKR	2,361,141	PKR	122,151	PKR	122,151	PKR	122,151	PKR	975,080	PKR	2,281,895	PKR	3,361,438	PKR	630,553	PKR	1,485,131	PKR	2,191,087	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

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Black Start Cost - KCCPP			
Cost For GT Startup			Remarks / References
EDG's Operation with Aux Till GT sync with 400V bus	45	min	
EDGS Specific Fuel Consumption (Base Load @ 1097KW)	0.24	Liter/KWh	
Aux Consumption Till GT Startup (KWh)	571.94	KWh	
Diesel Consumed By EDGs	136.08	Liters	
Rate of Diesel	219.94	PKR/Liter	Rate of Diesel @ 219.94 PKR/Liter for the month of August 2022.
Cost of Diesel Consumed by EDGs (A)	29,929	PKR	
Fuel Consumed by GT till Sync with 400V bus	390	Liter	
Cost of Fuel Consumed by GT till Sync with 400V bus (B)	85,777	PKR	
Cost of Diesel Consumed by EDGs & GT during startup C=(A+B)	115,705	PKR	
House Normalization time with GT on house Load (HV Switching)	10	Min	
GT House load operation time (EDG off - house load on GT)	30	Min	
Total Aux Load on GT for 40 Min after synchronization	1,680	KW	
GT fuel flow during 40 Min operation (while GT on house load)	53	LPM	
Fuel Consumption by GT in 40 Min. synchronization (while HV switching and GT on house load)	2,120	Liters	
Cost of Fuel Consumed by GT in 40 minutes "D"	466,273	PKR	
Cost of Diesel Consumed by GT E=(C+D)	581,978	PKR	

Fuel Cost From GT Synchronization up to ST Synchronization	Hot Startup	Warm Startup	Cold Startup
Operation from GT Synch to ST Synch (min)	52	144	220
Load from GT Synch to ST Synch (MW)	25	25	25
Open Cycle Station base load (MW)	174.375	174.375	174.375
HSD price (HHV) (Rs./MMBTU)	6067	6067	6067
Load (%age of base load of GT)	14.36%	14.36%	14.36%
Baseload GT efficiency	34.18%	34.18%	34.18%
Part load GT efficiency heat rate ratio	1.19062	1.19062	1.19062
Fuel Cost from GT Synch to ST Synch "F"	1,564,884	4,333,524	6,620,662
Cost of Diesel Consumed by GT I=(E+F)	2,146,862	4,915,503	7,202,640

Net Revenue:			
From GT Synchronization up to ST Synch			
Operation from GT Synch to ST Synch	52	144	220
Load from GT Synch to ST Synch (MW)	25.04	25.04	25.04
Baseload Unit efficiency (HHV)	43.13%	43.13%	43.13%
Part load GT efficiency heat rate ratio	1	1	1
Revenue from GT Synch to ST Synch	1,041,667	2,884,616	4,407,052
Net Revenue	1,105,195	2,030,886	2,795,588

Muhammad



Project No.	Document Name	Document Number	Revision date	Prepared by
IEI/KE/01/2022	List of Documents	IEI/KE/01/2022 - PL - 001_A_Results	11/15/2024	 Istroenergo International, a.s.

Percent Load Factor	Correction Factor on Gas fuel for Combined Cycle
100.00%	1.0000
95.00%	1.0069
90.00%	1.0143
85.00%	1.0232
80.00%	1.0347
75% (Note-1)	1.0033
71.00%	1.0104
67.00%	1.0183
64.00%	1.0280
60.00%	1.0400
56.00%	1.0545
53.00%	1.0726
49% (Note-2)	1.0428
47.00%	1.0525
44.00%	1.0633
42.00%	1.0763
40.00%	1.0924
37.00%	1.1121
35.00%	1.1362
32.00%	1.1692
30.00%	1.2133
25% (Note-3)	1.0643
24.00%	1.0759
22.00%	1.0888
21.00%	1.1041
20.00%	1.1229
19.00%	1.1459
17.00%	1.1741
16.00%	1.2116
15.00%	1.2619
12.00%	1.4119
11.00%	1.5157
10.00%	1.6528
8.00%	1.8466

Note-1 Heat Rate Values from 75% to 53% assumes 03 gas turbines in operation, this assumes 01 gas turbine will be shutdown

Note-2 Heat Rate Values from 49% to 30% assumes 02 gas turbines in operation, this assumes 02 gas turbine will be shutdown

Note-3 Heat Rate Values from 25% to 8% assumes 01 gas turbine in operation, this assumes 03 gas turbine will be shutdown

Note: Use liner interpolation when the load variation values fall between the stated values


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Project	Document Name	Document Number	Revision date	Prepared by
K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek Karachi Pakistan	Part Load Adjustment Factor Table for Net Heat Rate (Natural Gas Fuel)	IEI/KE/01/2022 - PL - 001_A_Results	11.10.2022	IEI Stroenergo International, a.s.

Percent Load Factor	Correction Factor on Gas fuel for Symple Cycle
100.00%	1.0000
95.00%	1.0047
91.00%	1.0112
86.00%	1.0209
81.00%	1.0333
75% (Note-1)	0.9981
72.00%	1.0027
68.00%	1.0090
64.00%	1.0185
61.00%	1.0307
57.00%	1.0460
53.00%	1.0663
50% (Note-2)	1.0281
48.00%	1.0343
45.00%	1.0426
40.00%	1.0695
35.00%	1.1126
30.00%	1.2243
25% (Note-3)	1.0448
20.00%	1.0924
15.00%	1.2630
10.00%	2.2755



- Note-1 Heat Rate Values from 75% to 53% assumes 03 gas turbines in operation, this assumes 01 gas turbine will be shutdown
- Note-2 Heat Rate Values from 50% to 30% assumes 02 gas turbines in operation, this assumes 02 gas turbine will be shutdown
- Note-3 Heat Rate Values from 25% to 10% assumes 01 gas turbine in operation, this assumes 03 gas turbine will be shutdown

Note: Use liner interpolation when the load variation values fall between the stated values

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Project	Document Name	Document Number	Revision date	Prepared by
K Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek Karachi Pakistan	Part Load Adjustment Factor Table for Net Heat Rate (HSD Fuel)	IEI/KE/01/2022 - PL - 001_A_Results	11.10.2022	IEI Stroenergo International, s. r. o.

Percent Load Factor	Correction Factor on HSD fuel for Simple Cycle
100.00%	1.0000
95.00%	1.0039
90.00%	1.0080
85.00%	1.0148
80.00%	1.0228
75% (Note-1)	1.0033
71.00%	1.0074
68.00%	1.0117
64.00%	1.0188
60.00%	1.0270
56.00%	1.0394
52.00%	1.0500
50% (Note-2)	1.0093
45.00%	1.0184
40.00%	1.0347
35.00%	1.0592
30.00%	1.1014
25% (Note-3)	1.0290
20.00%	1.0604
15.00%	1.1396
10.00%	1.5381



Note-1 Heat Rate Values from 75% to 52% assumes 03 gas turbines in operation, this assumes 01 gas turbine will be shutdown
Note-2 Heat Rate Values from 50% to 30% assumes 02 gas turbines in operation, this assumes 02 gas turbine will be shutdown
Note-3 Heat Rate Values from 25% to 10% assumes 01 gas turbine in operation, this assumes 03 gas turbines will be shutdown

Note: Use linear interpolation when the load variation values fall between the stated values

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Annex J

Degradation Curves

Table I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Total degradation of Power	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Total degradation of Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[.]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	200	0.08	0.08	0.00	0.06	0.07	0.04	0.04	0.00	0.03	0.03
3	400	0.15	0.15	0.00	0.13	0.14	0.09	0.09	0.00	0.06	0.07
4	600	0.23	0.23	0.00	0.19	0.20	0.13	0.13	0.00	0.09	0.10
5	800	0.30	0.30	0.00	0.25	0.27	0.17	0.17	0.00	0.12	0.14
6	1000	0.38	0.38	0.00	0.31	0.34	0.21	0.21	0.00	0.15	0.17
7	1200	0.46	0.46	0.00	0.38	0.41	0.26	0.26	0.00	0.17	0.20
8	1400	0.53	0.53	0.00	0.44	0.47	0.30	0.30	0.00	0.20	0.24
9	1600	0.61	0.61	0.00	0.50	0.54	0.34	0.34	0.00	0.23	0.27
10	1800	0.69	0.69	0.00	0.56	0.61	0.39	0.39	0.00	0.26	0.31
11	2000	0.76	0.76	0.00	0.63	0.68	0.43	0.43	0.00	0.29	0.34
12	2200	0.84	0.84	0.00	0.69	0.74	0.47	0.47	0.00	0.32	0.37
13	2400	0.91	0.91	0.00	0.75	0.81	0.52	0.52	0.00	0.35	0.41
14	2600	0.99	0.99	0.00	0.81	0.88	0.56	0.56	0.00	0.38	0.44
15	2800	1.07	1.07	0.00	0.88	0.95	0.60	0.60	0.00	0.41	0.48
16	3000	1.14	1.14	0.00	0.94	1.01	0.64	0.64	0.00	0.44	0.51
17	3200	1.22	1.22	0.00	1.00	1.08	0.69	0.69	0.00	0.46	0.54
18	3400	1.30	1.30	0.00	1.07	1.15	0.73	0.73	0.00	0.49	0.58
19	3600	1.37	1.37	0.00	1.13	1.22	0.77	0.77	0.00	0.52	0.61
20	3800	1.45	1.45	0.00	1.19	1.28	0.82	0.82	0.00	0.55	0.65
21	4000	1.52	1.52	0.00	1.25	1.35	0.86	0.86	0.00	0.58	0.68
22	4200	1.60	1.60	0.00	1.32	1.42	0.90	0.90	0.00	0.61	0.71
23	4400	1.68	1.68	0.00	1.38	1.49	0.94	0.94	0.00	0.64	0.75
24	4600	1.75	1.75	0.00	1.44	1.55	0.99	0.99	0.00	0.67	0.78
25	4800	1.83	1.83	0.00	1.50	1.62	1.03	1.03	0.00	0.70	0.82
26	5000	1.90	1.90	0.00	1.57	1.69	1.07	1.07	0.00	0.73	0.85
27	5200	1.99	1.99	0.00	1.64	1.77	1.11	1.11	0.00	0.75	0.88
28	5400	2.08	2.08	0.00	1.72	1.85	1.14	1.14	0.00	0.77	0.91
29	5600	2.16	2.16	0.00	1.79	1.93	1.18	1.18	0.00	0.79	0.94
30	5800	2.25	2.25	0.00	1.87	2.01	1.21	1.21	0.00	0.82	0.96
31	6000	2.33	2.33	0.00	1.94	2.09	1.24	1.24	0.00	0.84	0.99
32	6200	2.42	2.42	0.00	2.02	2.17	1.28	1.28	0.00	0.86	1.02
33	6400	2.50	2.50	0.00	2.09	2.25	1.31	1.31	0.00	0.88	1.05
34	6600	2.59	2.59	0.00	2.17	2.33	1.35	1.35	0.00	0.91	1.08
35	6800	2.68	2.68	0.00	2.24	2.41	1.38	1.38	0.00	0.93	1.11
36	7000	2.76	2.76	0.00	2.32	2.50	1.41	1.41	0.00	0.95	1.14
37	7200	2.85	2.85	0.00	2.39	2.58	1.45	1.45	0.00	0.97	1.16
38	7400	2.93	2.93	0.00	2.47	2.66	1.48	1.48	0.00	0.99	1.19
39	7600	3.02	3.02	0.00	2.54	2.74	1.52	1.52	0.00	1.02	1.22
40	7800	3.11	3.11	0.00	2.62	2.82	1.55	1.55	0.00	1.04	1.25
41	8000	3.19	3.19	0.00	2.69	2.90	1.58	1.58	0.00	1.06	1.28
42	8200	3.28	3.28	0.00	2.77	2.98	1.62	1.62	0.00	1.08	1.31
43	8400	3.36	3.36	0.00	2.84	3.06	1.65	1.65	0.00	1.11	1.33
44	8600	3.45	3.45	0.00	2.92	3.14	1.69	1.69	0.00	1.13	1.36
45	8800	3.53	3.53	0.00	3.00	3.22	1.72	1.72	0.00	1.16	1.39
46	9000	3.62	3.62	0.00	3.07	3.30	1.75	1.75	0.00	1.17	1.42
47	9200	3.71	3.71	0.00	3.14	3.38	1.79	1.79	0.00	1.20	1.45
48	9400	3.79	3.79	0.00	3.22	3.47	1.82	1.82	0.00	1.22	1.48
49	9600	3.88	3.88	0.00	3.29	3.55	1.86	1.86	0.00	1.24	1.51
50	9800	3.96	3.96	0.00	3.37	3.63	1.89	1.89	0.00	1.26	1.53
51	10000	4.05	4.05	0.00	3.44	3.71	1.92	1.92	0.00	1.29	1.56
52	11000	4.36	4.36	0.00	3.71	3.99	2.06	2.06	0.00	1.37	1.67
53	12000	4.67	4.67	0.00	3.97	4.27	2.20	2.20	0.00	1.46	1.78
54	13000	4.98	4.98	0.00	4.23	4.55	2.35	2.35	0.00	1.55	1.89
55	14000	5.29	5.29	0.00	4.49	4.83	2.49	2.49	0.00	1.63	2.00
56	15000	5.60	5.60	0.00	4.75	5.11	2.63	2.63	0.00	1.72	2.11
57	16000	5.86	5.86	0.00	4.98	5.36	2.74	2.74	0.00	1.79	2.20
58	17000	6.12	6.12	0.00	5.20	5.60	2.86	2.86	0.00	1.86	2.29
59	18000	6.38	6.38	0.00	5.42	5.84	2.98	2.98	0.00	1.93	2.38
60	19000	6.64	6.64	0.00	5.65	6.08	3.09	3.09	0.00	2.00	2.47
61	20000	6.90	6.90	0.00	5.87	6.32	3.21	3.21	0.00	2.08	2.56
62	21000	7.10	7.10	0.00	6.03	6.49	3.31	3.31	0.00	2.13	2.64
63	22000	7.29	7.29	0.00	6.19	6.66	3.41	3.41	0.00	2.19	2.71
64	23000	7.48	7.48	0.00	6.35	6.83	3.50	3.50	0.00	2.25	2.78
65	24000	7.67	7.67	0.00	6.50	7.00	3.60	3.60	0.00	2.31	2.86
66	25000	7.86	7.86	0.00	6.66	7.17	3.70	3.70	0.00	2.37	2.93
67	25000	4.05	0.00	0.00	3.32	3.58	2.68	0.00	0.00	1.91	2.19

K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates	Project Ref. N°	IEI/E/01/2018	 ISTROENERGO INTERNATIONAL, a.s.
		File Name	L_10_20180914	
		Revision date	Sept. 14th, 2018	

Table I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Total degradation of Power	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Total degradation of Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[-]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
68	26 000	4.36	1.12	0.00	3.59	3.87	2.76	0.61	0.00	1.94	2.24
69	27 000	4.67	2.24	0.00	3.86	4.16	2.83	1.22	0.00	1.97	2.29
70	28 000	4.98	3.36	0.00	4.13	4.45	2.90	1.83	0.00	2.00	2.34
71	29 000	5.29	4.48	0.00	4.40	4.74	2.98	2.44	0.00	2.03	2.39
72	30 000	5.60	5.60	0.00	4.67	5.03	3.05	3.05	0.00	2.05	2.44
73	31 000	5.81	5.81	0.00	4.86	5.23	3.13	3.13	0.00	2.10	2.50
74	32 000	6.02	6.02	0.00	5.05	5.43	3.20	3.20	0.00	2.14	2.56
75	33 000	6.24	6.24	0.00	5.23	5.63	3.28	3.28	0.00	2.18	2.62
76	34 000	6.45	6.45	0.00	5.42	5.83	3.36	3.36	0.00	2.23	2.68
77	35 000	6.67	6.67	0.00	5.60	6.03	3.43	3.43	0.00	2.27	2.74
78	36 000	6.83	6.83	0.00	5.75	6.19	3.50	3.50	0.00	2.31	2.79
79	37 000	7.00	7.00	0.00	5.90	6.35	3.56	3.56	0.00	2.35	2.84
80	38 000	7.17	7.17	0.00	6.05	6.51	3.62	3.62	0.00	2.38	2.89
81	39 000	7.33	7.33	0.00	6.19	6.67	3.68	3.68	0.00	2.42	2.94
82	40 000	7.50	7.50	0.00	6.34	6.83	3.75	3.75	0.00	2.46	3.00
83	41 000	7.62	7.62	0.00	6.45	6.94	3.79	3.79	0.00	2.49	3.03
84	42 000	7.74	7.74	0.00	6.55	7.06	3.83	3.83	0.00	2.52	3.07
85	43 000	7.86	7.86	0.00	6.66	7.17	3.88	3.88	0.00	2.55	3.11
86	44 000	7.98	7.98	0.00	6.77	7.28	3.92	3.92	0.00	2.58	3.15
87	45 000	8.09	8.09	0.00	6.87	7.40	3.97	3.97	0.00	2.61	3.19
88	46 000	8.21	8.21	0.00	6.98	7.51	4.01	4.01	0.00	2.63	3.22
89	47 000	8.33	8.33	0.00	7.09	7.63	4.05	4.05	0.00	2.66	3.26
90	48 000	8.45	8.45	0.00	7.19	7.74	4.10	4.10	0.00	2.68	3.29
91	49 000	8.57	8.57	0.00	7.30	7.85	4.14	4.14	0.00	2.71	3.33
92	50 000	8.69	8.69	0.00	7.40	7.97	4.18	4.18	0.00	2.73	3.36
93	50 000	0.00	0.00	0.00	0.38	0.41	0.00	0.00	0.00	0.39	0.42
94	51 000	0.38	0.38	0.00	0.66	0.71	0.21	0.21	0.00	0.49	0.54
95	52 000	0.76	0.76	0.00	0.93	1.00	0.43	0.43	0.00	0.60	0.67
96	53 000	1.14	1.14	0.00	1.20	1.30	0.64	0.64	0.00	0.70	0.80
97	54 000	1.52	1.52	0.00	1.48	1.59	0.86	0.86	0.00	0.81	0.93
98	55 000	1.90	1.90	0.00	1.75	1.89	1.07	1.07	0.00	0.91	1.05
99	56 000	2.33	2.33	0.00	2.09	2.25	1.24	1.24	0.00	0.99	1.15
100	57 000	2.76	2.76	0.00	2.43	2.61	1.41	1.41	0.00	1.06	1.25
101	58 000	3.19	3.19	0.00	2.76	2.97	1.58	1.58	0.00	1.13	1.35
102	59 000	3.62	3.62	0.00	3.10	3.34	1.75	1.75	0.00	1.21	1.45
103	60 000	4.05	4.05	0.00	3.44	3.70	1.92	1.92	0.00	1.28	1.55
104	61 000	4.36	4.36	0.00	3.71	3.99	2.06	2.06	0.00	1.37	1.67
105	62 000	4.67	4.67	0.00	3.98	4.28	2.20	2.20	0.00	1.47	1.79
106	63 000	4.98	4.98	0.00	4.24	4.57	2.35	2.35	0.00	1.56	1.91
107	64 000	5.29	5.29	0.00	4.51	4.86	2.49	2.49	0.00	1.66	2.02
108	65 000	5.60	5.60	0.00	4.78	5.15	2.63	2.63	0.00	1.75	2.14
109	66 000	5.86	5.86	0.00	5.02	5.40	2.74	2.74	0.00	1.83	2.24
110	67 000	6.12	6.12	0.00	5.25	5.65	2.86	2.86	0.00	1.91	2.35
111	68 000	6.38	6.38	0.00	5.48	5.90	2.98	2.98	0.00	1.99	2.45
112	69 000	6.64	6.64	0.00	5.71	6.15	3.09	3.09	0.00	2.08	2.55
113	70 000	6.90	6.90	0.00	5.95	6.40	3.21	3.21	0.00	2.16	2.65
114	71 000	7.10	7.10	0.00	6.11	6.58	3.31	3.31	0.00	2.22	2.73
115	72 000	7.29	7.29	0.00	6.28	6.75	3.41	3.41	0.00	2.29	2.82
116	73 000	7.48	7.48	0.00	6.44	6.93	3.50	3.50	0.00	2.36	2.90
117	74 000	7.67	7.67	0.00	6.61	7.11	3.60	3.60	0.00	2.43	2.98
118	75 000	7.86	7.86	0.00	6.77	7.29	3.70	3.70	0.00	2.49	3.06
119	75 000	4.05	0.00	0.00	3.44	3.71	2.68	0.00	0.00	2.03	2.32



K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates	Project Ref. N°	IEI/KE/01/2018	 ISTROENERGO INTERNATIONAL, s.r.l.
		File Name	L_10_20180914	
		Revision date	Sept. 14th, 2018	

Table I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Total degradation of Power	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Total degradation of Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[.]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
120	76 000	4.36	1.12	0.00	3.71	4.00	2.76	0.61	0.00	2.07	2.37
121	77 000	4.67	2.24	0.00	3.98	4.29	2.83	1.22	0.00	2.10	2.43
122	78 000	4.98	3.36	0.00	4.26	4.59	2.90	1.83	0.00	2.13	2.48
123	79 000	5.29	4.48	0.00	4.53	4.88	2.98	2.44	0.00	2.16	2.54
124	80 000	5.60	5.60	0.00	4.80	5.17	3.05	3.05	0.00	2.19	2.59
125	81 000	5.81	5.81	0.00	4.99	5.37	3.13	3.13	0.00	2.24	2.65
126	82 000	6.02	6.02	0.00	5.18	5.57	3.20	3.20	0.00	2.28	2.71
127	83 000	6.24	6.24	0.00	5.36	5.77	3.28	3.28	0.00	2.32	2.77
128	84 000	6.45	6.45	0.00	5.55	5.97	3.36	3.36	0.00	2.37	2.83
129	85 000	6.67	6.67	0.00	5.74	6.17	3.43	3.43	0.00	2.41	2.89
130	86 000	6.83	6.83	0.00	5.88	6.33	3.50	3.50	0.00	2.45	2.94
131	87 000	7.00	7.00	0.00	6.03	6.49	3.56	3.56	0.00	2.48	2.99
132	88 000	7.17	7.17	0.00	6.17	6.64	3.62	3.62	0.00	2.52	3.04
133	89 000	7.33	7.33	0.00	6.32	6.80	3.68	3.68	0.00	2.56	3.09
134	90 000	7.50	7.50	0.00	6.46	6.96	3.75	3.75	0.00	2.60	3.14
135	91 000	7.62	7.62	0.00	6.57	7.07	3.79	3.79	0.00	2.62	3.18
136	92 000	7.74	7.74	0.00	6.68	7.19	3.83	3.83	0.00	2.65	3.22
137	93 000	7.86	7.86	0.00	6.78	7.30	3.88	3.88	0.00	2.68	3.25
138	94 000	7.98	7.98	0.00	6.89	7.41	3.92	3.92	0.00	2.71	3.29
139	95 000	8.09	8.09	0.00	6.99	7.53	3.97	3.97	0.00	2.74	3.33
140	96 000	8.21	8.21	0.00	7.10	7.64	4.01	4.01	0.00	2.76	3.37
141	97 000	8.33	8.33	0.00	7.20	7.75	4.05	4.05	0.00	2.79	3.40
142	98 000	8.45	8.45	0.00	7.31	7.87	4.10	4.10	0.00	2.81	3.44
143	99 000	8.57	8.57	0.00	7.42	7.98	4.14	4.14	0.00	2.84	3.47
144	100 000	8.69	8.69	0.00	7.52	8.10	4.18	4.18	0.00	2.87	3.51
145	100 000	0.00	0.00	0.00	0.50	0.54	0.00	0.00	0.00	0.51	0.55
146	101 000	0.38	0.38	0.00	0.79	0.86	0.21	0.21	0.00	0.63	0.69
147	102 000	0.76	0.76	0.00	1.08	1.17	0.43	0.43	0.00	0.75	0.84
148	103 000	1.14	1.14	0.00	1.38	1.48	0.64	0.64	0.00	0.88	0.99
149	104 000	1.52	1.52	0.00	1.67	1.79	0.86	0.86	0.00	1.00	1.13
150	105 000	1.90	1.90	0.00	1.96	2.11	1.07	1.07	0.00	1.13	1.28
151	106 000	2.33	2.33	0.00	2.31	2.49	1.24	1.24	0.00	1.22	1.41
152	107 000	2.76	2.76	0.00	2.67	2.88	1.41	1.41	0.00	1.32	1.53
153	108 000	3.19	3.19	0.00	3.03	3.26	1.58	1.58	0.00	1.41	1.66
154	109 000	3.62	3.62	0.00	3.39	3.65	1.75	1.75	0.00	1.51	1.78
155	110 000	4.05	4.05	0.00	3.75	4.03	1.92	1.92	0.00	1.60	1.91
156	111 000	4.36	4.36	0.00	3.98	4.29	2.06	2.06	0.00	1.66	1.99
157	112 000	4.67	4.67	0.00	4.22	4.54	2.20	2.20	0.00	1.72	2.07
158	113 000	4.98	4.98	0.00	4.46	4.80	2.35	2.35	0.00	1.79	2.15
159	114 000	5.29	5.29	0.00	4.69	5.05	2.49	2.49	0.00	1.85	2.23
160	115 000	5.60	5.60	0.00	4.93	5.31	2.63	2.63	0.00	1.91	2.31
161	116 000	5.86	5.86	0.00	5.13	5.52	2.74	2.74	0.00	1.96	2.38
162	117 000	6.12	6.12	0.00	5.33	5.74	2.86	2.86	0.00	2.00	2.44
163	118 000	6.38	6.38	0.00	5.53	5.95	2.98	2.98	0.00	2.05	2.51
164	119 000	6.64	6.64	0.00	5.73	6.17	3.09	3.09	0.00	2.10	2.57
165	120 000	6.90	6.90	0.00	5.94	6.39	3.21	3.21	0.00	2.15	2.64
166	121 000	7.10	7.10	0.00	6.11	6.57	3.31	3.31	0.00	2.22	2.73
167	122 000	7.29	7.29	0.00	6.28	6.75	3.41	3.41	0.00	2.29	2.82
168	123 000	7.48	7.48	0.00	6.45	6.94	3.50	3.50	0.00	2.36	2.91
169	124 000	7.67	7.67	0.00	6.62	7.12	3.60	3.60	0.00	2.44	2.99
170	125 000	7.86	7.86	0.00	6.79	7.31	3.70	3.70	0.00	2.51	3.08
171	125 000	4.05	0.00	0.00	3.45	3.72	2.68	0.00	0.00	2.05	2.34



K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates	Project Ref. N°	IEIK/E/01/2018	IEI ISTROENERGO INTERNATIONAL, s.s.
		File Name	I_10_20180914	
		Revision date	Sept. 14th, 2018	

Table I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Total degradation of Power	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Total degradation of Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[-]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
172	126 000	4.36	1.12	0.00	3.73	4.02	2.76	0.61	0.00	2.09	2.40
173	127 000	4.67	2.24	0.00	4.01	4.32	2.83	1.22	0.00	2.13	2.46
174	128 000	4.98	3.36	0.00	4.29	4.62	2.90	1.83	0.00	2.16	2.52
175	129 000	5.29	4.48	0.00	4.57	4.92	2.98	2.44	0.00	2.20	2.58
176	130 000	5.60	5.60	0.00	4.84	5.22	3.05	3.05	0.00	2.24	2.64
177	131 000	5.81	5.81	0.00	5.03	5.42	3.13	3.13	0.00	2.28	2.70
178	132 000	6.02	6.02	0.00	5.22	5.62	3.20	3.20	0.00	2.33	2.76
179	133 000	6.24	6.24	0.00	5.41	5.82	3.28	3.28	0.00	2.37	2.83
180	134 000	6.45	6.45	0.00	5.60	6.03	3.36	3.36	0.00	2.42	2.89
181	135 000	6.67	6.67	0.00	5.79	6.23	3.43	3.43	0.00	2.46	2.95
182	136 000	6.83	6.83	0.00	5.93	6.39	3.50	3.50	0.00	2.50	3.00
183	137 000	7.00	7.00	0.00	6.08	6.54	3.56	3.56	0.00	2.54	3.05
184	138 000	7.17	7.17	0.00	6.22	6.70	3.62	3.62	0.00	2.58	3.10
185	139 000	7.33	7.33	0.00	6.37	6.86	3.68	3.68	0.00	2.62	3.15
186	140 000	7.50	7.50	0.00	6.52	7.01	3.75	3.75	0.00	2.65	3.20
187	141 000	7.62	7.62	0.00	6.62	7.13	3.79	3.79	0.00	2.68	3.24
188	142 000	7.74	7.74	0.00	6.73	7.24	3.83	3.83	0.00	2.71	3.28
189	143 000	7.86	7.86	0.00	6.83	7.36	3.88	3.88	0.00	2.74	3.32
190	144 000	7.98	7.98	0.00	6.94	7.47	3.92	3.92	0.00	2.77	3.36
191	145 000	8.09	8.09	0.00	7.05	7.58	3.97	3.97	0.00	2.80	3.40
192	146 000	8.21	8.21	0.00	7.15	7.70	4.01	4.01	0.00	2.82	3.43
193	147 000	8.33	8.33	0.00	7.26	7.81	4.05	4.05	0.00	2.85	3.47
194	148 000	8.45	8.45	0.00	7.37	7.93	4.10	4.10	0.00	2.88	3.51
195	149 000	8.57	8.57	0.00	7.47	8.04	4.14	4.14	0.00	2.90	3.54
196	150 000	8.69	8.69	0.00	7.58	8.16	4.18	4.18	0.00	2.93	3.58
197	150 000	0.00	0.00	0.00	0.56	0.61	0.00	0.00	0.00	0.57	0.61
198	151 000	0.38	0.38	0.00	0.86	0.92	0.21	0.21	0.00	0.69	0.76
199	152 000	0.76	0.76	0.00	1.15	1.23	0.43	0.43	0.00	0.82	0.91
200	153 000	1.14	1.14	0.00	1.44	1.55	0.64	0.64	0.00	0.94	1.06
201	154 000	1.52	1.52	0.00	1.73	1.86	0.86	0.86	0.00	1.07	1.20
202	155 000	1.90	1.90	0.00	2.02	2.18	1.07	1.07	0.00	1.19	1.35
203	156 000	2.33	2.33	0.00	2.38	2.56	1.24	1.24	0.00	1.29	1.48
204	157 000	2.76	2.76	0.00	2.74	2.95	1.41	1.41	0.00	1.39	1.61
205	158 000	3.19	3.19	0.00	3.10	3.34	1.58	1.58	0.00	1.49	1.74
206	159 000	3.62	3.62	0.00	3.46	3.73	1.75	1.75	0.00	1.59	1.87
207	160 000	4.05	4.05	0.00	3.82	4.11	1.92	1.92	0.00	1.68	1.99
208	161 000	4.36	4.36	0.00	4.08	4.39	2.06	2.06	0.00	1.77	2.10
209	162 000	4.67	4.67	0.00	4.34	4.67	2.20	2.20	0.00	1.85	2.20
210	163 000	4.98	4.98	0.00	4.59	4.94	2.35	2.35	0.00	1.93	2.31
211	164 000	5.29	5.29	0.00	4.85	5.22	2.49	2.49	0.00	2.02	2.42
212	165 000	5.60	5.60	0.00	5.11	5.50	2.63	2.63	0.00	2.10	2.52
213	166 000	5.86	5.86	0.00	5.33	5.74	2.74	2.74	0.00	2.17	2.61
214	167 000	6.12	6.12	0.00	5.55	5.97	2.86	2.86	0.00	2.24	2.70
215	168 000	6.38	6.38	0.00	5.77	6.21	2.98	2.98	0.00	2.31	2.79
216	169 000	6.64	6.64	0.00	5.99	6.45	3.09	3.09	0.00	2.38	2.88
217	170 000	6.90	6.90	0.00	6.21	6.68	3.21	3.21	0.00	2.45	2.97
218	171 000	7.10	7.10	0.00	6.36	6.84	3.31	3.31	0.00	2.49	3.02
219	172 000	7.29	7.29	0.00	6.50	7.00	3.41	3.41	0.00	2.54	3.08
220	173 000	7.48	7.48	0.00	6.65	7.15	3.50	3.50	0.00	2.58	3.14
221	174 000	7.67	7.67	0.00	6.79	7.31	3.60	3.60	0.00	2.63	3.20
222	175 000	7.86	7.86	0.00	6.94	7.46	3.70	3.70	0.00	2.67	3.26
223	175 000	4.05	0.00	0.00	3.60	3.88	2.68	0.00	0.00	2.21	2.51



K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates	Project Ref. N°	IEI/KE/01/2018	IEI ISTROENERGO INTERNATIONAL, a.s.
		File Name	L_10_20180914	
		Revision date	Sept. 14th. 2018	

Table I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Total degradation of Power	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Total degradation of Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[.]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
224	176 000	4.36	1.12	0.00	3.86	4.16	2.76	0.61	0.00	2.23	2.55
225	177 000	4.67	2.24	0.00	4.12	4.44	2.83	1.22	0.00	2.24	2.58
226	178 000	4.98	3.36	0.00	4.38	4.72	2.90	1.83	0.00	2.26	2.62
227	179 000	5.29	4.48	0.00	4.64	4.99	2.98	2.44	0.00	2.28	2.66
228	180 000	5.60	5.60	0.00	4.89	5.27	3.05	3.05	0.00	2.29	2.70
229	181 000	5.81	5.81	0.00	5.09	5.48	3.13	3.13	0.00	2.35	2.77
230	182 000	6.02	6.02	0.00	5.29	5.69	3.20	3.20	0.00	2.40	2.84
231	183 000	6.24	6.24	0.00	5.48	5.90	3.28	3.28	0.00	2.45	2.91
232	184 000	6.45	6.45	0.00	5.68	6.11	3.36	3.36	0.00	2.51	2.98
233	185 000	6.67	6.67	0.00	5.87	6.32	3.43	3.43	0.00	2.56	3.05
234	186 000	6.83	6.83	0.00	6.03	6.49	3.50	3.50	0.00	2.61	3.11
235	187 000	7.00	7.00	0.00	6.18	6.65	3.56	3.56	0.00	2.65	3.17
236	188 000	7.17	7.17	0.00	6.33	6.82	3.62	3.62	0.00	2.70	3.23
237	189 000	7.33	7.33	0.00	6.49	6.98	3.68	3.68	0.00	2.74	3.29
238	190 000	7.50	7.50	0.00	6.64	7.15	3.75	3.75	0.00	2.79	3.35
239	191 000	7.62	7.62	0.00	6.75	7.27	3.79	3.79	0.00	2.82	3.39
240	192 000	7.74	7.74	0.00	6.86	7.38	3.83	3.83	0.00	2.86	3.44
241	193 000	7.86	7.86	0.00	6.97	7.50	3.88	3.88	0.00	2.89	3.48
242	194 000	7.96	7.96	0.00	7.06	7.62	3.92	3.92	0.00	2.93	3.53
243	195 000	8.09	8.09	0.00	7.19	7.74	3.97	3.97	0.00	2.96	3.57
244	196 000	8.21	8.21	0.00	7.30	7.86	4.01	4.01	0.00	2.99	3.61
245	197 000	8.33	8.33	0.00	7.41	7.97	4.05	4.05	0.00	3.02	3.65
246	198 000	8.45	8.45	0.00	7.52	8.09	4.10	4.10	0.00	3.04	3.69
247	199 000	8.57	8.57	0.00	7.62	8.21	4.14	4.14	0.00	3.07	3.72
248	200 000	8.69	8.69	0.00	7.73	8.32	4.18	4.18	0.00	3.10	3.76
249	200 000	0.00	0.00	0.00	0.72	0.77	0.00	0.00	0.00	0.72	0.78
250	201 000	0.38	0.38	0.00	1.01	1.08	0.21	0.21	0.00	0.85	0.92
251	202 000	0.76	0.76	0.00	1.29	1.39	0.43	0.43	0.00	0.97	1.07
252	203 000	1.14	1.14	0.00	1.58	1.71	0.64	0.64	0.00	1.09	1.22
253	204 000	1.52	1.52	0.00	1.87	2.02	0.86	0.86	0.00	1.22	1.37
254	205 000	1.90	1.90	0.00	2.16	2.33	1.07	1.07	0.00	1.34	1.51
255	206 000	2.33	2.33	0.00	2.52	2.71	1.24	1.24	0.00	1.44	1.64
256	207 000	2.76	2.76	0.00	2.88	3.10	1.41	1.41	0.00	1.53	1.77
257	208 000	3.19	3.19	0.00	3.24	3.48	1.58	1.58	0.00	1.63	1.89
258	209 000	3.62	3.62	0.00	3.59	3.87	1.75	1.75	0.00	1.73	2.02
259	210 000	4.05	4.05	0.00	3.95	4.25	1.92	1.92	0.00	1.82	2.14
260	211 000	4.36	4.36	0.00	4.21	4.53	2.06	2.06	0.00	1.90	2.25
261	212 000	4.67	4.67	0.00	4.47	4.81	2.20	2.20	0.00	1.99	2.35
262	213 000	4.98	4.98	0.00	4.72	5.08	2.35	2.35	0.00	2.07	2.46
263	214 000	5.29	5.29	0.00	4.98	5.36	2.49	2.49	0.00	2.15	2.57
264	215 000	5.60	5.60	0.00	5.24	5.64	2.63	2.63	0.00	2.24	2.67
265	216 000	5.86	5.86	0.00	5.46	5.87	2.74	2.74	0.00	2.31	2.76
266	217 000	6.12	6.12	0.00	5.68	6.11	2.86	2.86	0.00	2.38	2.85
267	218 000	6.38	6.38	0.00	5.90	6.35	2.98	2.98	0.00	2.45	2.94
268	219 000	6.64	6.64	0.00	6.12	6.59	3.09	3.09	0.00	2.52	3.03
269	220 000	6.90	6.90	0.00	6.34	6.83	3.21	3.21	0.00	2.59	3.12
270	221 000	7.10	7.10	0.00	6.50	7.00	3.31	3.31	0.00	2.65	3.20
271	222 000	7.29	7.29	0.00	6.66	7.16	3.41	3.41	0.00	2.71	3.27
272	223 000	7.48	7.48	0.00	6.81	7.33	3.50	3.50	0.00	2.77	3.34
273	224 000	7.67	7.67	0.00	6.97	7.50	3.60	3.60	0.00	2.83	3.42
274	225 000	7.86	7.86	0.00	7.13	7.67	3.70	3.70	0.00	2.88	3.49
275	225 000	4.05	0.00	0.00	3.80	4.09	2.68	0.00	0.00	2.42	2.73



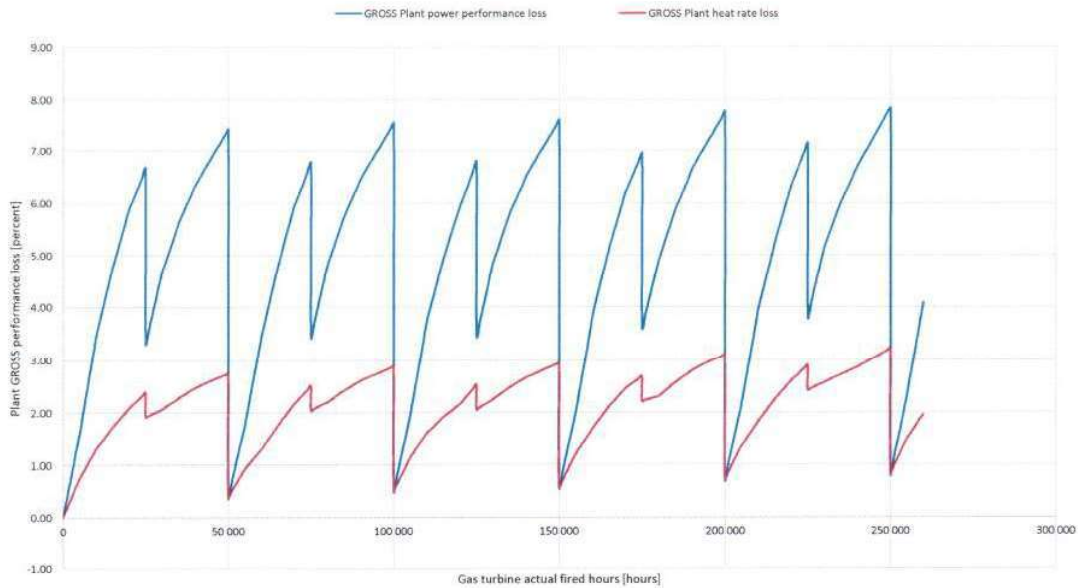
K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates	Project Ref. No.	IE/NEO/2018	IEI ISTROENERGO INTERNATIONAL, a.s.
		File Name	I_10_20180914	
		Revision date	Sept. 14th. 2018	

Table I.10.: Plant performance degradation rates

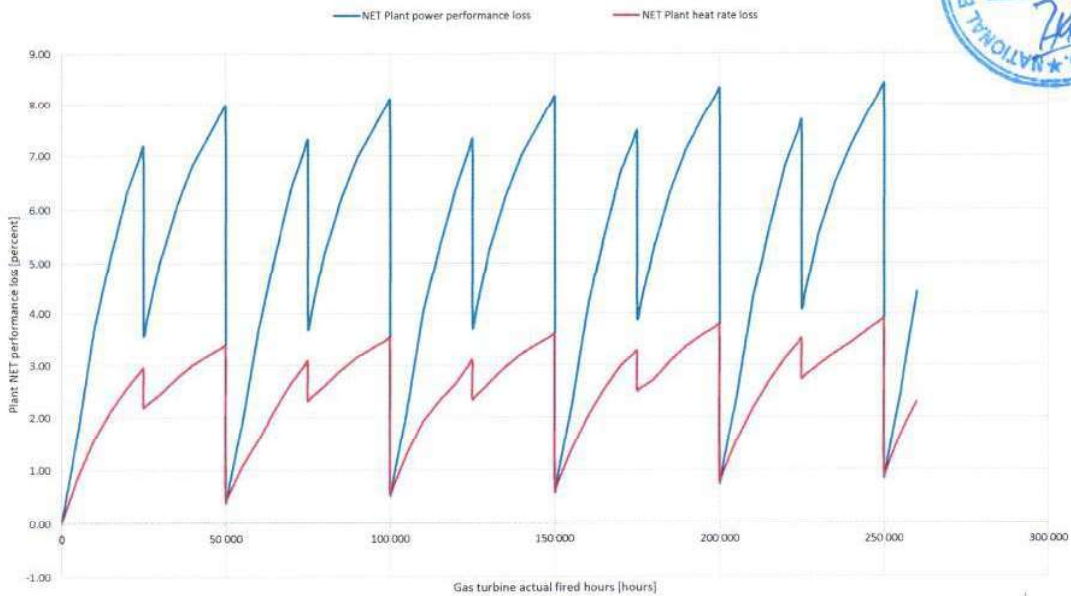
Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Total degradation of Power	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Total degradation of Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[-]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
276	226 000	4.36	1.12	0.00	4.07	4.38	2.76	0.61	0.00	2.44	2.78
277	227 000	4.67	2.24	0.00	4.33	4.67	2.83	1.22	0.00	2.47	2.83
278	228 000	4.98	3.36	0.00	4.60	4.96	2.90	1.83	0.00	2.50	2.88
279	229 000	5.29	4.48	0.00	4.87	5.24	2.98	2.44	0.00	2.53	2.93
280	230 000	5.60	5.60	0.00	5.14	5.53	3.05	3.05	0.00	2.55	2.98
281	231 000	5.81	5.81	0.00	5.31	5.72	3.13	3.13	0.00	2.58	3.03
282	232 000	6.02	6.02	0.00	5.49	5.91	3.20	3.20	0.00	2.61	3.07
283	233 000	6.24	6.24	0.00	5.66	6.09	3.28	3.28	0.00	2.65	3.12
284	234 000	6.45	6.45	0.00	5.83	6.28	3.36	3.36	0.00	2.68	3.17
285	235 000	6.67	6.67	0.00	6.01	6.47	3.43	3.43	0.00	2.71	3.21
286	236 000	6.83	6.83	0.00	6.15	6.62	3.50	3.50	0.00	2.74	3.25
287	237 000	7.00	7.00	0.00	6.28	6.76	3.56	3.56	0.00	2.76	3.29
288	238 000	7.17	7.17	0.00	6.42	6.91	3.62	3.62	0.00	2.79	3.34
289	239 000	7.33	7.33	0.00	6.56	7.06	3.68	3.68	0.00	2.82	3.38
290	240 000	7.50	7.50	0.00	6.70	7.21	3.75	3.75	0.00	2.85	3.42
291	241 000	7.62	7.62	0.00	6.81	7.33	3.79	3.79	0.00	2.89	3.47
292	242 000	7.74	7.74	0.00	6.92	7.45	3.83	3.83	0.00	2.92	3.51
293	243 000	7.86	7.86	0.00	7.04	7.57	3.88	3.88	0.00	2.96	3.56
294	244 000	7.98	7.98	0.00	7.15	7.70	3.92	3.92	0.00	3.00	3.61
295	245 000	8.09	8.09	0.00	7.26	7.82	3.97	3.97	0.00	3.04	3.66
296	246 000	8.21	8.21	0.00	7.38	7.94	4.01	4.01	0.00	3.07	3.70
297	247 000	8.33	8.33	0.00	7.49	8.06	4.05	4.05	0.00	3.11	3.75
298	248 000	8.45	8.45	0.00	7.60	8.18	4.10	4.10	0.00	3.14	3.79
299	249 000	8.57	8.57	0.00	7.72	8.30	4.14	4.14	0.00	3.17	3.84
300	250 000	8.69	8.69	0.00	7.83	8.43	4.18	4.18	0.00	3.21	3.88
301	250 000	0.00	0.00	0.00	0.82	0.88	0.00	0.00	0.00	0.82	0.89
302	251 000	0.38	0.38	0.00	1.11	1.20	0.21	0.21	0.00	0.95	1.04
303	252 000	0.76	0.76	0.00	1.41	1.51	0.43	0.43	0.00	1.08	1.19
304	253 000	1.14	1.14	0.00	1.70	1.83	0.64	0.64	0.00	1.21	1.35
305	254 000	1.52	1.52	0.00	2.00	2.15	0.86	0.86	0.00	1.34	1.50
306	255 000	1.90	1.90	0.00	2.29	2.47	1.07	1.07	0.00	1.47	1.66
307	256 000	2.33	2.33	0.00	2.65	2.85	1.24	1.24	0.00	1.57	1.78
308	257 000	2.76	2.76	0.00	3.01	3.24	1.41	1.41	0.00	1.67	1.91
309	258 000	3.19	3.19	0.00	3.36	3.62	1.58	1.58	0.00	1.76	2.03
310	259 000	3.62	3.62	0.00	3.72	4.00	1.75	1.75	0.00	1.86	2.16
311	260 000	4.05	4.05	0.00	4.08	4.39	1.92	1.92	0.00	1.95	2.28



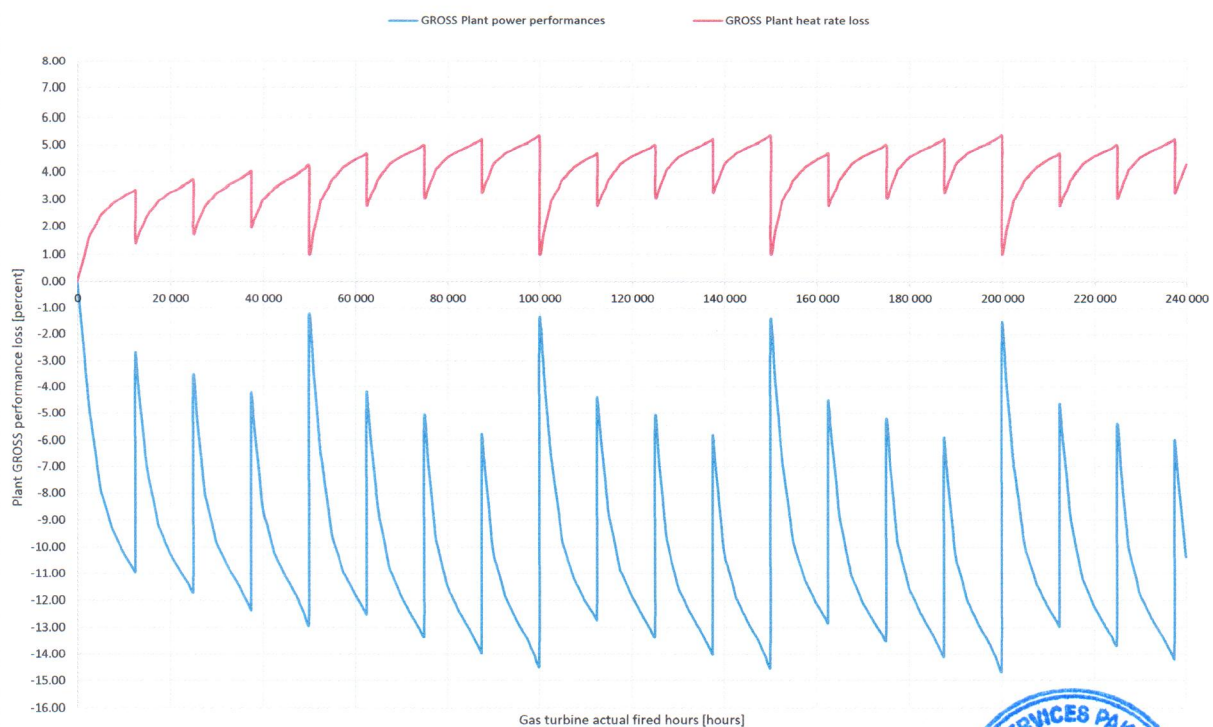
Graph I.10_part 1/2: Combined cycle plant performance degradation factors



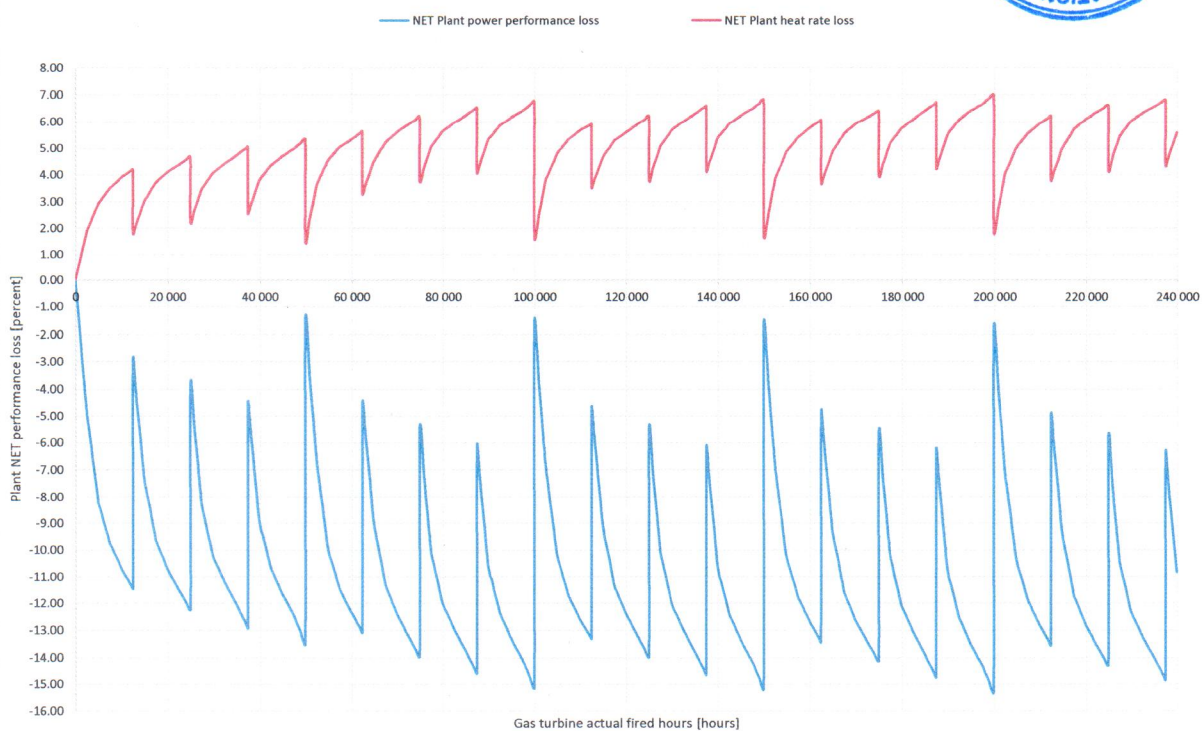
Graph I.10_part2/2: Combined cycle plant performance degradation factors



Graph L.I.10_part 1/2: Combined cycle plant performance degradation factors



Graph L.I.10_part2/2: Combined cycle plant performance degradation factors





K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates liquid fuel operation -	Project Ref. N°	IEI/KE/01/2021	 ISTROENERGO INTERNATIONAL, a.s.
		File Name	L_I_10_20210909	
		Revision date	September, 9th, 2021	

Table L.I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Power @ generator terminals	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[-]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
1	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	200	-0.50	-0.50	-0.01	-0.38	-0.40	0.27	0.26	0.01	0.13	0.15
3	400	-1.01	-0.99	-0.02	-0.76	-0.79	0.54	0.52	0.02	0.25	0.30
4	600	-1.51	-1.49	-0.02	-1.13	-1.19	0.81	0.78	0.02	0.38	0.45
5	800	-2.02	-1.98	-0.03	-1.51	-1.58	1.08	1.04	0.03	0.51	0.60
6	1 000	-2.52	-2.48	-0.04	-1.89	-1.98	1.34	1.30	0.04	0.64	0.75
7	1 200	-3.02	-2.98	-0.05	-2.27	-2.37	1.61	1.57	0.05	0.76	0.90
8	1 400	-3.53	-3.47	-0.06	-2.64	-2.77	1.88	1.83	0.06	0.89	1.05
9	1 600	-4.03	-3.97	-0.06	-3.02	-3.16	2.15	2.09	0.06	1.02	1.20
10	1 800	-4.54	-4.46	-0.07	-3.40	-3.56	2.42	2.35	0.07	1.14	1.35
11	2 000	-5.04	-4.96	-0.08	-3.78	-3.95	2.69	2.61	0.08	1.27	1.50
12	2 200	-5.54	-5.46	-0.09	-4.16	-4.35	2.96	2.87	0.09	1.40	1.66
13	2 400	-6.05	-5.95	-0.10	-4.53	-4.74	3.23	3.13	0.10	1.52	1.81
14	2 500	-6.30	-6.20	-0.10	-4.72	-4.94	3.36	3.26	0.10	1.59	1.88
15	2 700	-6.61	-6.50	-0.11	-4.98	-5.20	3.50	3.39	0.11	1.65	1.96
16	2 900	-6.92	-6.80	-0.12	-5.23	-5.47	3.64	3.53	0.12	1.72	2.05
17	3 100	-7.23	-7.10	-0.12	-5.48	-5.73	3.79	3.66	0.12	1.78	2.13
18	3 300	-7.54	-7.40	-0.13	-5.73	-5.99	3.93	3.79	0.13	1.85	2.21
19	3 500	-7.84	-7.70	-0.14	-5.99	-6.26	4.07	3.93	0.14	1.91	2.30
20	3 700	-8.15	-8.01	-0.15	-6.24	-6.52	4.21	4.06	0.15	1.97	2.38
21	3 900	-8.46	-8.31	-0.16	-6.49	-6.79	4.35	4.19	0.16	2.04	2.46
22	4 100	-8.77	-8.61	-0.16	-6.75	-7.05	4.49	4.33	0.16	2.10	2.55
23	4 300	-9.08	-8.91	-0.17	-7.00	-7.31	4.63	4.46	0.17	2.17	2.63
24	4 500	-9.39	-9.21	-0.18	-7.25	-7.58	4.77	4.59	0.18	2.23	2.71
25	4 700	-9.70	-9.51	-0.19	-7.51	-7.84	4.91	4.73	0.19	2.30	2.80
26	4 900	-10.01	-9.81	-0.20	-7.76	-8.11	5.05	4.86	0.20	2.36	2.88
27	5 000	-10.16	-9.96	-0.20	-7.88	-8.24	5.12	4.92	0.20	2.39	2.92
28	5 200	-10.30	-10.09	-0.21	-8.00	-8.36	5.20	4.99	0.21	2.43	2.97
29	5 400	-10.44	-10.23	-0.22	-8.12	-8.48	5.27	5.05	0.22	2.46	3.01
30	5 600	-10.58	-10.36	-0.22	-8.23	-8.61	5.34	5.12	0.22	2.50	3.06
31	5 800	-10.72	-10.49	-0.23	-8.35	-8.73	5.41	5.18	0.23	2.53	3.11
32	6 000	-10.86	-10.62	-0.24	-8.47	-8.85	5.49	5.25	0.24	2.57	3.15
33	6 200	-11.01	-10.76	-0.25	-8.58	-8.97	5.56	5.31	0.25	2.60	3.20
34	6 400	-11.15	-10.89	-0.26	-8.70	-9.09	5.63	5.37	0.26	2.64	3.24
35	6 600	-11.29	-11.02	-0.26	-8.82	-9.21	5.70	5.44	0.26	2.67	3.29
36	6 800	-11.43	-11.16	-0.27	-8.93	-9.34	5.77	5.50	0.27	2.70	3.33
37	7 000	-11.57	-11.29	-0.28	-9.05	-9.46	5.85	5.57	0.28	2.74	3.38
38	7 200	-11.71	-11.42	-0.29	-9.17	-9.58	5.92	5.63	0.29	2.77	3.42
39	7 400	-11.85	-11.55	-0.30	-9.29	-9.70	5.99	5.70	0.30	2.81	3.47
40	7 500	-11.92	-11.62	-0.30	-9.34	-9.76	6.03	5.73	0.30	2.82	3.49
41	7 700	-12.00	-11.70	-0.31	-9.41	-9.84	6.07	5.77	0.31	2.85	3.52
42	7 900	-12.09	-11.77	-0.32	-9.49	-9.91	6.12	5.80	0.32	2.87	3.56
43	8 100	-12.17	-11.85	-0.32	-9.56	-9.99	6.17	5.84	0.32	2.89	3.59
44	8 300	-12.26	-11.92	-0.33	-9.63	-10.06	6.21	5.88	0.33	2.92	3.62
45	8 500	-12.34	-12.00	-0.34	-9.70	-10.13	6.26	5.92	0.34	2.94	3.65
46	8 700	-12.42	-12.08	-0.35	-9.77	-10.21	6.30	5.96	0.35	2.96	3.68
47	8 900	-12.51	-12.15	-0.36	-9.84	-10.28	6.35	5.99	0.36	2.98	3.71
48	9 100	-12.59	-12.23	-0.36	-9.91	-10.36	6.40	6.03	0.36	3.01	3.74
49	9 300	-12.68	-12.30	-0.37	-9.98	-10.43	6.44	6.07	0.37	3.03	3.78
50	9 500	-12.76	-12.38	-0.38	-10.06	-10.51	6.49	6.11	0.38	3.05	3.81
51	9 700	-12.84	-12.46	-0.39	-10.13	-10.58	6.54	6.15	0.39	3.07	3.84
52	9 900	-12.93	-12.53	-0.40	-10.20	-10.66	6.58	6.19	0.40	3.10	3.87
53	10 000	-12.97	-12.57	-0.40	-10.23	-10.69	6.60	6.20	0.40	3.11	3.89
54	11 000	-13.32	-12.88	-0.44	-10.52	-10.99	6.80	6.36	0.44	3.20	4.01
55	12 000	-13.67	-13.19	-0.48	-10.81	-11.29	6.99	6.51	0.48	3.30	4.13
56	12 500	-13.84	-13.34	-0.50	-10.95	-11.45	7.08	6.58	0.50	3.34	4.19
57	12 501	-3.81	-3.31	-0.50	-2.79	-2.93	2.71	2.21	0.50	1.39	1.78
58	13 000	-4.85	-4.33	-0.52	-3.64	-3.81	3.14	2.62	0.52	1.59	2.02
59	14 000	-6.93	-6.37	-0.56	-5.33	-5.58	4.01	3.45	0.56	1.98	2.51
60	15 000	-9.01	-8.41	-0.60	-7.02	-7.34	4.89	4.29	0.60	2.37	3.00
61	16 000	-10.08	-9.44	-0.64	-7.90	-8.26	5.38	4.74	0.64	2.59	3.28
62	17 000	-11.15	-10.47	-0.68	-8.78	-9.17	5.87	5.19	0.68	2.82	3.56
63	17 500	-11.69	-10.99	-0.70	-9.21	-9.63	6.11	5.41	0.70	2.93	3.70
64	18 000	-11.94	-11.22	-0.72	-9.42	-9.85	6.25	5.53	0.72	2.99	3.78
65	19 000	-12.45	-11.69	-0.76	-9.84	-10.28	6.51	5.75	0.76	3.12	3.93
66	20 000	-12.95	-12.15	-0.80	-10.25	-10.71	6.77	5.97	0.80	3.24	4.09
67	21 000	-13.32	-12.48	-0.84	-10.56	-11.03	6.96	6.12	0.84	3.34	4.20
68	22 000	-13.69	-12.81	-0.88	-10.86	-11.35	7.15	6.27	0.88	3.43	4.32
69	22 500	-13.88	-12.98	-0.90	-11.01	-11.51	7.25	6.35	0.90	3.47	4.37
70	23 000	-14.05	-13.13	-0.92	-11.15	-11.65	7.34	6.42	0.92	3.52	4.43
71	24 000	-14.39	-13.43	-0.96	-11.43	-11.94	7.53	6.57	0.96	3.61	4.55

K-Electric Limited
248 MW Combined Cycle Power Plant
Korangi Creek, Karachi
Pakistan

Document Name



Project Ref. N°

IEI/KE/01/2021

File Name

L_I_10_20210909

Revision date

September, 9th, 2021



ISTROENERGO INTERNATIONAL, a.s.

Table L.I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine		Combined cycle plant			Gas turbine		Combined cycle plant		
		Power @ generator terminals	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[-]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
72	25 000	-14.73	-13.73	-1.00	-11.71	-12.23	7.72	6.72	1.00	3.71	4.66
73	25 001	-4.91	-3.91	-1.00	-3.71	-3.88	3.33	2.33	1.00	1.74	2.22
74	26 000	-7.03	-5.99	-1.04	-5.43	-5.68	4.23	3.19	1.04	2.14	2.72
75	27 000	-9.15	-8.07	-1.08	-7.16	-7.48	5.12	4.04	1.08	2.53	3.22
76	27 500	-10.21	-9.11	-1.10	-8.02	-8.38	5.57	4.47	1.10	2.73	3.46
77	28 000	-10.65	-9.53	-1.12	-8.38	-8.76	5.78	4.66	1.12	2.83	3.59
78	29 000	-11.54	-10.38	-1.16	-9.11	-9.52	6.20	5.04	1.16	3.03	3.83
79	30 000	-12.43	-11.23	-1.20	-9.84	-10.28	6.63	5.43	1.20	3.22	4.07
80	31 000	-12.88	-11.64	-1.24	-10.20	-10.67	6.86	5.62	1.24	3.34	4.21
81	32 000	-13.33	-12.05	-1.28	-10.57	-11.05	7.10	5.82	1.28	3.45	4.35
82	32 500	-13.55	-12.25	-1.30	-10.76	-11.24	7.21	5.91	1.30	3.51	4.43
83	33 000	-13.73	-12.41	-1.32	-10.91	-11.40	7.31	5.99	1.32	3.56	4.48
84	34 000	-14.10	-12.74	-1.36	-11.21	-11.72	7.50	6.14	1.36	3.65	4.60
85	35 000	-14.47	-13.07	-1.40	-11.51	-12.03	7.69	6.29	1.40	3.74	4.71
86	36 000	-14.88	-13.44	-1.44	-11.85	-12.39	7.91	6.47	1.44	3.84	4.84
87	37 000	-15.29	-13.81	-1.48	-12.20	-12.74	8.14	6.66	1.48	3.95	4.98
88	37 500	-15.50	-14.00	-1.50	-12.37	-12.92	8.25	6.75	1.50	4.00	5.04
89	37 501	-5.63	-4.13	-1.50	-4.32	-4.52	3.74	2.24	1.50	1.98	2.54
90	38 000	-6.66	-5.14	-1.52	-5.16	-5.40	4.19	2.67	1.52	2.17	2.78
91	39 000	-8.74	-7.18	-1.56	-6.85	-7.16	5.07	3.51	1.56	2.57	3.28
92	40 000	-10.81	-9.21	-1.60	-8.54	-8.93	5.96	4.36	1.60	2.96	3.77
93	41 000	-11.63	-9.99	-1.64	-9.22	-9.63	6.36	4.72	1.64	3.15	4.00
94	42 000	-12.45	-10.77	-1.68	-9.89	-10.34	6.75	5.07	1.68	3.33	4.24
95	42 500	-12.86	-11.16	-1.70	-10.23	-10.69	6.95	5.25	1.70	3.42	4.35
96	43 000	-13.08	-11.36	-1.72	-10.41	-10.88	7.07	5.35	1.72	3.48	4.42
97	44 000	-13.53	-11.77	-1.76	-10.78	-11.27	7.29	5.53	1.76	3.58	4.55
98	45 000	-13.98	-12.18	-1.80	-11.15	-11.65	7.52	5.72	1.80	3.69	4.68
99	46 000	-14.36	-12.52	-1.84	-11.46	-11.97	7.71	5.87	1.84	3.78	4.80
100	47 000	-14.73	-12.85	-1.88	-11.77	-12.30	7.91	6.03	1.88	3.87	4.91
101	47 500	-14.92	-13.02	-1.90	-11.92	-12.46	8.01	6.11	1.90	3.92	4.97
102	48 000	-15.16	-13.24	-1.92	-12.12	-12.66	8.14	6.22	1.92	3.98	5.04
103	49 000	-15.65	-13.69	-1.96	-12.52	-13.08	8.39	6.43	1.96	4.10	5.19
104	50 000	-16.13	-14.13	-2.00	-12.91	-13.49	8.65	6.65	2.00	4.21	5.34
105	50 001	-2.00	0.00	-2.00	-1.46	-1.53	2.00	0.00	2.00	1.08	1.52
106	51 000	-4.52	-2.52	-2.00	-3.46	-3.62	3.35	1.35	2.00	1.82	2.36
107	52 000	-7.04	-5.04	-2.00	-5.46	-5.71	4.69	2.69	2.00	2.56	3.20
108	52 500	-8.30	-6.30	-2.00	-6.46	-6.76	5.36	3.36	2.00	2.93	3.62
109	53 000	-9.07	-7.07	-2.00	-7.08	-7.41	5.71	3.71	2.00	3.09	3.81
110	54 000	-10.62	-8.62	-2.00	-8.33	-8.71	6.41	4.41	2.00	3.41	4.19
111	55 000	-12.16	-10.16	-2.00	-9.58	-10.01	7.12	5.12	2.00	3.73	4.56
112	56 000	-12.86	-10.86	-2.00	-10.14	-10.60	7.48	5.48	2.00	3.90	4.75
113	57 000	-13.57	-11.57	-2.00	-10.69	-11.18	7.85	5.85	2.00	4.08	4.95
114	57 500	-13.92	-11.92	-2.00	-10.97	-11.47	8.03	6.03	2.00	4.16	5.04
115	58 000	-14.13	-12.13	-2.00	-11.13	-11.64	8.14	6.14	2.00	4.22	5.10
116	59 000	-14.55	-12.55	-2.00	-11.46	-11.98	8.37	6.37	2.00	4.32	5.20
117	60 000	-14.97	-12.97	-2.00	-11.78	-12.32	8.60	6.60	2.00	4.43	5.31
118	61 000	-15.32	-13.32	-2.00	-12.08	-12.63	8.79	6.79	2.00	4.52	5.44
119	62 000	-15.67	-13.67	-2.00	-12.37	-12.93	8.99	6.99	2.00	4.61	5.57
120	62 500	-15.84	-13.84	-2.00	-12.52	-13.09	9.08	7.08	2.00	4.66	5.63
121	62 501	-5.81	-3.81	-2.00	-4.28	-4.49	4.71	2.71	2.00	2.78	3.27
122	63 000	-6.85	-4.85	-2.00	-5.14	-5.39	5.14	3.14	2.00	2.97	3.51
123	64 000	-8.93	-6.93	-2.00	-6.87	-7.19	6.01	4.01	2.00	3.35	4.01
124	65 000	-11.01	-9.01	-2.00	-8.59	-8.99	6.88	4.88	2.00	3.73	4.50
125	66 000	-12.08	-10.08	-2.00	-9.48	-9.92	7.37	5.37	2.00	3.95	4.79
126	67 000	-13.15	-11.15	-2.00	-10.37	-10.85	7.87	5.87	2.00	4.16	5.07
127	67 500	-13.69	-11.69	-2.00	-10.82	-11.31	8.12	6.12	2.00	4.27	5.22
128	68 000	-13.94	-11.94	-2.00	-11.02	-11.53	8.25	6.25	2.00	4.33	5.29
129	69 000	-14.45	-12.45	-2.00	-11.44	-11.96	8.51	6.51	2.00	4.44	5.45
130	70 000	-14.95	-12.95	-2.00	-11.86	-12.40	8.77	6.77	2.00	4.56	5.60
131	71 000	-15.32	-13.32	-2.00	-12.17	-12.73	8.96	6.96	2.00	4.64	5.72
132	72 000	-15.69	-13.69	-2.00	-12.48	-13.05	9.15	7.15	2.00	4.72	5.83
133	72 500	-15.88	-13.88	-2.00	-12.64	-13.21	9.25	7.25	2.00	4.76	5.89
134	73 000	-16.05	-14.05	-2.00	-12.78	-13.36	9.34	7.34	2.00	4.80	5.95
135	74 000	-16.39	-14.39	-2.00	-13.06	-13.66	9.53	7.53	2.00	4.88	6.06
136	75 000	-16.73	-14.73	-2.00	-13.34	-13.95	9.72	7.72	2.00	4.96	6.17
137	75 001	-6.91	-4.91	-2.00	-5.27	-5.52	5.33	3.33	2.00	3.08	3.78



K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates - Liquid fuel operation -	Project Ref. N°	IEI/KE/01/2021	 ISTROENERGO INTERNATIONAL, a.s.
		File Name	L_I_10_20210909	
		Revision date	September, 9th, 2021	

Table L.I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Power @ generator terminals	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[-]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
138	76 000	-9.03	-7.03	-2.00	-7.03	-7.36	6.23	4.23	2.00	3.48	4.29
139	77 000	-11.15	-9.15	-2.00	-8.79	-9.19	7.12	5.12	2.00	3.88	4.80
140	77 500	-12.21	-10.21	-2.00	-9.67	-10.11	7.57	5.57	2.00	4.08	5.06
141	78 000	-12.65	-10.65	-2.00	-10.03	-10.49	7.78	5.78	2.00	4.17	5.17
142	79 000	-13.54	-11.54	-2.00	-10.75	-11.25	8.21	6.21	2.00	4.34	5.40
143	80 000	-14.43	-12.43	-2.00	-11.48	-12.00	8.63	6.63	2.00	4.52	5.63
144	81 000	-14.88	-12.88	-2.00	-11.84	-12.38	8.86	6.86	2.00	4.62	5.76
145	82 000	-15.33	-13.33	-2.00	-12.21	-12.76	9.09	7.09	2.00	4.71	5.88
146	82 500	-15.55	-13.55	-2.00	-12.39	-12.95	9.20	7.20	2.00	4.76	5.94
147	83 000	-15.73	-13.73	-2.00	-12.54	-13.11	9.30	7.30	2.00	4.80	6.00
148	84 000	-16.10	-14.10	-2.00	-12.84	-13.42	9.50	7.50	2.00	4.88	6.11
149	85 000	-16.47	-14.47	-2.00	-13.14	-13.73	9.69	7.69	2.00	4.97	6.21
150	86 000	-16.88	-14.88	-2.00	-13.47	-14.08	9.92	7.92	2.00	5.05	6.33
151	87 000	-17.29	-15.29	-2.00	-13.80	-14.42	10.14	8.14	2.00	5.14	6.45
152	87 500	-17.50	-15.50	-2.00	-13.96	-14.60	10.25	8.25	2.00	5.19	6.50
153	87 501	-7.63	-5.63	-2.00	-5.85	-6.13	5.74	3.74	2.00	3.27	4.06
154	88 000	-8.66	-6.66	-2.00	-6.71	-7.03	6.19	4.19	2.00	3.46	4.31
155	89 000	-10.74	-8.74	-2.00	-8.44	-8.83	7.08	5.08	2.00	3.86	4.82
156	90 000	-12.81	-10.81	-2.00	-10.16	-10.62	7.96	5.96	2.00	4.26	5.32
157	91 000	-13.63	-11.63	-2.00	-10.83	-11.32	8.36	6.36	2.00	4.42	5.54
158	92 000	-14.45	-12.45	-2.00	-11.49	-12.02	8.76	6.76	2.00	4.59	5.75
159	92 500	-14.86	-12.86	-2.00	-11.83	-12.37	8.95	6.95	2.00	4.67	5.85
160	93 000	-15.08	-13.08	-2.00	-12.01	-12.55	9.07	7.07	2.00	4.71	5.91
161	94 000	-15.53	-13.53	-2.00	-12.37	-12.93	9.29	7.29	2.00	4.80	6.03
162	95 000	-15.98	-13.98	-2.00	-12.73	-13.31	9.52	7.52	2.00	4.89	6.15
163	96 000	-16.36	-14.36	-2.00	-13.03	-13.62	9.72	7.72	2.00	4.96	6.24
164	97 000	-16.73	-14.73	-2.00	-13.33	-13.94	9.91	7.91	2.00	5.04	6.34
165	97 500	-16.92	-14.92	-2.00	-13.48	-14.10	10.01	8.01	2.00	5.08	6.39
166	98 000	-17.16	-15.16	-2.00	-13.68	-14.30	10.14	8.14	2.00	5.13	6.46
167	99 000	-17.65	-15.65	-2.00	-14.07	-14.71	10.39	8.39	2.00	5.23	6.59
168	100 000	-18.13	-16.13	-2.00	-14.47	-15.12	10.65	8.65	2.00	5.34	6.73
169	100 001	-2.00	0.00	-2.00	-1.57	-1.65	2.00	0.00	2.00	1.08	1.64
170	101 000	-4.52	-2.52	-2.00	-3.58	-3.76	3.35	1.35	2.00	1.82	2.50
171	102 000	-7.04	-5.04	-2.00	-5.60	-5.86	4.69	2.69	2.00	2.56	3.37
172	102 500	-8.30	-6.30	-2.00	-6.61	-6.92	5.36	3.36	2.00	2.93	3.80
173	103 000	-9.07	-7.07	-2.00	-7.24	-7.57	5.71	3.71	2.00	3.09	4.00
174	104 000	-10.62	-8.62	-2.00	-8.50	-8.89	6.41	4.41	2.00	3.41	4.39
175	105 000	-12.16	-10.16	-2.00	-9.77	-10.21	7.12	5.12	2.00	3.73	4.79
176	106 000	-12.86	-10.86	-2.00	-10.34	-10.81	7.48	5.48	2.00	3.90	5.01
177	107 000	-13.57	-11.57	-2.00	-10.92	-11.42	7.85	5.85	2.00	4.08	5.23
178	107 500	-13.92	-11.92	-2.00	-11.21	-11.72	8.03	6.03	2.00	4.16	5.34
179	108 000	-14.13	-12.13	-2.00	-11.38	-11.90	8.14	6.14	2.00	4.22	5.40
180	109 000	-14.55	-12.55	-2.00	-11.72	-12.26	8.37	6.37	2.00	4.32	5.54
181	110 000	-14.97	-12.97	-2.00	-12.07	-12.62	8.60	6.60	2.00	4.43	5.67
182	111 000	-15.32	-13.32	-2.00	-12.33	-12.89	8.79	6.79	2.00	4.52	5.76
183	112 000	-15.67	-13.67	-2.00	-12.60	-13.17	8.99	6.99	2.00	4.61	5.85
184	112 500	-15.84	-13.84	-2.00	-12.73	-13.31	9.08	7.08	2.00	4.66	5.90
185	112 501	-5.81	-3.81	-2.00	-4.50	-4.71	4.71	2.71	2.00	2.78	3.51
186	113 000	-6.85	-4.85	-2.00	-5.34	-5.60	5.14	3.14	2.00	2.97	3.74
187	114 000	-8.93	-6.93	-2.00	-7.03	-7.36	6.01	4.01	2.00	3.35	4.20
188	115 000	-11.01	-9.01	-2.00	-8.73	-9.13	6.88	4.88	2.00	3.73	4.66
189	116 000	-12.08	-10.08	-2.00	-9.59	-10.03	7.37	5.37	2.00	3.95	4.92
190	117 000	-13.15	-11.15	-2.00	-10.45	-10.93	7.87	5.87	2.00	4.16	5.17
191	117 500	-13.69	-11.69	-2.00	-10.88	-11.38	8.12	6.12	2.00	4.27	5.29
192	118 000	-13.94	-11.94	-2.00	-11.07	-11.58	8.25	6.25	2.00	4.33	5.35
193	119 000	-14.45	-12.45	-2.00	-11.46	-11.99	8.51	6.51	2.00	4.44	5.47
194	120 000	-14.95	-12.95	-2.00	-11.85	-12.39	8.77	6.77	2.00	4.56	5.59
195	121 000	-15.32	-13.32	-2.00	-12.17	-12.72	8.96	6.96	2.00	4.64	5.71
196	122 000	-15.69	-13.69	-2.00	-12.48	-13.05	9.15	7.15	2.00	4.72	5.84
197	122 500	-15.88	-13.88	-2.00	-12.64	-13.22	9.25	7.25	2.00	4.76	5.90
198	123 000	-16.05	-14.05	-2.00	-12.79	-13.37	9.34	7.34	2.00	4.80	5.95
199	124 000	-16.39	-14.39	-2.00	-13.07	-13.67	9.53	7.53	2.00	4.88	6.07
200	125 000	-16.73	-14.73	-2.00	-13.36	-13.96	9.72	7.72	2.00	4.96	6.19
201	125 001	-6.91	-4.91	-2.00	-5.28	-5.54	5.33	3.33	2.00	3.08	3.80



K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates Liquid fuel operation -	Project Ref. N°	IEI/KE/01/2021	 ISTROENERGO INTERNATIONAL, a.s.
		File Name	L_I_10_20210909	
		Revision date	September, 9th, 2021	

Table L.I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Power @ generator terminals	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[-]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
202	126 000	-9.03	-7.03	-2.00	-7.05	-7.38	6.23	4.23	2.00	3.48	4.32
203	127 000	-11.15	-9.15	-2.00	-8.81	-9.22	7.12	5.12	2.00	3.88	4.83
204	127 500	-12.21	-10.21	-2.00	-9.69	-10.14	7.57	5.57	2.00	4.08	5.09
205	128 000	-12.65	-10.65	-2.00	-10.06	-10.52	7.78	5.78	2.00	4.17	5.21
206	129 000	-13.54	-11.54	-2.00	-10.79	-11.28	8.21	6.21	2.00	4.34	5.45
207	130 000	-14.43	-12.43	-2.00	-11.52	-12.04	8.63	6.63	2.00	4.52	5.68
208	131 000	-14.88	-12.88	-2.00	-11.88	-12.42	8.86	6.86	2.00	4.62	5.81
209	132 000	-15.33	-13.33	-2.00	-12.25	-12.81	9.09	7.09	2.00	4.71	5.93
210	132 500	-15.55	-13.55	-2.00	-12.43	-13.00	9.20	7.20	2.00	4.76	6.00
211	133 000	-15.73	-13.73	-2.00	-12.58	-13.15	9.30	7.30	2.00	4.80	6.05
212	134 000	-16.10	-14.10	-2.00	-12.88	-13.47	9.50	7.50	2.00	4.88	6.16
213	135 000	-16.47	-14.47	-2.00	-13.18	-13.78	9.69	7.69	2.00	4.97	6.28
214	136 000	-16.88	-14.88	-2.00	-13.52	-14.13	9.92	7.92	2.00	5.05	6.39
215	137 000	-17.29	-15.29	-2.00	-13.85	-14.47	10.14	8.14	2.00	5.14	6.51
216	137 500	-17.50	-15.50	-2.00	-14.01	-14.65	10.25	8.25	2.00	5.19	6.57
217	137 501	-7.63	-5.63	-2.00	-5.90	-6.18	5.74	3.74	2.00	3.27	4.11
218	138 000	-8.66	-6.66	-2.00	-6.76	-7.08	6.19	4.19	2.00	3.46	4.37
219	139 000	-10.74	-8.74	-2.00	-8.48	-8.88	7.08	5.08	2.00	3.86	4.88
220	140 000	-12.81	-10.81	-2.00	-10.21	-10.68	7.96	5.96	2.00	4.26	5.38
221	141 000	-13.63	-11.63	-2.00	-10.87	-11.37	8.36	6.36	2.00	4.42	5.60
222	142 000	-14.45	-12.45	-2.00	-11.54	-12.07	8.76	6.76	2.00	4.59	5.81
223	142 500	-14.86	-12.86	-2.00	-11.88	-12.42	8.95	6.95	2.00	4.67	5.92
224	143 000	-15.08	-13.08	-2.00	-12.06	-12.61	9.07	7.07	2.00	4.71	5.98
225	144 000	-15.53	-13.53	-2.00	-12.42	-12.98	9.29	7.29	2.00	4.80	6.09
226	145 000	-15.98	-13.98	-2.00	-12.78	-13.36	9.52	7.52	2.00	4.89	6.21
227	146 000	-16.36	-14.36	-2.00	-13.08	-13.68	9.72	7.72	2.00	4.96	6.31
228	147 000	-16.73	-14.73	-2.00	-13.39	-13.99	9.91	7.91	2.00	5.04	6.41
229	147 500	-16.92	-14.92	-2.00	-13.54	-14.15	10.01	8.01	2.00	5.08	6.46
230	148 000	-17.16	-15.16	-2.00	-13.73	-14.36	10.14	8.14	2.00	5.13	6.53
231	149 000	-17.65	-15.65	-2.00	-14.13	-14.77	10.39	8.39	2.00	5.23	6.67
232	150 000	-18.13	-16.13	-2.00	-14.52	-15.18	10.65	8.65	2.00	5.34	6.80
233	150 001	-2.00	0.00	-2.00	-1.63	-1.71	2.00	0.00	2.00	1.08	1.70
234	151 000	-4.52	-2.52	-2.00	-3.64	-3.81	3.35	1.35	2.00	1.82	2.56
235	152 000	-7.04	-5.04	-2.00	-5.66	-5.92	4.69	2.69	2.00	2.56	3.43
236	152 500	-8.30	-6.30	-2.00	-6.67	-6.98	5.36	3.36	2.00	2.93	3.86
237	153 000	-9.07	-7.07	-2.00	-7.30	-7.64	5.71	3.71	2.00	3.09	4.06
238	154 000	-10.62	-8.62	-2.00	-8.56	-8.95	6.41	4.41	2.00	3.41	4.46
239	155 000	-12.16	-10.16	-2.00	-9.83	-10.27	7.12	5.12	2.00	3.73	4.86
240	156 000	-12.86	-10.86	-2.00	-10.40	-10.88	7.48	5.48	2.00	3.90	5.09
241	157 000	-13.57	-11.57	-2.00	-10.98	-11.48	7.85	5.85	2.00	4.08	5.31
242	157 500	-13.92	-11.92	-2.00	-11.27	-11.79	8.03	6.03	2.00	4.16	5.42
243	158 000	-14.13	-12.13	-2.00	-11.45	-11.97	8.14	6.14	2.00	4.22	5.49
244	159 000	-14.55	-12.55	-2.00	-11.79	-12.33	8.37	6.37	2.00	4.32	5.62
245	160 000	-14.97	-12.97	-2.00	-12.14	-12.69	8.60	6.60	2.00	4.43	5.76
246	161 000	-15.32	-13.32	-2.00	-12.42	-12.99	8.79	6.79	2.00	4.52	5.87
247	162 000	-15.67	-13.67	-2.00	-12.71	-13.28	8.99	6.99	2.00	4.61	5.99
248	162 500	-15.84	-13.84	-2.00	-12.85	-13.43	9.08	7.08	2.00	4.66	6.05
249	162 501	-5.81	-3.81	-2.00	-4.62	-4.84	4.71	2.71	2.00	2.78	3.64
250	163 000	-6.85	-4.85	-2.00	-5.47	-5.73	5.14	3.14	2.00	2.97	3.89
251	164 000	-8.93	-6.93	-2.00	-7.18	-7.52	6.01	4.01	2.00	3.35	4.38
252	165 000	-11.01	-9.01	-2.00	-8.89	-9.30	6.88	4.88	2.00	3.73	4.87
253	166 000	-12.08	-10.08	-2.00	-9.77	-10.22	7.37	5.37	2.00	3.95	5.14
254	167 000	-13.15	-11.15	-2.00	-10.65	-11.14	7.87	5.87	2.00	4.16	5.42
255	167 500	-13.69	-11.69	-2.00	-11.09	-11.60	8.12	6.12	2.00	4.27	5.56
256	168 000	-13.94	-11.94	-2.00	-11.29	-11.81	8.25	6.25	2.00	4.33	5.63
257	169 000	-14.45	-12.45	-2.00	-11.70	-12.23	8.51	6.51	2.00	4.44	5.77
258	170 000	-14.95	-12.95	-2.00	-12.11	-12.66	8.77	6.77	2.00	4.56	5.92
259	171 000	-15.32	-13.32	-2.00	-12.40	-12.96	8.96	6.96	2.00	4.64	6.01
260	172 000	-15.69	-13.69	-2.00	-12.69	-13.27	9.15	7.15	2.00	4.72	6.10
261	172 500	-15.88	-13.88	-2.00	-12.84	-13.42	9.25	7.25	2.00	4.76	6.15
262	173 000	-16.05	-14.05	-2.00	-12.97	-13.56	9.34	7.34	2.00	4.80	6.19
263	174 000	-16.39	-14.39	-2.00	-13.23	-13.83	9.53	7.53	2.00	4.88	6.28
264	175 000	-16.73	-14.73	-2.00	-13.50	-14.11	9.72	7.72	2.00	4.96	6.37
265	175 001	-6.91	-4.91	-2.00	-5.42	-5.68	5.33	3.33	2.00	3.08	3.96
266	176 000	-9.03	-7.03	-2.00	-7.17	-7.50	6.23	4.23	2.00	3.48	4.46



K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates - Liquid fuel operation -	Project Ref. N°	IEI/KE/01/2021	 ISTROENERGO INTERNATIONAL, a.s.
		File Name	L_I_10_20210909	
		Revision date	September, 9th, 2021	

Table L.I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Power @ generator terminals	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[-]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
267	177 000	-11.15	-9.15	-2.00	-8.91	-9.32	7.12	5.12	2.00	3.88	4.96
268	177 500	-12.21	-10.21	-2.00	-9.78	-10.23	7.57	5.57	2.00	4.08	5.20
269	178 000	-12.65	-10.65	-2.00	-10.14	-10.61	7.78	5.78	2.00	4.17	5.31
270	179 000	-13.54	-11.54	-2.00	-10.85	-11.35	8.21	6.21	2.00	4.34	5.53
271	180 000	-14.43	-12.43	-2.00	-11.57	-12.09	8.63	6.63	2.00	4.52	5.74
272	181 000	-14.88	-12.88	-2.00	-11.94	-12.48	8.86	6.86	2.00	4.62	5.88
273	182 000	-15.33	-13.33	-2.00	-12.31	-12.87	9.09	7.09	2.00	4.71	6.01
274	182 500	-15.55	-13.55	-2.00	-12.49	-13.06	9.20	7.20	2.00	4.76	6.08
275	183 000	-15.73	-13.73	-2.00	-12.65	-13.22	9.30	7.30	2.00	4.80	6.14
276	184 000	-16.10	-14.10	-2.00	-12.96	-13.55	9.50	7.50	2.00	4.88	6.26
277	185 000	-16.47	-14.47	-2.00	-13.26	-13.87	9.69	7.69	2.00	4.97	6.38
278	186 000	-16.88	-14.88	-2.00	-13.60	-14.22	9.92	7.92	2.00	5.05	6.51
279	187 000	-17.29	-15.29	-2.00	-13.94	-14.57	10.14	8.14	2.00	5.14	6.63
280	187 500	-17.50	-15.50	-2.00	-14.11	-14.75	10.25	8.25	2.00	5.19	6.69
281	187 501	-7.63	-5.63	-2.00	-6.00	-6.29	5.74	3.74	2.00	3.27	4.23
282	188 000	-8.66	-6.66	-2.00	-6.86	-7.19	6.19	4.19	2.00	3.46	4.49
283	189 000	-10.74	-8.74	-2.00	-8.59	-8.99	7.08	5.08	2.00	3.86	5.01
284	190 000	-12.81	-10.81	-2.00	-10.32	-10.79	7.96	5.96	2.00	4.26	5.52
285	191 000	-13.63	-11.63	-2.00	-10.99	-11.50	8.36	6.36	2.00	4.42	5.75
286	192 000	-14.45	-12.45	-2.00	-11.67	-12.20	8.76	6.76	2.00	4.59	5.97
287	192 500	-14.86	-12.86	-2.00	-12.00	-12.55	8.95	6.95	2.00	4.67	6.08
288	193 000	-15.08	-13.08	-2.00	-12.18	-12.74	9.07	7.07	2.00	4.71	6.14
289	194 000	-15.53	-13.53	-2.00	-12.55	-13.12	9.29	7.29	2.00	4.80	6.26
290	195 000	-15.98	-13.98	-2.00	-12.92	-13.50	9.52	7.52	2.00	4.89	6.39
291	196 000	-16.36	-14.36	-2.00	-13.22	-13.82	9.72	7.72	2.00	4.96	6.49
292	197 000	-16.73	-14.73	-2.00	-13.52	-14.14	9.91	7.91	2.00	5.04	6.59
293	197 500	-16.92	-14.92	-2.00	-13.68	-14.30	10.01	8.01	2.00	5.08	6.64
294	198 000	-17.16	-15.16	-2.00	-13.87	-14.50	10.14	8.14	2.00	5.13	6.71
295	199 000	-17.65	-15.65	-2.00	-14.27	-14.91	10.39	8.39	2.00	5.23	6.85
296	200 000	-18.13	-16.13	-2.00	-14.66	-15.33	10.65	8.65	2.00	5.34	6.99
297	200 001	-2.00	0.00	-2.00	-1.77	-1.85	2.00	0.00	2.00	1.08	1.85
298	201 000	-4.52	-2.52	-2.00	-3.78	-3.96	3.35	1.35	2.00	1.82	2.72
299	202 000	-7.04	-5.04	-2.00	-5.79	-6.06	4.69	2.69	2.00	2.56	3.59
300	202 500	-8.30	-6.30	-2.00	-6.80	-7.12	5.36	3.36	2.00	2.93	4.02
301	203 000	-9.07	-7.07	-2.00	-7.43	-7.78	5.71	3.71	2.00	3.09	4.22
302	204 000	-10.62	-8.62	-2.00	-8.70	-9.09	6.41	4.41	2.00	3.41	4.62
303	205 000	-12.16	-10.16	-2.00	-9.96	-10.41	7.12	5.12	2.00	3.73	5.03
304	206 000	-12.86	-10.86	-2.00	-10.53	-11.01	7.48	5.48	2.00	3.90	5.25
305	207 000	-13.57	-11.57	-2.00	-11.11	-11.62	7.85	5.85	2.00	4.08	5.46
306	207 500	-13.92	-11.92	-2.00	-11.40	-11.92	8.03	6.03	2.00	4.16	5.57
307	208 000	-14.13	-12.13	-2.00	-11.57	-12.10	8.14	6.14	2.00	4.22	5.64
308	209 000	-14.55	-12.55	-2.00	-11.92	-12.46	8.37	6.37	2.00	4.32	5.78
309	210 000	-14.97	-12.97	-2.00	-12.26	-12.81	8.60	6.60	2.00	4.43	5.91
310	211 000	-15.32	-13.32	-2.00	-12.54	-13.11	8.79	6.79	2.00	4.52	6.03
311	212 000	-15.67	-13.67	-2.00	-12.83	-13.41	8.99	6.99	2.00	4.61	6.14
312	212 500	-15.84	-13.84	-2.00	-12.97	-13.55	9.08	7.08	2.00	4.66	6.20
313	212 501	-5.81	-3.81	-2.00	-4.74	-4.97	4.71	2.71	2.00	2.78	3.78
314	213 000	-6.85	-4.85	-2.00	-5.59	-5.86	5.14	3.14	2.00	2.97	4.03
315	214 000	-8.93	-6.93	-2.00	-7.30	-7.64	6.01	4.01	2.00	3.35	4.52
316	215 000	-11.01	-9.01	-2.00	-9.01	-9.43	6.88	4.88	2.00	3.73	5.01
317	216 000	-12.08	-10.08	-2.00	-9.89	-10.35	7.37	5.37	2.00	3.95	5.29
318	217 000	-13.15	-11.15	-2.00	-10.77	-11.26	7.87	5.87	2.00	4.16	5.57
319	217 500	-13.69	-11.69	-2.00	-11.21	-11.72	8.12	6.12	2.00	4.27	5.71
320	218 000	-13.94	-11.94	-2.00	-11.42	-11.94	8.25	6.25	2.00	4.33	5.78
321	219 000	-14.45	-12.45	-2.00	-11.82	-12.36	8.51	6.51	2.00	4.44	5.93
322	220 000	-14.95	-12.95	-2.00	-12.23	-12.79	8.77	6.77	2.00	4.56	6.07
323	221 000	-15.32	-13.32	-2.00	-12.53	-13.10	8.96	6.96	2.00	4.64	6.18
324	222 000	-15.69	-13.69	-2.00	-12.84	-13.42	9.15	7.15	2.00	4.72	6.29
325	222 500	-15.88	-13.88	-2.00	-12.99	-13.58	9.25	7.25	2.00	4.76	6.34
326	223 000	-16.05	-14.05	-2.00	-13.13	-13.72	9.34	7.34	2.00	4.80	6.39
327	224 000	-16.39	-14.39	-2.00	-13.40	-14.01	9.53	7.53	2.00	4.88	6.49
328	225 000	-16.73	-14.73	-2.00	-13.68	-14.29	9.72	7.72	2.00	4.96	6.60
329	225 001	-6.91	-4.91	-2.00	-5.60	-5.87	5.33	3.33	2.00	3.08	4.17



K-Electric Limited 248 MW Combined Cycle Power Plant Korangi Creek, Karachi Pakistan	Document Name Plant performance degradation rates - Liquid fuel operation -	Project Ref. N°	IEI/KE/01/2021	IEI ISTROENERGO INTERNATIONAL, a.s.
		File Name	L_I_10_20210909	
		Revision date	September, 9th, 2021	

Table L.I.10.: Plant performance degradation rates

Calculation number	Actual fired hours	Power output degradation					Heat rate degradation				
		Gas turbine			Combined cycle plant		Gas turbine			Combined cycle plant	
		Power @ generator terminals	Recoverable degradation of Power	Non-recoverable degradation of Power	GROSS power degradation	NET power degradation	Heat rate	Recoverable degradation of Heat rate	Non-recoverable degradation of Heat rate	GROSS heat rate degradation	NET heat rate degradation
[-]	[hrs]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]	[%]
330	226 000	-9.03	-7.03	-2.00	-7.35	-7.70	6.23	4.23	2.00	3.48	4.68
331	227 000	-11.15	-9.15	-2.00	-9.11	-9.53	7.12	5.12	2.00	3.88	5.19
332	227 500	-12.21	-10.21	-2.00	-9.99	-10.44	7.57	5.57	2.00	4.08	5.45
333	228 000	-12.65	-10.65	-2.00	-10.35	-10.82	7.78	5.78	2.00	4.17	5.57
334	229 000	-13.54	-11.54	-2.00	-11.07	-11.57	8.21	6.21	2.00	4.34	5.79
335	230 000	-14.43	-12.43	-2.00	-11.79	-12.33	8.63	6.63	2.00	4.52	6.02
336	231 000	-14.88	-12.88	-2.00	-12.14	-12.69	8.86	6.86	2.00	4.62	6.13
337	232 000	-15.33	-13.33	-2.00	-12.49	-13.06	9.09	7.09	2.00	4.71	6.25
338	232 500	-15.55	-13.55	-2.00	-12.67	-13.24	9.20	7.20	2.00	4.76	6.30
339	233 000	-15.73	-13.73	-2.00	-12.81	-13.39	9.30	7.30	2.00	4.80	6.35
340	234 000	-16.10	-14.10	-2.00	-13.10	-13.70	9.50	7.50	2.00	4.88	6.45
341	235 000	-16.47	-14.47	-2.00	-13.39	-14.00	9.69	7.69	2.00	4.97	6.54
342	236 000	-16.88	-14.88	-2.00	-13.71	-14.34	9.92	7.92	2.00	5.05	6.65
343	237 000	-17.29	-15.29	-2.00	-14.04	-14.67	10.14	8.14	2.00	5.14	6.76
344	237 500	-17.50	-15.50	-2.00	-14.20	-14.84	10.25	8.25	2.00	5.19	6.81
345	237 501	-7.63	-5.63	-2.00	-6.09	-6.38	5.74	3.74	2.00	3.27	4.33
346	238 000	-8.66	-6.66	-2.00	-6.95	-7.27	6.19	4.19	2.00	3.46	4.58
347	239 000	-10.74	-8.74	-2.00	-8.66	-9.06	7.08	5.08	2.00	3.86	5.09
348	240 000	-12.81	-10.81	-2.00	-10.37	-10.85	7.96	5.96	2.00	4.26	5.59

Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - Gas Operations

Net Heat Rate Degradation Factor - HHV (Gas)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Tested	Revised		Tested	Revised	
FY-19 (Test)	32.20%	32.20%	1.0000	41.72%	41.72%	1.0000
FY-23 (end)	32.20%	31.59%	1.0193	41.72%	41.10%	1.0152
+500	32.20%	31.57%	1.0198	41.72%	41.08%	1.0156
+1000	32.20%	31.56%	1.0202	41.72%	41.06%	1.0160
+1500	32.20%	31.54%	1.0207	41.72%	41.05%	1.0164
+2000	32.20%	31.53%	1.0212	41.72%	41.03%	1.0168
+2500	32.20%	31.51%	1.0217	41.72%	41.01%	1.0173
+3000	32.20%	31.50%	1.0222	41.72%	41.00%	1.0177
+3500	32.20%	32.61%	0.9874	41.72%	41.29%	1.0105
+4000	32.20%	32.51%	0.9905	41.72%	41.28%	1.0108
+4500	32.20%	32.41%	0.9935	41.72%	41.27%	1.0111
+5000	32.20%	32.31%	0.9966	41.72%	41.25%	1.0113
+5500	32.20%	32.21%	0.9996	41.72%	41.24%	1.0116
+6000	32.20%	32.11%	1.0027	41.72%	41.23%	1.0119
+6500	32.20%	32.01%	1.0057	41.72%	41.22%	1.0122
+7000	32.20%	31.92%	1.0088	41.72%	41.21%	1.0124
+7500	32.20%	31.82%	1.0118	41.72%	41.20%	1.0127
+8000	32.20%	31.72%	1.0149	41.72%	41.19%	1.0130
+8500	32.20%	31.69%	1.0161	41.72%	41.18%	1.0133
+9000	32.20%	31.67%	1.0165	41.72%	41.16%	1.0136
+9500	32.20%	31.66%	1.0169	41.72%	41.15%	1.0139
+10000	32.20%	31.65%	1.0173	41.72%	41.14%	1.0142
+10500	32.20%	31.64%	1.0177	41.72%	41.13%	1.0145
+11000	32.20%	31.63%	1.0180	41.72%	41.11%	1.0148
+11500	32.20%	31.61%	1.0184	41.72%	41.10%	1.0151
+12000	32.20%	31.60%	1.0188	41.72%	41.09%	1.0154
+12500	32.20%	31.59%	1.0192	41.72%	41.08%	1.0157
+13000	32.20%	31.58%	1.0196	41.72%	41.07%	1.0160
+13500	32.20%	31.57%	1.0199	41.72%	41.06%	1.0162
+14000	32.20%	31.56%	1.0202	41.72%	41.05%	1.0165
+14500	32.20%	31.55%	1.0205	41.72%	41.04%	1.0167
+15000	32.20%	31.54%	1.0208	41.72%	41.03%	1.0170
+15500	32.20%	31.53%	1.0212	41.72%	41.02%	1.0172
+16000	32.20%	31.52%	1.0215	41.72%	41.01%	1.0175
+16500	32.20%	31.51%	1.0218	41.72%	41.00%	1.0177
+17000	32.20%	31.50%	1.0221	41.72%	40.98%	1.0180
+17500	32.20%	31.49%	1.0224	41.72%	40.97%	1.0182
+18000	32.20%	31.48%	1.0227	41.72%	40.96%	1.0185
+18500	32.20%	31.47%	1.0230	41.72%	40.96%	1.0187



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - Gas Operations

Net Heat Rate Degradation Factor - HHV (Gas)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Tested	Revised		Tested	Revised	
+19000	32.20%	31.47%	1.0232	41.72%	40.95%	1.0189
+19500	32.20%	31.46%	1.0234	41.72%	40.94%	1.0191
+20000	32.20%	31.45%	1.0236	41.72%	40.93%	1.0193
+20500	32.20%	31.45%	1.0239	41.72%	40.93%	1.0195
+21000	32.20%	31.44%	1.0241	41.72%	40.92%	1.0196
+21500	32.20%	31.43%	1.0243	41.72%	40.91%	1.0198
+22000	32.20%	31.43%	1.0245	41.72%	40.90%	1.0200
+22500	32.20%	31.42%	1.0248	41.72%	40.90%	1.0202
+23000	32.20%	31.41%	1.0250	41.72%	40.89%	1.0204
+23500	32.20%	31.41%	1.0252	41.72%	40.88%	1.0206
+24000	32.20%	31.40%	1.0254	41.72%	40.87%	1.0208
+24500	32.20%	31.39%	1.0256	41.72%	40.87%	1.0209
+25000	32.20%	31.39%	1.0258	41.72%	40.86%	1.0211
+25500	32.20%	31.38%	1.0261	41.72%	40.85%	1.0213
+26000	32.20%	31.37%	1.0263	41.72%	40.85%	1.0215
+26500	32.20%	31.37%	1.0265	41.72%	40.84%	1.0216
+27000	32.20%	31.36%	1.0267	41.72%	40.83%	1.0218
+27500	32.20%	31.35%	1.0269	41.72%	40.82%	1.0220
+28000	32.20%	31.35%	1.0271	41.72%	40.82%	1.0222
+28500	32.20%	32.65%	0.9861	41.72%	42.01%	0.9931
+29000	32.20%	32.62%	0.9872	41.72%	41.98%	0.9939
+29500	32.20%	32.58%	0.9882	41.72%	41.95%	0.9946
+30000	32.20%	32.54%	0.9893	41.72%	41.92%	0.9953
+30500	32.20%	32.51%	0.9904	41.72%	41.89%	0.9961
+31000	32.20%	32.47%	0.9915	41.72%	41.86%	0.9968
+31500	32.20%	32.44%	0.9925	41.72%	41.83%	0.9975
+32000	32.20%	32.40%	0.9936	41.72%	41.79%	0.9983
+32500	32.20%	32.37%	0.9947	41.72%	41.76%	0.9990
+33000	32.20%	32.33%	0.9957	41.72%	41.73%	0.9997
+33500	32.20%	32.30%	0.9967	41.72%	41.71%	1.0004
+34000	32.20%	32.28%	0.9975	41.72%	41.68%	1.0010
+34500	32.20%	32.25%	0.9984	41.72%	41.65%	1.0016
+35000	32.20%	32.22%	0.9992	41.72%	41.63%	1.0023
+35500	32.20%	32.19%	1.0001	41.72%	41.60%	1.0029
+36000	32.20%	32.17%	1.0009	41.72%	41.58%	1.0035
+36500	32.20%	32.14%	1.0018	41.72%	41.55%	1.0041
+37000	32.20%	32.11%	1.0026	41.72%	41.52%	1.0048
+37500	32.20%	32.09%	1.0035	41.72%	41.50%	1.0054
+38000	32.20%	32.06%	1.0043	41.72%	41.47%	1.0060
+38500	32.20%	32.03%	1.0051	41.72%	41.45%	1.0065



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - Gas Operations

Net Heat Rate Degradation Factor - HHV (Gas)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Tested	Revised		Tested	Revised	
+39000	32.20%	32.01%	1.0058	41.72%	41.44%	1.0069
+39500	32.20%	31.99%	1.0065	41.72%	41.42%	1.0073
+40000	32.20%	31.97%	1.0072	41.72%	41.40%	1.0077
+40500	32.20%	31.94%	1.0079	41.72%	41.39%	1.0081
+41000	32.20%	31.92%	1.0086	41.72%	41.37%	1.0085
+41500	32.20%	31.90%	1.0093	41.72%	41.35%	1.0089
+42000	32.20%	31.88%	1.0100	41.72%	41.34%	1.0093
+42500	32.20%	31.86%	1.0107	41.72%	41.32%	1.0098
+43000	32.20%	31.83%	1.0114	41.72%	41.30%	1.0102
+43500	32.20%	31.81%	1.0120	41.72%	41.29%	1.0105
+44000	32.20%	31.80%	1.0126	41.72%	41.27%	1.0108
+44500	32.20%	31.78%	1.0132	41.72%	41.26%	1.0112
+45000	32.20%	31.76%	1.0138	41.72%	41.25%	1.0115
+45500	32.20%	31.74%	1.0144	41.72%	41.23%	1.0118
+46000	32.20%	31.72%	1.0149	41.72%	41.22%	1.0121
+46500	32.20%	31.70%	1.0155	41.72%	41.21%	1.0125
+47000	32.20%	31.69%	1.0161	41.72%	41.19%	1.0128
+47500	32.20%	31.67%	1.0167	41.72%	41.18%	1.0131
+48000	32.20%	31.65%	1.0173	41.72%	41.17%	1.0135
+48500	32.20%	31.63%	1.0178	41.72%	41.15%	1.0139
+49000	32.20%	31.62%	1.0183	41.72%	41.13%	1.0143
+49500	32.20%	31.60%	1.0188	41.72%	41.12%	1.0147
+50000	32.20%	31.59%	1.0193	41.72%	41.10%	1.0152
+50500	32.20%	31.57%	1.0198	41.72%	41.08%	1.0156
+51000	32.20%	31.56%	1.0202	41.72%	41.06%	1.0161
+51500	32.20%	31.54%	1.0207	41.72%	41.04%	1.0165
+52000	32.20%	31.53%	1.0212	41.72%	41.03%	1.0170
+52500	32.20%	31.51%	1.0217	41.72%	41.01%	1.0174
+53000	32.20%	31.50%	1.0222	41.72%	40.99%	1.0178
+53500	32.20%	32.61%	0.9874	41.72%	41.28%	1.0107
+54000	32.20%	32.51%	0.9905	41.72%	41.27%	1.0110
+54500	32.20%	32.41%	0.9935	41.72%	41.25%	1.0113
+55000	32.20%	32.31%	0.9966	41.72%	41.24%	1.0116
+55500	32.20%	32.21%	0.9996	41.72%	41.23%	1.0119
+56000	32.20%	32.11%	1.0027	41.72%	41.22%	1.0123
+56500	32.20%	32.01%	1.0057	41.72%	41.20%	1.0126
+57000	32.20%	31.92%	1.0088	41.72%	41.19%	1.0129
+57500	32.20%	31.82%	1.0118	41.72%	41.18%	1.0132
+58000	32.20%	31.72%	1.0149	41.72%	41.17%	1.0135
+58500	32.20%	31.69%	1.0161	41.72%	41.15%	1.0138



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - Gas Operations

Net Heat Rate Degradation Factor - HHV (Gas)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Tested	Revised		Tested	Revised	
+59000	32.20%	31.67%	1.0165	41.72%	41.14%	1.0141
+59500	32.20%	31.66%	1.0169	41.72%	41.13%	1.0144
+60000	32.20%	31.65%	1.0173	41.72%	41.12%	1.0147
+60500	32.20%	31.64%	1.0177	41.72%	41.10%	1.0150
+61000	32.20%	31.63%	1.0180	41.72%	41.09%	1.0153
+61500	32.20%	31.61%	1.0184	41.72%	41.08%	1.0156
+62000	32.20%	31.60%	1.0188	41.72%	41.07%	1.0159
+62500	32.20%	31.59%	1.0192	41.72%	41.06%	1.0162
+63000	32.20%	31.58%	1.0196	41.72%	41.04%	1.0166
+63500	32.20%	31.57%	1.0199	41.72%	41.03%	1.0168
+64000	32.20%	31.56%	1.0202	41.72%	41.02%	1.0171
+64500	32.20%	31.55%	1.0205	41.72%	41.01%	1.0173
+65000	32.20%	31.54%	1.0208	41.72%	41.00%	1.0176
+65500	32.20%	31.53%	1.0212	41.72%	40.99%	1.0178
+66000	32.20%	31.52%	1.0215	41.72%	40.98%	1.0181
+66500	32.20%	31.51%	1.0218	41.72%	40.97%	1.0184
+67000	32.20%	31.50%	1.0221	41.72%	40.96%	1.0186
+67500	32.20%	31.49%	1.0224	41.72%	40.95%	1.0189
+68000	32.20%	31.48%	1.0227	41.72%	40.94%	1.0191
+68500	32.20%	31.47%	1.0230	41.72%	40.93%	1.0193
+69000	32.20%	31.47%	1.0232	41.72%	40.92%	1.0195
+69500	32.20%	31.46%	1.0234	41.72%	40.92%	1.0197
+70000	32.20%	31.45%	1.0236	41.72%	40.91%	1.0199
+70500	32.20%	31.45%	1.0239	41.72%	40.90%	1.0201
+71000	32.20%	31.44%	1.0241	41.72%	40.89%	1.0203
+71500	32.20%	31.43%	1.0243	41.72%	40.88%	1.0205
+72000	32.20%	31.43%	1.0245	41.72%	40.88%	1.0207
+72500	32.20%	31.42%	1.0248	41.72%	40.87%	1.0209
+73000	32.20%	31.41%	1.0250	41.72%	40.86%	1.0211
+73500	32.20%	31.41%	1.0252	41.72%	40.85%	1.0212
+74000	32.20%	31.40%	1.0254	41.72%	40.85%	1.0214
+74500	32.20%	31.39%	1.0256	41.72%	40.84%	1.0216
+75000	32.20%	31.39%	1.0258	41.72%	40.83%	1.0218
+75500	32.20%	31.38%	1.0261	41.72%	40.82%	1.0220
+76000	32.20%	31.37%	1.0263	41.72%	40.82%	1.0222
+76500	32.20%	31.37%	1.0265	41.72%	40.81%	1.0223
+77000	32.20%	31.36%	1.0267	41.72%	40.80%	1.0225
+77500	32.20%	31.35%	1.0269	41.72%	40.80%	1.0227
+78000	32.20%	31.35%	1.0271	41.72%	40.79%	1.0229
+78500	32.20%	32.65%	0.9861	41.72%	41.98%	0.9938



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - Gas Operations

Net Heat Rate Degradation Factor - HHV (Gas)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Tested	Revised		Tested	Revised	
+79000	32.20%	32.62%	0.9872	41.72%	41.95%	0.9945
+79500	32.20%	32.58%	0.9882	41.72%	41.92%	0.9953
+80000	32.20%	32.54%	0.9893	41.72%	41.89%	0.9960
+80500	32.20%	32.51%	0.9904	41.72%	41.86%	0.9967
+81000	32.20%	32.47%	0.9915	41.72%	41.83%	0.9975
+81500	32.20%	32.44%	0.9925	41.72%	41.80%	0.9982
+82000	32.20%	32.40%	0.9936	41.72%	41.77%	0.9990
+82500	32.20%	32.37%	0.9947	41.72%	41.73%	0.9997
+83000	32.20%	32.33%	0.9957	41.72%	41.70%	1.0005
+83500	32.20%	32.30%	0.9967	41.72%	41.68%	1.0011
+84000	32.20%	32.28%	0.9975	41.72%	41.65%	1.0018
+84500	32.20%	32.25%	0.9984	41.72%	41.62%	1.0024
+85000	32.20%	32.22%	0.9992	41.72%	41.60%	1.0030
+85500	32.20%	32.19%	1.0001	41.72%	41.57%	1.0037
+86000	32.20%	32.17%	1.0009	41.72%	41.54%	1.0043
+86500	32.20%	32.14%	1.0018	41.72%	41.52%	1.0050
+87000	32.20%	32.11%	1.0026	41.72%	41.49%	1.0056
+87500	32.20%	32.09%	1.0035	41.72%	41.46%	1.0062
+88000	32.20%	32.06%	1.0043	41.72%	41.44%	1.0069
+88500	32.20%	32.03%	1.0051	41.72%	41.41%	1.0075
+89000	32.20%	32.01%	1.0058	41.72%	41.39%	1.0080
+89500	32.20%	31.99%	1.0065	41.72%	41.37%	1.0085
+90000	32.20%	31.97%	1.0072	41.72%	41.35%	1.0090
+90500	32.20%	31.94%	1.0079	41.72%	41.33%	1.0096
+91000	32.20%	31.92%	1.0086	41.72%	41.31%	1.0101
+91500	32.20%	31.90%	1.0093	41.72%	41.28%	1.0106
+92000	32.20%	31.88%	1.0100	41.72%	41.26%	1.0111
+92500	32.20%	31.86%	1.0107	41.72%	41.24%	1.0117
+93000	32.20%	31.83%	1.0114	41.72%	41.22%	1.0122
+93500	32.20%	31.81%	1.0120	41.72%	41.20%	1.0127
+94000	32.20%	31.80%	1.0126	41.72%	41.18%	1.0131
+94500	32.20%	31.78%	1.0132	41.72%	41.16%	1.0136
+95000	32.20%	31.76%	1.0138	41.72%	41.15%	1.0140
+95500	32.20%	31.74%	1.0144	41.72%	41.13%	1.0145
+96000	32.20%	31.72%	1.0149	41.72%	41.11%	1.0149
+96500	32.20%	31.70%	1.0155	41.72%	41.09%	1.0153
+97000	32.20%	31.69%	1.0161	41.72%	41.07%	1.0158
+97500	32.20%	31.67%	1.0167	41.72%	41.06%	1.0162
+98000	32.20%	31.65%	1.0173	41.72%	41.04%	1.0167
+98500	32.20%	31.63%	1.0178	41.72%	41.02%	1.0170



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - Gas Operations

Net Heat Rate Degradation Factor - HHV (Gas)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Tested	Revised		Tested	Revised	
+99000	32.20%	31.62%	1.0183	41.72%	41.01%	1.0173
+99500	32.20%	31.60%	1.0188	41.72%	41.00%	1.0176
+100000	32.20%	31.59%	1.0193	41.72%	40.99%	1.0179
+100500	32.20%	31.57%	1.0198	41.72%	40.98%	1.0182
+101000	32.20%	31.56%	1.0202	41.72%	40.96%	1.0185
+101500	32.20%	31.54%	1.0207	41.72%	40.95%	1.0188
+102000	32.20%	31.53%	1.0212	41.72%	40.94%	1.0191
+102500	32.20%	31.51%	1.0217	41.72%	40.93%	1.0194
+103000	32.20%	31.50%	1.0222	41.72%	40.92%	1.0197
+103500	32.20%	32.61%	0.9874	41.72%	41.21%	1.0124
+104000	32.20%	32.51%	0.9905	41.72%	41.20%	1.0126
+104500	32.20%	32.41%	0.9935	41.72%	41.20%	1.0128
+105000	32.20%	32.31%	0.9966	41.72%	41.19%	1.0129
+105500	32.20%	32.21%	0.9996	41.72%	41.18%	1.0131
+106000	32.20%	32.11%	1.0027	41.72%	41.17%	1.0133
+106500	32.20%	32.01%	1.0057	41.72%	41.17%	1.0135
+107000	32.20%	31.92%	1.0088	41.72%	41.16%	1.0137
+107500	32.20%	31.82%	1.0118	41.72%	41.15%	1.0139
+108000	32.20%	31.72%	1.0149	41.72%	41.14%	1.0141
+108500	32.20%	31.69%	1.0161	41.72%	41.13%	1.0144
+109000	32.20%	31.67%	1.0165	41.72%	41.12%	1.0148
+109500	32.20%	31.66%	1.0169	41.72%	41.10%	1.0151
+110000	32.20%	31.65%	1.0173	41.72%	41.09%	1.0155
+110500	32.20%	31.64%	1.0177	41.72%	41.07%	1.0158
+111000	32.20%	31.63%	1.0180	41.72%	41.06%	1.0162
+111500	32.20%	31.61%	1.0184	41.72%	41.04%	1.0165
+112000	32.20%	31.60%	1.0188	41.72%	41.03%	1.0169
+112500	32.20%	31.59%	1.0192	41.72%	41.02%	1.0172
+113000	32.20%	31.58%	1.0196	41.72%	41.00%	1.0176
+113500	32.20%	31.57%	1.0199	41.72%	40.99%	1.0179
+114000	32.20%	31.56%	1.0202	41.72%	40.98%	1.0182
+114500	32.20%	31.55%	1.0205	41.72%	40.96%	1.0185
+115000	32.20%	31.54%	1.0208	41.72%	40.95%	1.0188
+115500	32.20%	31.53%	1.0212	41.72%	40.94%	1.0191
+116000	32.20%	31.52%	1.0215	41.72%	40.93%	1.0194
+116500	32.20%	31.51%	1.0218	41.72%	40.92%	1.0197
+117000	32.20%	31.50%	1.0221	41.72%	40.91%	1.0200
+117500	32.20%	31.49%	1.0224	41.72%	40.89%	1.0203
+118000	32.20%	31.48%	1.0227	41.72%	40.88%	1.0206
+118500	32.20%	31.47%	1.0230	41.72%	40.87%	1.0208



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - Gas Operations

Net Heat Rate Degradation Factor - HHV (Gas)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Tested	Revised		Tested	Revised	
+119000	32.20%	31.47%	1.0232	41.72%	40.86%	1.0210
+119500	32.20%	31.46%	1.0234	41.72%	40.85%	1.0213
+120000	32.20%	31.45%	1.0236	41.72%	40.84%	1.0215
+120500	32.20%	31.45%	1.0239	41.72%	40.84%	1.0217
+121000	32.20%	31.44%	1.0241	41.72%	40.83%	1.0219
+121500	32.20%	31.43%	1.0243	41.72%	40.82%	1.0221
+122000	32.20%	31.43%	1.0245	41.72%	40.81%	1.0224
+122500	32.20%	31.42%	1.0248	41.72%	40.80%	1.0226
+123000	32.20%	31.41%	1.0250	41.72%	40.79%	1.0228
+123500	32.20%	31.41%	1.0252	41.72%	40.78%	1.0230
+124000	32.20%	31.40%	1.0254	41.72%	40.78%	1.0232
+124500	32.20%	31.39%	1.0256	41.72%	40.77%	1.0234
+125000	32.20%	31.39%	1.0258	41.72%	40.76%	1.0236
+125500	32.20%	31.38%	1.0261	41.72%	40.75%	1.0238
+126000	32.20%	31.37%	1.0263	41.72%	40.75%	1.0240
+126500	32.20%	31.37%	1.0265	41.72%	40.74%	1.0242
+127000	32.20%	31.36%	1.0267	41.72%	40.73%	1.0243
+127500	32.20%	31.35%	1.0269	41.72%	40.72%	1.0245
+128000	32.20%	31.35%	1.0271	41.72%	40.72%	1.0247
+128500	32.20%	32.65%	0.9861	41.72%	41.91%	0.9954
+129000	32.20%	32.62%	0.9872	41.72%	41.88%	0.9962
+129500	32.20%	32.58%	0.9882	41.72%	41.85%	0.9969
+130000	32.20%	32.54%	0.9893	41.72%	41.82%	0.9976
+130500	32.20%	32.51%	0.9904	41.72%	41.79%	0.9984
+131000	32.20%	32.47%	0.9915	41.72%	41.76%	0.9991
+131500	32.20%	32.44%	0.9925	41.72%	41.73%	0.9998
+132000	32.20%	32.40%	0.9936	41.72%	41.70%	1.0006
+132500	32.20%	32.37%	0.9947	41.72%	41.67%	1.0013
+133000	32.20%	32.33%	0.9957	41.72%	41.64%	1.0021
+133500	32.20%	32.30%	0.9967	41.72%	41.61%	1.0027
+134000	32.20%	32.28%	0.9975	41.72%	41.58%	1.0034
+134500	32.20%	32.25%	0.9984	41.72%	41.56%	1.0040
+135000	32.20%	32.22%	0.9992	41.72%	41.53%	1.0046
+135500	32.20%	32.19%	1.0001	41.72%	41.50%	1.0052
+136000	32.20%	32.17%	1.0009	41.72%	41.48%	1.0059
+136500	32.20%	32.14%	1.0018	41.72%	41.45%	1.0065
+137000	32.20%	32.11%	1.0026	41.72%	41.43%	1.0071
+137500	32.20%	32.09%	1.0035	41.72%	41.40%	1.0078
+138000	32.20%	32.06%	1.0043	41.72%	41.38%	1.0084
+138500	32.20%	32.03%	1.0051	41.72%	41.35%	1.0089



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - Gas Operations

Net Heat Rate Degradation Factor - HHV (Gas)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Tested	Revised		Tested	Revised	
+139000	32.20%	32.01%	1.0058	41.72%	41.33%	1.0095
+139500	32.20%	31.99%	1.0065	41.72%	41.31%	1.0100
+140000	32.20%	31.97%	1.0072	41.72%	41.29%	1.0105

FY 19 : As per 3rd Party Heat Rate Test on Gas Fuel

FY 23 : As per actual operating hours. Operating hours at end of FY23 : 71,836 hours



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - Gas Operations

Net Output Degradation Factor - CC (Gas)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
FY-19 (Test)	220.83	220.83	1.0000
FY-23 (end)	220.83	212.32	1.0401
+500	220.83	212.14	1.0410
+1000	220.83	211.96	1.0419
+1500	220.83	211.78	1.0427
+2000	220.83	211.60	1.0436
+2500	220.83	211.41	1.0445
+3000	220.83	211.23	1.0454
+3500	220.83	218.46	1.0109
+4000	220.83	218.14	1.0123
+4500	220.83	217.82	1.0138
+5000	220.83	217.51	1.0153
+5500	220.83	217.20	1.0167
+6000	220.83	216.88	1.0182
+6500	220.83	216.57	1.0197
+7000	220.83	216.26	1.0211
+7500	220.83	215.95	1.0226
+8000	220.83	215.64	1.0241
+8500	220.83	215.40	1.0252
+9000	220.83	215.19	1.0262
+9500	220.83	214.98	1.0272
+10000	220.83	214.77	1.0282
+10500	220.83	214.56	1.0292
+11000	220.83	214.35	1.0302
+11500	220.83	214.14	1.0312
+12000	220.83	213.93	1.0322
+12500	220.83	213.72	1.0332
+13000	220.83	213.52	1.0342
+13500	220.83	213.34	1.0351
+14000	220.83	213.18	1.0359
+14500	220.83	213.02	1.0367
+15000	220.83	212.86	1.0374
+15500	220.83	212.70	1.0382
+16000	220.83	212.54	1.0390
+16500	220.83	212.38	1.0398
+17000	220.83	212.22	1.0406
+17500	220.83	212.06	1.0414
+18000	220.83	211.90	1.0421
+18500	220.83	211.77	1.0428
+19000	220.83	211.65	1.0433
+19500	220.83	211.54	1.0439
+20000	220.83	211.42	1.0445
+20500	220.83	211.31	1.0451
+21000	220.83	211.19	1.0456
+21500	220.83	211.08	1.0462
+22000	220.83	210.96	1.0468
+22500	220.83	210.85	1.0473

Net Output Degradation Factor - OC (Gas)		
Tested Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
170.70	170.70	1.0000
170.70	163.56	1.0437
170.70	163.41	1.0446
170.70	163.26	1.0456
170.70	163.11	1.0465
170.70	162.96	1.0475
170.70	162.81	1.0484
170.70	162.66	1.0494
170.70	175.10	0.9749
170.70	174.10	0.9805
170.70	173.11	0.9861
170.70	172.13	0.9917
170.70	171.17	0.9973
170.70	170.21	1.0029
170.70	169.27	1.0085
170.70	168.33	1.0140
170.70	167.41	1.0196
170.70	166.49	1.0252
170.70	166.08	1.0278
170.70	165.91	1.0289
170.70	165.73	1.0299
170.70	165.56	1.0310
170.70	165.39	1.0321
170.70	165.22	1.0332
170.70	165.05	1.0342
170.70	164.88	1.0353
170.70	164.71	1.0364
170.70	164.54	1.0374
170.70	164.39	1.0384
170.70	164.26	1.0392
170.70	164.13	1.0400
170.70	164.00	1.0409
170.70	163.87	1.0417
170.70	163.73	1.0425
170.70	163.60	1.0434
170.70	163.47	1.0442
170.70	163.34	1.0450
170.70	163.21	1.0459
170.70	163.11	1.0465
170.70	163.02	1.0471
170.70	162.92	1.0477
170.70	162.83	1.0483
170.70	162.74	1.0489
170.70	162.65	1.0495
170.70	162.55	1.0501
170.70	162.46	1.0507
170.70	162.37	1.0513



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - Gas Operations

Net Output Degradation Factor - CC (Gas)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
+23000	220.83	210.73	1.0479
+23500	220.83	210.62	1.0485
+24000	220.83	210.51	1.0490
+24500	220.83	210.39	1.0496
+25000	220.83	210.28	1.0502
+25500	220.83	210.16	1.0507
+26000	220.83	210.05	1.0513
+26500	220.83	209.94	1.0519
+27000	220.83	209.82	1.0525
+27500	220.83	209.71	1.0530
+28000	220.83	209.59	1.0536
+28500	220.83	225.49	0.9793
+29000	220.83	225.14	0.9809
+29500	220.83	224.78	0.9824
+30000	220.83	224.42	0.9840
+30500	220.83	224.06	0.9856
+31000	220.83	223.71	0.9871
+31500	220.83	223.36	0.9887
+32000	220.83	223.00	0.9902
+32500	220.83	222.65	0.9918
+33000	220.83	222.30	0.9934
+33500	220.83	221.90	0.9952
+34000	220.83	221.47	0.9971
+34500	220.83	221.04	0.9990
+35000	220.83	220.62	1.0010
+35500	220.83	220.19	1.0029
+36000	220.83	219.77	1.0048
+36500	220.83	219.35	1.0067
+37000	220.83	218.93	1.0087
+37500	220.83	218.52	1.0106
+38000	220.83	218.10	1.0125
+38500	220.83	217.78	1.0140
+39000	220.83	217.51	1.0153
+39500	220.83	217.23	1.0165
+40000	220.83	216.96	1.0178
+40500	220.83	216.69	1.0191
+41000	220.83	216.42	1.0204
+41500	220.83	216.15	1.0216
+42000	220.83	215.88	1.0229
+42500	220.83	215.61	1.0242
+43000	220.83	215.35	1.0255
+43500	220.83	215.11	1.0266
+44000	220.83	214.88	1.0277
+44500	220.83	214.65	1.0288
+45000	220.83	214.43	1.0298
+45500	220.83	214.20	1.0309
+46000	220.83	213.98	1.0320
+46500	220.83	213.75	1.0331

Net Output Degradation Factor - OC (Gas)		
Tested Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
170.70	162.28	1.0519
170.70	162.19	1.0525
170.70	162.10	1.0531
170.70	162.00	1.0537
170.70	161.91	1.0543
170.70	161.82	1.0549
170.70	161.73	1.0554
170.70	161.64	1.0560
170.70	161.55	1.0566
170.70	161.46	1.0572
170.70	161.36	1.0578
170.70	175.54	0.9724
170.70	175.20	0.9743
170.70	174.86	0.9762
170.70	174.52	0.9781
170.70	174.18	0.9800
170.70	173.84	0.9819
170.70	173.50	0.9838
170.70	173.17	0.9857
170.70	172.83	0.9876
170.70	172.50	0.9895
170.70	172.14	0.9916
170.70	171.77	0.9938
170.70	171.40	0.9959
170.70	171.03	0.9980
170.70	170.67	1.0002
170.70	170.30	1.0023
170.70	169.94	1.0045
170.70	169.58	1.0066
170.70	169.22	1.0088
170.70	168.86	1.0109
170.70	168.57	1.0126
170.70	168.31	1.0142
170.70	168.05	1.0157
170.70	167.80	1.0173
170.70	167.54	1.0188
170.70	167.29	1.0204
170.70	167.03	1.0219
170.70	166.78	1.0235
170.70	166.53	1.0250
170.70	166.28	1.0266
170.70	166.05	1.0280
170.70	165.84	1.0293
170.70	165.63	1.0306
170.70	165.42	1.0319
170.70	165.21	1.0332
170.70	165.00	1.0345
170.70	164.80	1.0358



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - Gas Operations

Net Output Degradation Factor - CC (Gas)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
+47000	220.83	213.53	1.0342
+47500	220.83	213.31	1.0353
+48000	220.83	213.08	1.0363
+48500	220.83	212.88	1.0373
+49000	220.83	212.70	1.0382
+49500	220.83	212.51	1.0392
+50000	220.83	212.32	1.0401
+50500	220.83	212.13	1.0410
+51000	220.83	211.95	1.0419
+51500	220.83	211.76	1.0428
+52000	220.83	211.57	1.0437
+52500	220.83	211.39	1.0447
+53000	220.83	211.20	1.0456
+53500	220.83	218.41	1.0111
+54000	220.83	218.09	1.0125
+54500	220.83	217.77	1.0140
+55000	220.83	217.45	1.0155
+55500	220.83	217.13	1.0170
+56000	220.83	216.81	1.0185
+56500	220.83	216.49	1.0200
+57000	220.83	216.18	1.0215
+57500	220.83	215.86	1.0230
+58000	220.83	215.55	1.0245
+58500	220.83	215.30	1.0257
+59000	220.83	215.09	1.0267
+59500	220.83	214.88	1.0277
+60000	220.83	214.67	1.0287
+60500	220.83	214.45	1.0297
+61000	220.83	214.24	1.0307
+61500	220.83	214.03	1.0317
+62000	220.83	213.82	1.0328
+62500	220.83	213.61	1.0338
+63000	220.83	213.41	1.0348
+63500	220.83	213.23	1.0356
+64000	220.83	213.07	1.0364
+64500	220.83	212.91	1.0372
+65000	220.83	212.74	1.0380
+65500	220.83	212.58	1.0388
+66000	220.83	212.42	1.0396
+66500	220.83	212.26	1.0404
+67000	220.83	212.10	1.0411
+67500	220.83	211.94	1.0419
+68000	220.83	211.78	1.0427
+68500	220.83	211.65	1.0434
+69000	220.83	211.54	1.0439
+69500	220.83	211.42	1.0445
+70000	220.83	211.31	1.0451
+70500	220.83	211.19	1.0456

Net Output Degradation Factor - OC (Gas)		
Tested Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
170.70	164.59	1.0371
170.70	164.38	1.0384
170.70	164.17	1.0397
170.70	164.00	1.0408
170.70	163.85	1.0418
170.70	163.70	1.0427
170.70	163.56	1.0437
170.70	163.41	1.0446
170.70	163.26	1.0456
170.70	163.11	1.0465
170.70	162.96	1.0475
170.70	162.81	1.0484
170.70	162.66	1.0494
170.70	175.10	0.9749
170.70	174.10	0.9805
170.70	173.11	0.9861
170.70	172.13	0.9917
170.70	171.17	0.9973
170.70	170.21	1.0029
170.70	169.27	1.0085
170.70	168.33	1.0140
170.70	167.41	1.0196
170.70	166.49	1.0252
170.70	166.08	1.0278
170.70	165.91	1.0289
170.70	165.73	1.0299
170.70	165.56	1.0310
170.70	165.39	1.0321
170.70	165.22	1.0332
170.70	165.05	1.0342
170.70	164.88	1.0353
170.70	164.71	1.0364
170.70	164.54	1.0374
170.70	164.39	1.0384
170.70	164.26	1.0392
170.70	164.13	1.0400
170.70	164.00	1.0409
170.70	163.87	1.0417
170.70	163.73	1.0425
170.70	163.60	1.0434
170.70	163.47	1.0442
170.70	163.34	1.0450
170.70	163.21	1.0459
170.70	163.11	1.0465
170.70	163.02	1.0471
170.70	162.92	1.0477
170.70	162.83	1.0483
170.70	162.74	1.0489



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - Gas Operations

Net Output Degradation Factor - CC (Gas)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
+71000	220.83	211.08	1.0462
+71500	220.83	210.96	1.0468
+72000	220.83	210.85	1.0473
+72500	220.83	210.73	1.0479
+73000	220.83	210.62	1.0485
+73500	220.83	210.50	1.0491
+74000	220.83	210.39	1.0496
+74500	220.83	210.27	1.0502
+75000	220.83	210.16	1.0508
+75500	220.83	210.04	1.0514
+76000	220.83	209.93	1.0519
+76500	220.83	209.81	1.0525
+77000	220.83	209.70	1.0531
+77500	220.83	209.58	1.0537
+78000	220.83	209.47	1.0542
+78500	220.83	225.35	0.9799
+79000	220.83	224.99	0.9815
+79500	220.83	224.63	0.9831
+80000	220.83	224.27	0.9847
+80500	220.83	223.91	0.9862
+81000	220.83	223.56	0.9878
+81500	220.83	223.20	0.9894
+82000	220.83	222.85	0.9909
+82500	220.83	222.50	0.9925
+83000	220.83	222.15	0.9941
+83500	220.83	221.74	0.9959
+84000	220.83	221.31	0.9978
+84500	220.83	220.88	0.9998
+85000	220.83	220.45	1.0017
+85500	220.83	220.03	1.0036
+86000	220.83	219.60	1.0056
+86500	220.83	219.18	1.0075
+87000	220.83	218.76	1.0094
+87500	220.83	218.34	1.0114
+88000	220.83	217.92	1.0133
+88500	220.83	217.59	1.0149
+89000	220.83	217.29	1.0163
+89500	220.83	217.00	1.0177
+90000	220.83	216.70	1.0190
+90500	220.83	216.41	1.0204
+91000	220.83	216.11	1.0218
+91500	220.83	215.82	1.0232
+92000	220.83	215.53	1.0246
+92500	220.83	215.24	1.0260
+93000	220.83	214.95	1.0273
+93500	220.83	214.69	1.0286
+94000	220.83	214.44	1.0298
+94500	220.83	214.19	1.0310

Net Output Degradation Factor - OC (Gas)		
Tested Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
170.70	162.65	1.0495
170.70	162.55	1.0501
170.70	162.46	1.0507
170.70	162.37	1.0513
170.70	162.28	1.0519
170.70	162.19	1.0525
170.70	162.10	1.0531
170.70	162.00	1.0537
170.70	161.91	1.0543
170.70	161.82	1.0549
170.70	161.73	1.0554
170.70	161.64	1.0560
170.70	161.55	1.0566
170.70	161.46	1.0572
170.70	161.36	1.0578
170.70	175.54	0.9724
170.70	175.20	0.9743
170.70	174.86	0.9762
170.70	174.52	0.9781
170.70	174.18	0.9800
170.70	173.84	0.9819
170.70	173.50	0.9838
170.70	173.17	0.9857
170.70	172.83	0.9876
170.70	172.50	0.9895
170.70	172.14	0.9916
170.70	171.77	0.9938
170.70	171.40	0.9959
170.70	171.03	0.9980
170.70	170.67	1.0002
170.70	170.30	1.0023
170.70	169.94	1.0045
170.70	169.58	1.0066
170.70	169.22	1.0088
170.70	168.86	1.0109
170.70	168.57	1.0126
170.70	168.31	1.0142
170.70	168.05	1.0157
170.70	167.80	1.0173
170.70	167.54	1.0188
170.70	167.29	1.0204
170.70	167.03	1.0219
170.70	166.78	1.0235
170.70	166.53	1.0250
170.70	166.28	1.0266
170.70	166.05	1.0280
170.70	165.84	1.0293
170.70	165.63	1.0306



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - Gas Operations

Net Output Degradation Factor - CC (Gas)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
+95000	220.83	213.95	1.0322
+95500	220.83	213.70	1.0333
+96000	220.83	213.46	1.0345
+96500	220.83	213.21	1.0357
+97000	220.83	212.97	1.0369
+97500	220.83	212.73	1.0381
+98000	220.83	212.48	1.0393
+98500	220.83	212.30	1.0402
+99000	220.83	212.14	1.0410
+99500	220.83	211.98	1.0417
+100000	220.83	211.82	1.0425
+100500	220.83	211.66	1.0433
+101000	220.83	211.50	1.0441
+101500	220.83	211.35	1.0449
+102000	220.83	211.19	1.0456
+102500	220.83	211.03	1.0464
+103000	220.83	210.88	1.0472
+103500	220.83	218.08	1.0126
+104000	220.83	217.78	1.0140
+104500	220.83	217.49	1.0154
+105000	220.83	217.19	1.0168
+105500	220.83	216.89	1.0181
+106000	220.83	216.60	1.0195
+106500	220.83	216.30	1.0209
+107000	220.83	216.01	1.0223
+107500	220.83	215.72	1.0237
+108000	220.83	215.43	1.0251
+108500	220.83	215.18	1.0262
+109000	220.83	214.96	1.0273
+109500	220.83	214.74	1.0283
+110000	220.83	214.52	1.0294
+110500	220.83	214.30	1.0305
+111000	220.83	214.08	1.0315
+111500	220.83	213.87	1.0326
+112000	220.83	213.65	1.0336
+112500	220.83	213.43	1.0347
+113000	220.83	213.21	1.0357
+113500	220.83	213.03	1.0366
+114000	220.83	212.86	1.0374
+114500	220.83	212.69	1.0383
+115000	220.83	212.52	1.0391
+115500	220.83	212.36	1.0399
+116000	220.83	212.19	1.0407
+116500	220.83	212.02	1.0415
+117000	220.83	211.85	1.0424
+117500	220.83	211.69	1.0432
+118000	220.83	211.52	1.0440
+118500	220.83	211.38	1.0447

Net Output Degradation Factor - OC (Gas)		
Tested Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
170.70	165.42	1.0319
170.70	165.21	1.0332
170.70	165.00	1.0345
170.70	164.80	1.0358
170.70	164.59	1.0371
170.70	164.38	1.0384
170.70	164.17	1.0397
170.70	164.00	1.0408
170.70	163.85	1.0418
170.70	163.70	1.0427
170.70	163.56	1.0437
170.70	163.41	1.0446
170.70	163.26	1.0456
170.70	163.11	1.0465
170.70	162.96	1.0475
170.70	167.02	1.0220
170.70	173.53	0.9837
170.70	175.10	0.9749
170.70	174.10	0.9805
170.70	173.11	0.9861
170.70	172.13	0.9917
170.70	171.17	0.9973
170.70	170.21	1.0029
170.70	169.27	1.0085
170.70	168.33	1.0140
170.70	167.41	1.0196
170.70	166.49	1.0252
170.70	166.08	1.0278
170.70	165.91	1.0289
170.70	165.73	1.0299
170.70	165.56	1.0310
170.70	165.39	1.0321
170.70	165.22	1.0332
170.70	165.05	1.0342
170.70	164.88	1.0353
170.70	164.71	1.0364
170.70	164.54	1.0374
170.70	164.39	1.0384
170.70	164.26	1.0392
170.70	164.13	1.0400
170.70	164.00	1.0409
170.70	163.87	1.0417
170.70	163.73	1.0425
170.70	163.60	1.0434
170.70	163.47	1.0442
170.70	163.34	1.0450
170.70	163.21	1.0459
170.70	163.11	1.0465



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - Gas Operations

Net Output Degradation Factor - CC (Gas)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
+119000	220.83	211.26	1.0453
+119500	220.83	211.14	1.0459
+120000	220.83	211.02	1.0465
+120500	220.83	210.90	1.0471
+121000	220.83	210.78	1.0477
+121500	220.83	210.66	1.0483
+122000	220.83	210.54	1.0489
+122500	220.83	210.42	1.0495
+123000	220.83	210.30	1.0501
+123500	220.83	210.19	1.0506
+124000	220.83	210.07	1.0512
+124500	220.83	209.95	1.0518
+125000	220.83	209.84	1.0524
+125500	220.83	209.72	1.0529
+126000	220.83	209.61	1.0535
+126500	220.83	209.49	1.0541
+127000	220.83	209.38	1.0547
+127500	220.83	209.26	1.0553
+128000	220.83	209.15	1.0558
+128500	220.83	224.97	0.9816
+129000	220.83	224.62	0.9831
+129500	220.83	224.26	0.9847
+130000	220.83	223.91	0.9863
+130500	220.83	223.55	0.9878
+131000	220.83	223.20	0.9894
+131500	220.83	222.85	0.9909
+132000	220.83	222.50	0.9925
+132500	220.83	222.15	0.9940
+133000	220.83	221.80	0.9956
+133500	220.83	221.40	0.9974
+134000	220.83	220.97	0.9993
+134500	220.83	220.55	1.0013
+135000	220.83	220.13	1.0032
+135500	220.83	219.71	1.0051
+136000	220.83	219.29	1.0070
+136500	220.83	218.87	1.0090
+137000	220.83	218.45	1.0109
+137500	220.83	218.03	1.0128
+138000	220.83	217.62	1.0147
+138500	220.83	217.29	1.0163
+139000	220.83	216.99	1.0177
+139500	220.83	216.70	1.0191
+140000	220.83	216.41	1.0204

Net Output Degradation Factor - OC (Gas)		
Tested Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
170.70	163.02	1.0471
170.70	162.92	1.0477
170.70	162.83	1.0483
170.70	162.74	1.0489
170.70	162.65	1.0495
170.70	162.55	1.0501
170.70	162.46	1.0507
170.70	162.37	1.0513
170.70	162.28	1.0519
170.70	162.19	1.0525
170.70	162.10	1.0531
170.70	162.00	1.0537
170.70	161.91	1.0543
170.70	161.82	1.0549
170.70	161.73	1.0554
170.70	161.64	1.0560
170.70	161.55	1.0566
170.70	161.46	1.0572
170.70	161.36	1.0578
170.70	175.54	0.9724
170.70	175.20	0.9743
170.70	174.86	0.9762
170.70	174.52	0.9781
170.70	174.18	0.9800
170.70	173.84	0.9819
170.70	173.50	0.9838
170.70	173.17	0.9857
170.70	172.83	0.9876
170.70	172.50	0.9895
170.70	172.14	0.9916
170.70	171.77	0.9938
170.70	171.40	0.9959
170.70	171.03	0.9980
170.70	170.67	1.0002
170.70	170.30	1.0023
170.70	169.94	1.0045
170.70	169.58	1.0066
170.70	169.22	1.0088
170.70	168.86	1.0109
170.70	168.57	1.0126
170.70	168.31	1.0142
170.70	168.05	1.0157
170.70	167.80	1.0173

FY 19 : As per 3rd Party Heat Rate Test on Gas Fuel

FY 23 : As per actual operating hours. Operating hours at end of FY23 : 71,836 hours



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - HSD Operations

Net Heat Rate Degradation Factor - HHV (HSD)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Calculated	Revised		Tested	Revised	
FY-21 (Test)	34.18%	34.18%	1.0000	43.13%	43.13%	1.0000
FY-23 (end)	34.18%	33.92%	1.0078	43.13%	42.93%	1.0047
+500	34.18%	33.88%	1.0088	43.13%	42.90%	1.0053
+1000	34.18%	33.85%	1.0097	43.13%	42.88%	1.0058
+1500	34.18%	33.82%	1.0107	43.13%	42.85%	1.0064
+2000	34.18%	33.79%	1.0116	43.13%	42.83%	1.0069
+2500	34.18%	33.76%	1.0125	43.13%	42.81%	1.0075
+3000	34.18%	33.73%	1.0135	43.13%	42.78%	1.0080
+3500	34.18%	35.13%	0.9729	43.13%	43.74%	0.9861
+4000	34.18%	34.97%	0.9774	43.13%	43.62%	0.9886
+4500	34.18%	34.81%	0.9819	43.13%	43.51%	0.9912
+5000	34.18%	34.65%	0.9864	43.13%	43.40%	0.9937
+5500	34.18%	34.50%	0.9909	43.13%	43.29%	0.9963
+6000	34.18%	34.40%	0.9938	43.13%	43.22%	0.9979
+6500	34.18%	34.32%	0.9959	43.13%	43.17%	0.9990
+7000	34.18%	34.25%	0.9980	43.13%	43.12%	1.0002
+7500	34.18%	34.18%	1.0001	43.13%	43.07%	1.0013
+8000	34.18%	34.11%	1.0022	43.13%	43.02%	1.0025
+8500	34.18%	34.06%	1.0037	43.13%	42.99%	1.0033
+9000	34.18%	34.02%	1.0048	43.13%	42.96%	1.0039
+9500	34.18%	33.98%	1.0060	43.13%	42.93%	1.0045
+10000	34.18%	33.94%	1.0071	43.13%	42.91%	1.0051
+10500	34.18%	33.90%	1.0083	43.13%	42.88%	1.0058
+11000	34.18%	33.86%	1.0093	43.13%	42.86%	1.0063
+11500	34.18%	33.83%	1.0103	43.13%	42.83%	1.0069
+12000	34.18%	33.80%	1.0113	43.13%	42.81%	1.0074
+12500	34.18%	33.77%	1.0123	43.13%	42.79%	1.0079
+13000	34.18%	33.73%	1.0132	43.13%	42.76%	1.0085
+13500	34.18%	33.70%	1.0143	43.13%	42.74%	1.0091
+14000	34.18%	33.66%	1.0154	43.13%	42.72%	1.0096
+14500	34.18%	33.62%	1.0165	43.13%	42.69%	1.0102
+15000	34.18%	33.59%	1.0176	43.13%	42.67%	1.0108
+15500	34.18%	33.55%	1.0187	43.13%	42.64%	1.0114
+16000	34.18%	34.98%	0.9770	43.13%	43.62%	0.9888
+16500	34.18%	34.83%	0.9815	43.13%	43.50%	0.9913
+17000	34.18%	34.67%	0.9859	43.13%	43.39%	0.9939
+17500	34.18%	34.51%	0.9904	43.13%	43.28%	0.9964
+18000	34.18%	34.36%	0.9948	43.13%	43.17%	0.9989
+18500	34.18%	34.26%	0.9976	43.13%	43.11%	1.0005
+19000	34.18%	34.20%	0.9996	43.13%	43.06%	1.0015
+19500	34.18%	34.13%	1.0015	43.13%	43.02%	1.0026
+20000	34.18%	34.06%	1.0035	43.13%	42.97%	1.0037



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - HSD Operations

Net Heat Rate Degradation Factor - HHV (HSD)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Calculated	Revised		Tested	Revised	
+20500	34.18%	33.99%	1.0055	43.13%	42.92%	1.0047
+21000	34.18%	33.95%	1.0069	43.13%	42.89%	1.0055
+21500	34.18%	33.91%	1.0080	43.13%	42.87%	1.0060
+22000	34.18%	33.87%	1.0092	43.13%	42.84%	1.0066
+22500	34.18%	33.83%	1.0103	43.13%	42.82%	1.0072
+23000	34.18%	33.79%	1.0114	43.13%	42.79%	1.0078
+23500	34.18%	33.76%	1.0125	43.13%	42.77%	1.0083
+24000	34.18%	33.73%	1.0135	43.13%	42.75%	1.0088
+24500	34.18%	33.69%	1.0144	43.13%	42.73%	1.0093
+25000	34.18%	33.66%	1.0154	43.13%	42.71%	1.0098
+25500	34.18%	33.63%	1.0164	43.13%	42.69%	1.0103
+26000	34.18%	33.59%	1.0176	43.13%	42.66%	1.0109
+26500	34.18%	33.55%	1.0189	43.13%	42.63%	1.0116
+27000	34.18%	33.51%	1.0201	43.13%	42.61%	1.0123
+27500	34.18%	33.46%	1.0214	43.13%	42.58%	1.0129
+28000	34.18%	33.42%	1.0227	43.13%	42.55%	1.0136
+28500	34.18%	36.32%	0.9411	43.13%	44.65%	0.9658
+29000	34.18%	36.06%	0.9479	43.13%	44.46%	0.9701
+29500	34.18%	35.81%	0.9546	43.13%	44.26%	0.9744
+30000	34.18%	35.56%	0.9613	43.13%	44.06%	0.9788
+30500	34.18%	35.31%	0.9680	43.13%	43.87%	0.9831
+31000	34.18%	35.14%	0.9726	43.13%	43.75%	0.9858
+31500	34.18%	35.02%	0.9761	43.13%	43.66%	0.9878
+32000	34.18%	34.89%	0.9796	43.13%	43.57%	0.9898
+32500	34.18%	34.77%	0.9831	43.13%	43.48%	0.9918
+33000	34.18%	34.64%	0.9866	43.13%	43.40%	0.9938
+33500	34.18%	34.56%	0.9890	43.13%	43.34%	0.9952
+34000	34.18%	34.50%	0.9908	43.13%	43.29%	0.9963
+34500	34.18%	34.43%	0.9927	43.13%	43.24%	0.9973
+35000	34.18%	34.37%	0.9945	43.13%	43.19%	0.9984
+35500	34.18%	34.31%	0.9963	43.13%	43.15%	0.9995
+36000	34.18%	34.26%	0.9977	43.13%	43.11%	1.0003
+36500	34.18%	34.22%	0.9988	43.13%	43.08%	1.0010
+37000	34.18%	34.18%	0.9999	43.13%	43.06%	1.0017
+37500	34.18%	34.14%	1.0011	43.13%	43.03%	1.0023
+38000	34.18%	34.11%	1.0022	43.13%	43.00%	1.0030
+38500	34.18%	34.07%	1.0032	43.13%	42.98%	1.0035
+39000	34.18%	34.04%	1.0042	43.13%	42.96%	1.0040
+39500	34.18%	34.00%	1.0052	43.13%	42.94%	1.0044
+40000	34.18%	33.97%	1.0062	43.13%	42.92%	1.0049
+40500	34.18%	33.94%	1.0071	43.13%	42.90%	1.0053
+41000	34.18%	35.36%	0.9666	43.13%	43.87%	0.9831
+41500	34.18%	35.20%	0.9710	43.13%	43.76%	0.9855



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - HSD Operations

Net Heat Rate Degradation Factor - HHV (HSD)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Calculated	Revised		Tested	Revised	
+42000	34.18%	35.05%	0.9753	43.13%	43.66%	0.9878
+42500	34.18%	34.89%	0.9796	43.13%	43.56%	0.9901
+43000	34.18%	34.74%	0.9840	43.13%	43.46%	0.9924
+43500	34.18%	34.63%	0.9870	43.13%	43.39%	0.9940
+44000	34.18%	34.54%	0.9895	43.13%	43.33%	0.9953
+44500	34.18%	34.46%	0.9920	43.13%	43.28%	0.9965
+45000	34.18%	34.37%	0.9945	43.13%	43.22%	0.9978
+45500	34.18%	34.28%	0.9970	43.13%	43.17%	0.9991
+46000	34.18%	34.23%	0.9987	43.13%	43.13%	0.9999
+46500	34.18%	34.18%	1.0000	43.13%	43.11%	1.0005
+47000	34.18%	34.14%	1.0013	43.13%	43.08%	1.0011
+47500	34.18%	34.09%	1.0026	43.13%	43.06%	1.0017
+48000	34.18%	34.05%	1.0039	43.13%	43.03%	1.0023
+48500	34.18%	34.01%	1.0050	43.13%	43.00%	1.0029
+49000	34.18%	33.98%	1.0059	43.13%	42.98%	1.0035
+49500	34.18%	33.95%	1.0069	43.13%	42.95%	1.0041
+50000	34.18%	33.92%	1.0078	43.13%	42.93%	1.0047
+50500	34.18%	33.88%	1.0088	43.13%	42.90%	1.0053
+51000	34.18%	33.85%	1.0097	43.13%	42.88%	1.0059
+51500	34.18%	33.82%	1.0107	43.13%	42.85%	1.0065
+52000	34.18%	33.79%	1.0116	43.13%	42.83%	1.0070
+52500	34.18%	33.76%	1.0125	43.13%	42.80%	1.0076
+53000	34.18%	33.73%	1.0135	43.13%	42.78%	1.0082
+53500	34.18%	35.13%	0.9729	43.13%	43.73%	0.9862
+54000	34.18%	34.97%	0.9774	43.13%	43.61%	0.9888
+54500	34.18%	34.81%	0.9819	43.13%	43.50%	0.9914
+55000	34.18%	34.65%	0.9864	43.13%	43.39%	0.9940
+55500	34.18%	34.50%	0.9909	43.13%	43.27%	0.9966
+56000	34.18%	34.40%	0.9938	43.13%	43.20%	0.9982
+56500	34.18%	34.32%	0.9959	43.13%	43.15%	0.9994
+57000	34.18%	34.25%	0.9980	43.13%	43.10%	1.0006
+57500	34.18%	34.18%	1.0001	43.13%	43.05%	1.0018
+58000	34.18%	34.11%	1.0022	43.13%	43.00%	1.0030
+58500	34.18%	34.06%	1.0037	43.13%	42.97%	1.0038
+59000	34.18%	34.02%	1.0048	43.13%	42.94%	1.0044
+59500	34.18%	33.98%	1.0060	43.13%	42.91%	1.0050
+60000	34.18%	33.94%	1.0071	43.13%	42.88%	1.0057
+60500	34.18%	33.90%	1.0083	43.13%	42.86%	1.0063
+61000	34.18%	33.86%	1.0093	43.13%	42.83%	1.0069
+61500	34.18%	33.83%	1.0103	43.13%	42.81%	1.0074
+62000	34.18%	33.80%	1.0113	43.13%	42.79%	1.0080
+62500	34.18%	33.77%	1.0123	43.13%	42.76%	1.0085
+63000	34.18%	33.73%	1.0132	43.13%	42.74%	1.0091



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Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - HSD Operations

Net Heat Rate Degradation Factor - HHV (HSD)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Calculated	Revised		Tested	Revised	
+63500	34.18%	33.70%	1.0143	43.13%	42.71%	1.0097
+64000	34.18%	33.66%	1.0154	43.13%	42.69%	1.0102
+64500	34.18%	33.62%	1.0165	43.13%	42.67%	1.0108
+65000	34.18%	33.59%	1.0176	43.13%	42.64%	1.0114
+65500	34.18%	33.55%	1.0187	43.13%	42.62%	1.0120
+66000	34.18%	34.98%	0.9770	43.13%	43.59%	0.9894
+66500	34.18%	34.83%	0.9815	43.13%	43.48%	0.9919
+67000	34.18%	34.67%	0.9859	43.13%	43.37%	0.9945
+67500	34.18%	34.51%	0.9904	43.13%	43.26%	0.9970
+68000	34.18%	34.36%	0.9948	43.13%	43.15%	0.9995
+68500	34.18%	34.26%	0.9976	43.13%	43.08%	1.0011
+69000	34.18%	34.20%	0.9996	43.13%	43.03%	1.0022
+69500	34.18%	34.13%	1.0015	43.13%	42.99%	1.0032
+70000	34.18%	34.06%	1.0035	43.13%	42.94%	1.0043
+70500	34.18%	33.99%	1.0055	43.13%	42.90%	1.0054
+71000	34.18%	33.95%	1.0069	43.13%	42.87%	1.0061
+71500	34.18%	33.91%	1.0080	43.13%	42.84%	1.0067
+72000	34.18%	33.87%	1.0092	43.13%	42.82%	1.0073
+72500	34.18%	33.83%	1.0103	43.13%	42.79%	1.0079
+73000	34.18%	33.79%	1.0114	43.13%	42.77%	1.0084
+73500	34.18%	33.76%	1.0125	43.13%	42.74%	1.0090
+74000	34.18%	33.73%	1.0135	43.13%	42.72%	1.0095
+74500	34.18%	33.69%	1.0144	43.13%	42.70%	1.0100
+75000	34.18%	33.66%	1.0154	43.13%	42.68%	1.0105
+75500	34.18%	33.63%	1.0164	43.13%	42.66%	1.0110
+76000	34.18%	33.59%	1.0176	43.13%	42.63%	1.0116
+76500	34.18%	33.55%	1.0189	43.13%	42.60%	1.0123
+77000	34.18%	33.51%	1.0201	43.13%	42.58%	1.0130
+77500	34.18%	33.46%	1.0214	43.13%	42.55%	1.0136
+78000	34.18%	33.42%	1.0227	43.13%	42.52%	1.0143
+78500	34.18%	36.32%	0.9411	43.13%	44.63%	0.9664
+79000	34.18%	36.06%	0.9479	43.13%	44.43%	0.9707
+79500	34.18%	35.81%	0.9546	43.13%	44.23%	0.9751
+80000	34.18%	35.56%	0.9613	43.13%	44.03%	0.9794
+80500	34.18%	35.31%	0.9680	43.13%	43.84%	0.9837
+81000	34.18%	35.14%	0.9726	43.13%	43.72%	0.9865
+81500	34.18%	35.02%	0.9761	43.13%	43.63%	0.9885
+82000	34.18%	34.89%	0.9796	43.13%	43.54%	0.9905
+82500	34.18%	34.77%	0.9831	43.13%	43.45%	0.9925
+83000	34.18%	34.64%	0.9866	43.13%	43.37%	0.9945
+83500	34.18%	34.56%	0.9890	43.13%	43.30%	0.9959
+84000	34.18%	34.50%	0.9908	43.13%	43.26%	0.9970
+84500	34.18%	34.43%	0.9927	43.13%	43.21%	0.9981



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - HSD Operations

Net Heat Rate Degradation Factor - HHV (HSD)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Calculated	Revised		Tested	Revised	
+85000	34.18%	34.37%	0.9945	43.13%	43.16%	0.9992
+85500	34.18%	34.31%	0.9963	43.13%	43.11%	1.0003
+86000	34.18%	34.26%	0.9977	43.13%	43.08%	1.0011
+86500	34.18%	34.22%	0.9988	43.13%	43.05%	1.0018
+87000	34.18%	34.18%	0.9999	43.13%	43.02%	1.0025
+87500	34.18%	34.14%	1.0011	43.13%	42.99%	1.0032
+88000	34.18%	34.11%	1.0022	43.13%	42.96%	1.0039
+88500	34.18%	34.07%	1.0032	43.13%	42.93%	1.0045
+89000	34.18%	34.04%	1.0042	43.13%	42.91%	1.0051
+89500	34.18%	34.00%	1.0052	43.13%	42.88%	1.0057
+90000	34.18%	33.97%	1.0062	43.13%	42.86%	1.0062
+90500	34.18%	33.94%	1.0071	43.13%	42.84%	1.0068
+91000	34.18%	35.36%	0.9666	43.13%	43.80%	0.9846
+91500	34.18%	35.20%	0.9710	43.13%	43.69%	0.9870
+92000	34.18%	35.05%	0.9753	43.13%	43.59%	0.9895
+92500	34.18%	34.89%	0.9796	43.13%	43.48%	0.9919
+93000	34.18%	34.74%	0.9840	43.13%	43.37%	0.9944
+93500	34.18%	34.63%	0.9870	43.13%	43.30%	0.9961
+94000	34.18%	34.54%	0.9895	43.13%	43.24%	0.9975
+94500	34.18%	34.46%	0.9920	43.13%	43.18%	0.9989
+95000	34.18%	34.37%	0.9945	43.13%	43.12%	1.0003
+95500	34.18%	34.28%	0.9970	43.13%	43.06%	1.0016
+96000	34.18%	34.23%	0.9987	43.13%	43.02%	1.0026
+96500	34.18%	34.18%	1.0000	43.13%	42.99%	1.0033
+97000	34.18%	34.14%	1.0013	43.13%	42.95%	1.0040
+97500	34.18%	34.09%	1.0026	43.13%	42.92%	1.0047
+98000	34.18%	34.05%	1.0039	43.13%	42.89%	1.0055
+98500	34.18%	34.01%	1.0050	43.13%	42.87%	1.0060
+99000	34.18%	33.98%	1.0059	43.13%	42.85%	1.0065
+99500	34.18%	33.95%	1.0069	43.13%	42.83%	1.0069
+100000	34.18%	33.92%	1.0078	43.13%	42.81%	1.0074
+100500	34.18%	33.88%	1.0088	43.13%	42.79%	1.0078
+101000	34.18%	33.85%	1.0097	43.13%	42.77%	1.0083
+101500	34.18%	33.82%	1.0107	43.13%	42.75%	1.0087
+102000	34.18%	33.79%	1.0116	43.13%	42.74%	1.0092
+102500	34.18%	33.76%	1.0125	43.13%	42.72%	1.0096
+103000	34.18%	33.73%	1.0135	43.13%	42.70%	1.0100
+103500	34.18%	35.13%	0.9729	43.13%	43.66%	0.9878
+104000	34.18%	34.97%	0.9774	43.13%	43.55%	0.9903
+104500	34.18%	34.81%	0.9819	43.13%	43.44%	0.9928
+105000	34.18%	34.65%	0.9864	43.13%	43.33%	0.9953
+105500	34.18%	34.50%	0.9909	43.13%	43.22%	0.9978
+106000	34.18%	34.40%	0.9938	43.13%	43.16%	0.9993



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - HSD Operations

Net Heat Rate Degradation Factor - HHV (HSD)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Calculated	Revised		Tested	Revised	
+106500	34.18%	34.32%	0.9959	43.13%	43.11%	1.0004
+107000	34.18%	34.25%	0.9980	43.13%	43.07%	1.0014
+107500	34.18%	34.18%	1.0001	43.13%	43.02%	1.0025
+108000	34.18%	34.11%	1.0022	43.13%	42.97%	1.0036
+108500	34.18%	34.06%	1.0037	43.13%	42.94%	1.0044
+109000	34.18%	34.02%	1.0048	43.13%	42.91%	1.0051
+109500	34.18%	33.98%	1.0060	43.13%	42.88%	1.0057
+110000	34.18%	33.94%	1.0071	43.13%	42.85%	1.0064
+110500	34.18%	33.90%	1.0083	43.13%	42.82%	1.0071
+111000	34.18%	33.86%	1.0093	43.13%	42.80%	1.0077
+111500	34.18%	33.83%	1.0103	43.13%	42.77%	1.0083
+112000	34.18%	33.80%	1.0113	43.13%	42.75%	1.0089
+112500	34.18%	33.77%	1.0123	43.13%	42.72%	1.0095
+113000	34.18%	33.73%	1.0132	43.13%	42.70%	1.0101
+113500	34.18%	33.70%	1.0143	43.13%	42.67%	1.0107
+114000	34.18%	33.66%	1.0154	43.13%	42.64%	1.0114
+114500	34.18%	33.62%	1.0165	43.13%	42.62%	1.0120
+115000	34.18%	33.59%	1.0176	43.13%	42.59%	1.0126
+115500	34.18%	33.55%	1.0187	43.13%	42.56%	1.0132
+116000	34.18%	34.98%	0.9770	43.13%	43.54%	0.9905
+116500	34.18%	34.83%	0.9815	43.13%	43.43%	0.9931
+117000	34.18%	34.67%	0.9859	43.13%	43.31%	0.9957
+117500	34.18%	34.51%	0.9904	43.13%	43.20%	0.9983
+118000	34.18%	34.36%	0.9948	43.13%	43.09%	1.0009
+118500	34.18%	34.26%	0.9976	43.13%	43.02%	1.0025
+119000	34.18%	34.20%	0.9996	43.13%	42.97%	1.0036
+119500	34.18%	34.13%	1.0015	43.13%	42.92%	1.0047
+120000	34.18%	34.06%	1.0035	43.13%	42.88%	1.0058
+120500	34.18%	33.99%	1.0055	43.13%	42.83%	1.0069
+121000	34.18%	33.95%	1.0069	43.13%	42.80%	1.0077
+121500	34.18%	33.91%	1.0080	43.13%	42.77%	1.0083
+122000	34.18%	33.87%	1.0092	43.13%	42.75%	1.0089
+122500	34.18%	33.83%	1.0103	43.13%	42.72%	1.0096
+123000	34.18%	33.79%	1.0114	43.13%	42.69%	1.0102
+123500	34.18%	33.76%	1.0125	43.13%	42.67%	1.0107
+124000	34.18%	33.73%	1.0135	43.13%	42.65%	1.0112
+124500	34.18%	33.69%	1.0144	43.13%	42.63%	1.0118
+125000	34.18%	33.66%	1.0154	43.13%	42.60%	1.0123
+125500	34.18%	33.63%	1.0164	43.13%	42.58%	1.0128
+126000	34.18%	33.59%	1.0176	43.13%	42.56%	1.0134
+126500	34.18%	33.55%	1.0189	43.13%	42.53%	1.0141
+127000	34.18%	33.51%	1.0201	43.13%	42.50%	1.0148
+127500	34.18%	33.46%	1.0214	43.13%	42.47%	1.0155



Korangi Combined Cycle Power Plant (KCCPP)
Heat Rate Degradation Table - HSD Operations

Net Heat Rate Degradation Factor - HHV (HSD)						
Interval	Gas Turbine		Correction Factor	Complex (100% LF)		Correction Factor
	Efficiency			Efficiency		
	Calculated	Revised		Tested	Revised	
+128000	34.18%	33.42%	1.0227	43.13%	42.44%	1.0162
+128500	34.18%	36.32%	0.9411	43.13%	44.56%	0.9679
+129000	34.18%	36.06%	0.9479	43.13%	44.36%	0.9723
+129500	34.18%	35.81%	0.9546	43.13%	44.16%	0.9766
+130000	34.18%	35.56%	0.9613	43.13%	43.96%	0.9810
+130500	34.18%	35.31%	0.9680	43.13%	43.77%	0.9853
+131000	34.18%	35.14%	0.9726	43.13%	43.65%	0.9881
+131500	34.18%	35.02%	0.9761	43.13%	43.56%	0.9901
+132000	34.18%	34.89%	0.9796	43.13%	43.47%	0.9921
+132500	34.18%	34.77%	0.9831	43.13%	43.38%	0.9941
+133000	34.18%	34.64%	0.9866	43.13%	43.30%	0.9961
+133500	34.18%	34.56%	0.9890	43.13%	43.23%	0.9975
+134000	34.18%	34.50%	0.9908	43.13%	43.19%	0.9986
+134500	34.18%	34.43%	0.9927	43.13%	43.14%	0.9997
+135000	34.18%	34.37%	0.9945	43.13%	43.09%	1.0008
+135500	34.18%	34.31%	0.9963	43.13%	43.05%	1.0019
+136000	34.18%	34.26%	0.9977	43.13%	43.01%	1.0027
+136500	34.18%	34.22%	0.9988	43.13%	42.98%	1.0034
+137000	34.18%	34.18%	0.9999	43.13%	42.95%	1.0041
+137500	34.18%	34.14%	1.0011	43.13%	42.92%	1.0047
+138000	34.18%	34.11%	1.0022	43.13%	42.90%	1.0054
+138500	34.18%	34.07%	1.0032	43.13%	42.87%	1.0060
+139000	34.18%	34.04%	1.0042	43.13%	42.84%	1.0066
+139500	34.18%	34.00%	1.0052	43.13%	42.82%	1.0072
+140000	34.18%	33.97%	1.0062	43.13%	42.80%	1.0078

FY 21 : As per 3rd Party Heat Rate Test on HSD Fuel

FY 23 : As per actual operating hours. Operating hours at end of FY23 : 71,836 hours

Note: Simple cycle output has been computed from combined cycle 3rd party test results, by removing ST



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - HSD Operations

Net Output Degradation Factor - CC (HSD)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
FY-21 (Test)	220.02	220.02	1.0000
FY-23 (end)	220.02	217.16	1.0132
+500	220.02	216.81	1.0148
+1000	220.02	216.49	1.0163
+1500	220.02	216.17	1.0178
+2000	220.02	215.86	1.0193
+2500	220.02	215.55	1.0207
+3000	220.02	215.24	1.0222
+3500	220.02	232.93	0.9446
+4000	220.02	230.69	0.9537
+4500	220.02	228.49	0.9629
+5000	220.02	226.33	0.9721
+5500	220.02	224.22	0.9813
+6000	220.02	222.95	0.9868
+6500	220.02	222.10	0.9906
+7000	220.02	221.25	0.9944
+7500	220.02	220.42	0.9982
+8000	220.02	219.58	1.0020
+8500	220.02	219.03	1.0045
+9000	220.02	218.62	1.0064
+9500	220.02	218.21	1.0083
+10000	220.02	217.80	1.0102
+10500	220.02	217.39	1.0121
+11000	220.02	217.03	1.0138
+11500	220.02	216.70	1.0153
+12000	220.02	216.37	1.0169
+12500	220.02	216.03	1.0184
+13000	220.02	215.70	1.0200
+13500	220.02	215.35	1.0217
+14000	220.02	214.98	1.0234
+14500	220.02	214.62	1.0251
+15000	220.02	214.26	1.0269
+15500	220.02	213.90	1.0286
+16000	220.02	231.47	0.9505
+16500	220.02	229.30	0.9595
+17000	220.02	227.17	0.9685
+17500	220.02	225.08	0.9775
+18000	220.02	223.03	0.9865
+18500	220.02	221.84	0.9918
+19000	220.02	221.07	0.9953
+19500	220.02	220.29	0.9987
+20000	220.02	219.53	1.0022
+20500	220.02	218.77	1.0057
+21000	220.02	218.25	1.0081
+21500	220.02	217.84	1.0100
+22000	220.02	217.43	1.0119

Net Output Degradation Factor - OC (HSD)		
Calculated Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
174.38	174.38	1.0000
174.38	171.77	1.0151
174.38	171.46	1.0170
174.38	171.16	1.0188
174.38	170.88	1.0205
174.38	170.59	1.0222
174.38	170.31	1.0239
174.38	170.03	1.0256
174.38	186.49	0.9350
174.38	184.40	0.9456
174.38	182.36	0.9562
174.38	180.36	0.9668
174.38	178.40	0.9774
174.38	177.23	0.9839
174.38	176.43	0.9883
174.38	175.64	0.9928
174.38	174.86	0.9972
174.38	174.09	1.0017
174.38	173.57	1.0046
174.38	173.19	1.0069
174.38	172.80	1.0091
174.38	172.42	1.0113
174.38	172.04	1.0136
174.38	171.70	1.0156
174.38	171.39	1.0174
174.38	171.08	1.0192
174.38	170.78	1.0211
174.38	170.47	1.0229
174.38	170.14	1.0249
174.38	169.80	1.0270
174.38	169.46	1.0290
174.38	169.12	1.0311
174.38	168.78	1.0331
174.38	185.10	0.9421
174.38	183.09	0.9524
174.38	181.11	0.9628
174.38	179.19	0.9732
174.38	177.30	0.9835
174.38	176.19	0.9897
174.38	175.47	0.9938
174.38	174.75	0.9979
174.38	174.03	1.0020
174.38	173.32	1.0061
174.38	172.83	1.0089
174.38	172.45	1.0112
174.38	172.07	1.0134



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - HSD Operations

Net Output Degradation Factor - CC (HSD)				Net Output Degradation Factor - OC (HSD)		
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor	Calculated Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
+22500	220.02	217.03	1.0138	174.38	171.69	1.0156
+23000	220.02	216.63	1.0157	174.38	171.31	1.0179
+23500	220.02	216.27	1.0173	174.38	170.97	1.0199
+24000	220.02	215.93	1.0189	174.38	170.66	1.0218
+24500	220.02	215.60	1.0205	174.38	170.35	1.0236
+25000	220.02	215.27	1.0221	174.38	170.03	1.0255
+25500	220.02	214.94	1.0236	174.38	169.72	1.0274
+26000	220.02	214.54	1.0255	174.38	169.35	1.0297
+26500	220.02	214.11	1.0276	174.38	168.96	1.0321
+27000	220.02	213.69	1.0296	174.38	168.56	1.0345
+27500	220.02	213.26	1.0317	174.38	168.17	1.0369
+28000	220.02	212.84	1.0337	174.38	167.78	1.0393
+28500	220.02	242.65	0.9067	174.38	196.53	0.8873
+29000	220.02	239.86	0.9173	174.38	193.78	0.8999
+29500	220.02	237.14	0.9278	174.38	191.10	0.9125
+30000	220.02	234.47	0.9384	174.38	188.50	0.9251
+30500	220.02	231.87	0.9489	174.38	185.96	0.9377
+31000	220.02	229.96	0.9568	174.38	184.13	0.9470
+31500	220.02	228.38	0.9634	174.38	182.64	0.9547
+32000	220.02	226.83	0.9700	174.38	181.18	0.9624
+32500	220.02	225.30	0.9766	174.38	179.74	0.9702
+33000	220.02	223.79	0.9831	174.38	178.32	0.9779
+33500	220.02	222.84	0.9873	174.38	177.43	0.9828
+34000	220.02	222.16	0.9903	174.38	176.80	0.9863
+34500	220.02	221.49	0.9934	174.38	176.17	0.9898
+35000	220.02	220.82	0.9964	174.38	175.54	0.9933
+35500	220.02	220.15	0.9994	174.38	174.92	0.9969
+36000	220.02	219.67	1.0016	174.38	174.48	0.9994
+36500	220.02	219.28	1.0034	174.38	174.11	1.0015
+37000	220.02	218.89	1.0052	174.38	173.74	1.0036
+37500	220.02	218.50	1.0070	174.38	173.38	1.0057
+38000	220.02	218.11	1.0088	174.38	173.02	1.0078
+38500	220.02	217.78	1.0103	174.38	172.70	1.0097
+39000	220.02	217.48	1.0117	174.38	172.40	1.0114
+39500	220.02	217.19	1.0130	174.38	172.11	1.0132
+40000	220.02	216.89	1.0144	174.38	171.81	1.0149
+40500	220.02	216.60	1.0158	174.38	171.52	1.0166
+41000	220.02	235.00	0.9363	174.38	188.74	0.9239
+41500	220.02	232.80	0.9451	174.38	186.64	0.9343
+42000	220.02	230.65	0.9539	174.38	184.58	0.9447
+42500	220.02	228.53	0.9628	174.38	182.57	0.9551
+43000	220.02	226.45	0.9716	174.38	180.60	0.9655
+43500	220.02	225.08	0.9775	174.38	179.30	0.9725
+44000	220.02	224.05	0.9820	174.38	178.32	0.9779
+44500	220.02	223.03	0.9865	174.38	177.35	0.9832
+45000	220.02	222.02	0.9910	174.38	176.39	0.9886
+45500	220.02	221.02	0.9955	174.38	175.44	0.9940



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - HSD Operations

Net Output Degradation Factor - CC (HSD)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
+46000	220.02	220.39	0.9983
+46500	220.02	219.94	1.0003
+47000	220.02	219.50	1.0024
+47500	220.02	219.05	1.0044
+48000	220.02	218.61	1.0064
+48500	220.02	218.22	1.0082
+49000	220.02	217.87	1.0099
+49500	220.02	217.51	1.0115
+50000	220.02	217.16	1.0132
+50500	220.02	216.81	1.0148
+51000	220.02	216.48	1.0164
+51500	220.02	216.16	1.0179
+52000	220.02	215.84	1.0194
+52500	220.02	215.52	1.0209
+53000	220.02	215.21	1.0224
+53500	220.02	232.89	0.9447
+54000	220.02	230.64	0.9539
+54500	220.02	228.44	0.9631
+55000	220.02	226.28	0.9723
+55500	220.02	224.15	0.9815
+56000	220.02	222.89	0.9871
+56500	220.02	222.03	0.9909
+57000	220.02	221.18	0.9948
+57500	220.02	220.33	0.9986
+58000	220.02	219.49	1.0024
+58500	220.02	218.94	1.0049
+59000	220.02	218.53	1.0068
+59500	220.02	218.12	1.0087
+60000	220.02	217.71	1.0106
+60500	220.02	217.30	1.0125
+61000	220.02	216.94	1.0142
+61500	220.02	216.60	1.0158
+62000	220.02	216.27	1.0174
+62500	220.02	215.93	1.0189
+63000	220.02	215.60	1.0205
+63500	220.02	215.24	1.0222
+64000	220.02	214.88	1.0239
+64500	220.02	214.52	1.0256
+65000	220.02	214.16	1.0274
+65500	220.02	213.79	1.0291
+66000	220.02	231.34	0.9510
+66500	220.02	229.18	0.9600
+67000	220.02	227.05	0.9690
+67500	220.02	224.96	0.9780
+68000	220.02	222.92	0.9870
+68500	220.02	221.73	0.9923
+69000	220.02	220.95	0.9958

Net Output Degradation Factor - OC (HSD)		
Calculated Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
174.38	174.83	0.9974
174.38	174.39	0.9999
174.38	173.95	1.0024
174.38	173.51	1.0050
174.38	173.08	1.0075
174.38	172.72	1.0096
174.38	172.41	1.0114
174.38	172.09	1.0133
174.38	171.77	1.0151
174.38	171.46	1.0170
174.38	171.16	1.0188
174.38	170.88	1.0205
174.38	170.59	1.0222
174.38	170.31	1.0239
174.38	170.03	1.0256
174.38	186.49	0.9350
174.38	184.40	0.9456
174.38	182.36	0.9562
174.38	180.36	0.9668
174.38	178.40	0.9774
174.38	177.23	0.9839
174.38	176.43	0.9883
174.38	175.64	0.9928
174.38	174.86	0.9972
174.38	174.09	1.0017
174.38	173.57	1.0046
174.38	173.19	1.0069
174.38	172.80	1.0091
174.38	172.42	1.0113
174.38	172.04	1.0136
174.38	171.70	1.0156
174.38	171.39	1.0174
174.38	171.08	1.0192
174.38	170.78	1.0211
174.38	170.47	1.0229
174.38	170.14	1.0249
174.38	169.80	1.0270
174.38	169.46	1.0290
174.38	169.12	1.0311
174.38	168.78	1.0331
174.38	185.10	0.9421
174.38	183.09	0.9524
174.38	181.11	0.9628
174.38	179.19	0.9732
174.38	177.30	0.9835
174.38	176.19	0.9897
174.38	175.47	0.9938



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - HSD Operations

Net Output Degradation Factor - CC (HSD)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
+69500	220.02	220.18	0.9993
+70000	220.02	219.41	1.0028
+70500	220.02	218.65	1.0062
+71000	220.02	218.13	1.0086
+71500	220.02	217.72	1.0105
+72000	220.02	217.32	1.0124
+72500	220.02	216.91	1.0143
+73000	220.02	216.51	1.0162
+73500	220.02	216.15	1.0179
+74000	220.02	215.82	1.0195
+74500	220.02	215.48	1.0210
+75000	220.02	215.15	1.0226
+75500	220.02	214.82	1.0242
+76000	220.02	214.42	1.0261
+76500	220.02	213.99	1.0281
+77000	220.02	213.57	1.0302
+77500	220.02	213.14	1.0323
+78000	220.02	212.72	1.0343
+78500	220.02	242.49	0.9073
+79000	220.02	239.71	0.9179
+79500	220.02	236.99	0.9284
+80000	220.02	234.32	0.9389
+80500	220.02	231.72	0.9495
+81000	220.02	229.81	0.9574
+81500	220.02	228.24	0.9640
+82000	220.02	226.69	0.9706
+82500	220.02	225.16	0.9772
+83000	220.02	223.65	0.9838
+83500	220.02	222.70	0.9880
+84000	220.02	222.02	0.9910
+84500	220.02	221.34	0.9940
+85000	220.02	220.67	0.9970
+85500	220.02	220.01	1.0001
+86000	220.02	219.52	1.0023
+86500	220.02	219.13	1.0041
+87000	220.02	218.73	1.0059
+87500	220.02	218.34	1.0077
+88000	220.02	217.95	1.0095
+88500	220.02	217.61	1.0111
+89000	220.02	217.29	1.0126
+89500	220.02	216.97	1.0140
+90000	220.02	216.66	1.0155
+90500	220.02	216.34	1.0170
+91000	220.02	234.67	0.9376
+91500	220.02	232.45	0.9465
+92000	220.02	230.28	0.9554
+92500	220.02	228.15	0.9644

Net Output Degradation Factor - OC (HSD)		
Calculated Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
174.38	174.75	0.9979
174.38	174.03	1.0020
174.38	173.32	1.0061
174.38	172.83	1.0089
174.38	172.45	1.0112
174.38	172.07	1.0134
174.38	171.69	1.0156
174.38	171.31	1.0179
174.38	170.97	1.0199
174.38	170.66	1.0218
174.38	170.35	1.0236
174.38	170.03	1.0255
174.38	169.72	1.0274
174.38	169.35	1.0297
174.38	168.96	1.0321
174.38	168.56	1.0345
174.38	168.17	1.0369
174.38	167.78	1.0393
174.38	196.53	0.8873
174.38	193.78	0.8999
174.38	191.10	0.9125
174.38	188.50	0.9251
174.38	185.96	0.9377
174.38	184.13	0.9470
174.38	182.64	0.9547
174.38	181.18	0.9624
174.38	179.74	0.9702
174.38	178.32	0.9779
174.38	177.43	0.9828
174.38	176.80	0.9863
174.38	176.17	0.9898
174.38	175.54	0.9933
174.38	174.92	0.9969
174.38	174.48	0.9994
174.38	174.11	1.0015
174.38	173.74	1.0036
174.38	173.38	1.0057
174.38	173.02	1.0078
174.38	172.70	1.0097
174.38	172.40	1.0114
174.38	172.11	1.0132
174.38	171.81	1.0149
174.38	171.52	1.0166
174.38	188.74	0.9239
174.38	186.64	0.9343
174.38	184.58	0.9447
174.38	182.57	0.9551



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - HSD Operations

Net Output Degradation Factor - CC (HSD)				Net Output Degradation Factor - OC (HSD)		
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor	Calculated Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
+93000	220.02	226.05	0.9733	174.38	180.60	0.9655
+93500	220.02	224.67	0.9793	174.38	179.30	0.9725
+94000	220.02	223.62	0.9839	174.38	178.32	0.9779
+94500	220.02	222.58	0.9885	174.38	177.35	0.9832
+95000	220.02	221.55	0.9931	174.38	176.39	0.9886
+95500	220.02	220.54	0.9977	174.38	175.44	0.9940
+96000	220.02	219.89	1.0006	174.38	174.83	0.9974
+96500	220.02	219.42	1.0027	174.38	174.39	0.9999
+97000	220.02	218.96	1.0048	174.38	173.95	1.0024
+97500	220.02	218.50	1.0070	174.38	173.51	1.0050
+98000	220.02	218.04	1.0091	174.38	173.08	1.0075
+98500	220.02	217.66	1.0108	174.38	172.72	1.0096
+99000	220.02	217.34	1.0123	174.38	172.41	1.0114
+99500	220.02	217.01	1.0139	174.38	172.09	1.0133
+100000	220.02	216.68	1.0154	174.38	171.77	1.0151
+100500	220.02	216.36	1.0169	174.38	171.46	1.0170
+101000	220.02	216.06	1.0183	174.38	171.16	1.0188
+101500	220.02	215.77	1.0197	174.38	170.88	1.0205
+102000	220.02	215.48	1.0211	174.38	170.59	1.0222
+102500	220.02	215.19	1.0225	174.38	170.31	1.0239
+103000	220.02	214.90	1.0238	174.38	170.03	1.0256
+103500	220.02	232.55	0.9461	174.38	186.49	0.9350
+104000	220.02	230.33	0.9552	174.38	184.40	0.9456
+104500	220.02	228.16	0.9643	174.38	182.36	0.9562
+105000	220.02	226.02	0.9734	174.38	180.36	0.9668
+105500	220.02	223.93	0.9825	174.38	178.40	0.9774
+106000	220.02	222.68	0.9880	174.38	177.23	0.9839
+106500	220.02	221.85	0.9917	174.38	176.43	0.9883
+107000	220.02	221.02	0.9955	174.38	175.64	0.9928
+107500	220.02	220.20	0.9992	174.38	174.86	0.9972
+108000	220.02	219.38	1.0029	174.38	174.09	1.0017
+108500	220.02	218.83	1.0054	174.38	173.57	1.0046
+109000	220.02	218.41	1.0074	174.38	173.19	1.0069
+109500	220.02	217.99	1.0093	174.38	172.80	1.0091
+110000	220.02	217.57	1.0112	174.38	172.42	1.0113
+110500	220.02	217.16	1.0132	174.38	172.04	1.0136
+111000	220.02	216.79	1.0149	174.38	171.70	1.0156
+111500	220.02	216.44	1.0165	174.38	171.39	1.0174
+112000	220.02	216.10	1.0181	174.38	171.08	1.0192
+112500	220.02	215.76	1.0197	174.38	170.78	1.0211
+113000	220.02	215.42	1.0213	174.38	170.47	1.0229
+113500	220.02	215.06	1.0230	174.38	170.14	1.0249
+114000	220.02	214.69	1.0248	174.38	169.80	1.0270
+114500	220.02	214.32	1.0266	174.38	169.46	1.0290
+115000	220.02	213.95	1.0283	174.38	169.12	1.0311
+115500	220.02	213.59	1.0301	174.38	168.78	1.0331
+116000	220.02	231.09	0.9521	174.38	185.10	0.9421



Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - HSD Operations

Net Output Degradation Factor - CC (HSD)			
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor
+116500	220.02	228.92	0.9611
+117000	220.02	226.79	0.9701
+117500	220.02	224.70	0.9792
+118000	220.02	222.65	0.9882
+118500	220.02	221.46	0.9935
+119000	220.02	220.68	0.9970
+119500	220.02	219.90	1.0005
+120000	220.02	219.14	1.0040
+120500	220.02	218.37	1.0075
+121000	220.02	217.85	1.0100
+121500	220.02	217.44	1.0119
+122000	220.02	217.02	1.0138
+122500	220.02	216.62	1.0157
+123000	220.02	216.21	1.0176
+123500	220.02	215.85	1.0193
+124000	220.02	215.52	1.0209
+124500	220.02	215.18	1.0225
+125000	220.02	214.85	1.0241
+125500	220.02	214.52	1.0256
+126000	220.02	214.12	1.0275
+126500	220.02	213.69	1.0296
+127000	220.02	213.27	1.0317
+127500	220.02	212.84	1.0337
+128000	220.02	212.42	1.0358
+128500	220.02	242.10	0.9088
+129000	220.02	239.33	0.9193
+129500	220.02	236.62	0.9298
+130000	220.02	233.97	0.9404
+130500	220.02	231.38	0.9509
+131000	220.02	229.47	0.9588
+131500	220.02	227.91	0.9654
+132000	220.02	226.36	0.9720
+132500	220.02	224.84	0.9786
+133000	220.02	223.34	0.9851
+133500	220.02	222.39	0.9893
+134000	220.02	221.72	0.9923
+134500	220.02	221.04	0.9954
+135000	220.02	220.38	0.9984
+135500	220.02	219.72	1.0014
+136000	220.02	219.23	1.0036
+136500	220.02	218.84	1.0054
+137000	220.02	218.45	1.0072
+137500	220.02	218.06	1.0090
+138000	220.02	217.68	1.0108
+138500	220.02	217.34	1.0123
+139000	220.02	217.02	1.0138
+139500	220.02	216.70	1.0153

Net Output Degradation Factor - OC (HSD)		
Calculated Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
174.38	183.09	0.9524
174.38	181.11	0.9628
174.38	179.19	0.9732
174.38	177.30	0.9835
174.38	176.19	0.9897
174.38	175.47	0.9938
174.38	174.75	0.9979
174.38	174.03	1.0020
174.38	173.32	1.0061
174.38	172.83	1.0089
174.38	172.45	1.0112
174.38	172.07	1.0134
174.38	171.69	1.0156
174.38	171.31	1.0179
174.38	170.97	1.0199
174.38	170.66	1.0218
174.38	170.35	1.0236
174.38	170.03	1.0255
174.38	169.72	1.0274
174.38	169.35	1.0297
174.38	168.96	1.0321
174.38	168.56	1.0345
174.38	168.17	1.0369
174.38	167.78	1.0393
174.38	196.53	0.8873
174.38	193.78	0.8999
174.38	191.10	0.9125
174.38	188.50	0.9251
174.38	185.96	0.9377
174.38	184.13	0.9470
174.38	182.64	0.9547
174.38	181.18	0.9624
174.38	179.74	0.9702
174.38	178.32	0.9779
174.38	177.43	0.9828
174.38	176.80	0.9863
174.38	176.17	0.9898
174.38	175.54	0.9933
174.38	174.92	0.9969
174.38	174.48	0.9994
174.38	174.11	1.0015
174.38	173.74	1.0036
174.38	173.38	1.0057
174.38	173.02	1.0078
174.38	172.70	1.0097
174.38	172.40	1.0114
174.38	172.11	1.0132



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Korangi Combined Cycle Power Plant (KCCPP)
Power Output Degradation Table - HSD Operations

Net Output Degradation Factor - CC (HSD)				Net Output Degradation Factor - OC (HSD)		
Interval	Tested Combined Cycle Output (MW)	Revised Combined Cycle Output (MW)	Correction Factor	Calculated Simple Cycle Output (MW)	Revised Simple Cycle Output (MW)	Correction Factor
+140000	220.02	216.39	1.0168	174.38	171.81	1.0149

FY 21 : As per 3rd Party Heat Rate Test on HSD Fuel

FY 23 : As per actual operating hours. Operating hours at end of FY23 : 71,836 hours

Note: Simple cycle output has been computed from combined cycle 3rd party test results, by removing ST

